

Eurasian Studies in Business and Economics 10/2  
*Series Editors:* Mehmet Huseyin Bilgin · Hakan Danis

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# Eurasian Economic Perspectives

Proceedings of the 22nd Eurasia Business  
and Economics Society Conference



 Springer

# **Eurasian Studies in Business and Economics 10/2**

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Editors

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Proceedings of the 22nd Eurasia Business  
and Economics Society Conference

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# Preface

This is the second volume (Eurasian Economic Perspectives) of the tenth issue of the Springer's series *Eurasian Studies in Business and Economics*, which is the official book series of the **Eurasia Business and Economics Society** (EBES, [www.ebesweb.org](http://www.ebesweb.org)). This issue includes selected papers in the field of economics presented at the 22nd EBES Conference that was held on **May 24–26, 2017** at the **Faculty of Economics of Sapienza University of Rome** in Rome, Italy, with the support of Istanbul Economic Research Association. Jonathan Batten, Giuseppe Ciccarone, Giovanni Dosi, Klaus F. Zimmermann, and Marco Vivarelli joined the conference as the keynote speakers. All accepted papers for the issue went through peer-review process and benefited from the comments made during the conference as well. In 2015, EBES Executive Board decided to honor academicians for their lifetime contributions to their fields once a year. The EBES Fellows Award is given to acknowledge a lifetime of contributions to the corresponding academic field. Contributions may be theoretical, empirical, or methodological. The recipients for the EBES Fellow Award are determined by the EBES Executive Board and the Award is given every year at the EBES Conference in May. EBES Executive Board selected **Giovanni Dosi** as the EBES Fellow Award 2017 recipient for his outstanding contribution to the fields of the economics of innovation and technological change and evolutionary theory.

During the conference, participants had many productive discussions and exchanges that contributed to the success of the conference where 265 papers by 435 colleagues from 59 countries were presented. In addition to publication opportunities in EBES journals (*Eurasian Business Review* and *Eurasian Economic Review*, which are also published by Springer), conference participants were given opportunity to submit their full papers for this Issue.

Theoretical and empirical papers in the series cover diverse areas of business, economics, and finance from many different countries, providing a valuable oppor-

tunity to researchers, professionals, and students to catch up with the most recent studies in a diverse set of fields across many countries and regions.

The aim of the EBES conferences is to bring together scientists from business, finance, and economics fields, attract original research papers, and provide them publication opportunities. Each issue of the Eurasian Studies in Business and Economics covers a wide variety of topics from business and economics and provides empirical results from many different countries and regions that are less investigated in the existing literature. The current issue (Eurasian Economic Perspectives) covers fields such as:

1. Economics of innovation
2. Regional studies
3. Empirical studies on emerging markets

Although the papers in this issue may provide empirical results for a specific country or regions, we believe that the readers would have an opportunity to catch up with the most recent studies in a diverse set of fields across many countries and regions and empirical support for the existing literature. In addition, the findings from these papers could be valid for similar economies or regions.

On behalf of the Series Editors, Volume Editors, and EBES officers, I would like to thank all presenters, participants, board members, and the keynote speakers, and we are looking forward to seeing you at the upcoming EBES conferences.

Istanbul, Turkey

Ender Demir

# Eurasia Business and Economics Society (EBES)

*EBES* is a scholarly association for scholars involved in the practice and study of economics, finance, and business worldwide. EBES was founded in 2008 with the purpose of not only promoting academic research in the field of business and economics but also encouraging the intellectual development of scholars. In spite of the term “Eurasia,” the scope should be understood in its broadest terms as having a global emphasis.

EBES aims to bring worldwide researchers and professionals together through organizing conferences and publishing academic journals and increase economics, finance, and business knowledge through academic discussions. To reach its goal, EBES benefits from its executive and advisory boards which consist of well-known academicians from all around the world. Every year, with the inclusion of new members, our executive and advisory boards became more diverse and influential. I would like to thank them for their support.

EBES conferences and journals are open to all economics, finance, and business scholars and professionals around the world. Any scholar or professional interested in economics, finance, and business is welcome to attend EBES conferences. Since 2012, EBES has been organizing three conferences every year. Since our first conference, around 9132 colleagues from 92 different countries have joined our conferences and 5240 academic papers have been presented. Also, in a very short period of time, *EBES has reached 1713 members from 84 countries.*

Since 2011, EBES has been publishing two academic journals. One of those journals, *Eurasian Business Review—EABR*, is in the fields of industry and business, and the other one, *Eurasian Economic Review—EAER*, is in the fields of economics and finance. Both journals are published thrice a year, and we are committed to having both journals included in SSCI as soon as possible. Both journals have been published by *Springer* since 2014 and are currently indexed in *Scopus*, the *Emerging Sources Citation Index* (Thomson Reuters), *EconLit*, *Google Scholar*, *EBSCO*, *ProQuest*, *ABI/INFORM*, *Business Source*, *International Bibliography of the Social Sciences (IBSS)*, *OCLC*, *Research Papers in Economics (RePEc)*, *Summon by ProQuest*, and *TOC Premier*.



Furthermore, since 2014 Springer has started to publish a new conference proceedings series (*Eurasian Studies in Business and Economics*) which includes selected papers from the EBES conferences. Also, the 10th, 11th, 12th, 13th, 14th, 15th, and 17th EBES Conference Proceedings have already been accepted for inclusion in the Thomson Reuters' *Conference Proceedings Citation Index*. The 16th, 18th, and subsequent conference proceedings are in progress.

On behalf of the EBES officers, I sincerely thank you for your participation and look forward to seeing you at our future conferences. In order to improve our future conferences, we welcome your comments and suggestions. Our success is only possible with your valuable feedback and support.

With my very best wishes,

Jonathan Batten, PhD  
President

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**Part I**  
**Economics of Innovation**

# Two Types of Innovation and Their Economic Impacts: A General Equilibrium Simulation



Toshitaka Fukiharu

**Abstract** In the traditional two-sector growth model, we show that the real wage rate and the rate of profit converge to positive values when the “constant returns to scale” is assumed. When the “decreasing returns to scale” is assumed, however, the real wage rate converges to zero. Thus, we examine how the trajectories are modified by the creation of a third sector, under the “decreasing returns to scale”. First, we examine the downstream innovation: i.e. the third sector produces a new luxury. This innovation is temporarily effective since it raises the average rate of profit, while the rate converges to the same positive value as in the basic model. Next, we introduce the third sector which produces a new energy: the upstream innovation. This innovation is temporarily effective in raising the real wage rate and the rate of profit so long as it takes place in the early stage. These rates, however, converge to zero. Although the effect on the rate of profit in the downstream innovation is greater than the upstream innovation, it is because the total investment in the latter is greater than the former. Thus, we conclude that the upstream innovation has stronger economic impact.

**Keywords** Innovation · General equilibrium · Simulation · Capital accumulation · Real wage · Rate of profit

## 1 Introduction

Fukiharu (2013, 2018) examined the innovation and globalism from the viewpoint of income distribution, where “innovation” was defined as the creation of new consumption good and “globalism” as the established world trade, following the present-day usage. This usage is somewhat different from Schumpeter 1911 [1955], which is regarded as the first contribution on innovation. Five types of innovation [neue Kombination] are classified as follows in Schumpeter (1955, p. 66):

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1. The introduction of a new good.
2. The introduction of a new method of production.
3. The opening of a new market.
4. The conquest of a new source of supply of raw materials or half-manufactured goods.
5. The carrying out of the new organization of any industry, like the creation of a monopoly position or the breaking up of a monopoly position.

According to this classification, “innovation” in Fukiharu (2013, 2018) corresponds with Type 1 innovation, while “globalism” corresponds with Type 3 innovation. In this paper, Type 1 and 4 innovations are called the “downstream” and “upstream” innovations, respectively, and their economic impacts are compared. This examination may be important when we consider the history after the financial crisis of 2007–2008. This crisis was regarded in those days as the resurgence of the financial crisis of 1930. As the history reveals, after the crisis, the world economy recovered strongly and the depression of the 1930s did not re-emerge. In this decade, on the one hand, new consumption goods stemming from informational technology have been invented: i.e. downstream innovation. On the other hand, new energy sources, shale oil and gas, have been exerting strong lowering pressure on the energy price: i.e. upstream innovation. Admitting that both types of innovation have exerted a strong effect on the recovery from the financial crisis of 2007–2008, there remains a curiosity in knowing which type has stronger effect than the other. Constructing two-, and three-sector economic models, this paper attempts to answer this curiosity from a purely theoretical viewpoint.

The present paper begins with the construction of a discrete version of Uzawa (1961)’s neo-classical two-sector growth model, originally formulated in a continuous version. With this discrete version of our basic model, we focus our attention on the variations of the real wage and the rate of profit on the process of capital accumulation. We proceed to an examination of the comparison of the economic impact of the two types of innovation, by introducing a third sector into the basic two-sector model. Incidentally, this modification of focus allows us to shed some light on the comparison between the classical and neo-classical growth models.

Formally, in Sect. 2, we compare the “constant returns to scale” case and the “decreasing returns to scale” case of the basic two-sector model. In Sect. 3, we introduce a third sector into the basic model, producing a new consumption good. The modification of the variations of the real wage and the rate of profit is examined on this three-sector growth model. In Sect. 4, we introduce a third sector into the basic model, producing a new energy source. The modification of the variations of the real wage and the rate of profit is examined on this three-sector growth model. In this way, we attempt to derive a conclusion on the examination of which type has a stronger economic effect than the other. In the Appendix, we apply this approach to the classical capital accumulation model.

## 2 Basic Two-Sector Growth Model

The present paper begins with the construction of a basic two-sector model of capital accumulation, similar to Uzawa (1961). The main difference between this paper and Uzawa (1961) is the treatment of fixed capital. Formulating the two-sector growth model in terms of continuous version, Uzawa (1961) assumed that the decision of installment of fixed capital is decided within each period,  $t$ , in exactly the same way as labor input. In the present paper, the fixed capital is installed at the end of previous period,  $t - 1$ , and cannot be modified during the present period,  $t$ . It can only be modified at the end of the present period,  $t$ , which cannot be modified during the succeeding period,  $t + 1$ . In other words, our model is rather similar to Arrow and Hahn (1971). In order to make this point clear the basic model is formulated in a discrete version. On this basic model, we first examine the variation of real wage and the rate of profit on the capital accumulation, while Uzawa (1961) focused its attention solely on the stability of the growth process: e.g. the stability of the trajectories of per capita outputs. Following Uzawa (1961), we start with an examination for the case of “constant returns to scale” of the two sectors’ production functions.

### 2.1 “Constant Returns to Scale” Case

In the basic two sector model, first, we assume that the production functions:  $y_1 = f_1[N_1, C_1]$  for the first sector, producing a consumption good,  $y_1$ , a necessity,  $y_2 = f_2[N_2, C_2]$  for the second sector, producing (fixed) capital good  $y_2$ ; are of Cobb-Douglas type as in the following, where  $N_i$  is the labor input, and  $C_i$  is the capital input in the  $i$ -th sector ( $i = 1, 2$ ).

$$f_1[N_1, C_1] = N_1^{a_1} C_1^{b_1} \quad (1)$$

$$f_2[N_2, C_2] = N_2^{a_2} C_2^{b_2} \quad (2)$$

$$a_1 = \frac{1}{2}, b_1 = \frac{1}{2}, a_2 = \frac{1}{2}, b_2 = 1/2 \quad (3)$$

In Eq. (3), we make the assumption of “constant factor intensity”. In the beginning of the  $t$ -th period, the capital inputs  $C_1(t - 1)$  and  $C_2(t - 1)$  are already installed and cannot be modified in this period. In the  $t$ -th period, investment of capital good in the  $i$ -th sector,  $M_i(t)$  is decided and added to  $C_i(t - 1)$  ( $i = 1, 2$ ), and  $C_1(t) = C_1(t - 1)(1 - g_1) + M_1(t)$  and  $C_2(t) = C_2(t - 1)(1 - g_1) + M_2(t)$  are installed, where  $g_1$  is the rate of capital depreciation. In the beginning of the  $(t + 1)$ -th period, the capital inputs  $C_1(t)$  and  $C_2(t)$  are given and cannot be modified in this period. In the  $(t + 1)$ -th period, investment of capital good in the  $i$ -th sector,  $M_i(t + 1)$  is decided and added to  $C_i(t)$  ( $i = 1, 2$ ), and  $C_1(t + 1) = C_1(t)(1 - g_1) + M_1(t + 1)$  and

$C_2(t + 1) = C_2(t)(1 - g_1) + M_2(t + 1)$  are determined. The capital accumulation proceeds in this way ( $t = 2, 3 \dots$ ).

In what follows, we explain how the investment of capital good is decided. Suppose that the initial endowment of fixed capital at the first period are given as  $C_1(1) = 100$  and  $C_2(1) = 200$ , as well as the one of labor,  $N(1) = 100$ . Given these data, we must determine  $C_1(2)$  and  $C_2(2)$ . Each sector demands labor,  $N_i^D(2)$  ( $i = 1, 2$ ) by profit maximization, given  $C_i(1)$ :

$$\text{Max } \pi_i \equiv p_i f_i[N_i, C_i(1)] - wN_i \quad (i = 1, 2)$$

where  $p_i$  is the price of the output of the  $i$ -th sector and  $w$  is the wage rate. Profit accruing to the  $i$ -th sector is

$$\pi_i^0 \equiv p_i f_i[N_i(2), C_i(1)] - wN_i(2) \quad (i = 1, 2)$$

This profit is used for the capital accumulation, so that the demand for the capital good of the  $i$ -th sector,  $M_i^D(2)$ , is given by

$$M_i^D(2) = \frac{\pi_i^0}{p_2} \quad (i = 1, 2)$$

It is also assumed that workers use all of their labor income,  $wN(1)$ , for the consumption of the first good. Market equilibrium conditions are stipulated as in what follows.

$$N_1^D(2) + N_2^D(2) = N(1) \quad (4)$$

$$M_1^D(2) + M_2^D(2) = f_2[N_2^D(2), C_2(1)] \quad (5)$$

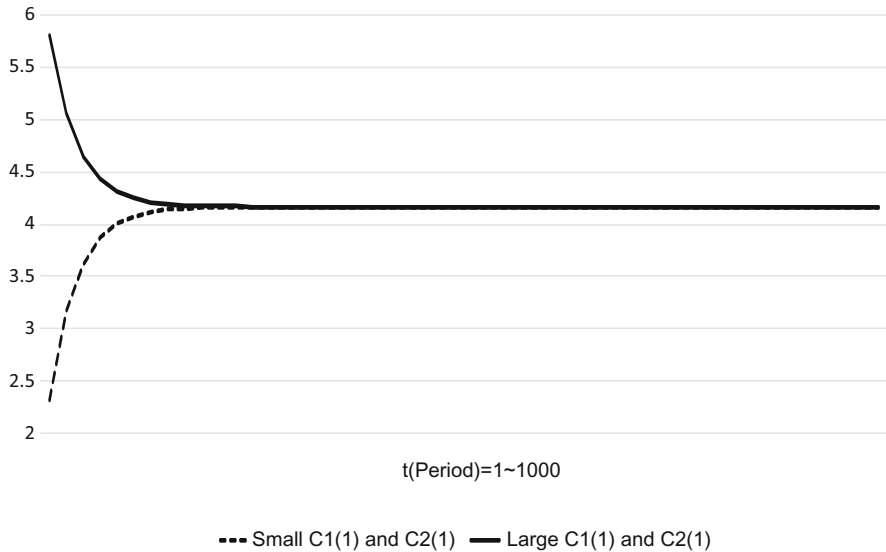
$$\frac{wN(1)}{p_1} = f_1[N_1^D(2), C_1(1)] \quad (6)$$

From these equilibrium conditions, we can determine  $p_1^*(2)$  and  $p_2^*(2)$ , given  $w = 1$ . These equilibrium prices determine equilibrium investment:  $M_1^*(2)$  and  $M_2^*(2)$ . Thus, we have

$$C_i(2) = C_i(1)(1 - g_1) + M_i^*(2) \quad (i = 1, 2)$$

It is assumed that  $N(2) = (1 + g_0)N(1)$ , where  $g_0 = 0.01$ . Now, given  $C_1(2)$  and  $C_2(2)$ , and  $N(2)$ , we must determine  $C_1(3)$  and  $C_2(3)$  following the above procedure. This process is continued.

It is easy to show that  $p_1^*(2)$  and  $p_2^*(2)$  can be solved analytically (without numerical specification) given  $C_1(t - 1)$  and  $C_2(t - 1)$ , and  $N(t - 1)$ .



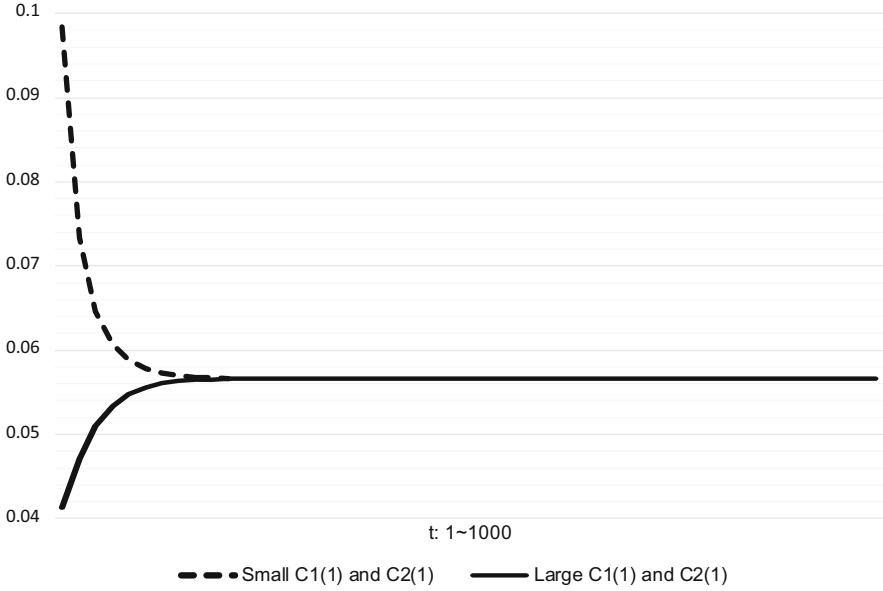
**Fig. 1** Trajectory of  $w/p_1^*(t)$  under constant returns to scale for the neo-classical discrete version under the Eq. (3). Source: Fukiharu (2017a)

$$p_1^*(t) = a_1^{-a_1} C_1(t-1)^{-b_1} N(t-1)^{-a_1}$$

$$p_2^*(t) = (1-a_1)^{1-a_2} a_2^{-1} C_2(t-1)^{-b_2} N(t-1)^{1-a_2}$$

The trajectory of the real wage:  $w/p_1^*(t)$ , is shown as the dashed curve in Fig. 1, rising continuously, converging to 4.16667 finally. In Fig. 1, the dashed curve is derived for  $C_1(1) = 100$ ,  $C_2(1) = 200$ , and,  $N(1) = 100$ . When the endowment of fixed capital is relatively large:  $C_1(1) = 10,000$ ,  $C_2(1) = 10,000$ , and,  $N(1) = 100$ , we have the solid curve, declining continuously, converging to  $w_c = 4.16667$ . On this dynamic process, the rates of profit of two sectors:  $\pi_i^0 / (p_2^*(t)C_i(t) + wN_i^D(t))$  converge to  $r_c = 0.0566038$ , while declining in the beginning, as the dashed curve in Fig. 2. In Fig. 2, when the endowment of fixed capital is relatively large:  $C_1(1) = 10,000$ ,  $C_2(1) = 10,000$ , and,  $N(1) = 100$ , we have the solid curve, rising continuously, converging to  $r_c = 0.0566038$ . Thus, independently of the initial endowments, the real wage converges to  $w_c = 4.16667$ , while the rate of profit converges to  $r_c = 0.0566038$ . There appears to be no serious problem to worry about when the assumption of constant returns to scale is guaranteed.

**Remark 1** This conclusion is independent of the Eq. (3): “constant factor intensity”. When the consumption good is *capital intensive*:



**Fig. 2** Trajectory of  $\pi_i^0/(p_2^*(t)C_i(t) + wN_i^D(t))$  under constant returns to scale for the neo-classical discrete version under the Eq. (3). Source: Fukiharu (2017a)

$$a_1 = \frac{2}{3}, b_1 = \frac{1}{3}, a_2 = \frac{1}{3}, b_2 = \frac{2}{3} \quad (7)$$

the real wage converges to 4.66637, while the rate of profit for the sector 1 converges to 0.0535714285714286 and the one for the sector 2 converges to 0.0582524 (Fukiharu 2017b). When the consumption good is *labor intensive*:

$$a_1 = \frac{1}{3}, b_1 = \frac{2}{3}, a_2 = \frac{2}{3}, b_2 = \frac{1}{3} \quad (8)$$

the real wage converges to 4.66637, while the rate of profit for the sector 1 converges to 0.0582524 and the one for the sector 2 converges to 0.0535714 (Fukiharu 2017c).

**Remark 2** The main concern in (Uzawa 1961) is the stability of the *per capita* variables on the continuous dynamic system. In our discrete dynamic system, we have the following result when  $C_1(1) = 100$ ,  $C_2(1) = 200$ , and  $N(1) = 100$ .

1. Under Eq. (3),  $y_1(t)/N_1^D(t)$ : *per capita* output of consumption good; converges to 8.33333 and  $C_1(t)/N_1^D(t)$ : *per capita* fixed capital; converges to 69.4444 (Fukiharu 2017a).
2. Under Eq. (7),  $y_1(t)/N_1^D(t)$  converges to 6.99956138830484 and  $C_1(t)/N_1^D(t)$  converges to 342.9355281207124 (Fukiharu 2017b). Finally,
3. Under Eq. (8),  $y_1(t)/N_1^D(t)$  converges to 13.9991 and  $C_1(t)/N_1^D(t)$  converges to 52.3783 (Fukiharu 2017c).

## 2.2 “Decreasing Returns to Scale” Case

In the previous subsection, it was concluded that there appears to be no serious problem to worry about when the assumption of constant returns to scale is guaranteed. We proceed to the “decreasing returns to scale” case with “constant factor intensity”:

$$a_1 = \frac{1}{2}, b_1 = \frac{1}{3}, a_2 = \frac{1}{2}, b_2 = \frac{1}{3} \quad (9)$$

Since  $M_1^D(t)$  and  $M_2^D(t)$  can be derived analytically (without numerical specification of parameters), the simulation on this case is nothing but the repetition of the previous section’s program with different specification of parameters.

When  $C_1(1) = 100$ ,  $C_2(1) = 200$ , and  $N(1) = 100$ , the simulation result under Eq. (9) is shown as the dashed curve in Fig. 3: i.e. the trajectory of real wage first rises and after reaching the peak (0.473996) it begins to decline, continuously declining to zero. When the initial endowments of fixed capital are relatively large:  $C_1(1) = 10,000$ ,  $C_2(1) = 10,000$ , and  $N(1) = 100$ , simulation result under Eq. (9) is shown as the solid curve in Fig. 3: i.e. the trajectory of real wage monotonously declines to zero. These simulation results reveals that under “decreasing returns to scale”, at least after some period, the real wage declines monotonously, converging to zero. This simulation result is a serious problem to worry about.

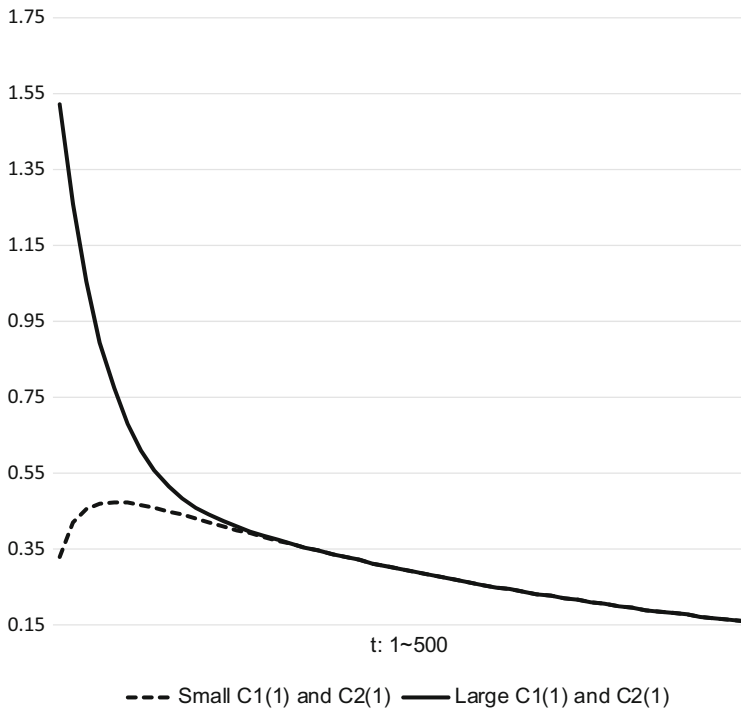
We proceed to the analysis of the variation of the rate of profit on the capital accumulation process under “decreasing returns to scale”. When  $C_1(1) = 100$ ,  $C_2(1) = 200$ , and  $N(1) = 100$ , the simulation result under Eq. (9) is shown as the dashed curve in Fig. 4: i.e. the trajectory of the rate of profit declines continuously, converging to a positive value:  $r_d = 0.0543651739063128$ . When the initial endowments of fixed capital are relatively large:  $C_1(1) = 10,000$ ,  $C_2(1) = 10,000$ , and  $N(1) = 100$ , the simulation result under Eq. (9) is shown as the solid curve in Fig. 4: i.e. the trajectory of the rate of profit continuously rises, converging to the same positive value:  $r_d = 0.0543651739063128$ . These simulation results reveals that, under “decreasing returns to scale”, the rate of profit converges to a positive value: i.e. there is no serious problem to worry about.

**Remark 3** We may say that this conclusion is rather robust. It is confirmed in Fukiharu (2017b, c) that we have essentially the same figures as Figs. 3 and 4 under assumptions similar to Eqs. (7) and (8): e.g.

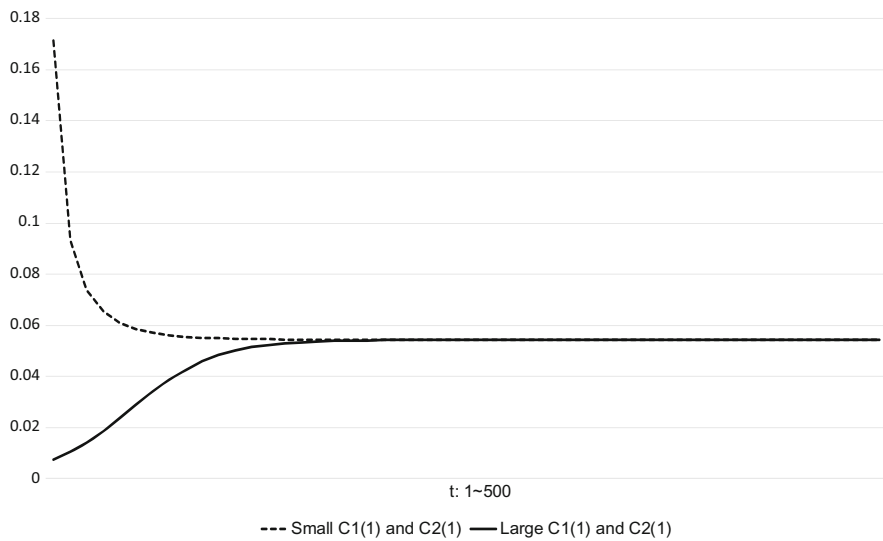
$$a_1 = \frac{1}{2}, b_1 = \frac{1}{3}, a_2 = \frac{1}{3}, b_2 = \frac{1}{2} \quad (10)$$

$$a_1 = \frac{1}{3}, b_1 = \frac{1}{2}, a_2 = \frac{1}{2}, b_2 = \frac{1}{3} \quad (11)$$





**Fig. 3** Trajectory of  $w/p_1^*(t)$  under decreasing returns to scale for the neo-classical discrete version. Source: Fukiharu (2017a)



**Fig. 4** Trajectory of the rate of profit under decreasing returns to scale for the neo-classical discrete version. Source: Fukiharu (2017a)

### 3 Downstream (Type 1) Innovation Under Decreasing Returns to Scale

As shown in the previous subsection, under the “decreasing returns to scale” case, the real wage rate converges to zero, independently of the endowment of fixed capital. The difference of endowment influences only the period at which the declining of the real wage begins. In other words, when the endowment of fixed capital is large, the real wages declines monotonously from the first period. Meanwhile, when the endowment is small, the wage rate rises in the beginning. Unfortunately, it starts declining from the 100th period after reaching a peak before the 100th period. In this section, we examine the consequence of “downstream (or Type 1) innovation” under the “decreasing returns to scale” case with small endowment of fixed capital:  $C_1(1) = 100$  and  $C_2(1) = 200$ , in which a new commodity, a luxury good, is invented after the peak (at  $t = 200$ ), or before the peak ( $t = 20$ ). Note that Schumpeter (1955, p. 66) defined five types of innovation (new combination). The first type is the introduction of a new commodity—that is one with which consumers are not yet familiar—or of a new quality of a good. This first type of innovation is defined as “downstream innovation” in this paper. Since there are two consumption goods now, the workers are supposed to maximize utility under income constraint in this section. The production function of this third commodity,  $y_3 = f_3[N_3, C_3]$ , is assumed to be of the following CES type under “decreasing returns to scale”, where  $y_3$  is quantity of consumption good, a luxury,  $N_3$  is labor input and  $C_3$ , is fixed capital.

$$y_3 \equiv f_3[N_3, C_3] = N_3^{\frac{1}{2}} + C_3^{\frac{1}{2}}$$

#### 3.1 Downstream Innovation Takes Place After the Peak: At $t = 200$

We start with the examination of the case in which the innovation takes place after the peak, at  $t = 200$ : i.e. the examination of “if the innovation overcomes the serious problem”. At  $t = 200$ , fixed capitals and the values of other parameters are given by the following.

$$\begin{aligned} C_1(200) &= 2128.73 \\ C_2(200) &= 2128.74 \\ N(200) &= 724.358 \end{aligned} \tag{12}$$

The rate of profit for the first sector = 0.0542188

The rate of profit for the second sector = 0.0542188

The third sector demands labor,  $N_3^D$  by profit maximization, given  $C_3$ :

$$\text{Max } \pi_3 \equiv p_3 f_3[N_3, C_3] - wN_3$$

where  $p_3$  is the price of the output of the third sector. Profit accruing to the third sector is

$$\pi_3^0 \equiv p_3 f_3[N_3^D, C_3] - wN_3^D$$

This profit is used for the capital accumulation of this sector, so that the demand for the capital good of the third sector,  $M_3^D$ , is given by

$$M_3^D = \pi_3^0/p_2$$

By assumption, capitalists do not consume consumption goods, and the workers maximize utility, from the consumption of  $y_1$  and  $y_3$ . The utility function,  $u[y_1, y_3]$ , is specified to be of the following Cobb-Douglas type.

$$u[y_1, y_3] = y_1^{1/2} y_3^{1/2}$$

The workers' demand functions for consumption goods,  $y_1^D$  and  $y_3^D$ , are derived from the maximization of utility under income constraint as in what follows:

$$\text{Max } u[y_1, y_3] \text{ s.t. } p_1 y_1 + p_3 y_3 = wN$$

The capital accumulation process newly starts at  $t = 1$  as follows. Equilibrium prices,  $p_1^*$ ,  $p_2^*$ ,  $p_3^*$ , and  $w = 1$  are determined by the following equilibrium conditions.

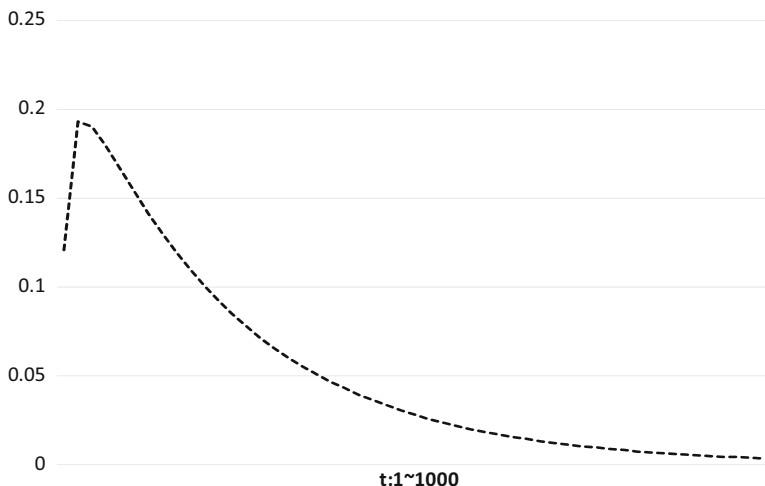
$$N_1^D(2) + N_2^D(2) + N_3^D(2) = N(1) \quad (13)$$

$$M_1^D(2) + M_2^D(2) + M_3^D(2) = f_2[N_2^D(2), C_2(1)] \quad (14)$$

$$y_1^D(2) = f_1[N_1^D(2), C_1(1)] \quad (15)$$

$$y_3^D(2) = f_3[N_3^D(2), C_3(1)] \quad (16)$$

where  $N(1) = 724.358$ ,  $C_1(1) = 2128.73$ ,  $C_2(1) = 2128.74$ , and  $C_3(1) = 0$ . Under Eq. (3), from these equilibrium conditions, (13)–(16),  $p_1^*$ ,  $p_2^*$ , and  $p_3^*$ , with  $w = 1$ , are derived analytically as follows:



**Fig. 5** The new trajectory of the per capita utility for the downstream innovation. Source: Fukiharu (2017a)

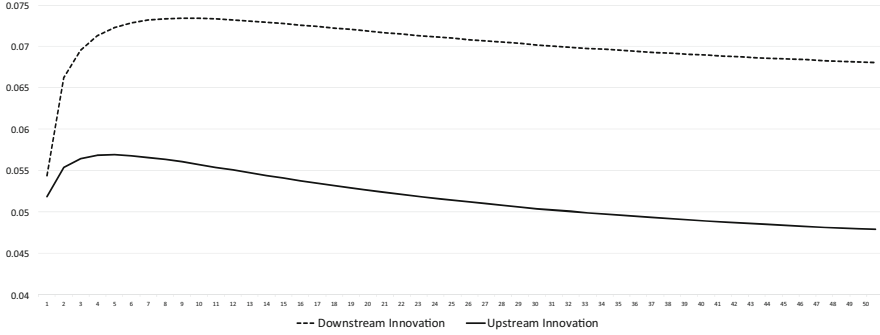
$$p_1^* = N^{1/2}/C_1^{1/3}$$

$$p_2^* = 2^{\frac{1}{2}} \left( N - C_3 + C_3^{\frac{1}{2}}(C_3 + N)^{\frac{1}{2}} \right)^{1/2} C_2^{-1/3}$$

$$p_3^* = (C_3 + N)^{1/2} - C_3^{1/2}$$

Utilizing these equilibrium prices,  $M_1(2)$ ,  $M_2(2)$ , and  $M_3(2)$  are determined, so that  $C_1(2) = C_1(1)(1 - g_1) + M_1(2)$ ,  $C_2(2) = C_2(1)(1 - g_1) + M_1(2)$ , and  $C_3(2) = C_3(1)(1 - g_1) + M_3(2)$  are determined, as well as  $N(2) = (1 + g_0)N(1)$ . In this way, the new capital accumulation process begins with the initial conditions stipulated in Eq. (12). Under the new capital accumulation process, the price of the necessity,  $p_1(t)$ , rises continuously, while the price of the luxury,  $p_3(t)$ , declines sharply in the beginning and after reaching the bottom before  $t = 100$ , it rises continuously. Thanks to the decline of the price of luxury good, per capita utility, a different expression of real wage, rises in the beginning, declining later continuously after reaching the peak before  $t = 100$ . Finally, it converges to zero as shown in Fig. 5. Unfortunately, utility function is introduced after the innovation, so that it is not possible to compare the workers' situation between before and after the invention of luxury good.

Thanks to the rising  $p_1(t)$ , the rate of profit of the first sector also rises in the beginning. After reaching a peak at around  $t = 300$ , the rate declines monotonously afterwards. Meanwhile, the trajectory of the three sectors' average rate of profit is depicted as the dashed curve in Fig. 6. Note that the peak (0.0733999) of the new trajectory reached after the innovation is greater than 0.0542188, the average of the two sectors' rates of profit, the rate just before the invention of luxury good. Thus,



**Fig. 6** The new trajectories of the average rate of profit starting from  $t = 200$  when the downstream and upstream innovations take place. Source: Fukiharu (2017a)

the downstream (Type 1) innovation is effective to the economy as a whole. The new trajectory converges to  $r_d = 0.0543651739063128$ : the limit of the old trajectory.

**Remark 4** We may say that this conclusion is rather robust. It is confirmed in (Fukiharu 2017b, c) that we have essentially the same figures as Figs. 5 and 6 under Eqs. (10) and (11).

### 3.2 *Downstream Innovation Takes Place Before the Peak: At $t = 20$*

We proceed to the examination of the case in which the innovation takes place before the peak: at  $t = 20$ : i.e. the examination of “if the downstream Innovation overcomes the serious problem”.

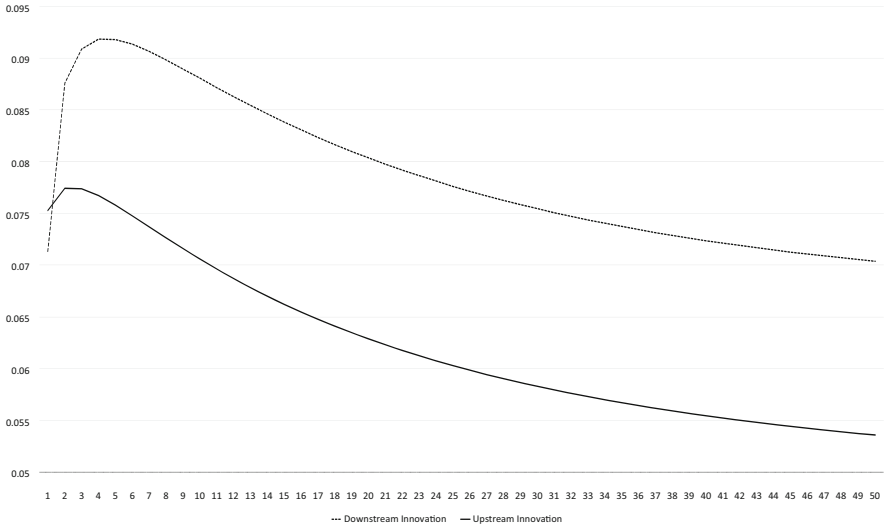
At  $t = 20$ , fixed capitals and other values of parameters are given by the following.

$$\begin{aligned} C_1(20) &= 350.134 \\ C_2(20) &= 387.87 \\ N(20) &= 120.811 \end{aligned} \tag{17}$$

The rate of profit for the first sector = 0.0748802

The rate of profit for the second sector = 0.0748802

Starting from the initial conditions stipulated in Eq. (17), the new trajectory of the three sectors' average rate of profit is depicted as the dashed curve in Fig. 7. Note that the peak (0.0918332) of the new trajectory reached after the innovation is greater than 0.0748802, the average of the two sectors' rates of profit, Eq. (17), the rate just before the innovation of luxury good. Thus, the downstream (Type 1) innovation is



**Fig. 7** The new trajectories of the average rate of profit starting from  $t = 20$  when downstream and upstream innovations take place. Source: Fukiharu (2017a)

effective to the economy as a whole. As in Sect. 3.1, the new trajectory converges to  $r_d = 0.0543651739063128$ : the limit of the old trajectory.

**Remark 5** We may say that this conclusion is rather robust. It is confirmed in Fukiharu (2017b, c) that we have essentially the same figures as Figs. 5 and 7 under Eqs. (10) and (11).

## 4 Upstream (Type 4) Innovation Under Decreasing Returns to Scale

As shown in Sect. 2, under the “decreasing returns to scale” case, the real wage rate converges to zero, independently of the endowment of fixed capital. In this section, we examine the consequence of upstream (Type 4) innovation under the “decreasing returns to scale” case with small endowment of fixed capital:  $C_1(1) = 100$  and  $C_2(1) = 200$ , in which a new source of energy is invented after the peak (at  $t = 200$ ), or before the peak ( $t = 20$ ). The production function of this third commodity,  $y_3 = f_3[N_3, C_3] = N_3^{1/2} + C_3^{1/2}$ , is assumed to be of the same CES type under “decreasing returns to scale” used in Sect. 3.

#### 4.1 *Upstream Innovation Takes Place After the Peak: At $t = 200$*

The first and second sectors' production functions are modified to the following after  $t = 200$ , with  $E_i$  the energy input for the  $i$ -th sector.

$$\begin{aligned} f_1[N_1, C_1, E_1] &\equiv N_1^{\frac{1}{2}}C_1^{\frac{1}{3}}(1 + E_1)^{1/10} \\ f_2[N_2, C_2, E_2] &\equiv N_2^{\frac{1}{2}}C_2^{\frac{1}{3}}(1 + E_2)^{1/10} \\ f_3[N_3, C_3] &\equiv N_3^{\frac{1}{2}} + C_3^{\frac{1}{2}} \end{aligned}$$

For ease of computation, it is assumed that the energy industry does not need energy in the production of energy. For the same reason, it is assumed that energy is not consumed by the workers: energy is solely production input.

Given  $C_i$ , the  $i$ -th sector maximizes profit, and its demand functions for  $N_i$  and  $E_i$ :  $N_i^{DD}$  and  $E_i^{DD}$  are derived as in the previous sections. All this profit is used for the capital accumulation, so that this sector's demand for the capital good,  $M_i^{DD}$ , is derived as in the previous sections ( $i = 1, 2$ ). In the same way, given  $C_3$ , the third sector maximizes profit, and its demand functions for  $N_3$ :  $N_3^{DD}$  is derived as in the previous sections. All this profit is used for the capital accumulation, so that the third sector's demand for the capital good,  $M_3^{DD}$ , is derived as in the previous sections.

The capital accumulation process newly starts at  $t = 1$  as follows. Equilibrium prices,  $p_1^*$ ,  $p_2^*$ , and  $p_3^*$ , where  $w = 1$ , must satisfy the following equilibrium conditions.

$$N_1^{DD}(2) + N_2^{DD}(2) + N_3^{DD}(2) = N(1) \quad (18)$$

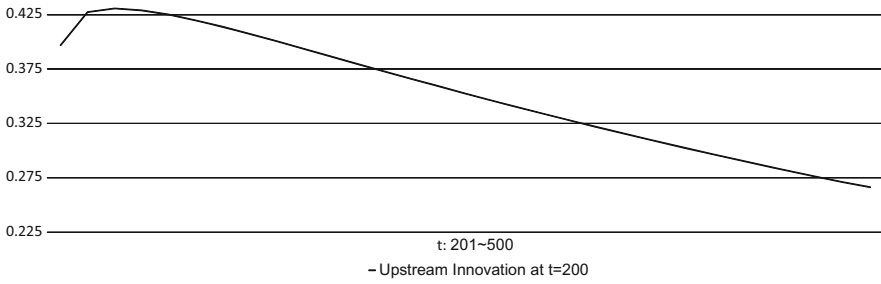
$$M_1^{DD}(2) + M_2^{DD}(2) + M_3^{DD}(2) = f_2[N_2^{DD}(2), C_2(1)] \quad (19)$$

$$\frac{wN(1)}{p_1} = f_1[N_1^{DD}(2), C_1(1)] \quad (20)$$

$$E_1^{DD}(2) + E_2^{DD}(2) = f_3[N_3^{DD}(2), C_3(1)] \quad (21)$$

where  $w = 1$ ,  $N(1) = 724.358$ ,  $C_1(1) = 2128.73$ ,  $C_2(1) = 2128.74$ , and  $C_3(1) = 0$ , in view of Eq. (12). From these equilibrium conditions: (18)–(21),  $p_1^*$ ,  $p_2^*$ , and  $p_3^*$  are derived analytically with  $N$ ,  $C_1$ ,  $C_2$ , and  $C_3$  variables, where  $w = 1$ .

$$\begin{aligned} p_1^* &= G_1[N, C_1, C_2, C_3] \\ p_2^* &= G_2[N, C_1, C_2, C_3] \\ p_3^* &= G_3[N, C_1, C_2, C_3] \end{aligned}$$



**Fig. 8** The new trajectory of  $w/p_1^*(t)$  after the upstream innovation takes place at  $t = 200$ . Source: Fukiharu (2017a)

For  $G_i[N, C_1, C_2, C_3]$ , refer to Fukiharu (2017a). Utilizing these equilibrium prices,  $M_1(2)$ ,  $M_2(2)$ , and  $M_3(2)$  are derived, so that  $C_1(2) = C_1(1)(1 - g_1) + M_1(2)$ ,  $C_2(2) = C_1(1)(1 - g_1) + M_2(2)$ , and  $C_3(2) = C_3(1)(1 - g_1) + M_3(2)$  are determined, as well as  $N(2) = (1 + g_0)N(1)$ . In this way, the new capital accumulation begins.

The new trajectory of the real wage is shown in Fig. 8. The price of consumption good, a necessity, drops sharply in the beginning, which contributes to the rise of real wage. As shown in Fig. 8, the real wage first rises and reaches the peak (0.430706) before  $t = 250$ , declining monotonously afterwards. Note that the peak of real wage on the new trajectory, 0.430706, is lower than the one on the old trajectory of the innovation, 0.473996. Thus, it may be concluded that upstream (Type 4) innovation cannot reverse “the declining tendency of real wage” on the capital accumulation if the innovation takes place when  $t = 200$  in the old process.

The rate of profit for the first sector declines monotonously. At  $t = 201$ , it is 0.0414211, which is lower than the corresponding rate just before the upstream innovation takes place. Furthermore, due to the rising energy price, the rate of profit converges to zero. Thus, energy innovation is harmful to the first sector from the viewpoint of the rate of profit. The rate of profit for the second sector declines monotonously. At  $t = 201$ , it is 0.0362835, which is lower than the corresponding rate just before the energy innovation takes place. Furthermore, due to the rising energy price, the rate of profit converges to zero. Thus, energy innovation is also harmful to the second sector from the viewpoint of the rate of profit. The rate of profit for the third sector rises in the beginning, and after reaching the peak at  $t = 202$  it declines continuously. Furthermore, in the long run, it converges to zero. Thus, all the rates of profits converge to zero. Meanwhile, the new trajectory of the average rate of profit for the upstream innovation is provided as the solid curve in Fig. 6. The peak (0.0568906) is higher than the value of the rate of profit at  $t = 200$  for the old trajectory (0.0543754). Thus, the upstream innovation is effective temporarily in overcoming “the tendency of falling rate of profit”. There is an important difference between the downstream and upstream innovations. In the downstream innovation, the new trajectory of average rate of profit converges to  $r_d = 0.0543651739063128$ : the limit of the old trajectory when the innovation does not take place, while in the upstream innovation, the new trajectory converges to zero.

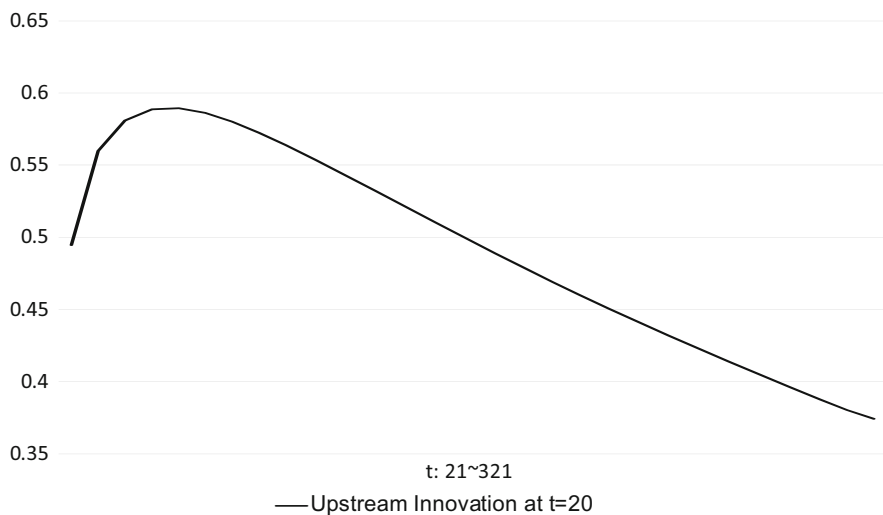


**Remark 6** We may say that this conclusion is rather robust. It is confirmed in (Fukiharu 2017b, c) that we have essentially the same figures as Figs. 6 and 8 and under Eqs. (10) and (11).

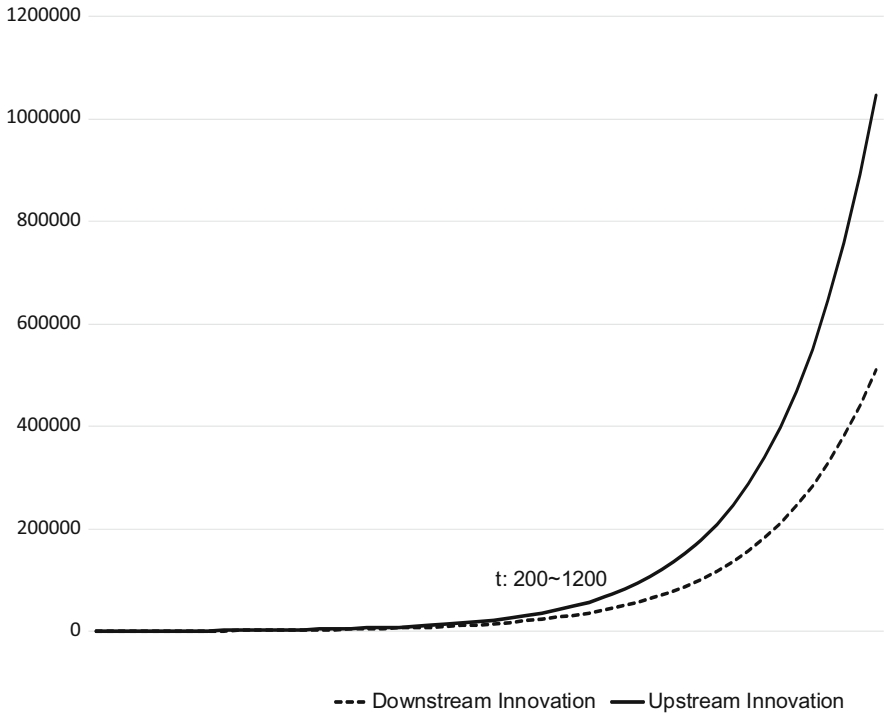
## 4.2 *Upstream Innovation Takes Place Before the Peak: At $t = 20$*

We proceed to the examination of the case in which the upstream innovation takes place before the peak (at  $t = 20$ ): the examination of “if the upstream innovation can overcome the serious problem”. At  $t = 20$ , fixed capitals and others are given by Eq. (17). The new trajectory of real wage is depicted as the solid curve in Fig. 9. The price of consumption good, a necessity, drops sharply in the beginning, which contributes to the rise of real wage. As shown in Fig. 9, the real wage first rises and reaches the peak (0.589764) before  $t = 250$ , declining monotonously afterwards. Note that the peak of real wage after the innovation is higher than the peak on the old trajectory without innovation (0.473996). Thus, the upstream innovation can temporarily reverse “the declining tendency of real wage” on the old capital accumulation if the innovation takes place when  $t = 20$ .

The new trajectory of the average rate of profit for the upstream (Type 4) innovation is provided as the solid curve in Fig. 7. The peak (0.077421) on this new trajectory is higher than the value of the average rate of profit at  $t = 20$  on the old trajectory for the no-innovation case (0.0748802). Thus, the upstream innovation is temporarily effective in overcoming “the tendency of falling rate of profit”.



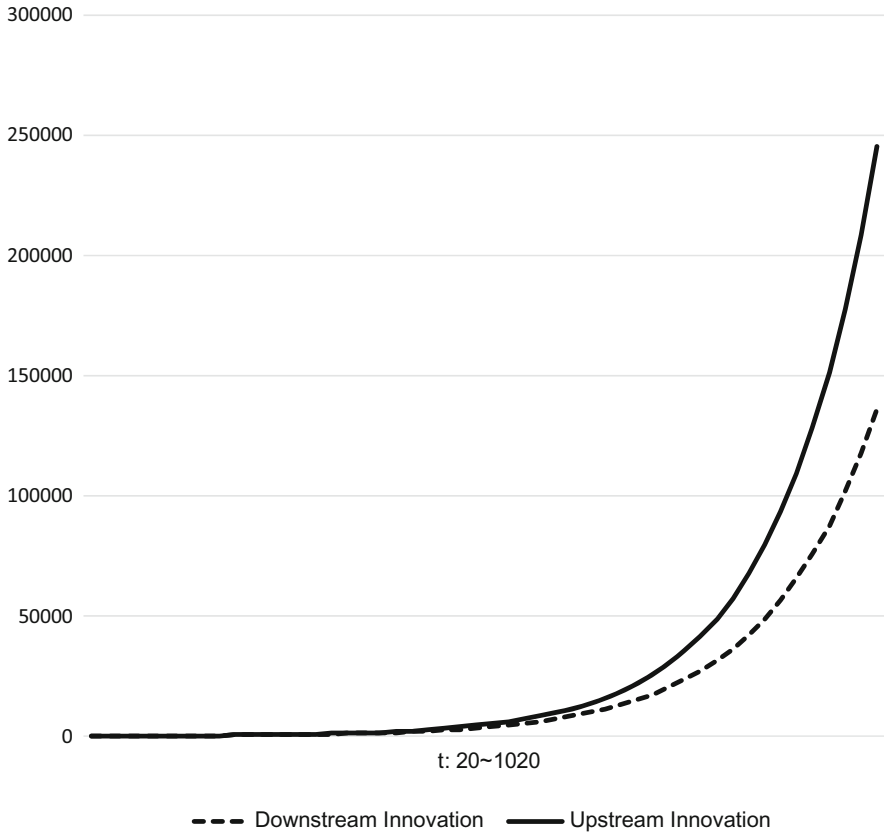
**Fig. 9** The new trajectory of  $w/p_1^*(t)$  after the upstream innovation takes place at  $t = 20$ . Source: Fukiharu (2017a)



**Fig. 10** The new trajectories of total investment:  $M_1(t) + M_2(t) + M_3(t)$  for upstream and downstream innovations when they take place at  $t = 200$ . Source: Fukiharu (2017a)

In Figs. 6 and 7, the peak values (0.0733999 for “ $t = 200$ ” case, 0.0918332 for “ $t = 20$ ” case) on the new trajectories for the downstream innovation are higher than those (0.0568906 for “ $t = 200$ ” case, 0.077421 for “ $t = 20$ ” case) for the upstream innovation. Does this imply that the downstream innovation has a stronger impact on the economy than the upstream innovation? We must examine the reason why this happens. In Fig. 10, the trajectories of total investment for the downstream innovation (dashed curve) and the upstream innovation (solid curve) are depicted when those innovations take place at  $t = 200$ . The total investment for the upstream innovation is greater than the one for the downstream innovation.

In the same way, in Fig. 11, the trajectories of total investment for the downstream innovation (dashed curve) and the upstream innovation (solid curve) are depicted when those innovations take place at  $t = 20$ . While the total investment for the upstream innovation is lower than the one for the downstream innovation until  $t = 140$ , the former is greater than the latter after that period, as is clear from Fig. 11. The greater amount of total investment in the upstream innovation after  $t = 140$  may well cause the lower peak values of average rate of profit. Thus, we may conclude that the upstream innovation has stronger impact on the economy than the downstream innovation.



**Fig. 11** The new trajectories of total investment:  $M_1(t) + M_2(t) + M_3(t)$  for upstream and downstream innovations when they take place at  $t = 20$ . Source: Fukiharu (2017a)

**Remark 7** We may say that this conclusion is rather robust. It is confirmed in (Fukiharu 2017b, c) that we have essentially the same figures as Figs. 9–11 under Eqs. (10) and (11).

## 5 Conclusion

The aim of this paper was to compare the impacts of two types of innovation (Type 1: the “downstream” innovation, the creation of new consumption good, and Type 4: the “upstream” innovation, the creation of new energy) on the economy. This paper began with the construction of a discrete version of Uzawa (1961)’s neo-classical two-sector growth model, formulated in a continuous version. Uzawa’s aim was to examine the stability of the capital accumulation process, proving the global stability of the per capita variables such as per capita outputs, on the two-sector model. The

construction of discrete version allows us to transit smoothly from the two-sector model to the three-sector model, by introducing the third sector, a newly created sector by the innovations. The attention of the present paper is more focused on the variations (trajectories) of the real wage rate and the rate of profit on the accumulation process than the stability of the process. This modified attention allows us to compare the effects of innovations on the economy by examining how the trajectories are modified by these innovations.

In Sect. 2, we compared the “constant returns to scale” case and the “decreasing returns to scale” case of the basic two-sector model, where the first sector produces consumption good, a necessity, and the second sector produces fixed capital good. First, we showed that the real wage rate, i.e. money wage rate divided by the price of the first sector, and the rate of profit converge to positive values:  $w_c$  and  $r_c$ , on the capital accumulation process when the “constant returns to scale” is assumed on the production functions. In this sense, there is no serious problem to worry about. When the “decreasing returns to scale” is assumed, however, there arises a serious problem to be concerned about. We showed that the real wage rate converges to zero, although the rate of profit converges to a positive value:  $r_d$ . Thus, in this paper, we examined how the trajectories of real wage rate and the rate of profit are modified by the creation of the third sector under the “decreasing returns to scale”.

In Sect. 3, we introduced a third sector into the basic model, producing a new consumption good, a luxury good. In this case, there are two consumption goods, so that we introduced the utility maximizing hypothesis. This implies that we cannot examine the modification of the trajectory of the real wage, although the modification of the trajectory of average rate of profit can be examined. It was shown that by this “downstream” innovation, i.e. creation of consumption good, the average rate of profit rises after the innovation on the new accumulation process with three sectors, and after reaching a peak, it begins to decline, converging to  $r_d$ .

In Sect. 4, we introduced a third sector into the basic model producing a new energy, a production input. In this case, there is one consumption good, a necessity, so that we can examine the modification of the trajectory of the real wage, as well as the modification of the trajectory of average rate of profit. It was shown that by this “upstream” innovation, i.e. creation of new energy, the real wage rises after the innovation of the new accumulation process with three sectors, and after reaching a peak, it begins to decline, converging to zero. Furthermore, the rate of profit rises after the innovation of the new accumulation process, and after reaching a peak, it begins to decline, converging to zero. It was also shown that the peak of the trajectory for the “downstream” innovation computed in Sect. 3 is greater than the one for the “upstream” innovation computed in Sect. 4. The reason for this result was shown to stem from the fact that the total investment in the “upstream” innovation was greater on the new accumulation process than the one in the “downstream” innovation. In this way we concluded that the “upstream” innovation has a stronger economic impact than the “downstream” innovation. In Appendix, we examine the classical economists’ assertion of “falling rate of profit” by somewhat modifying the basic growth model. It is shown that when the assumption of “decreasing returns to

scale” is made, their assertion is correct, whereas the rate of profit is constant when the “constant returns to scale” is assumed.

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## Appendix

The variation of the real wage and the rate of profit was also one of the main concerns of the classical economists, starting from Smith (1776), Malthus (1798), Ricardo (1817) to Marx (1867). They examined this variation in terms of labor theory of value. Pasinetti (1960) presented a mathematical formulation of Ricardo model, which was extended to Ricardo-Marx model by Fukiharu (1987) in the framework of the continuous type capital accumulation process. In what follows, the relation between Fukiharu (1987) and the Uzawa-type basic model of the present paper is examined in the framework of the discrete type capital accumulation process.

The Ricardo-Marx capital accumulation process in Fukiharu (1987) in the continuous version may be reformulated as in what follows utilizing the same variables and functions as in the main text.

$$\frac{f_1[N_1(t+1), C_1(t)]}{\bar{x}} = N_1(t+1) + N_2(t+1) \quad (22)$$

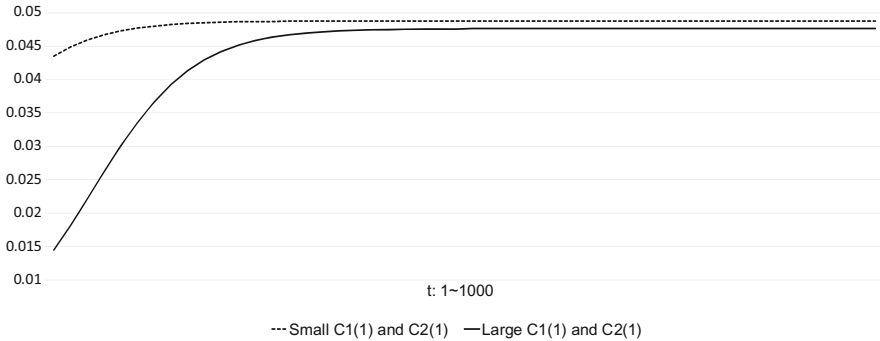
$$f_2[N_2(t+1), C_2(t)] = M_1(t+1) + M_2(t+1) \quad (23)$$

$$\bar{x} N_2(t+1) = p(t+1)M_1(t+1) \quad (24)$$

$$p(t+1) = \frac{\frac{\partial}{\partial N_1} f_1[N_1(t+1), C_1(t)]}{\frac{\partial}{\partial N_2} f_2[N_2(t+1), C_2(t)]} \quad (25)$$

$$\begin{aligned} r(t+1) &= \frac{f_1[N_1(t+1), C_1(t)] - \bar{x} N_1(t+1)}{C_1(t)p(t+1) + \bar{x} N_1(t+1)} \\ &= \frac{p(t+1)f_2[N_2(t+1), C_2(t)] - \bar{x} N_2(t+1)}{C_2(t)p(t+1) + \bar{x} N_2(t+1)} \end{aligned} \quad (26)$$

A few remarks are in order. One parameter,  $\bar{x}$ : fixed real wage rate in terms of consumption good, and one variable,  $p(t+1)$ : relative price of capital good in terms of consumption good,  $p_2/p_1$ , are newly introduced. The real wage rate is fixed at the subsistence level. The classical economists did not assume the full employment. The Eq. (24) implies the exchange between the first sector and the second sector. Noting that  $dN_i/dy_i = 1/\frac{\partial}{\partial N_i} f_i[N_i(t+1), C_i(t)]$  ( $i = 1, 2$ ), the Eq. (25) implies the “marginal”



**Fig. 12** The trajectories of the rate of profit under decreasing returns to scale with capital depreciation. Source: Fukiharu (2017d)

labor theory of value, which was also assumed in Pasinetti (1960, p. 83). Ricardo appears to have accepted this type of labor theory of value (Negishi 1981). The Eq. (26) implies that the rate of profit,  $r$ , is equalized between the two sectors.

Under Eqs. (22)–(26), the capital accumulation process,  $C_i(t + 1) = C_i(t)(1 - g_1) + M_i(t + 1)$  ( $i = 1, 2$ ) is examined ( $t = 1, 2 \dots$ ). Formulating these relations in terms of differential equations, Fukiharu (1987) asserted that the rate of profit on this capital accumulation process is constant when the “constant returns to scale” is assumed.

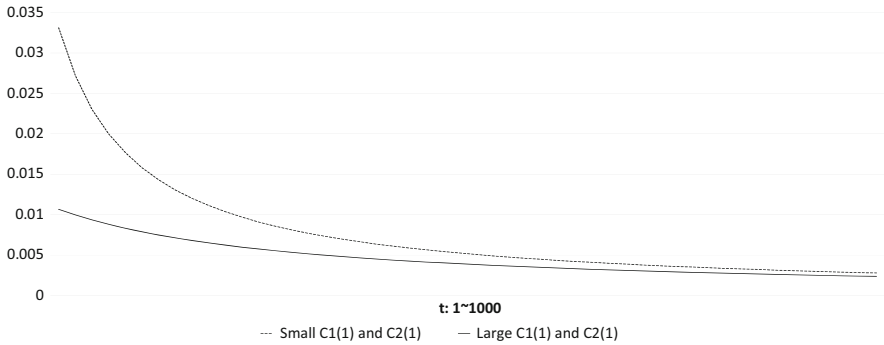
We have the following simulation result (Fukiharu 2017d):

1. Under Eq. (3) when  $\bar{x} = 1$ ,  $C_1(1) = 100$ ,  $C_2(1) = 200$ , and  $g_1 = 0.05$  are assumed, we have  $r(t) = 0.2$  ( $t = 1, 2, \dots$ ).
2. Under Eq. (3) when  $\bar{x} = 1$ ,  $C_1(1) = 10,000$ ,  $C_2(1) = 10,000$ , and  $g_1 = 0.05$  are assumed, we have  $r(t) = 0.2$  ( $t = 1, 2, \dots$ ).
3. Under Eq. (9) when  $\bar{x} = 1$ ,  $C_1(1) = 100$ ,  $C_2(1) = 200$ , and  $g_1 = 0.05$  are assumed, we have  $r(t)$  ( $t = 1, 2 \dots$ ) as the dashed curve in Fig. 12.
4. Under Eq. (9) when  $\bar{x} = 1$ ,  $C_1(1) = 10,000$ ,  $C_2(1) = 10,000$ , and  $g_1 = 0.05$  are assumed, we have  $r(t)$  ( $t = 1, 2 \dots$ ) as the solid curve in Fig. 12.

Considering Marx (1867), it may be strange to have the rising rate of profit on the capital accumulation process. It must be noted that these results stem from the large depreciation of capital:  $g_1 = 0.05$ . In this capital accumulation process, in fact, “capital decumulation” emerges due to the capital depreciation: i.e.  $C_i(t)$  ( $t = 1, 2 \dots$ ) decreases monotonically. Indeed, we have the following:

5. Under Eq. (9) when  $\bar{x} = 1$ ,  $C_1(1) = 100$ ,  $C_2(1) = 200$ , and  $g_1 = 0$  are assumed, we have  $r(t)$  ( $t = 1, 2, \dots$ ) as the dashed curve in Fig. 13.
6. Under Eq. (9) when  $\bar{x} = 1$ ,  $C_1(1) = 10,000$ ,  $C_2(1) = 10,000$ , and  $g_1 = 0$  are assumed, we have  $r(t)$  ( $t = 1, 2 \dots$ ) as the solid curve in Fig. 13.

Indeed, in these cases, capital accumulation takes place: i.e.  $C_i(t)$  ( $t = 1, 2 \dots$ ) increases monotonically.



**Fig. 13** The trajectories of the rate of profit under decreasing returns to scale without capital depreciation. Source: Fukiharu (2017d)

Thus, we may conclude that in the framework of classical economics, under “decreasing returns to scale”, the rate of profit declines on the capital accumulation while it remains constant under “constant returns to scale”.

## References

- Arrow, K. J., & Hahn, F. H. (1971). *General competitive analysis*. San Francisco: Holden-Day.
- Fukiharu, T. (1987). The classical economics from the neo-classical viewpoint. *Kobe University Economic Review*, 33, 71–99.
- Fukiharu, T. (2013). Income distribution inequality, globalization, and innovation: A general equilibrium simulation. *Mathematics and Computers in Simulation*, 93, 117–127.
- Fukiharu, T. (2017a). *Two types of innovation and their economic impacts: A general equilibrium simulation [part I]*. Accessed August 30, 2017, from <http://www.cc.aoyama.ac.jp/~fukito/IndexII.htm>.
- Fukiharu, T. (2017b). *Two types of innovation and their economic impacts: A general equilibrium simulation [part II]*. Accessed August 04, 2017, from <http://www.cc.aoyama.ac.jp/~fukito/IndexII.htm>.
- Fukiharu, T. (2017c). *Two types of innovation and their economic impacts: A general equilibrium simulation [part III]*. Accessed August 04, 2017, from <http://www.cc.aoyama.ac.jp/~fukito/IndexII.htm>.
- Fukiharu, T. (2017d). *Two types of innovation and their economic impacts: A general equilibrium simulation [part IV]*. Accessed August 04, 2017, from <http://www.cc.aoyama.ac.jp/~fukito/IndexII.htm>.
- Fukiharu, T. (2018). General equilibrium simulations on the income distribution. In M. H. Bilgin, H. Danis, E. Demir, & U. Can (Eds.), *Eurasian economic perspectives: Proceedings of the 20th Eurasia business and economics society conference* (Vol. 2, pp. 503–524). Cham: Springer.
- Malthus, T. R. (1798). *An essay on the principle of populations: Oxford world's classics*. Oxford: Oxford University Press.
- Marx, K. H. (1867). *Das Kapital (Capital: A critique of political economy)*. Accessed August 04, 2017, from <https://www.marxists.org/archive/marx/works/1867-c1/>.
- Negishi, T. (1981). *Classical economics and modern economics* (in Japanese). Tokyo: Iwanami.

- Pasinetti, L. L. (1960). A mathematical formulation of the ricardian system. *Review of Economic Studies*, 27, 78–98.
- Ricardo, D. (1817, 1911). *On the principles of political economy and taxation*. London: Everyman's Library.
- Schumpeter, J. A. (1955). *The theory of economic development, an inquiry into profit, capital, credit, interest and the business cycle* (translation of *Theorie der Wirtschaftlichen Entwicklung*, 1911, by Redvers Opie). Cambridge, MA: Harvard University Press.
- Smith, A. (1776, 1937). In E. Cannan (ed.), *An inquiry into the nature and causes of the wealth of nations*. New York: Modern Library.
- Uzawa, H. (1961). On a two-sector model of economic growth, I. *Review of Economic Studies*, 29, 40–47.



# Sustainability Integration Impact on Fast Fashion Supply Chains



Vytautas Snieska and Ignas Valodka

**Abstract** The main objective of this paper is to define whether sustainable performance (environmental and social) integration in business activity and consequently supply chains of fast fashion industry has a positive impact on financial performance. Sustainability must comprise and balance all three elements: environmental, social and economic. Sustainability is strongest when it is broad, not substitutable and relative. The main sustainability integration drivers are of three categories: internal drivers, market drivers and law related drivers. The main ways for the integration of sustainability into fast fashion supply chains are: integrating sustainability into the values and strategy of the company, investing in long-term relationships with the main partners, collaboration, certification and standards. Consensus definition of sustainable fast fashion supply chain does not exist, but it may be defined as a supply chain incorporated by environmental, social and economic dimensions. The correlation analysis of fast fashion companies data which form the largest part of fast fashion industry, demonstrated that there exist positive link between sustainability and profitability of companies.

**Keywords** Sustainability · Supply chain · Corporate growth · Fast fashion

## 1 Introduction

In the last two decades academicians have increasingly focused on sustainable supply chain studies. Especially due to the increase in environmental concerns businesses are forced to consider the impact of their supply chains on the environment implementing sustainability practices. More and more companies are adopting the term sustainability and generate a separate annual sustainability reports (KPMG 2005). However as literature review showed the term of sustainability has been inconsistently defined and applied in the extant research. According to Carter and

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Rogers (2008) the economic criteria was not considered enough and failed to apply sustainability into supply chain management. To understand the integration of sustainability into supply chains and assess its impact, firstly clear definition of sustainability must be defined. Thus sustainability concept will be reviewed and defined.

As enterprise main goal is profit, business enterprises and their supply chains activity primarily focus on economic performance. By focusing only on economic performance companies often ignore social and environmental activities which mean they are causing damage to environment and society. Despite governmental regulations and growing concern about environment and society most companies still avoid sustainable practices. As one of the most highly polluting industries are fast fashion apparel industry, top companies (by turnover) of this industry will be evaluated.

Fast fashion concept begun to rise around 15 years ago, when fashion industry experienced a radical change. New business strategy was initiated by such companies like Gap, Zara, Forever21 and H&M, when prices began to drop dramatically. The reason for this change was the move from the traditional strategy of seasonal selling, in which new designs and garments were introduced typically between two and four times each year, to fast and frequent introduction of new trends, where new designs move from idea to design and to store shelves within few weeks, after which the designs are retired (Cline 2013). The purpose of this change from traditional selling to frequent trends introduction was to achieve more frequent sales (Ferdows et al. 2004).

More and more research has been done in the area of whether or not environmental performance integration can improve firm performance. Despite the arguments that environmental practices lead to more efficient utilization of resources and corporate image improvement, many companies are still afraid to take actions due to the lack of perceived evidence that the benefits exceed the costs (Montabon et al. 2007). Since 1996 has been increasingly growing pressure on industry supply chains to address environmental performance was observed after ISO 14001 standards were released (Zuckerman 2000).

The main objective of this paper is to define whether sustainable performance (environmental and social) integration in business activity and consequently supply chains has a positive impact on financial performance by analysing the main theories and research done in the literature already. The second part of the objective is empirically test this theory by analysing financial and sustainability data from the selected world biggest fast fashion industry companies.

## 2 Sustainability Concepts

In the literature there is a huge variety of different definitions of sustainability and according to some authors the term is often misinterpreted. Therefore an analysis on sustainability definition is important before starting further research.

Besides increasing sustainability research in the literature in the past decades there is no concrete definition yet for sustainability in business activity (Appelbaum et al. 2016). As Marshall and Toffel (2005) state, already in the 1990s, there were over 100 definitions of sustainability. Deepest studies within sustainability research are done in Economy and Business system. Even such influential initiatives as the Global Reporting Initiative and UN Global Compact have defined sustainability in different ways. This abundance of many alternative conceptions might have impact to the fact that many corporations failed to achieve the anticipated results in terms of environmental and social improvements (Lankoski 2016).

In the literature most common and quoted definition of sustainability is: “development that meets the needs of the present without compromising the ability of future generations to meet their needs” (World Commission on Environment and Development 1987). According to Herremans and Reid (2002) the concept of sustainability means to be capable to maintain over the long term due to its derivative “sustain” which means “to keep going” or “to keep in existence”. There are authors who analogously use the term of “corporate sustainability” with the term of “corporate social responsibility” (Van Velsor 2009). Also there are authors who often time misinterpret sustainability in business activity as green (environmental) practices. Operations management literatures consider sustainability from the ecological perspective without explicit incorporation of the social aspect.

However most authors (Elkington 1998; Carter and Rogers 2008; Izadikhah and Saen 2016) agree that sustainability includes and balance all three elements: environmental, social and economic. According to Sikdar (2003), most accurate definition is found in engineering literature where sustainability is defined as a balance among environmental stewardship, social equity and economic development.

This perspective of the three components was developed by Elkington (1998, 2004) who considers and balances all three elements: economic, environmental and social goals from microeconomic standpoint. The concept in which all three performances are balanced is often called in literature “the Triple Bottom Line” (Elkington 1998).

Herremans and Reid (2002) describe the sustainability domain as the area in which an organization can operate and still maintain a harmony among the three main dimensions. The development and implementation of suggested sustainability concept into a large scale companies is significant and growing importance and it is not only best practice towards sustainability but also profitability for business. These three factors look like conflicting while they actually are interdependent and complementary.

Lankoski (2016) analyzes sustainability within business context and due to the big variety of this term definition, in order to add some value to the analysis by clarifying and adding structure, have built a common frame of sustainability definition within business context. Author divided sustainability into three constituent dimensions: substitutability, scope, goal orientation and divided it into eight types.

Scope of sustainability is what it is consequently regarded as sustainability issues. The definition of sustainability can be narrow or broad. If sustainability only covers environmental issues it is narrow, while if it also covers economic and social issues it

is broad. Substitutability refers if poor performance in one sustainability issue can be compensated with good performance in another. Weak sustainability in business allows substitution between economic, environmental and social issues, while strong sustainability does not allow such substitution. Goal orientation refers to a fundamental distinction which is whether sustainability in business is absolute or relative. Sustainability is absolute when assessed by the attainment of a critical outcome and relative when assessed by whether reference performance is exceeded (Lankoski 2016).

Sustainability measurement is not straightforward and requires a supply chain perspective. There is not possible to measure firm's emissions, as the product goes through various manufacturing and transportation activities and operate with numerous companies in the supply chain. Besides, the direct emissions of a company constitute a small part of supply chain emissions. Therefore when measuring sustainability of a company we should take supply chain perspective, rather than company itself (Bouchery et al. 2017).

### 3 Sustainability Integration Drivers, Barriers and Ways

In this chapter an analysis on the main drivers of sustainability implementation or in other words, why sustainability (or its components) is important and why companies implement it is performed. The ways of implementing sustainability are provided and the impacts analyzed. According to Caniato et al. (2011), drivers for fashion industry have not yet been studied, thus the drivers are analyzed in general.

According to Brundtland (1987), sustainability is required for economic development in order to fit within the planet's natural and ecological resource boundaries. Sustainability is now mandatory and has become commonly included in business sustainability reporting. Sustainability reporting is defined as public reports of companies provided to external and internal stakeholders about their activity on economic, environmental and social performance (World Business Council for Sustainable Development 2002). According to Gonzalez-Benito and Gonzalez-Benito (2006), nongovernmental stakeholder pressure explain environmental practices integration in firms activity. Empirical study of textile and apparel manufacturers has shown that environmental practices are positively moderated by regulatory pressure (Wu et al. 2012). Bouchery et al. (2017) discuss that becoming more sustainable is often optional. In some cases is not and business face increasing pressure to become more sustainable with their supply chains. The pressure comes from individual customers and from B2B context organizations.

All the drivers for implementing sustainability can be classified into three main categories from Porter's view:

1. Internal company drivers, due to efficiency purposes such as cost reduction (Carter and Dresner 2001).

2. Market drivers related with the requirements for environmental stability from the industrial clients or end customers (Beamon 1999).
3. Law related to current and future regulations (Hall 2001).

According to Kolk and Pinkse (2004) analysis of 111 companies has shown that by focusing on their supply chains, innovating and compensating for their emissions organizations can address climate change. The results of clean tech firm's interviews have shown that a key for generating environmental and societal benefits is process innovation (Plambeck 2013). Caniato et al. (2011) on study based on five fashion industry companies identified that the key drivers for green practices in the supply chain management are corporate values of the owner, requirements of the market niche and growing relevance for the final customer.

Jain and Sharma (2014) provide main factors why companies implement green practices in the supply chain:

- Pressure from customers and competition;
- Governmental regulations;
- Supplier certification of environmental management system;
- Supplier environmental collaboration;
- Customer collaboration;
- Social responsibility and ethics;
- Business benefits;
- Pressure from employees;
- Exports and sales to foreign customers;
- Competition;
- Sustainability of resources;
- Reduced costs;
- Return on investment and organizational factors: commitment, awareness and experience.

Hoffman and Bazerman (2005) investigated the main barriers for implementing environmental practices based on behavioral decision research and organizational theory which are: fear of the unknown, resource constraints, habitual distrust, and threats to political interests. Wu and Pagell (2011) concluded that managers lack sufficient information for making environmental decisions. Klassen and Vereecke (2012) proved that dealing with social issues are difficult. Matos and Hall (2007) argued that sustainable development pressures require ambiguous challenges that many present environmental techniques cannot address. Perotti et al. (2012) concluded that although there is an overall increasing interest in environmental issues, the present level for adopting green practices in supply chain management is still limited.

In order to implement sustainability into supply chain performance, some practices and aspects have to be changed and managed differently (Ashby et al. 2012). Sharfman et al. (2009) work shows that companies implementing sustainable supply chain practices follow sustainable policies and are value-driven. In most literature

the most powerful and influential notion in the supply chain is a focal firm which is an initiator of sustainable practices in the supply chain.

According to Beske (2014), sustainability can be implemented into supply chain via practices after categorizing them all into five categories. Pagell and Wu (2009) state that the foundation of sustainable practices in the supply chain is the mindset of a focal company. Firstly the pursuit of sustainability has to be implemented in the values and strategy of the company. This orientation is a key factor for reaching full potential of sustainability in the supply chains (Beske 2014). Schein (1993) in his extensive research on culture found that culture is the core concept for improving and managing company's behavior. As Holt and Ghobadian (2009) state CEO and company culture are main important drivers for implanting environmental practices into supply chain management. According to Pagell and Wu (2009), to create a sustainable supply chain, managers must incorporate sustainability practices and goals into supply chain management. First step how to implement sustainability into core values of a company is to understand the purpose of this change. The organization members must be convinced that this change is reasonable and the business leaders should see how this change contribute to their business vision. This will minimize confusion and will clarify the intent of sustainability implementation (Crews 2010).

After integrating values of sustainability next stage is its implementation in the structure of supply chain management. Here main factor for sustainable supply chain is good relationships with partners. Especially, where both of them share risks and profits (Mentzer et al. 2001). To achieve this good relationship with partners in the supply chain the main way is to invest in long-term relationships with the partners or at least the key partners in the supply chain (Vachon and Klassen 2006; Carter and Rogers 2008). In this way common goals can be developed as the sustainability practices in the supply chain should be implemented in both sides.

In sustainable supply chain management as well as in the supply chain management collaboration is an important role in order to enhance the competitive advantage in the supply chains and can reduce overall cost and uncertainty (Chen and Paulraj 2004; Carter and Rogers 2008). When companies develop trust with partners they are more likely to engage in environmental activities (Sharfman et al. 2009). An enabler for collaboration between partners is information sharing (Skjoett-Larsen et al. 2003). Collaboration is viewed as a key factor to achieving sustainability performance (Sarkis et al. 2011).

Companies which engage in sustainability practices in their supply chains are more likely to face risk than traditional companies (Walker et al. 2008; Miemczyk et al. 2012). One of the most common risks are smaller supplier base. However at the same time, companies engaging in long-term relationships, also reduce risks associated with individual suppliers, at the cost of depending more on few suppliers.

One of the main ways to reduce risk issues are certifications and standards (Muller et al. 2009). Certifications and standards are easy way to make the supply chain more environmentally friendly (Srivastava 2007) and socially responsible (Seuring and Müller 2008a, b). Mostly such certifications and standards like ISO 14001 are used in sustainable supply chain activities. Most common systems to

monitoring and evaluating sustainability include triple bottom line accounting, international standards like the sustainability reporting guidelines by Global Reporting Initiative and the Dow Jones Sustainability Index. According to KPMG (2005) one of the most well-known approaches is triple bottom line accounting, which has been adopted by 68% of the Fortune 250. According to Crews (2010), just like there is no one barometer measuring business financial performance, likewise there is no one barometer measuring sustainability performance either. Companies may also use their own standards to translate specific values and needs into detailed practices (Miemczyk et al. 2012).

Bouchery et al. (2017) states that measuring sustainability leads to its improvement. For instance, the reason Walmart found ways to reduce GHG emissions and costs was when they started taking a close look to their carbon footprint.

## **4 Sustainability Integration into Supply Chain: Sustainable Supply Chain**

In order to understand the impact of sustainability on supply chains it is important to understand what is the difference between both of them, or in other words what happens when we add/integrate sustainability into supply chain. According to Jakhar (2014), in order to create sustainable supply chain, firstly is needed to re-define the basic structure of the supply chain and integrate the sustainability components. Sustainable supply chain is in the same way traditional supply chain, just integrated with economic, environmental and social objectives. As Svensson (2007) agrees, sustainable supply chain is a theoretical and practical extension of supply chain. In other words sustainable supply chain management is supply chain management with added sustainability criteria. According to Ahi and Searcy (2013) consensus definition of sustainable supply chain does not exist, however most authors agree that it can be defined as incorporating various dimensions of economic, social and environmental factors into supply chain. According to Harms et al. (2013) main difference between traditional and sustainable supply chain lies in the achievement of all three dimensions of sustainability. Sustainable supply chain can also be described as “the creation of coordinated supply chains through the voluntary integration of economic, environmental, and social considerations with key inter-organizational business systems designed to efficiently and effectively manage the material, information, and capital flows associated with the procurement, production, and distribution of products or services in order to meet stakeholder requirements and improve the profitability, competitiveness, and resilience of the organization over the short- and long-term” (Ahi and Searcy 2013). Beske (2014) even questioned whether there is a difference between traditional supply chain management and sustainable supply chain management. Pagell and Shevchenko (2014) envisioned that in the future research all supply chain management research will be sustainable supply chain management research. Izadikhah and Saen (2016) explain that sustainable supply

chain comprises environmental, social, and economic practices and includes product design, material selection, manufacturing, packaging, transportation, warehousing, distribution, and consumption. As Carter and Rogers (2008) also suggests sustainability of a company consists of three components: the natural environment, society and economic performance. Thus we can agree that sustainable supply chain, likewise sustainability definition, is a supply chain, which improves all three named dimensions.

The economic dimension address the long-term economic stability and some financial performance indicators such as supply chain costs or service level. Besides achieving financial objectives this dimensions also refers to protect the environment and society (Yusuf et al. 2013). The implementation of environmental and social activities has advantages. According to Herremans and Reid (2002) “economic dimension represents a system of producing, distributing, and consuming wealth, which is generally defined as the means of satisfying the material needs of people through money, property, possessions of monetary goods, or anything having economic value measurable in price”.

As Sadler (1990) describes, the environmental dimension represents a system of preservation and integrity of ecosystems and is concerned about ecosystems long term productivity and functioning. According to Shearman (1990) interestingly describes the environmental dimension perspective which concerns about sustaining the ecological conditions that make development possible. As well as in the social dimension, environmental activity does not represent wealth and improvement in terms which are valued only in the market place. Thus determining the costs and benefits of initiatives to save the environment cannot be quantified.

As Srivastava (2007) defines, the environment dimension aims to implemented environment issues into supply chain processes such as product design, supplier selection, operations and transportation. Main important concerns in the supply chain literature are greenhouse gas (GHG) emissions because of the hazardous consequences on ecosystem and human health. Other are resource depletion, hazardous substances in products, waste generation, energy and water consumption (Varsei 2016). The environment dimension can be implemented into supply chains in two main ways namely green operations and green design. According to Srivastava (2007), green operations address issues such as remanufacturing, including reverse logistics into supply chain and waste management. Remanufacturing is defined as the transformation of used products maintaining the same or grater satisfaction standards and profitability. Green design refers to the product design which affects how the product can be re-used, recovered, repaired, remanufactured or recycled (Linton et al. 2007).

Social dimension considers the satisfaction of basic human needs and higher-level social necessities. Differently than economic dimension, social dimension does not define its growth in terms of material possessions that can be bought or sold. It includes health care, food standards, safety standards at work, happy personal life, etc. (Herremans and Reid 2002).

Companies following sustainability practices in their business use certain practices in their supply chain activity. Usually these practices are related to quality



issues of relationships inside the supply chain and external stakeholders. Investing in these practices, overall performance in all three dimensions of sustainability can be enhanced (Pagell and Wu 2009).

According to Jakhar (2014), in order to create sustainable supply chain, firstly is needed to re-define the basic structure of the supply chain and integrate the sustainability components. The basic fast fashion supply chain consists of four stages: suppliers, retailers, customers and disposal. At each stage of the supply chain can be detected negative social and environmental impacts.

At the stage of suppliers the negative impact is due to outsourcing, what is common for fast fashion industry, as its production process comprises of labor-intensive work which is the cheapest in Asia. Low wages and poor working conditions can be defined as one of the main social impact at the stage of suppliers. Outsourcing has resulted in long supply chain due to the presence of multiple levels of subcontractors. Pollution from chemicals and dyes in the garments production process leads to negative environmental impacts on the stage of suppliers. At the stage of retailers due to outsourcing which was a result of fast fashion more than half a million jobs were lost in US since the appearance of fast fashion which can be defined as the main social impact. Due to apparel transportation from suppliers to retailers carbon footprint is left. At the customers stage social impact due to dramatically low clothing prices the society view on clothing transformed radically and society now view clothing as disposable rather than valuable and durable assets. This large purchasing volume of cheap clothing translates to high environmental footprint, which can be defined as environmental impact. At the stage of disposal, studies show that most discarded clothes are not reused and become trash. Unlike two decades ago, when clothes were composed of organic fibers and biodegradable, now contain polyester, rayon and viscose, which are difficult to recycle and decompose. This increase of non-biodegradable fabrics can be defined as environmental impact at the disposal stage (Shambu and College 2015).

## 5 Sustainability Integration Impact

Implementing sustainability practices and goals companies have to be aware of the possible trade-offs. However as Seuring and Müller (2008a, b) state, win-win situations can be achieved, e.g. minimizing waste is both good for environment and put less pollution on society at the same time saving money for the company in the long run. Studies have shown positive relation between higher firm performance and at least environmental management practices (Golicic and Smith 2013). Environmental practices like GHG emissions reductions may have other benefits that are indirect and are not immediately captured in the stock market reaction. In this section results of literature review on sustainable activities impact on firms and their supply chains are provided (Table 1).

By undertaking variety of environmental and social issues firm can both improve and harm the economic bottom line. Zhu and Sarkis (2006), have recognized in their

**Table 1** The link between the social dimension performance and financial performance

| Authors                                    | Research results   |
|--|--|
| Gonzalez-Benito and Gonzalez-Benito (2006) | Stated that there exist positive relationship between environmental activity and business performance.   |
| Pil and Rothenberg (2003)                  | Concluded that better environmental performance results in higher quality and competitive advantage.   |
| Pullman et al. (2009)                      | Showed that environmental and social activities improvement has impact on improved quality, which leads to improved cost performance.                          |
| Zailani et al. (2012)                      | Concluded that sustainable supply chain activity can positively affect environmental, social and economic outcomes.  |
| Delmas (2001)                              | Suggested that improved environmental and safety activity can increase market share and revenues.  |
| Potoski and Prakash (2005)                 | By analyzing data of 3709 facilities showed that ISO 14001 certified facilities perform better environmental performance as compared to the noncertified ones. |
| Schoenherr (2012)                          | Collected empirical data from 1211 factories in 21 countries confirmed significant influence of environmental activities on competitive performance.           |
| Wu et al. (2014)                           | In his study showed that by selecting the right environmental strategy in business supply chain strategy context can improve corporate performance.            |
| Hofer et al. (2012)                        | Based on Schumpeterian economics suggested that the past environmental management activities of a rival firm affects environmental activity of a focal firm.   |
| Golicic and Smith (2013)                   | Environmental practices in supply chain are associated with positive business performance. However profitability is a more indirect outcome.                   |

studies that environmental practices in the supply chain are significantly effective in reducing the negative impact on environment and as later studies have shown (Zhu and Sarkis 2007) its implementation can also enhance a firm's competitiveness. According to United Nations Global Compact and Business for Social Responsibility report, several executives have stated that businesses' future success would depend on sustainability issues (UNGC 2010). Biggest fashion retailers such as H&M, Zara, Top Shop and Mango try to avoid risk and be green in order to achieve business success.

However Walley and Whitehead (1994) argue that environmental and social initiatives has always been costly and complicated tasks for companies and win-win situations are very rare. Win-win situations increasingly arise and sustainability practices become more viable when energy prices increase, pressures from consumer groups increase and "firms begin to make more holistic view of the costs and benefits associated with social and environmental projects" (Buckley 2007).

Carter and Rogers (2008) in their article claim that environmental and social initiatives result in enhanced economic performance and its proportion is relatively. Highest economic performance occurs at the intersection of the three dimensions. Companies which maximize performance of the three dimensions will outperform

companies that maximize only economic performance or environmental and social performance without considering economic performance.

Analysis of the link between corporate environmental and financial performance, a meta-analysis of 64 outcomes from 37 empirical studies point out a positive link between sustainability and profitability (Horvathova 2010). However it takes time for environmental dimension to take effect in financial performance (Konar and Cohen 2001).

Analyzing the link between social dimension performance and financial performance, a meta-analysis has shown that they are positively correlated (Orlitzky et al. 2003). More studies results on the linkage between the three dimensions and the impacts on supply chain activities whether sustainability dimension positively or negatively affect the supply chain and companies activity are summarized in Table 1.

## 6 Impact of Sustainability Integration into Supply Chains on Fast Fashion Industry Corporate Financial Results

Fast fashion is a business model which offers fashionable clothes at affordable price. Fast fashion model requires a highly responsive supply chain which can support periodically changing product assortment. One of the main GAP's sustainability indexes is used to assess companies supplying branded apparel, as according to GAP (2014) building closer relationships with strategic suppliers plays a key role in embedding sustainability into our sourcing practices. Inditex group recently was included in the Dow Jones Sustainability Indexes (DJSI) thus we have performed Pearson product-moment correlation coefficient (PPMCC) analysis comparing DJSI index to all analyzed companies' net sales.

Main fast fashion companies, which form the largest part of fast fashion industry, are H&M and Inditex group. After that follows Gap, Uniqlo. For these reasons we will take these four main companies for correlation analysis.

Each company defines their sustainability goals differently and measure sustainability in different indicators. Therefore each companies' one of the main sustainability indicators will be compared to sales.

In Tables 2, 3, 4 and 5 Inditex H&M GAP and Uniqlo (Fast Retailing Co.) net sales compared to DJSI data for available period are presented. Pearson product-moment correlation coefficient (PPMCC) of net sales and DJSI for these companies proved the existence significant positive correlation of DJSI and net sales.

**Table 2** DJSI and net sales PPMCC correlation for Inditex

| Year           | 2009   | 2010   | 2011   | 2012   | 2013   | 2014   | 2015   | PPMCC |
|----------------|--------|--------|--------|--------|--------|--------|--------|-------|
| Net sales, M € | 11,100 | 12,500 | 13,800 | 15,900 | 16,700 | 18,100 | 20,900 |       |
| DJSI           | 72     | 76     | 85     | 81     | 81     | 81     | 81     | 0.56  |

**Table 3** DJSI and net sales PPMCC correlation for H&M

| H&M              | 2011    | 2012    | 2013    | 2014    | 2015    | PPMCC |
|------------------|---------|---------|---------|---------|---------|-------|
| Net sales, M SEK | 128,810 | 140,948 | 150,090 | 176,620 | 209,921 |       |
| DJSI             | 76.5    | 77.3    | 77.8    | 81      | 82.2    | 0.99  |

**Table 4** DJSI and net sales PPMCC correlation for GAP

| GAP               | 2011   | 2012   | 2013   | 2014   | 2015   | PPMCC |
|-------------------|--------|--------|--------|--------|--------|-------|
| Net sales, M US\$ | 14,549 | 15,651 | 16,148 | 16,435 | 15,797 |       |
| DJSI              | 78     | 81     | 83     | 89     | 91.5   | 0.68  |

**Table 5** DJSI and net sales PPMCC correlation for Uniqlo (Fast Retailing Co.)

| Uniqlo (Fast Retailing Co.) | 2011    | 2012    | 2013      | 2014      | 2015      | PPMCC |
|-----------------------------|---------|---------|-----------|-----------|-----------|-------|
| Net sales, M YEN            | 820,349 | 928,669 | 1,142,971 | 1,382,935 | 1,681,781 |       |
| DJSI                        | 188     | 229     | 294       | 332       | 472       | 0.99  |

## 7 Conclusion

Sustainability concept literature analysis shows that despite the existence of a big variety of different definitions, most authors agree that sustainability must comprise and balance all three elements: environmental, social and economic. Sustainability is strongest when it is broad, not substitutable and relative.

The main sustainability integration drivers are of three categories: internal drivers, market drivers and law related drivers. The main ways for the integration of sustainability into fast fashion supply chains are: integrating sustainability into the values and strategy of the company, investing in long-term relationships with the main partners, collaboration, certification and standards. Consensus definition of sustainable fast fashion supply chain does not exist, but it may be defined as a supply chain incorporated by environmental, social and economic dimensions. The correlation analysis of fast fashion companies data which form the largest part of fast fashion industry, demonstrated that there exist positive link between sustainability and profitability of companies.

## References

- Ahi, P., & Searcy, C. (2013). A comparative literature analysis of definitions for green and sustainable supply chain management. *Journal of Cleaner Production*, 52, 329–341.
- Appelbaum, S. H., Calcagno, R., Magarelli, S. M., & Saliba, M. (2016). A relationship between corporate sustainability and organizational change (part I). *Industrial and Commercial Training*, 48(1), 16–23.

- Ashby, A., Leat, M., & Hudson-Smith, M. (2012). Making connections: A review of supply chain management and sustainability literature. *Supply Chain Management: An International Journal*, 17(5), 497–516.
- Beamon, B. M. (1999). Designing the green supply chain. *Logistics Information Management*, 12(4), 332–342.
- Beske, P. (2014). Putting sustainability into supply chain management. *Supply Chain Management: An International Journal*, 19(3), 322–331.
- Bouchery, Y., Corbett, C. J., Fransoo, J. C., & Tan, T. (2017). *Market value implications of voluntary corporate environmental initiatives*. Retrieved January 27, 2017, from <http://www.springer.com/us/book/9783319297897>.
- Brundtland, G. (1987). *The Brundtland report: Our common future*. New York: United Nations World Commission on Environment and Development. Retrieved January 27, 2017, from <http://www.un-documents.net/our-common-future.pdf>.
- Buckley, M. (2007). *Environmental programs meet supply chain at staples: Achieving the energy efficient supply chain conference*. Orlando, FL.
- Caniato, F., Caridi, M., Crippa, L., & Moretto, A. (2011). Environmental sustainability in fashion supply chains: An exploratory case based research. *International Journal of Production Economics*, 135, 659–670.
- Carter, C. R., & Dresner, M. (2001). Purchasing's role in environmental management: Cross-functional development of grounded theory. *Supply Chain Management*, 37(3), 12–26.
- Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: Moving toward new theory. *International Journal of Physical Distribution and Logistics Management*, 38(5), 360–387.
- Chen, I. J., & Paulraj, A. (2004). Towards a theory of supply chain management: The constructs and measurements. *Journal of Operations Management*, 22(2), 119–150.
- Cline, E. (2013). *Overdressed: The shockingly high cost of cheap fashion*. Penguin. Retrieved January 04, 2017, from <http://www.penguinrandomhouse.com/books/309019/overdressed-by-elizabeth-l-cline/9781591846543/>.
- Crews, D. E. (2010). Strategies for implementing sustainability: Five leadership challenges. *S.A.M. Advanced Management Journal*, 75(2), 15.
- Delmas, M. D. (2001). Stakeholders and competitive advantage: The case of ISO 14001. *Production and Operation Management*, 10(3), 343–358.
- Elkington, J. (1998). *Cannibals with forks: The triple bottom line of 21st century business*. Gabriola Island, BC: New Society Publishers.
- Elkington, J. (2004). Enter the triple bottom line. In A. Henriques & J. Richardson (Eds.), *The triple bottom line: Does it all add up?* (pp. 1–16). London: Earthscan.
- Ferdows, K., Lewis, M. A., & Machuca, J. A. D. (2004). Rapid-fire fulfillment. *Harvard Business Review*, 82(11), 104–110.
- GAP. (2014). *Our futures are woven together*. Retrieved February 17, 2017, from <http://www.gapincustainability.com/sites/default/files/Gap%20Inc.%202013%20-%202014%20Report.pdf>.
- Golicic, S. L., & Smith, C. D. (2013). A meta-analysis of environmentally sustainable supply chain management practices and firm performance. *Journal of Supply Chain Management*, 49(2), 78–95.
- Gonzalez-Benito, J., & Gonzalez-Benito, O. (2006). The role of stakeholder pressure and managerial values in the implementation of environmental logistics practices. *International Journal of Production Research*, 4(7), 1353–1373.
- Hall, J. (2001). Environmental supply chain innovation. *Greener Management International*, 35, 105–119.
- Harms, D., Hansen, E. G., & Schaltegger, S. (2013). Strategies in sustainable supply chain management: An empirical investigation of large German companies. *Corporate Social Responsibility and Environmental Management*, 20, 205–218.
- Herremans, I. M., & Reid, E. R. (2002). Developing awareness of the sustainability concept. *The Journal of Environmental Education*, 34(1), 16–20.

- Hofer, C., Cantor, D. E., & Dai, J. (2012). The competitive determinants of a firm's environmental management activities: Evidence from US manufacturing industries. *Journal of Operations Management*, 30(1), 69–84.
- Hoffman, A. J., & Bazerman, M. H. (2005). *Changing environmental practice: Understanding and overcoming the organizational and psychological barriers*. MICHIGAN Ross School of Business Working Paper Series. Working Paper No. 923. Retrieved February 22, 2017, from <http://ssrn.com/abstract=663564>.
- Holt, D., & Ghobadian, A. (2009). An empirical study of green supply chain management practices amongst UK manufacturers. *Journal of Manufacturing Technology Management*, 20(7), 933–956.
- Horvathova, E. (2010). Does environmental performance affect financial performance? A meta analysis. *Ecological Economics*, 70(1), 52–59.
- Izadikhah, M., & Saen, R. F. (2016). Evaluating sustainability of supply chains by two-stage range directional measure in the presence of negative data. *Transportation Research Part D Transport and Environment*, 49, 110–126.
- Jain, V. K., & Sharma, S. (2014). Drivers affecting the green supply chain management adaptation: A review. *The IUP Journal of Operations Management*, 13(1), 54–63.
- Jakhar, S. K. (2014). Performance evaluation and a flow allocation decision model for a sustainable supply chain of an apparel industry. *Journal of Cleaner Production*, 87, 391–413.
- Klassen, R. D., & Vereecke, A. (2012). Social issues in supply chains: Capabilities link responsibility, risk (opportunity) and performance. *International Journal of Production Economics*, 140(1), 103–115.
- Kolk, A., & Pinkse, J. (2004). Market strategies for climate change. *European Management Journal*, 22(3), 304–314.
- Konar, S., & Cohen, M. A. (2001). Does the market value environmental performance? *Review of Economics and Statistics*, 83(2), 2814–2890.
- KPMG. (2005). *International survey of corporate responsibility reporting 2005*. Retrieved January 03, 2017, from <https://home.kpmg.com/xx/en/home/insights/2015/11/kpmg-international-survey-of-corporate-responsibility-reporting-2015.html>.
- Lankoski, L. (2016). Alternative conceptions of sustainability in business context. *Journal of Cleaner Production*, 139, 847–857.
- Linton, J. D., Klassen, R., & Jayaraman, V. (2007). Sustainable supply chains: An introduction. *Journal of Operations Management*, 25(6), 1075–1082.
- Marshall, J. D., & Toffel, M. W. (2005). Framing the elusive concept of sustainability: A sustainability hierarchy. *Environmental Science and Technology*, 39(3), 673–682.
- Matos, S., & Hall, J. (2007). Integrating sustainable development in the supply chain: The case of life cycle assessment in oil and gas and agricultural biotechnology. *Journal of Operations Management*, 25(6), 1083–1102.
- Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., & Zacharia, Z. G. (2001). Defining supply chain management. *Journal of Business Logistics*, 22(2), 1–25.
- Miemczyk, J., Johnson, T. E., & Macquet, M. (2012). Sustainable purchasing and supply management: A structured literature review of definitions and measures at the dyad, chain and network levels. *Supply Chain Management: An International Journal*, 17(5), 478–496.
- Montabon, F., Sroufe, R., & Narasimhan, R. (2007). An examination of corporate reporting, environmental management practices and firm performance. *Journal of Operations Management*, 25, 998–1014.
- Muller, M., Gomes dos Santos, V., & Seuring, S. (2009). The contribution of environmental and social standards towards ensuring legitimacy in supply chain governance. *Journal of Business Ethics*, 89(4), 509–523.
- Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate social and financial performance: A metaanalysis. *Organization Studies*, 24(3), 403–441.
- Pagell, M., & Shevchenko, A. (2014). Why research in sustainable supply chain management should have no future. *Journal of Supply Chain Management*, 50(1), 1–32.

- Pagell, M., & Wu, Z. (2009). Building a more complete theory of sustainable supply chain management using case studies of 10 exemplars. *Journal of Supply Chain Management*, 45(2), 37–56.
- Perotti, S., Zorzini, M., Cagno, E., & Micheli, G. J. L. (2012). Green supply chain practices and company performance: The case of 3PLs in Italy. *International Journal of Physical Distribution & Logistics Management*, 42(7), 640–672.
- Pil, F. K., & Rothenberg, S. (2003). Environmental performance as a driver of superior quality. *Production and Operations Management*, 12(3), 404–415.
- Plambeck, E. L. (2013). OM forum-operations management challenges for some Cleantech firms. *Manufacturing and Service Operations Management*, 15(4), 527–536.
- Potoski, M., & Prakash, A. (2005). Covenants with weak swords: ISO 14001 and facilities' environmental performance. *Journal of Policy Analysis and Management*, 24(4), 745–769.
- Pullman, M. E., Maloni, M. J., & Carter, C. R. (2009). Food for thought: Social versus environmental sustainability practices and performance outcomes. *Journal of Supply Chain Management*, 45(4), 38–54.
- Sadler, S. (1990). Sustainable development and water resources management. *Alternatives*, 3(17), 14–24.
- Sarkis, J., Zhu, Q., & Lai, K. H. (2011). An organizational theoretic review of green supply chain management literature. *International Journal of Production Economics*, 130, 1–15.
- Schein, E. (1993). *Organizational culture and leadership*. New York: Harcourt Brace.
- Schoenherr, T. (2012). The role of environmental management in sustainable business development: A multi-country investigation. *International Journal of Production Economics*, 140(1), 116–128.
- Seuring, S., & Müller, M. (2008a). Core issues in sustainable supply chain management – a Delphi study. *Business Strategy and the Environment*, 17(8), 455–466.
- Seuring, S., & Müller, M. (2008b). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production*, 16(15), 1699–1710.
- Shambu, G., & College, C. (2015). Using the fast fashion supply chain to teach sustainability. *Business Education Innovation Journal*, 7(1), 1.
- Sharfman, M. P., Shaft, T. M., & Anex, R. P. (2009). The road to cooperative supply-chain environmental management: Trust and uncertainty among pro-active firms. *Business Strategy and the Environment*, 18(1), 1–13.
- Shearman, R. (1990). The meaning and ethics of sustainability. *Environmental Management*, 14(1), 1–8.
- Sikdar, S. K. (2003). Sustainable development and sustainability metrics. *AIChE Journal*, 49(8), 1928–1932.
- Skjoett-Larsen, T., Thernøe, C., & Andresen, C. (2003). Supply chain collaboration: Theoretical perspectives and empirical evidence. *International Journal of Physical Distribution and Logistics Management*, 33(6), 531–549.
- Srivastava, S. K. (2007). Green supply chain management: A state of the art literature review. *International Journal of Management Reviews*, 9(1), 53–80.
- Svensson, G. (2007). Aspects of sustainable supply chain management (SSCM): Conceptual framework and empirical example. *Supply Chain Management*, 12(4), 262–266.
- UNGC. (2010). *A new era of sustainability in the utilities industry*. Retrieved February 17, 2017, from [https://www.accenture.com/t20150527T202823\\_\\_w\\_/gb-en/\\_acnmedia/Accenture/Conversion-Assets/LandingPage/Documents/2/Accenture-UNGC-Utilities-Industry.pdf](https://www.accenture.com/t20150527T202823__w_/gb-en/_acnmedia/Accenture/Conversion-Assets/LandingPage/Documents/2/Accenture-UNGC-Utilities-Industry.pdf).
- Vachon, S., & Klassen, R. D. (2006). Extending green practices across the supply chain: The impact of upstream and downstream integration. *International Journal of Operations and Production Management*, 26(7), 795–821.
- Van Velsor, E. (2009). Introduction: Leadership and corporate social responsibility. *Corporate Governance*, 9(1), 3–6.
- Varsei, M. (2016). *Sustainable supply chain management: A brief literature review*. Special issue on Dubai Conference held in June 2016. Australian Institute of Business, Australia.

- Walker, H., Disito, L., & McBain, D. (2008). Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors. *Journal of Purchasing and Supply Management*, 14(1), 69–88.
- Walley, N., & Whitehead, B. (1994). It's not easy being green. *Harvard Business Review*, 72(3), 46–52.
- World Business Council for Sustainable Development (WBCSD). (2002). *The business case for sustainable development*. Retrieved January 23, 2017, from <http://www.wbcsd.org/work-program/sector-projects/cement/local-impacts.aspx>.
- World Commission on Environment and Development. (1987). *Our common future*. New York: Oxford University Press.
- Wu, G. C., Ding, J. H., & Chen, P. S. (2012). The effects of GSCM drivers and institutional pressures on GSCM practices in Taiwan's textile and apparel industry. *International Journal of Production Economics*, 135(2), 618–636.
- Wu, T., Jim Wu, Y. C., Chen, Y. J., & Goh, M. (2014). Aligning supply chain strategy with corporate environmental strategy: A contingency approach. *International Journal of Production Economics*, 147, 220–229.
- Wu, Z., & Pagell, M. (2011). Balancing priorities: Decision-making in sustainable supply chain management. *Journal of Operations Management*, 29(6), 577–590.
- Yusuf, Y. Y., Gunasekaran, A., Musa, A., El-Berishy, N. M., Abubakar, T., & Ambursa, H. M. (2013). The UK oil and gas supply chains: An empirical analysis of adoption of sustainable measures and performance outcomes. *International Journal of Production Economics*, 146(2), 501–514.
- Zailani, S., Eltayeb, T., Hsu, C., & Tan, K. (2012). The impact of external institutional drivers and internal strategy on environmental performance. *International Journal of Operations and Production Management*, 32(6), 721–745.
- Zhu, Q., & Sarkis, J. (2006). An inter-sectoral comparison of green supply chain management in China: Drivers and practices. *Journal of Cleaner Production*, 14(5), 472–486.
- Zhu, Q., & Sarkis, J. (2007). The moderating effects of institutional pressures on emergent green supply chain practices and performance. *International Journal of Production Research*, 45 (18–19), 4333–4355.
- Zuckerman, A. (2000). Ford, GM set ISO 14000 requirements. *Iron Age New Steel*, 16(3), 58–60.



# The Model of Assessing the Innovativeness of Public Entities Obligated to Carry Out Public–Private Partnership Projects



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**Abstract** Public–Private Partnership (PPP) is one of the innovative economic instruments allowing for the acceleration of development and investment, especially during economic downturn. Literature studies show a paucity of items related to the issues of improving the innovativeness with the use of PPP. While recognizing this gap the article attempts to build a model to assess the innovativeness of public entities obliged to initiate and implement PPP projects. Network thinking methodology has been used to build the model. As a result, after the identification of factors affecting the innovativeness of PPP projects, a network of links has been established between them and examined in terms of type and intensity of exposure. Building a model according to the methodology involved using the opinions of experts along with long-term suggestions and opinions conducted in the course of participation in all kinds of conferences and trainings. The model was also subjected to validation by two selected entities. Results obtained from the use of the model are confirmed by low innovativeness of public entities obliged to carry out PPP projects. The model itself can promote entities that contribute to the formation of innovativeness and results in their fairer assessment.

**Keywords** Macroeconomic policy · Policy making · Innovations · Public–private partnership

## 1 Introduction

Public–private partnerships serve the purpose of executing public tasks in numerous countries around the world (Tkacheva and Afanasjefa 2017). It is increasingly difficult to find a region of the world where PPP has not been implemented. In Great Britain, these partnerships are developed to the highest extent. The official launch of PPP over there dates back to 1992, and despite passing years, Great Britain

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continues to lead the way in implementing this kind of solution. Other European countries widely using PPPs include Ireland, Spain, Germany, the Netherlands, Portugal, France; and globally—Australia and the USA. It is also worth emphasizing that public–private partnership market in Poland has been developing very slowly in comparison to the rest of Europe.

Public–private partnerships are designed to boost development and investment, which is particularly important in times of economic downturn. Public–private sector co-operation is an innovative form of investment that benefits both sides, but society remains its greatest beneficiary. Public–private partnerships serve innovativeness in two ways. Firstly, PPP itself remains an innovative model for the implementation of public tasks. The second dimension of the positive impact of PPPs on innovation is the growing importance of the public procurement market, which is becoming an important space for implementing innovative solutions. The public sphere in which the partnership projects are implemented may be considered a “test ground” for commercial entities—a place where new services or products are confronted with the market. A private partner gains an opportunity to develop their innovation, while a public one obtains a modern solution based on the most up-to-date knowledge and technology. Not without reason innovativeness of technical and organizational solutions remains among the basic factors determining the so-called Value for Money—the added value resulting from the implementation of projects in the PPP formula (Almarri and Boussabaine 2017).

Public entities may promote innovation by specifying the shape and terms of investments that are the subject of a PPP contract. Such a pro-innovative approach, however, requires a fundamental change in a way public sector operates: from an attitude of someone who orders and demands to an attitude of someone who asks and discusses. PPP positively stimulates innovation in the economy only when the public sector is fully committed to working with the commercial sector. The choice of innovative solutions requires from public partners—the contracting authorities—to become acquainted with the current state of the art and technology in a given field.

Public–private partnership fosters innovativeness not only at the level of the final solution (the implementation of an innovative public service) but also during its development. The results of the work of the private partner are primarily relevant for public entities, and in terms of how the results are achieved, the public side can rely on knowledge and experience of commercial partners. As a result of this investment, entrepreneurs are not baffled by bureaucratic procedures and can use innovative, cost-effective, techno-technological, organizational and process solutions. No other form of public sector partnership provides the other with so much freedom in the choice of techniques and methods of work.

In the literature, the problem of innovation is described very broadly. Similarly, there are multiple publications regarding public–private partnerships. However, it is difficult to find a link between this issue and the assessment of public entities. This problem, constituting a research gap, to a large extent determined the choice of the subject of this article. Against the background of these considerations, one should also consider how to assess the innovativeness of individuals obliged to implement public–private partnership projects. Looking for an answer to this question, the

article attempts to build an original model of innovation assessment of these units using expert opinion and conclusions resulting from participation in various conferences and training. The analysis used the methodology of network thinking according to the following three professors: Gomez, Probst and Ulrich (Probst and Gomez 1989), which is based on Systems Theory.

The selection of factors included in the model as well as the strength of interactions between them were established among a group of 35 employees of public entities obliged to undertake PPP projects, 12 contractors with experience in participating in such projects, and 3 academic lecturers working closely with this issue. This deliberate selection was aimed at obtaining the opinions of people professionally connected with the PPP market. From the point of view of the issues discussed in this article, the analysis omits the time factor related to the interaction of factors within a network.

## 2 Selected Concepts of Innovation

Literature abounds in numerous definitions of innovation. The concept of innovation was introduced in economic sciences by Schumpeter (1960). According to Schumpeter innovation refers to putting new solutions into practice. He focuses primarily on technical innovations and their impact on the economy. Any dissemination of innovation remains a distinct kind of change, called imitation. Schumpeter is the author of the concept of the so-called creative destruction, which consists of continuous destruction of old structures and continuous creation of new, more and more effective ones. Its definition is the starting point for considering the importance of innovation in the economy. Interest in innovation has evolved over the years, just as global economy has changed. Schumpeter's classic approach had worked until the Second World War. Against the background of Schumpeter's theory of supply there have emerged other, often opposing ones, such as Schmookler's (1966) demand theory or supply-demand theory by Oppenländer (2000). The latest understanding of the concept of innovation assumes that innovation is an interactive and systemic process (Koschatzky 2017).

By analyzing the notion of innovation in the subject literature, it is possible to come across both broad and narrow definitions. In the narrow sense, innovation is an invention that finds certain use, but in a broader sense it is the whole process of management, which involves a variety of activities, leads to creation, development and introduction of new values in products or new combinations of resources that are new for the entity making or introducing them. The broadly perceived innovations also involve transferring these values to existing or new market partners and can result from the work of a group of companies (Niedzielski and Rychlik 2006). This article uses the concept of innovation *sensu largo*.

The broad understanding of innovation is offered by Oslo Manual (OECD 2005). According to this manual, innovation refers to the implementation of a new or significantly improved product (or service) or process, a new marketing method or

a new organizational method in business practice, workplace organization or the environment. The Oslo Handbook is a document issued by the Organization for Economic Co-operation and Development (OECD), which discusses methods for collecting and interpreting innovation indicators. Its purpose is to provide internationally accepted methodological guidelines for collecting and interpreting statistics related to innovation issues and innovations with an asset of the so-called international comparability.

### **3 Construction of a Model for Evaluating the Innovativeness of Public Entities Implementing Public–Private Partnership Projects**

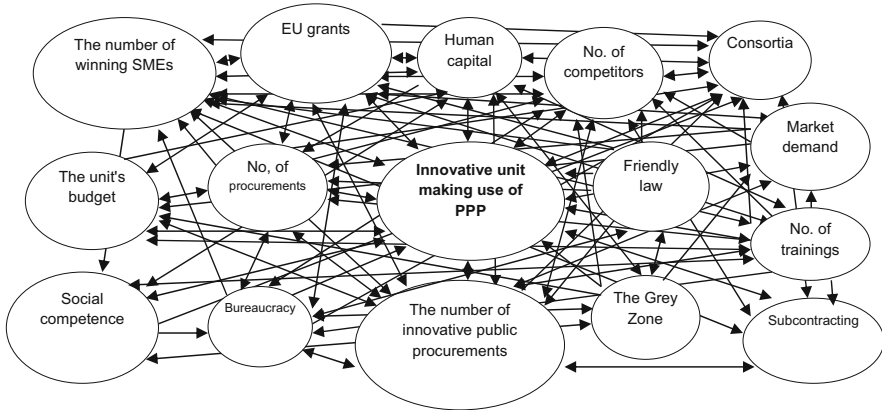
#### ***3.1 The Network of Dependencies of Factors Influencing the Innovativeness of PPP Proceedings***

The focus of system analysis is to investigate and explain important issues. This helps the decision-making process and the choice of specific actions (Piekarczyk and Zimmiewicz 2010, p. 43). This is why it is ideally suited to accurately diagnose links between public–private partnerships and to accurately define and understand PPP market terms, while exposing key factors influencing the innovativeness of PPP proceedings on behalf of entities obliged to do so.

The methodology of network thinking consists of six interrelated phases: goal setting and problem modeling, impact analysis, the interpretation of opportunities for change, the clarification of leadership possibilities, strategy and action planning. In practice, these phases are not sequential as solving problems with methodology requires multiple attempts to go through them.

Therefore, with a clearly defined purpose, a network of links between the factors affecting the problem should be created. Due to the issues adopted in this article, it was decided that the center of the network would include a factor called an innovative unit using PPP. After a discussion among a group of experts, it was assumed that the following elements of the network will remain connected to it: EU subsidies, the number of innovative public procurement contracts, human capital, subcontracting, consortia, friendly law, winning SMEs, bureaucracy, gray zone, the number of trainings, market demand, the number of competitors, budget of a unit, the number of competitions, social competences. A network of relationships between these factors is shown in Fig. 1.

After presenting the factors in a network of links, one should analyze the interactions between them in the following two sections: the type and the intensity of their interaction. There are the following two types of interactions: isotropic one-way interactions and opposing interactions. The analysis of impact type, as well as its intensity, was re-conducted among 50 experts. The selection of factors included in the model as well as the strength of interactions between them were



**Fig. 1** Network of dependencies between factors influencing the innovativeness of public entities implementing PPP projects. Source: Own study

established among a group of 35 employees of public entities obliged to undertake PPP projects, 12 contractors with experience in participating in such projects, and 3 academic lecturers working closely with this issue. Determining the intensity of the impact was supported by the intensity matrix shown in Table 1.

It was determined that the intensity would be determined on a four-point scale (0–3), where “0” means no impact, while “3”—a very intense impact. After the matrix is created, it is important to identify which factors in the network remain active (i.e. very strongly influence other elements, but are not influenced themselves), passive (they influence other elements very little, but are strongly influenced themselves), critical (strongly influence other elements, but at the same time, are subject to strong influences themselves), and which are lazy (they have little influence on other elements, and are subject only to weak influences themselves).

The nature of the factors allowed identifying the intensity map, as shown in Fig. 2. Due to the potential for change in the system and the power of action, the key elements influencing the innovativeness of public entities implementing public–private partnership projects are both the active and the critical factors. While creating an intensity map, it is extremely important to draw a boundary between the factors. In this analysis it is assumed that the dividing lines will extend in places that are formed by dividing the maximum value of A and P by 2. Thus obtained values are  $A = 15$  and  $P = 14$ .

The intensity map shows that the key drivers influencing innovativeness of public entities conducting public–private partnership projects are the following: the number of winning SMEs (2), EU grants (3), the number of competitions (8), the number of training courses (11), the number of innovative public procurement (14). At this stage it is useful to determine which of these factors are controllable by public entities, and which are not affected. Undoubtedly, all the listed factors are manageable. Indeed, the number of competitions (8) lies at the crossroads between critical and passive factors; however, due to the specificity of the public–private partnership

**Table 1** Influence matrix

| No  | Name of the factor                           | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Sum of activity |
|-----|--|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|-----------------|
| 1.  | Innovative unit making use of PPP            | X  | 2  | 3  | 2  | 1  | 2  | 1  | 2  | 0 | 1  | 2  | 1  | 0  | 3  | 0  | 1  | 21              |
| 2.  | The number of winning SMEs                   | 2  | X  | 1  | 1  | 2  | 3  | 0  | 0  | 0 | 0  | 1  | 1  | 0  | 3  | 0  | 2  | 16              |
| 3.  | EU grants                                    | 3  | 3  | X  | 2  | 3  | 1  | 3  | 3  | 0 | 3  | 3  | 0  | 3  | 3  | 0  | 0  | 30              |
| 4.  | Human capital                                | 2  | 2  | 3  | X  | 0  | 1  | 0  | 1  | 0 | 0  | 1  | 1  | 0  | 1  | 1  | 0  | 13              |
| 5.  | The number of competitors                    | 1  | 2  | 1  | 0  | X  | 2  | 0  | 0  | 0 | 0  | 0  | 0  | 1  | 1  | 0  | 1  | 9               |
| 6.  | Consortia                                    | 1  | 3  | 0  | 1  | 2  | X  | 0  | 0  | 0 | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 8               |
| 7.  | The unit's budget                            | 2  | 0  | 2  | 2  | 0  | 0  | X  | 2  | 0 | 0  | 2  | 0  | 0  | 2  | 0  | 0  | 12              |
| 8.  | The number of competitions                   | 2  | 1  | 1  | 0  | 3  | 2  | 1  | X  | 0 | 0  | 0  | 0  | 2  | 3  | 0  | 0  | 15              |
| 9.  | Friendly law                                 | 2  | 2  | 2  | 0  | 1  | 0  | 0  | 1  | X | 0  | 0  | 0  | 2  | 2  | 0  | 0  | 14              |
| 10. | Market demand                                | 2  | 2  | 2  | 0  | 1  | 0  | 2  | 1  | 0 | X  | 0  | 0  | 0  | 3  | 0  | 0  | 13              |
| 11. | The number of trainings                      | 3  | 2  | 3  | 3  | 1  | 1  | 2  | 2  | 0 | 1  | X  | 2  | 2  | 3  | 0  | 1  | 26              |
| 12. | Social competence                            | 2  | 0  | 0  | 2  | 0  | 1  | 0  | 0  | 0 | 0  | 1  | X  | 2  | 0  | 2  | 0  | 10              |
| 13. | Bureaucracy                                  | 1  | 1  | 1  | 0  | 1  | 1  | 0  | 1  | 2 | 0  | 0  | 0  | X  | 1  | 1  | 0  | 10              |
| 14. | The number of innovative public procurements | 3  | 2  | 3  | 3  | 2  | 2  | 2  | 2  | 0 | 3  | 3  | 0  | 2  | X  | 0  | 2  | 29              |
| 15. | The Grey Zone                                | 1  | 0  | 0  | 1  | 1  | 0  | 1  | 0  | 2 | 1  | 0  | 2  | 1  | 0  | X  | 0  | 10              |
| 16. | Subcontracting                               | 1  | 1  | 0  | 0  | 1  | 1  | 0  | 0  | 0 | 0  | 0  | 0  | 0  | 1  | 0  | X  | 5               |
|     | The sum of passivity                         | 28 | 23 | 22 | 17 | 19 | 17 | 12 | 15 | 4 | 9  | 13 | 7  | 15 | 26 | 6  | 8  |                 |

Source: Own study

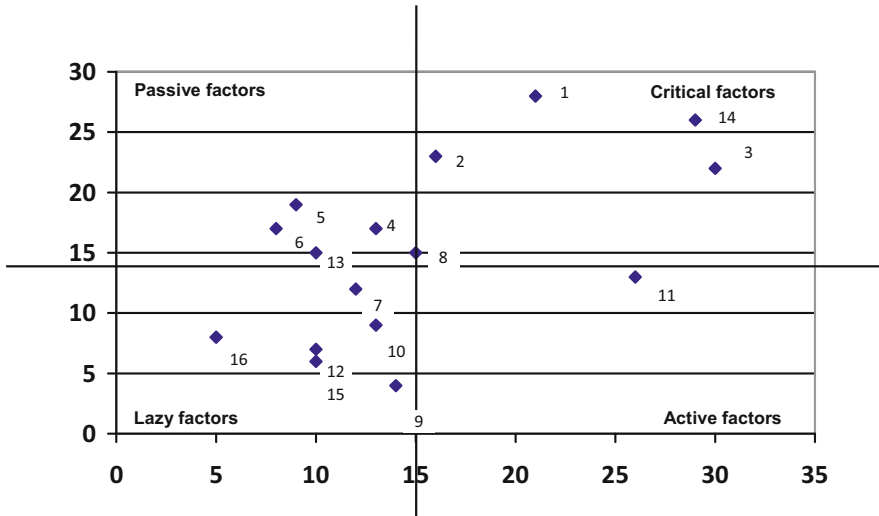


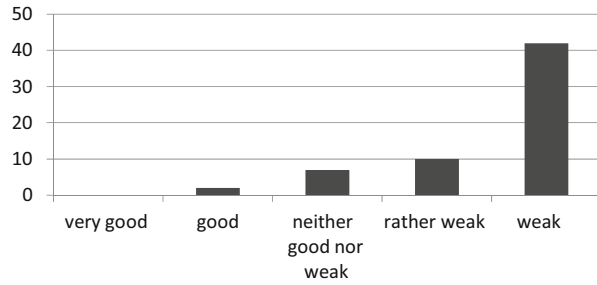
Fig. 2 Intensity map. Source: Own study

market and the freedom that network thinking methodology provides for researchers, it may be included in further consideration. It is also worth to briefly describe the factors revealed by the group of experts.

The number of small and medium size enterprises winning PPP procedures is determined by the size of the project and the criteria imposed by public entities. Stereotypically it is believed that PPP investments are reserved mainly for the largest companies. However, according to the research, this is not entirely true (Borowiec 2012). The smallest projects in Poland to be implemented by local governments in the PPP formula mostly include underground parking lots and swimming pools. This is undoubtedly due to good examples of the implementation of such investments between public and private entities. There are also a lot of small PPP facilities in the area of housing and real estate projects. An example of the implementation of a PPP-based project by SMEs is the construction, financing and operation of the motorway section of Athens orbital (Gajewska-Jedwabny 2007). The winning consortium of Attiki Odos joint-stock Company involved 14 Greek companies of different sizes. Construction works could only be carried out in this case by the allocation of both government funding and private financing. The agreed funding of the project covered government subsidies (through EU Structural Funds) of nearly 34% and 14% of the cost covered by sponsors. The European Investment Bank provided loans for 45% of the required funds and the remaining 7% was provided by commercial banks.

EU subsidies are an important element in the development and modernization of numerous European Union member states. Involving the private sector to carry out public tasks and thus gaining additional funding should further strengthen the scale of EU funding for the innovativeness of proceedings. Nonetheless, hybrid projects have to face a number of additional obligations carried by the EU funds (such as the

**Fig. 3** Competence of officials in PPP procedures.  
Source: Own study



duration of the task, which cannot exceed the funding disbursement deadline, reporting obligations, sustainability obligations, the obligation to promote and inform about co-financing). The big challenge for this type of projects is to build a financial model that must be as realistic as possible.

The number of procurements before public–private partnership proceedings is a solution linked to the presentation and selection of innovative projects. The procurement involves participants presenting projects, which are appraised by the jury appointed by the contracting authority. At this stage it is possible to present innovative solutions that, once accepted and evaluated, can be implemented. It is important, however, for the entries to be actions which are in fact creations, since it is desired that the subject of the procurement remains protected and its rights were transferred to the contractor (Starzyńska 2011).

The number of trainings allows overcoming the barrier of the lack of competence diagnosed in public entities. Figure 3 shows the results of own research on competencies in knowledge of PPP procedures among public officials.

The impact of trainings for staff preparing PPP-related procedures on their innovativeness seems to be undisputed. The number of innovative public procurements concerns those entities which are obliged to conduct tenders and initiate PPPs. They constitute a good tool for shaping pro-innovation attitudes on behalf of both contracting authorities and entrepreneurs. In Poland a new mode of awarding contracts serves this purpose—an innovative partnership. The purpose of Innovative Partnership is to develop an innovative product, service or construction work not available on the market and to sell this innovative product, service or construction work, provided that they correspond to performance levels and maximum costs agreed between the contracting authority and the partners. The use of this mode should be preceded by an in-depth market analysis to determine whether there is a solution that meets the expectations of contracting authorities or whether there is a need for a new solution.



### 3.2 *Model for Assessing Innovativeness of Public Entities Obligated to Implement PPP Projects*

To objectively assess changes in a public administration unit, and thus in the whole national economy, it is necessary to rely primarily on factors, which are directly influenced by the analyzed entity. Therefore, the starting point in the selection of the factors used for its assessment should be an ability to influence them by deliberate actions undertaken by this entity's management. Such reasoning leads to a situation where it is necessary to use manageable factors identified in the methodology of network thinking as part of the factors used to construct the innovation assessment model of a public entity obligated to implement PPP projects. As mentioned above, these factors include the number of winning SMEs, EU subsidies, the number of procurements, the number of trainings and the number of innovative public contracts.

In order to choose the weights for each of the factors that form this model, one can use the total amount of activity accumulated by each factor in the experts' assessment. Table 2 lists all the factors outlined in the study, together with their combined effect on the remaining ones and the calculated weight.

To indicate the percentage weight of each factor, the total sum of their activity was determined and subsequently divided by activity value of each factor. Having determined the percentage weight of each factor included in the model, it is possible to proceed to its presentation. Its final form has been shown in Table 3.

It is very important to interpret the obtained results with the use of a model. The author, similarly as in the case of the analogous model of innovation assessment of public administration units awarding public contracts, (Borowiec 2015) proposes to adopt the following limits:

- 100–76%—the highest innovativeness,
- 75–51%—high innovativeness,
- 50–26%—moderate innovativeness,
- 25–0%—low innovativeness.

The validation of the model was carried out at two public entities conducting the same kind of activity and located in Poland and in Sweden. The data collected by the units supplemented by interviews with their management gave rise to Table 4. As

**Table 2** Factors related to building the model of innovativeness of public entities obligated to implement PPP projects

| Name of the factor                           | Strength of influence | Weight (%) |
|--|-----------------------|------------|
| The number of winning SMEs                   | 16                    | 14         |
| EU grants                                    | 30                    | 26         |
| The number of procurements                   | 15                    | 13         |
| The number of trainings                      | 26                    | 22         |
| The number of innovative public procurements | 29                    | 25         |

Source: Own study

**Table 3** Model of innovation assessment of public entities implementing PPP projects

| Factor                                       | The method of calculation   | Weight (%) |
|--|---|------------|
| The number of winning SMEs                   | Number of procurements leading to the conclusion of PPP contracts with the SME sector company/total number of proceedings     | 14         |
| EU grants                                    | Number of proceedings using EU subsidies in the PPP formula/total number of PPP proceedings                                   | 26         |
| The number of procurements                   | Number of proceedings used by the procurement unit/total number of proceedings  | 13         |
| The number of trainings                      | Number of training courses related to innovative PPP proceedings/total number of training courses conducted by employees      | 22         |
| The number of innovative public procurements | Number of public contracts concluded with an innovative service, delivery or construction/total number of completed contracts | 25         |
| Innovativeness total                         |   | 100        |

Source: Own study

**Table 4** The use of the innovativeness assessment model in selected entities

| Factor               | A Polish entity |            |            | A Swedish entity |            |            |
|----------------------|-----------------|------------|------------|------------------|------------|------------|
|                      | Ratio           | Weight (%) | Result (%) | Ratio            | Weight (%) | Result (%) |
| LMSP                 | 0.38            | 14         | 5.32       | 0.76             | 14         | 10.64      |
| DU                   | 0.32            | 26         | 8.32       | 0.32             | 26         | 8.32       |
| LK                   | 0.05            | 13         | 0.65       | 0.33             | 13         | 4.29       |
| LSZ                  | 0.04            | 22         | 0.88       | 0.52             | 22         | 11.44      |
| LIZP                 | 0.03            | 25         | 0.75       | 0.72             | 25         | 18         |
| Innovativeness total |                 |            | 15.92      |                  |            | 52.69      |

Source: Own study based on test results

indicated by the data obtained on the basis of surveys involving public entities in Poland and Sweden, Polish entities should be classified as low-performing institutions, while the Swedish ones generate high-level innovativeness in the PPP area. The survey reflects the situation of Poland and Sweden in the ranking of the most innovative economies of the European Union. Not without reason Sweden is the leader and Poland ranks 23rd among 28 countries in the Community.

The biggest differences can be seen in terms of the so-called innovative public procurement and the number of training courses on public-private partnerships. Only in one criterion Poland matches Sweden. It involves the use of EU grants for infrastructure development. The example of the Polish entity shows how much still has to be done in terms of using the factors that create innovative PPP projects, and how much distance separates Poland from European leaders in this regard.

## 4 Conclusion

In today's economy, implementing innovation is the prerequisite for market success and competitive advantage. There is a shortage of tools in the literature to measure the innovativeness of public bodies responsible for the preparation and conduct of public–private partnership procedures. Due to the presentation of the author's model, this article is an attempt to begin a broader discussion of this issue among both scientists and practitioners.

Research results show that key factors behind the innovativeness of these units should include the following: the number of SMEs winning contracts, EU grants, the number of procurements, and the number of trainings and the number of innovative public contracts. While listing the advantages of being able to evaluate the innovativeness of public entities and thus the ability to allocate resources more efficiently, the author of this paper is also aware of some of the limitations associated with adapting the model to practical applications.

These limitations undoubtedly include legal and procedural barriers to contracting using the PPP instrument. Not every public contract and project implemented by a PPP entity can be innovative or implemented by a small or a medium-sized enterprise. It is not always possible for a public entity to seek and raise funds from the European Union. If the number of trainings was to decide on the amount allocated to a public entity, then there is a threat that such a body could deliberately participate in ineffective trainings in order to gather a competitive number of such trainings. It is also worth remembering the dangers mentioned by Simpson (Simpson et al. 2006) and Audretsch (1995), as well as Malerba and Orsenigo (1996) regarding the market structure influencing innovativeness or market risk. These doubts constitute the basis for further research into the appropriateness and effectiveness of using the model in practice. The research conducted for this article clearly indicates that, especially in Poland (which remains in the tail of European Union Member States) in terms of economic innovativeness, such a tool may be needed by decision-makers to create a more effective economic policy than ever before.

In conclusion, it should also be noted that Poland, where the research was conducted, despite boasting advanced PPP legislation has one of the lowest rates in Europe for using this instrument. It is, therefore, worth to provide practitioners and decision makers with tools that would facilitate making a better use of this instrument.

## References

- Almari, K., & Boussabaine, H. (2017). The influence of critical success factors on value for money viability analysis in public–private partnership projects. *Project Management Journal*, 48(4), 93–106.

- Audretsch, D. B. (1995). The propensity to exit and innovation. *Review of Industrial Organization*, 10(5), 589–605. <https://doi.org/10.1007/BF0102688>.
- Borowiec, A. (2012). Perspectives for the application of public-private partnerships in the SME sector in the light of empirical research. *Zeszyty Naukowe Uniwersytetu Szczecińskiego*, 696, 30–39.
- Borowiec, A. (2015). A model assessing innovativeness of administration units awarding public contracts as a tool to conduct economic policy of the state. *Equilibrium*, 10(2), 93–114. <https://doi.org/10.12775/EQUIL.2015.015>.
- Gajewska-Jedwabny, A. (2007). Institutional support for the development of PPP in the world. *Gazeta Samorządu i Administracji*, No. 15/16 (241/242).
- Koschatzky, K. (2017). *A theoretical view on public-private partnerships in research and innovation in Germany*. Working Papers Firms and Region, No. R2/2017.
- Malerba, F., & Orsenigo, L. (1996). Schumpeterian patterns of innovation are technology-specific. *Research Policy*, 25(3), 451–478. [https://doi.org/10.1016/0048-7333\(95\)00840-3](https://doi.org/10.1016/0048-7333(95)00840-3).
- Niedzielski, P., & Rychlik, K. (2006). *Innovation and creativity*. Szczecin: Uniwersytet Szczeciński.
- OECD. (2005). *Oslo manual. Guidelines for collecting and interpreting innovation data*. Paris: Organisation for Economics Cooperation and Development, Statistical Office of the European Communities.
- Oppenländer, K. H. (2000). *Empirische Wirtschaftsforschung als Grundlage für unternehmerisches und wirtschaftspolitisches Handeln [Empirical economic research as a basis for entrepreneurial and economic policy action]*. Berlin: Duncker und Humboldt.
- Piekarczyk, A., & Zimniewicz, K. (2010). *Network thinking in theory and practice*. Warszawa: PWE.
- Probst, G., & Gomez, P. (1989). *Vernetztes Denken, Unternehmen ganzheitlichen führen [Connected thinking, company holistic lead]*. Wiesbaden: Gabler.
- Schmookler, J. (1966). *Invention and economic growth*. Cambridge: CUP.
- Schumpeter, J. (1960). *Economic development theory*. Warszawa: PWN.
- Simpson, P. M., Siguaw, J. A., & Enz, C. A. (2006). Innovation orientation outcomes: The good and the bad. *Journal of Business Research*, 59(10–11), 1133–1141. <https://doi.org/10.1016/j.jbusres.2006.08.001>.
- Starzyńska, W. (2011). Innovation and public procurement system in the opinion of contracting entities. In J. Niczyporuk, J. Sadowy, & M. Urbanek (Eds.), *New approach to public procurement – public procurement as an instrument for enhancing the economy's innovation and sustainability. Polish and foreign experiences* (pp. 183–191). Warszawa: Urząd Zamówień Publicznych.
- Tkacheva, T., & Afanasjewa, L. (2017). Public-private partnership as an encouragement tool of innovative development. *Journal of Applied Engineering Science*, 15(3), 242–246.

# Impact of Managers' Innovation Perception on Innovation Activities and Innovation Strategies in Hotel Businesses



Ayhan Karakaş, Yusuf Bilgin, and Muhammed Raşit Yıldız

**Abstract** The purpose of this study is to examine the impact of managers' innovation perceptions on innovation activities and innovation strategies in hotel business. The research also examined the relationship between innovation types applied in hotel businesses and innovation strategies. Quantitative method was used in the research. The universe of the research constitutes hotel businesses operating in the Western Black Sea Region. Survey data were obtained using questionnaire technique. As a result of the analysis, it is determined that the innovation perceptions of the managers of the hotel businesses has an effect on the types of innovations applied in the businesses. Nevertheless, it has been determined that business managers' perceptions of innovation have no meaningful effect on innovation strategies applied to the business. In other words, it has been reached that the innovation strategies of the businesses are determined by the variables other than the innovation perceptions of the managers. The research also find that there is a relationship between innovation types applied in hotel businesses and innovation strategies.

**Keywords** Innovation perception · Innovation activities · Innovation strategies · Hotel business

## 1 Introduction

In today's competitive markets, innovation is becoming increasingly important and a necessity as an option for businesses. Every business needs innovation activities according to its position (market conditions, economic conditions and management

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function of the business). In businesses, those who need or feel the need are managers in a decision-making position. The tendency of managers to innovate is influenced by many factors. Competitors and market conditions for businesses in the position of followers in the market are often the driving forces of innovation. However, for the businesses in the leading position in the market, the leading element of innovation is to maintain market leadership through brand value and image. In addition, the negative view of the manager can be the biggest obstacle to innovativeness, while the fact that an executive believes that innovation activities will benefit the enterprise brings with it the effective application of innovation.

While some managers see innovation as a very complex process, some managers see it as an opportunity to get out of the crisis. In this study, the purpose of measuring the business managers' innovation perceptions is to determine what meaning the managers who determine the road maps of the businesses get from innovation and whether the business managers have the awareness of innovation. Because it is a myopia indicator to look like innovating for businesses in today's market conditions and intensified competitive environment. Innovations made just for innovation will not go far beyond a vacancy for the business and will damage the plans of the business for the future. For this reason, it is very important for managers to look at innovation activities. This also applies to tourism businesses operating in the service sector.

The purpose of this study is to examine the impact of managers' innovation perceptions on innovation activities and innovation strategies in tourism businesses. In this context, innovation, innovation strategies and innovation perceptions of tourism business managers are discussed in the literature. In the method section, the researcher's universe and sample, data collection tools, data collection process are expressed. In the findings, the information that emerged as a result of the data analysis is given. Finally, the results of the research were explained and suggestions were made for researchers and practitioners.

## **2 Conceptual Framework**

### ***2.1 Innovation and Types of Innovation***

Today, many businesses are turning to innovation activities in order to decrease their costs, to increase product variety by developing new products and services, and to increase the quality of products and services. In this direction, many businesses incur significant costs for innovation and also take risks that the benefits and disadvantages for the enterprise can not be fully calculated. Innovation is the most important premise of the information. Innovation in this sense; business managers should be considered as a natural process to take these risks because they need to change, take risks, and more importantly, get out of the ordinary (Demirel and Seçkin 2008). The path to success in this process is sometimes possible with radical innovations (discontinuous or revolutionary), sometimes with gradual (continuous or evolutionary) transitions (Özen and Bingöl 2007).

Drucker (1985) described innovation as useful information that allowed people with different knowledge and experience working in an enterprise to make them productive and effective for the first time, as there is no consensus about what innovation actually means for businesses and the limitations of the concept. Kuczmariski (1996) stated that innovation is a widespread attitude that allows the company to see the future when it is in business and to form the vision for the future. Wulfen (2014) stated that innovation is a kind of idea production, but that ideas can only be transformed into new ones by planned actions that must be realized in five stages. These steps; the aim of continuous progress, observation and motivation of the learning feeling, the production of the idea and the testing of the idea, the passing of the intellectuals produced as a result of the test. According to Johansson (2013), ideas that cannot pass the test phase can not be accepted as innovation, and acceptance of the idea of innovation is only possible with the acceptance of the target.

Today, every element that is a source of innovation, such as the preparation of working environments in businesses and the promotion of managerial and structural mechanisms to support it and the innovative skills of employees are being actively used (Yahyagil 2001). Another thing to consider here is the compatibility with your operating resources and capabilities. In this context, the content of innovative actions that can be undertaken for businesses and the types of appropriate innovations should be carefully analyzed. Innovation in businesses can be realized in a wide range of products and services ranging from production to after-sale services. In this sense, areas where innovation can be made for businesses, in other words, types of innovation can be expressed under four headings. These are product and service innovation, process innovation, organizational innovation and marketing innovation. Product or service innovation benefits its users in the end product's technical specifications, components, materials, integrated software offered to customers (Yavuz 2010; Esen and Çetin 2012; Kucharska 2014).

Process innovation is a structure in which inputs and outputs are determined for action and innovation activities to be performed with a starting point and a result point determined. Process innovation is intended to be used in the most beneficial way by the variables that can be controlled by the targeted business (Davenport 2013). Organizational innovation includes efforts to improve the performance of the business by reducing the management costs and transaction costs of the business (Guloglu and Tekin 2012; Karakaş et al. 2017). In addition, organizational innovation means not only business operations but also changes in the way business operates in the external relationship of the business. Finally, marketing innovation involves the businesses' knowledge of the desires and expectations of the target consumer group and the different and unique practices that compete with those demands and expectations (Chen 2006).

## 2.2 *Innovation Strategies*

The innovation strategies that can be applied in the businesses are shaped according to the viewpoints of the managers. Miles and Snow (2003) have identified four types of strategies through which the representation of alternative ways of movement of organizations through the adaptive loop is shown. These are aggressive strategy, defensive strategy, imitative strategy and reactive strategy. This movement structure, as revealed by Miles and Snow (2003), also applies to innovation strategies of businesses. The aggressive strategy is to present a product or service before its competitors and to obtain market leadership by patenting a new product or service that is not on the market. Aggressive strategy is used to take advantage of being in front of competitors in the market where the product and service are new. But in order to be able to use aggressive strategy, it is necessary to have very strong R&D (Research and Development) activities. With the aggressive innovation strategy, businesses move more quickly to allocate their resources and assets to strengthen their position. Thus, they gain the advantage of being first in the market with their new products and services (Akman and Yılmaz 2008).

Defensive strategy is a kind of cautious strategy. It is being used by businesses that set out innovations that need to be made in the future, followed by businesses that have implemented these innovations, and are moving toward innovation strategies to balance their own economy by analyzing (Thoenig and Verdier 2003). Businesses that embrace this strategy strive to maintain and control stability to protect the current market they are focusing on (Luke and Begun 1988; Źelazny and Pietrucha 2017). In this direction, instead of producing a new product directly in the defensive innovation strategy, it is moving through the produced product and the created market. The purpose of the imitator strategy is to work with low workforce, less material and investment. It is a strategy that avoids high R&D costs. Earnings from avoiding businesses are also low. The imitator strategy has two important points. The first of these is getting healthy information about the change in the market. In order to be able to identify the product or service to be adapted, it is necessary to know which product or service the market is interested in. The second point is the selection of the innovation to be imitated and the establishment of the businesses to receive the know-how (Deniz 2008; Mitra and Jha 2015). Dependent innovation strategy is usually implemented in small and capital intensive businesses that are not very involved in product design, service delivery, research and development work. These businesses can achieve sufficient profit rates due to low general and administrative costs, enterprise capabilities, specialized knowledge and special local advantages (Mohnen and Hall 2013; Ebrahimi and Mirbargkar 2017).

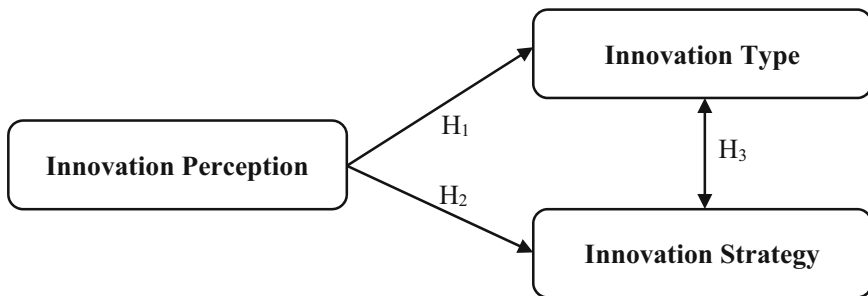


### 2.3 *Perceptions of Innovation in Managers, Innovative Actions and Innovation Strategies*

Due to the multifaceted nature of the tourism industry, complex structure and rapidly changing structure, managers in the sector need to have different, innovative and superior qualities (Ebrahimi and Mirbargkar 2017; Świadek 2015). Perception is the interpretation and interpretation of data obtained through the sense organs possessed. These interpretations reveal the meanings of the people they have installed in their actions in their surroundings. Therefore, perceptions of business managers' innovation activities and innovation strategies have a bearing on the benefits or harms to business will lead their attitudes towards these actions. Tourism business managers who think that innovation activities will cost to operate will try to avoid these actions as much as possible. In these business managers' strategic decisions, the adoption of reactionary and defensive strategies seems to be a natural process. The managers of tourism businesses that believe in innovation activity and the competitiveness and profitability of the enterprise are profit-oriented bosses instead of cost orientation to innovation activities. It is likely that these managers will set their business strategies as aggressors or impostors.

## 3 Methodology

The purpose of this research is to examine the influence of managers' innovation perceptions on innovation activities and innovation strategies in hotel businesses. In addition, the relationship between types of innovation and innovation strategies in hotel businesses in the research has been analyzed. Figure 1 shows the research model explaining the relationship between the variables of the research.



**Fig. 1** Research model

Research hypotheses formed in this direction are as follows:

- H<sub>1</sub>: Hotel managers' perceptions of innovation are influential on innovation activities in businesses.
- H<sub>2</sub>: Innovation perceptions of hotel managers are influential on innovation strategies in business.
- H<sub>3</sub>: There is a correlation between types of innovation and innovation strategies in hotel business.

The universe of this research is composed of 125 hotel management businesses operating in the provinces of Zonguldak, Bartın and Karabük, which are located in the Western Black Sea region of Turkey, with tourism operation certificate and municipal certificate. Full census sampling was conducted in the survey and all businesses involved in the survey were included in the survey. Survey data were obtained using questionnaire technique. In the creation of the research questionnaire, questions about innovation activities and strategies were adapted from Taşgıt and Torun (2016). In addition, 36 statements have been added to measure the manager's view of innovation. The scale was used in the five-point Likert type scale (1 = never agree, 5 = strongly agree). The survey data were obtained through face-to-face surveys applied to business managers between 20-01-2017 and 17-05-2017. At the end of the data collection period, data related to the survey were obtained from 82 hotel management directors. The reliability of the research scale is  $\alpha = 0.88$ .

## 4 Findings

### 4.1 Demographic Findings

Twenty-two percent (18 people) of the participants were female, 78% (64 people) were male. 69.5% (57 people) were married and 30.5% (25 people) were single. 50% of the participants (41 people) are between the ages of 31–40, 39% (32 people) are between the ages of 41–50 and 8.5% (7 people) are between the ages of 20–30. There are one person between the ages of 51–60 and over 60 years old. When the educational status of the participants is examined; 59.8% (49 people) are university graduates, 20.3% (24 people) are high school graduates, 8.5% (7 persons) are secondary school graduates and 2.4% (2 persons) are primary school graduates. While 57.3% (47 people) of the participants did not receive tourism education, 42.7% (35 people) received tourism education. When the managers' working time in the sector participating in the survey are evaluated; 37.8% (31 people), 11–15 years, 29.3% (24 people), 6–10 years, 14.6% (12 people), 16–20 years, 9.8% (8 people) 1–5 years and 8.5% (7 people) have 20 or more years of sector experience.

**Table 1** Frequency values related to innovation perceptions of managers

| Responses given by managers to innovation perceptions are given as a percentage   | Strongly disagree | Disagree | Partly agree | Agree | Strongly agree |
|---|-------------------|----------|--------------|-------|----------------|
| Innovation is an opportunity to get out of the crisis period  | 3.7               | 4.9      | 32.9         | 47.6  | 11             |
| Innovation is an important tool for creating competitive advantage  | 7.3               | 25.6     | 45.1         | 22    | 0.0            |
| Innovation activity poses a risk to my position in case of failure  | 15.9              | 31.7     | 41.7         | 9.8   | 0.0            |
| Innovation is a difficult process to manage   | 2.4               | 23.2     | 53.7         | 18.3  | 2.4            |
| Innovation is a process full of uncertainties   | 6.1               | 31.7     | 43.9         | 17.1  | 1.2            |
| Innovation activities are applications that require additional costs within the organization                            | 2.4               | 22       | 45.1         | 26.8  | 3.7            |
| Innovation is a process that will make radical changes  | 2.4               | 30.5     | 43.9         | 20.7  | 2.4            |
| Innovation is a process that will be faced with resistance due to the difficulties experienced by customers in adapting | 12.2              | 42.7     | 30.5         | 13.4  | 1.2            |
| Innovation activities are activities that are met with resistance by the staff in general                               | 8.5               | 26.8     | 40.2         | 20.7  | 3.7            |
| Innovation activities are activities that increase the product quality of the operator                                  | 1.2               | 3.7      | 15.9         | 45.1  | 34.1           |

## 4.2 Findings Related to Innovation Perceptions of Managers

The innovation perceptions of managers are measured through 12 questions. The reliability level of the scale is 86. Table 1 shows the frequency values of responses given by tourism managers to innovation perceptions.

When managers' perceptions of innovation are examined; it is seen that managers perceive innovation as an opportunity for exit from crisis periods with 47.6% participation level. Though managers see innovation as a critical element to creating a competitive advantage (partly agree = 45.1%), the fact that the full participation rate is 0% indicates that managers are pessimistic about this issue. Managers perceive innovation as a difficult (53.7%) and uncertain process of governance (43.9%). Findings show that managers perceive innovations as activities that create additional costs for the enterprise (45.1%), require radical changes (43.9%), and are likely to be encountered by customers (42.7%) and business personnel (40.2%) and contribute to increasing product quality (45.1%).

**Table 2** Types of innovation and innovation strategies in tourism businesses

| Types of innovation          | Mean | Standard deviation |
|------------------------------|------|--------------------|
| Product innovation           | 3.77 | 0.725              |
| Service innovation           | 4.02 | 0.769              |
| Process innovation           | 3.41 | 0.845              |
| Marketing innovation         | 3.51 | 0.946              |
| Organizational innovation    | 3.13 | 0.813              |
| <i>Innovation strategies</i> |      |                    |
| Offensive strategy           | 2.67 | 0.876              |
| Defensive strategy           | 3.34 | 0.849              |
| Imitator strategy            | 3.11 | 0.832              |
| Reactive strategy            | 2.06 | 1.01               |

### 4.3 Findings of Innovation Types and Innovation Strategies in Businesses

Following the managers' perceptions of innovation, the types of innovation realized in businesses and the data on innovation strategies are examined. Table 2 shows the types of innovations carried out in the hotel businesses operating in the Western Black Sea region and the frequency values of the innovation strategies adopted by the businesses.

When the findings are examined, it is noteworthy that the service innovation of the hotel types is 4.02 average level. This innovation is followed by product innovation with an average of 3.77. The type of innovation that has the least application in hotel operations in the Western Black Sea Region is organizational innovation with an average of 3.13. When the innovation strategy adopted by the business is examined, it is seen that the innovation strategy generally adopted by the businesses is the defensive strategy. This strategy follows an imitative strategy with an average of 3.11. The innovation strategy that is least adopted by the business is a reactionary strategy with an average of 2.06.

### 4.4 Relationship Between Innovation Perception and Types of Innovation

Correlation analysis was applied to the data obtained in order to determine whether there is a relationship between the innovation perceptions of the managers of hotels operating in the Western Black Sea Region and the types of innovation realized in the businesses. Table 3 shows the results of the correlation analysis.

When the relationship between hotel managers' innovation perceptions and the type of innovation implemented in the business they work in is reached: it has been determined that service innovation and process innovation from innovation types are

**Table 3** Results of correlation analysis between innovation perception and innovation types

| Variables             | Product innovation | Service innovation | Process innovation | Marketing innovation | Organizational innovation |
|-----------------------|--------------------|--------------------|--------------------|----------------------|---------------------------|
| Exit from the crisis  | 0.150              | 0.300**            | 0.224*             | 0.214                | 0.182                     |
| Competitive advantage | 0.162              | 0.328**            | 0.299**            | 0.168                | 0.194                     |
| Position risk         | -0.141             | -0.202             | 0.103              | 0.119                | 0.202                     |
| Management challenge  | -0.067             | -0.035             | 0.035              | 0.166                | 0.053                     |
| Uncertainty           | 0.094              | 0.101              | 0.248*             | 0.306**              | 0.006                     |
| Additional cost       | -0.112             | -0.065             | 0.191              | 0.187                | 0.081                     |
| Radical change        | 0.091              | -0.005             | -0.016             | 0.112                | -0.121                    |
| Customer resistance   | -0.235*            | -0.068             | 0.127              | 0.103                | -0.102                    |
| Staff resistance      | -0.67              | 0.135              | 0.147              | 0.191                | -0.133                    |
| Quality increase      | 0.158              | 0.216              | 0.002              | 0.187                | -0.015                    |

Note: \* and \*\* represent significance levels at 0.05 level and 0.01 level, respectively

a weak and positive correlation between managers' perceptions of exit from crisis and perceptions of competitive advantage. In addition, there is a positive relationship between managers' uncertainty perceptions and process innovations and marketing innovation practices. Finally, it is seen that managers have a meaningful and positive relationship (at 0.05 level) between customer resistance perceptions and product innovation practices.

#### ***4.5 Relationship Between Innovation Perception and Innovation Strategies***

Correlation analysis was applied to the data obtained in order to determine whether there is a relationship between managers' innovation perceptions and innovation strategies applied in businesses in hotel businesses. Table 4 shows the results of the managers' analysis of the correlation between innovation perceptions and innovative strategies.

As a result of the analysis to determine the relation of managers' innovation perceptions with the innovation strategies applied in the businesses, it was determined that there was a negative correlation between the managers' positional risk of innovation perceptions and aggressive strategy and imitator strategy at 0.05 level. Other findings on the analysis show that there is no meaningful relationship between managers' innovation perceptions and innovative strategies of businesses.

**Table 4** Results of correlation analysis between innovation perception and innovation strategies

| Variables             | Offensive strategy | Defensive strategy | Imitator strategy | Reactive strategy |
|-----------------------|--------------------|--------------------|-------------------|-------------------|
| Exit from the crisis  | 0.132              | 0.062              | 0.189             | 0.149             |
| Competitive advantage | 0.062              | 0.051              | 0.138             | 0.119             |
| Position risk         | -0.242*            | -0.245*            | -0.158            | -0.012            |
| Management challenge  | -0.109             | -0.033             | 0.094             | -0.127            |
| Uncertainty           | 0.085              | 0.030              | 0.013             | 0.078             |
| Additional cost       | -0.007             | -0.093             | -0.179            | 0.102             |
| Radical change        | -0.055             | -0.024             | -0.114            | 0.046             |
| Customer resistance   | -0.153             | -0.202             | -0.134            | -0.55             |
| Staff resistance      | 0.001              | 0.098              | -0.064            | 0.021             |
| Quality increase      | 0.193              | 0.189              | 0.077             | -0.113            |

Note: \* represents significance levels at 0.05 level

**Table 5** Results of correlation analysis of innovation types and innovation strategies in tourism businesses

| Variables                 | Offensive strategy | Defensive strategy | Imitator strategy | Reactive strategy |
|---------------------------|--------------------|--------------------|-------------------|-------------------|
| Product innovation        | 0.073              | 0.210              | 0.186             | 0.053             |
| Service innovation        | 0.140              | 0.422              | 0.459**           | 0.205             |
| Process innovation        | 0.137              | 0.110              | -0.153            | 0.172             |
| Marketing innovation      | 0.042              | 0.287**            | 0.147             | -0.059            |
| Organizational innovation | 0.271*             | 0.468*             | 0.471**           | 0.400**           |

Note: \* and \*\* represent significance levels at 0.05 level and 0.01 level, respectively

#### **4.6 The Relationship Between Innovation Types and Innovation Strategies**

The research also analyzed the relationship between innovation types applied in hotel businesses and innovation strategies. Table 5 shows the results obtained from the correlation analysis.

When examining the relationship between types of innovation and innovation strategies in hotel businesses; a significant and moderately positive relationship was found between service innovation and imitator strategy at 0.01 level. In addition, low and positive at 0.01 significance level between marketing innovation and defense strategy; organizational innovation and aggressive strategy are low and positive at a level of 0.05 significance; a moderate and positive relationship was found at 0.01 significance level between organizational innovation and imitative strategy and responsive strategy. As a result of the analysis, it is also determined that there is

**Table 6** Results of multiple regression analysis

|                         | Product innovation  | Service innovation  | Process innovation  | Marketing innovation | Organizational innovation |
|-------------------------|---------------------|---------------------|---------------------|----------------------|---------------------------|
| Exit from the crisis    | 0.141<br>(0.297)    | 0.164<br>(0.207)    | 0.082<br>(0.520)    | 0.144<br>(0.303)     | 0.110<br>(0.433)          |
| Competitive advantage   | -0.016<br>(0.912)   | 0.247*<br>(0.084)   | 0.195<br>(0.165)    | 0.091<br>(0.548)     | 0.060<br>(0.695)          |
| Position risk           | -0.078<br>(0.546)   | -0.279**<br>(0.026) | 0.072<br>(0.553)    | -0.009<br>(0.944)    | 0.295**<br>(0.030)        |
| Management challenge    | -0.189<br>(0.145)   | -0.068<br>(0.582)   | -0.120<br>(0.327)   | 0.037<br>(0.778)     | -0.031<br>(0.819)         |
| Uncertainty             | 0.117<br>(0.419)    | 0.137<br>(0.324)    | 0.279**<br>(0.044)  | 0.278*<br>(0.065)    | -0.040<br>(0.790)         |
| Additional cost         | -0.105<br>(0.495)   | -0.072<br>(0.627)   | 0.227<br>(0.121)    | 0.077<br>(0.629)     | 0.279*<br>(0.084)         |
| Radical change          | 0.366**<br>(0.015)  | 0.102<br>(0.471)    | -0.301**<br>(0.033) | -0.111<br>(0.464)    | -0.212<br>(0.168)         |
| Customer resistance     | -0.322**<br>(0.018) | -0.046<br>(0.717)   | 0.163<br>(0.198)    | 0.059<br>(0.664)     | -0.093<br>(0.500)         |
| Staff resistance        | -0.076<br>(0.593)   | 0.228*<br>(0.097)   | -0.028<br>(0.834)   | 0.112<br>(0.446)     | -0.206<br>(0.166)         |
| Quality increase        | 0.254*<br>(0.053)   | 0.170<br>(0.174)    | 0.318**<br>(0.011)  | 0.105<br>(0.433)     | 0.055<br>(0.681)          |
| N                       | 125                 | 125                 | 125                 | 125                  | 125                       |
| Adjusted R <sup>2</sup> | 0.231               | 0.176               | 0.134               | 0.184                | 0.173                     |
| F statistic             | 2.127**             | 2.970***            | 3.251***            | 1.604                | 1.483                     |

p = \*, \*\* and \*\*\* represent significance at 10%, 5% and 1% levels, respectively. p-Values are presented in the parenthesis

no meaningful relationship between product innovation and process innovation and innovation strategies. H3 hypothesis was accepted in the obtained findings direction.

#### 4.7 *The Impact of Innovation Perception on Innovation Types*

Regression analysis was applied to the data obtained in order to examine the effect of managers' innovation perception on the types of innovation realized in hotel businesses. In regression analysis, managers' innovation perceptions are independent and hotel innovations are considered dependent variables. The effect of independent variables on dependent variables has been tested sequentially. Table 6 shows the results of multiple regression analysis.

As a result of the analysis, it was determined that managers' affected product innovation from the innovation types of innovation perceptions at 0.231 level. When the levels of significance were examined, it was seen that the managers' significantly

affected the perceptions of change and the customer resistance perceptions significantly (sig.  $<0.05$ ,  $<0.10$  respectively). Other managerial innovation perceptions were found to have no significant effect on product innovation (sig.  $> 0.05$ ). Managers' perceptions of innovation have been found to have a significant effect (Sig. 0.02) on the service innovation of the position risk. When managers' perceptions of innovations on process innovations in businesses are examined, managers' innovation perceptions have a significant effect on process innovation at 0.184 level. When the influence of innovation perceptions on process innovation is examined, the uncertainty sense and the cadence perception influence the positive direction, while the fundamental change affects the negative direction. This result is statistically significant (Sig.: 0.44; 0.33; 0.11). Uncertainty perception with a rate of 27.9%, deep root change perception with a rate of 30.1% and quality increase perception with a rate of 31.8% affect process innovation. When the influence of managers' innovation perceptions on marketing innovation was examined, it was seen that the level of significance for all the variables that constitute managers' innovation perceptions is higher than 0.05. That is, managers' perceptions of innovation have meaningful effect on marketing innovation in business at 10% significance level. Finally, when managers' influence of innovation perceptions on organizational innovation was examined, it was determined that the position risk variable had significant (sig. 0.03) effect on organizational innovation at 0.295 level. In this context, the alternative hypothesis was rejected and the H1 hypothesis was accepted.

#### ***4.8 Effect of Innovation Perception on Innovation Strategies***

In the research, the impact of innovations of hotel management on innovation strategies of businesses was analyzed. The results of the multiple regression analysis carried out in this context are shown in Table 7.

When the results of the multiple regression analysis are analyzed, it was determined that the innovation perceptions of hotel managers have meaningful effect (sig.  $< 0.10$ ) on the aggressive strategy, counterfeit strategy and responsive strategy from the innovation strategies applied in the businesses at 10% significance level. On the other hand, managers' perception of position risk has a significant effect (sig. 0.03) on the defensive strategy. The direction of this effect is negative ( $-0.284$ ). In other words, as managers' perceptions of position risk increased, defensive strategy implementation levels decreased by 28%. The alternative hypothesis was rejected in the obtained findings and the H2 hypothesis was accepted.



**Table 7** Effect of innovation perception on innovation strategies

|                         | Offensive strategy | Defensive strategy  | Imitator strategy | Reactive strategy |
|-------------------------|--------------------|---------------------|-------------------|-------------------|
| Exit from the crisis    | 0.171<br>(0.224)   | 0.037<br>(0.790)    | 0.145<br>(0.320)  | 0.154<br>(0.295)  |
| Competitive advantage   | -0.080<br>(0.604)  | 0.019<br>(0.899)    | 0.020<br>(0.898)  | (0.096<br>(0.549) |
| Position risk           | -0.233*<br>(0.084) | -0.284**<br>(0.036) | -0.193<br>(0.167) | -0.006<br>(0.965) |
| Management challenge    | -0.066<br>(0.624)  | 0.008<br>(0.953)    | 0.128<br>(0.356)  | -0.169<br>(0.228) |
| Uncertainty             | -0.152<br>(0.315)  | 0.055<br>(0.715)    | 0.126<br>(0.418)  | 0.049<br>(0.754)  |
| Additional cost         | 0.249<br>(0.123)   | -0.052<br>(0.747)   | -0.176<br>(0.292) | 0.063<br>(0.706)  |
| Radical change          | 0.125<br>(0.414)   | 0.151<br>(0.324)    | -0.042<br>(0.791) | 0.082<br>(0.606)  |
| Customer resistance     | -0.210<br>(0.131)  | -0.261*<br>(0.061)  | -0.010<br>(0.943) | -0.117<br>(0.416) |
| Staff resistance        | -0.048<br>(0.748)  | 0.215<br>(0.149)    | 0.062<br>(0.687)  | 0.112<br>(0.469)  |
| Quality increase        | 0.266*<br>(0.052)  | 0.113<br>(0.400)    | -0.025<br>(0.858) | -0.145<br>(0.303) |
| N                       | 125                | 125                 | 125               | 125               |
| Adjusted R <sup>2</sup> | 0.169              | 0.171               | 0.106             | 0.096             |
| F statistic             | 1.439              | 1.461               | 0.841             | 0.747             |

p = \* and \*\* represent significance at 10% and 5% levels, respectively. p-Values are presented in the parenthesis

## 5 Conclusions and Recommendations

This research was conducted in order to investigate the effects of hotel managers' innovation perceptions on innovation types and innovation strategies in the businesses. It was conducted in 125 hotels operating in Zonguldak, Bartın and Karabük. The research first explored perceptions of business managers regarding innovation activities. As a result of the review, it has been determined that business managers' perception of innovation activities is a difficult process to manage, that innovation activities are activities that provide competitive advantage to the enterprise, and that innovation activities will incur additional costs to operate. The most positive perception of managers' innovation activities is that innovation activities will enhance the quality of products and services offered in businesses.

Later, the innovation activities and innovation strategies applied by the business managers in their businesses were examined. As a result of the review, it was determined that the most applied innovation category in the businesses is service innovation and this innovation is followed by product innovation. It has been determined that organizational innovation from the types of innovation applied in

the businesses is the type of innovation applied at least in the level. When the innovation strategies applied by the hotel businesses are examined, it is determined that the most applied strategy by the businesses is the defensive strategy and the least adopted strategy is the reactive strategy. When the relationships between the variables of the research were analyzed, it was determined that there was a meaningful relation between managers' exit from the crisis, uncertainty, competitive advantage and customer resistance perceptions and innovation types. In addition, managers have determined that there is no significant relationship between innovation perceptions and innovation strategies in dimensions other than position risk dimension. In addition, it has been determined that there is a significant relationship between innovations applied in businesses and innovation strategies. Finally, business managers' perceptions of innovation have been found to have a significant effect on innovation practices beyond marketing innovation. However, managers' perceptions of innovation have not been found to have any significant effect on the innovation strategies applied in businesses.

It can be said that effective and on-site innovations play an important role in enhancing the competitiveness of the operator, which is a huge effect of the differentiation of innovations. Differentiation can be achieved through the employment of qualified and trained personnel, the management of the enterprise through an innovative management style, the continuous innovation in food, beverages and services, the creation of tight coordination among departments, the creation of innovation climate in the enterprise and the attempt to create an enterprise identity (Çakıcı et al. 2016).

Searches of tourism sector has focused on issues such as increasing customer demand, customer satisfaction, improving the quality of services and improving satisfaction of staffs. Result of this focus, innovation has become a necessity for businesses. Even in terms of the global economy, enterprises have the obligation to do innovative applications (Vatan and Zengin 2014).

This research is based on the influence of hotel managers' innovation perceptions on innovation types and innovation strategies applied in businesses. The research to be done can focus on the types of innovation applied in hotel business and other factors affecting innovation strategies. In addition, the impact of managers' innovation perceptions on innovation types and innovation strategies can be explored in the sub-sectors that comprise the tourism industry.

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## References

- Akman, G., & Yılmaz, C. (2008). Innovative capability, innovation strategy and market orientation: An empirical analysis in Turkish software industry. *International Journal of Innovation Management*, 12(1), 69–111.

- Çakıcı, A. C., Çalhan, H., & Karamustafa, K. (2016). Yiyecek ve İçecek İşletmelerinde İnovasyon ve Sürdürülebilir Rekabet Üstünlüğü İlişkisi [Innovation and sustainable competitive advantage relation in food and beverage enterprises]. *Kırıkkale Üniversitesi Sosyal Bilimler Dergisi*, 6(2), 11–36.
- Chen, Y. (2006). Marketing innovation. *Journal of Economics & Management Strategy*, 15(1), 101–123.
- Davenport, T. H. (2013). *Process innovation: Reengineering work through information technology*. Boston, MA: Harvard Business Press.
- Demirel, Y., & Seçkin, Z. (2008). Bilgi ve Bilgi Paylaşımının Yenilik Üzerine Etkileri [The effects of knowledge and information sharing on innovation]. *Ç.Ü. Sosyal Bilimler Enstitüsü Dergisi*, 17(1), 189–202.
- Deniz, M. (2008). KOBİ'lerde Yenilik, Yenilik Stratejileri ve Bir Uygulama [Innovation, innovation strategies and an application in SMEs]. *Selçuk Üniversitesi İİBF Sosyal ve Ekonomik Araştırmalar Dergisi*, 22, 141–176.
- Drucker, P. F. (1985). The discipline of innovation. *Harvard Business Review*, 63(3), 67–72.
- Ebrahimi, P., & Mirbargkar, S. M. (2017). Green entrepreneurship and green innovation for SME development in market turbulence. *Eurasian Business Review*, 7, 203–228.
- Esen, Ş., & Çetin, S. (2012). Siyasi Parti ve Hükümet Programlarında Girişimcilik ve İnovasyon. [Entrepreneurship and innovation in political parties and government programs]. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*, 34, 71–82.
- Guloglu, B., & Tekin, R. B. (2012). A panel causality analysis of the relationship among research and development, innovation, and economic growth in high-income OECD countries. *Eurasian Economic Review*, 2(1), 32–47.
- Johansson, F. (2013). *Yaratıcılık ve İnovasyon Medici Etkisi Yaratmak [The medici effect: What elephants and epidemics can teach us about innovation]* (D. Tayanç, Trans.). İstanbul: Media Cat Kitapları.
- Karakaş, A., Öz, Y., & Yıldız, R. (2017). The effect of innovation activities on organizational performance: A research on hotel businesses. *Journal of Recreation and Tourism Research*, 4(1), 49–59.
- Kucharska, S. A. (2014). Regional differences in innovation activities of industrial enterprises in Poland. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 9(2), 73–92.
- Kuczmariski, T. D. (1996). What is innovation? The art of welcoming risk. *Journal of Consumer Marketing*, 13(5), 7–11.
- Luke, R. D., & Begun, J. W. (1988). Strategic orientations of small multihospital systems. *Health Services Research*, 23(5), 597–618.
- Miles, R., & Snow, C. C. (2003). *Organizational strategy: Structure and process*. Palo Alto, CA: Stanford University Press.
- Mitra, A., & Jha, A. K. (2015). Innovation and employment: A firm level study of Indian industries. *Eurasian Business Review*, 5, 45–71.
- Mohnen, P., & Hall, B. H. (2013). Innovation and productivity: An update. *Eurasian Business Review*, 3(1), 47–55.
- Özen, Ü., & Bingöl, M. (2007). İşletmelerde Bilişim Teknolojileri ve Yenilikçilik: Erzurum, Erzincan ve Bayburt'taki KOBİ'lerde Bir Araştırma [Information technologies and innovation in enterprises: A research in SMEs in Erzurum, Erzincan and Bayburt]. *Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 10(2), 399–417.
- Świadek, A. (2015). The economic cycle and the innovation activity of the Polish industry system. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 10(2), 75–92.
- Taşgıt, Y. E., & Torun, B. (2016). Yöneticilerin İnovasyon Algısı, İnovasyon Sürecini Yönetme Arzu ve İşletmelerin İnovasyon Performansı Arasındaki İlişkiler: KOBİ'ler Üzerinde Bir Araştırma [The relationship between managerial innovation perception, innovation process management style and innovation performance: A research on SMEs]. *Yönetim Bilimleri Dergisi*, 14(28), 121–156.

- Thoenig, M., & Verdier, T. (2003). A theory of defensive skill-biased innovation and globalization. *The American Economic Review*, 93(3), 709–728.
- Vatan, A., & Zengin, B. (2014). Çevresel İnovasyon ve Konaklama İşletmelerindeki Uygulamalar Üzerine Bir Araştırma: İstanbul Örneği [Environmental innovation and research about applications on accommodation enterprises: İstanbul sample]. *The Journal of Academic Social Science*, 2(8), 511–530.
- Wulfen, G. V. (2014). *İnovasyon Seferi İnovasyon Başlatmak için Görsel Alet Takımı. [The innovation expedition: A visual toolkit to start innovation]* (P. Şengözer, Trans.). İstanbul: Optimist Yayın Dağıtım.
- Yahyagil, M. M. (2001). Örgütsel Yaratıcılık ve Yenilikçilik. [Organizational creativity and innovation]. *İstanbul Üniversitesi İşletme İktisadi Enstitüsü Yönetim Dergisi*, 12(38), 7–16.
- Yavuz, Ç. (2010). İşletmelerde İnovasyon-Performans İlişkisinin İncelenmesine Dönük Bir Çalışma [A study toward investigation of innovation-performance relationship in business]. *Girişimcilik ve Kalkınma Dergisi*, 5(2), 143–173.
- Żelazny, R., & Pietrucha, J. (2017). Measuring innovation and institution: The creative economy index. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 12(1), 43–62.

# Export Specialization by Technological Intensity: The Case of the Baltic States



Asta Saboniene, Akvile Cibinskiene, Irena Pekarskiene, and Rozita Susniene

**Abstract** The article is directed to evaluation of the export specialization in the Baltic States and revelation of the main differences by the aspect of technological intensity in commodity groups with revealed comparative advantage. The approach of revealed comparative advantage was employed to identify the commodity groups that are capable of successfully competing in the global market. The purpose of this research is to determine whether exports of the Baltic States are capable of achieving comparative advantage in the commodity groups that occupy major shares in the overall export structure and to find out how the exports are distributed by technological intensity of produced goods. The results of the empirical study have disclosed that the Baltic States have quite similar export specialization with large shares of raw material-intensive and labour-intensive goods in their total exports. The category of difficult-to-imitate research-intensive goods also occupies a visible share, but the states do not have any comparative advantage in production of these goods. Similarities in the export structure disclose that a more sustained way to compete in global markets can be achieved by increasing diversity of the exports of the Baltic States and by enlarging the shares of difficult-to-imitate research-intensive, capital-intensive and easy-to-imitate research-intensive goods.

**Keywords** Exports · Commodity groups · Revealed comparative advantage · Technological intensity

## 1 Introduction

Export structure is an important economic indicator of every economy that characterizes the abilities of different manufacturing industries to produce commodities demanded by foreign countries. Export is extremely significant for development and

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vitality of small and vulnerable economies while pursuing to achieve economies of scale, high rates of employment and high value-added. Export also induces manufacturing companies to invest in new technologies, quality and staff skill upgrading. From an individual country's perspective, it is important to analyse the export structure by technological intensity of the export goods because every economy strives to increase its export shares in high and high-medium industries. The Baltic States have come through the period of a long economic transformation since 1991; the process of the transformation has revealed that traditional branches, commonly called low-tech, have been more flexible while adapting to market conditions and now prevail in the industrial structure of the Baltic States. The export structure naturally depends on the aspects that are well identified in international trade theory, including production inputs and the factors created in an individual industry or a country. Export specialization is highly related to the structure of manufacturing industry when the amounts of re-export are eliminated and the export pattern is evaluated by including only the commodities produced in a host country.

The issues and changes of export specialization have attracted much attention while examining the results of international trade in many countries, especially under the conditions of trade liberalization and economic integration into the EU. Export specialization in the Baltic States was analysed in some empirical studies of Pilinkiene (2014), Bruneckiene and Paltanaviciene (2012), Bernatonyte and Normandiene (2009), and Saboniene (2009). The economic growth and development of the Baltic States was discussed by Staehr (2015), Remeikiene et al. (2015), and Hilmola (2013).

Nevertheless, virtually no comparative analysis of the export distribution in the Baltic States by technological intensity of particular commodity groups has been conducted so far. This article is directed to expansion of the research on export specialization of the Baltic States by incorporation of the above-mentioned aspect. This empirical study covers the analysis of export specialization which was conducted by employing the index of revealed comparative advantage (RCA) to disclose the differences and similarities of the Baltic States in terms of their export structure.

The main aim of this research is to reveal the patterns of export specialization in the Baltic States and to compare the structure of the exports in terms of technological intensity of particular commodity groups. The object of the research is export specialization. The export shares and RCA indexes for 2014 were obtained from the Database of the International Trade Centre (ITC). Classification of the commodity groups by their technological intensity is based on the taxonomy suggested by Erlat and Erlat (2008). The methods of the scientific research include scientific analysis, review of the literature, mathematical calculations and comparative analysis of statistical indexes.

## 2 Methodology

The structure of exports is commonly analysed by estimating structural shares of different commodity groups in total exports. As international trade emphasizes the capacity of a country to dynamically compete in the global market, the more modern way of the research is to examine the export pattern by employing the approach of comparative advantage. The approach of revealed comparative advantage was suggested by Balassa (1965), later widely discussed and employed in the studies for evaluation of the patterns of trade and specialization while trying to identify the countries with this advantage (Hoen and Oosterhaven 2006; Laursen 2015; Amir 2000; Prasad 2004; Benedictis and Tamberi 2001; Banterle 2005; Stefaniak-Kopoboru and Kuczevska 2016). In our empirical study, we employed the Revealed Comparative Advantage Index (RCA) (also known as Balassa Index introduced by Balassa (1965)), which reflects only the volumes of exports. RCA index estimates a country's export share in a particular commodity in comparison to its share in the world exports.

$$RCA_i^A = \frac{x_i^A / X^A}{x_i^W / X^W} \quad (1)$$

where:

- $x_i^A$ —country's A exports of product i;
- $X^A$ —total exports of country A;
- $x_i^W$ —world exports of product i;
- $X^W$ —total world exports.

$RCA_i^A > 1$  reflects a country's revealed comparative advantage in product i. Balassa's (1965) analysis is restricted to manufactured goods only, as distortions in primary products, subsidies, quotas and special arrangement would not reflect the real achieved comparative advantage. Despite some limitations, estimations of revealed comparative advantage can provide useful information about the potential of trade. Havrila and Gunawardana (2003) proposed three interpretations of RCA values: dichotomous, ordinal and cardinal. Under the dichotomous interpretation, RCA is used to verify the presence of comparative advantage in a sector; under the ordinal interpretation, RCA is applied to rank sectors or countries in terms of their comparative advantage; finally, under the cardinal interpretation, RCA is suitable to measure the dimension of comparative advantage.

The relevant method to analyse the export structure and specialization of a selected country is to examine the export pattern by technological intensity of particular commodity groups, i.e. by applying the taxonomies which distinguish different categories of commodity groups in terms of their skill, technology and capital intensities. Recent economic literature presents some classifications. Lall (2000) classified commodities other than primary products into nine groups which included two categories of resource-based manufacture and seven categories of

technological intensity, starting with low and ending with medium and high levels. The United Nation (2002) employed the taxonomy for classification of particular product groups into primary commodities, labour-intensive and resource-based manufacture, manufacture with low skill and technology intensity, manufacture with medium skill and technology intensity, and manufacture with high skill and technology intensity. In this empirical study, we employed the technological classification proposed by Erlat and Erlat (2008). The scholars categorised produced commodities into the groups of raw material-intensive goods, labour-intensive goods, capital-intensive goods, easy-to-imitate research-intensive goods and difficult-to-imitate research-intensive goods. The approach of revealed comparative advantage was employed to examine the pattern of export specialization in the Baltic States by technological intensity of produced commodities.

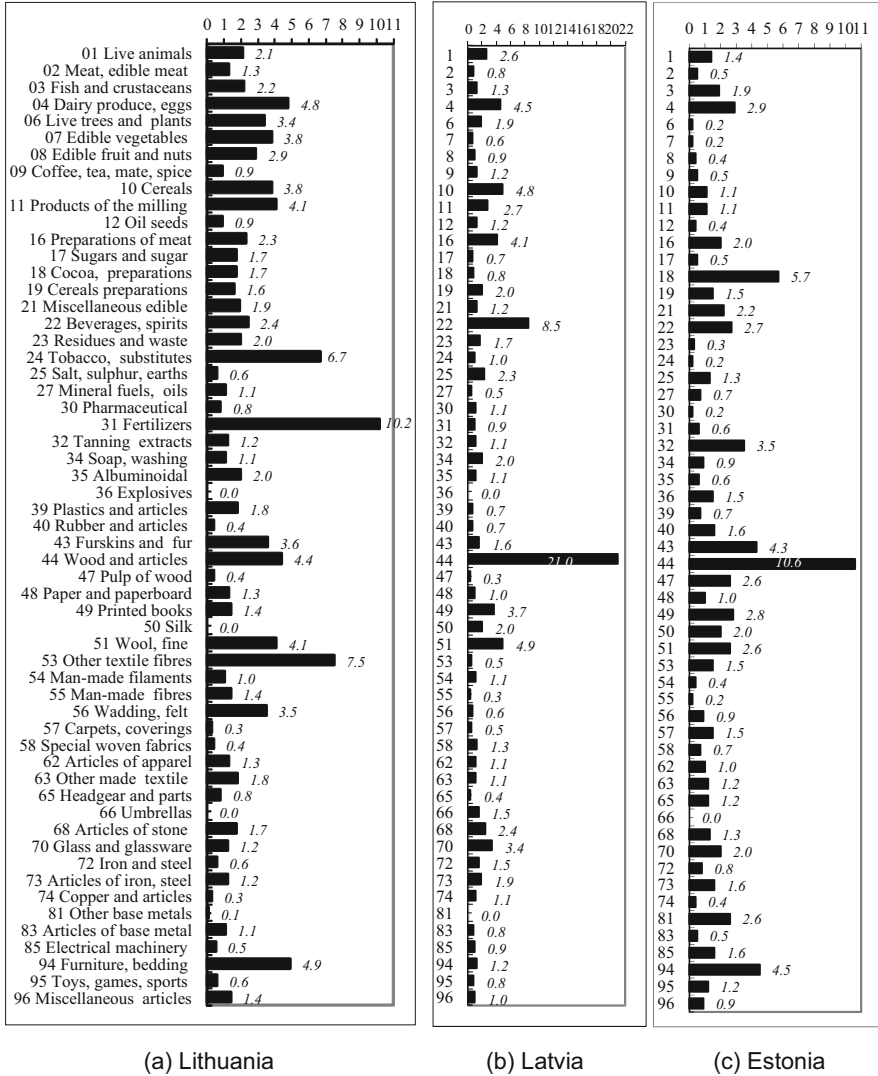
### 3 Findings

The Baltic States have similar political, social, technological and natural factors of economic development, and since 1991, they have gone through similar economic reforms and development problems. The Baltic States do not possess any strategically important natural resources, therefore, the structure of their manufacturing industries leans of the sectors that more flexibly adapted to the conditions of market demand over the period of economic transformation. It is essential that traditional industries prevail in industrial structures of all of the states, while high-tech and medium-high-tech industries occupy a relatively small share.

Figure 1 presents the RCA values estimated for the commodity groups with comparative advantage ( $RCA > 1$ ) in either of the Baltic States. It must be taken into account that re-export is included in the indicators of both the export structure and RCA values. The commodity groups with  $RCA < 1$  were not included, except the cases when one of the states had  $RCA > 1$  for a particular commodity group. The statistical data of export percentage distribution demonstrates different results for the Baltic States. Aiming to compare the percentage export shares and RCA values estimated for particular commodity groups, we considered both indicators.

In 2014, the largest shares in Lithuanian export structure were occupied by 27 Mineral fuels, oils, etc. (17.55%,  $RCA = 1.1$ ), 84 Boilers, machinery, etc. (8.45%,  $RCA = 0.7$ ), 85 Electrical machinery, electronic equipment (6.58%,  $RCA = 0.5$ ), 94 Furniture, bedding, etc. (6.28%,  $RCA = 4.9$ ), 39 Plastics and articles thereof (5.63%,  $RCA = 1.8$ ), 87 Vehicles other than railway, tramway (4.48%,  $RCA = 0.6$ ), 31 Fertilizers (3.46%,  $RCA = 10.2$ ), 44 Wood and articles of wood (3.27%,  $RCA = 4.4$ ), 04 Dairy products, etc. (2.45%,  $RCA = 4.8$ ), and 10 Cereals (2.38%,  $RCA = 3.8$ ). As it was found, not all above-mentioned commodity groups have comparative advantage ( $RCA > 1$ ) regardless of their large share in the export structure. The highest values of RCA were estimated for the following commodity groups: 31 Fertilizers, 53 Other vegetable textile fibres (the share in the export structure amounts to only 0.14%), 24 Tobacco and substitutes





**Fig. 1** RCA for different commodity groups, 2014 (RCA > 1 reflects revealed comparative advantage). Source: The estimates based on the data of the International Trade Centre (ITC)

(with the export share equal to 1.24%), 94 Furniture, bedding, etc., 04 Dairy products, etc., and 44 Wood and articles of wood (with the export share equal to 3.27%) (see Fig. 1).

The results for 2014 show that the largest shares of Latvian export structure were occupied by 44 Wood and articles of wood (15.57%, RCA = 21), 85 Electrical machinery, electronic equipment (11.11%, RCA = 0.9), 27 Mineral fuels, oils, etc. (7.42%, RCA = 0.5), 22 Beverages, spirits and vinegar (5.02%, RCA = 8.5),

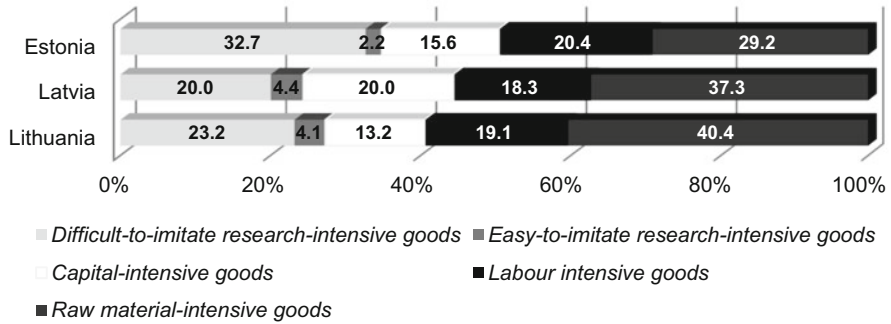
84 Boilers, machinery, etc. (4.85%, RCA = 0.4), 87 Vehicles other than railway, tramway (4.29%, RCA = 0.6), 72 Iron and steel (3.34%, RCA = 1.5), 73 Articles of iron or steel (3.09%, RCA = 1.9), 10 Cereals (3.04%, RCA = 4.8), 30 Pharmaceutical products (2.92%, RCA = 1.1), 04 Dairy products, etc. (2.31%, RCA = 4.5), and 94 Furniture, bedding, etc. (2.21%, RCA = 1.2). Latvian commodity groups with the highest values of RCA are as follows: 44 Wood and articles of wood, 22 Beverages, spirits and vinegar, 51 Wool, fine or coarse animal hair (the share in the export structure amounts to only 0.39%), 10 Cereals, 04 Dairy products, etc., and 16 Preparations of meat (with the export share equal to 1.07%).

Estonian export structure in 2014 covered the same commodity groups with the largest shares: 85 Electrical machinery, electronic equipment (20.18%, RCA = 1.6), 27 Mineral fuels, oils, etc. (11.41%, RCA = 0.7), 44 Wood and articles of wood (7.88%, RCA = 10.6), 84 Boilers, machinery, etc. (7.14%, RCA = 0.6), 94 Furniture, bedding, etc. (5.79%, RCA = 4.5), 87 Vehicles other than railway, tramway (4.48%, RCA = 0.6), and 90 Optical, photo, technical, medical, etc. (2.25%, RCA = 0.7). The highest values of RCA belong to 44 Wood and articles of wood, 18 Cocoa and cocoa preparations (with the export share equal to 1.47%), 94 Furniture, bedding, 43 Furskins and artificial fur (the share in the export structure amounts to only 0.3%), and 32 Tanning or dyeing extracts (with the export share equal to 1.5%) (Fig. 1).

The analysis demonstrates that all three Baltic States possess the same commodity groups with high indexes of revealed comparative advantage. The highest RCA indexes estimated for the groups 44 Wood and articles of wood, 22 Beverages, spirits and vinegar, 16 Preparations of meat, 10 Cereals and 51 Wool, fine or coarse animal hair belong to Latvia, although they are sufficiently high in the other two Baltic States. Lithuania prevails in the industries of 04 Dairy products, 11 Products of the milling industry and 94 Furniture, bedding, while Latvia has the highest RCA index for the industry 43 Furskins and artificial fur (Fig. 1).

Export specialization of the Baltic States was examined by employing the method of classification of particular commodity groups by their technological intensity. This method revealed the shares of the commodities with different technological intensity in total structure of the exports and allowed to identify the differences among the states. It was found that percentage distribution of different categories of technological intensity was very close for all of the states, as demonstrated in Fig. 2.

The results of the research have shown that Estonia occupies the best position in terms of technological intensity of different commodity groups; the share of difficult-to-imitate research-intensive goods prevails in comparison to the shares of the other groups (32.7%) (Fig. 2). Table 1 reveals that only one commodity group (85 Electrical machinery) has comparative advantage in Estonia, and only one (39 Plastics and articles)—in Lithuania. The modest export shares of easy-to-imitate research-intensive goods were estimated for all of the states, although Latvia has a relatively largest export share in this category (4.4%). The list of commodity groups with  $RCA > 1$  includes only one or two groups, and the highest RCA value was estimated for industry 35 Albuminoidal substances in Lithuania.



**Fig. 2** Export distribution by the categories of technological intensity of goods %, 2014

The results of the research have revealed that Latvia has the largest share (20%) of capital-intensive goods in its export structure; this state also has the longest list of commodity groups with  $RCA > 1$  in comparison to the other Baltic States.  $RCA$  values are highest for industry 22 Beverages, spirits in Latvia, industry 24 Tobacco and substitutes in Lithuania, and industry 32 Tanning or dyeing ex-tracts in Estonia.

Estonian exports of labour-intensive goods contributed 20.4% in 2014, while the other states show slightly lower export shares in this category. The category of labour-intensive goods covers a wide range of commodity groups with revealed comparative advantage. The  $RCA$  values larger than four were estimated for Lithuania (industries 53 Other vegetable fibres, 94 Furniture, bedding, and 51 Wool, fine or animal hair), Latvia (industry 51 Wool, fine or animal hair) and Estonia (industries 94 Furniture, bedding, and 43 Furskins and artificial fur) (see Table 1).

The analysis has confirmed the predominance of raw material-intensive goods in Lithuanian and Latvian total exports, although Lithuanian share was the largest (40% of Lithuanian total exports) in comparison to the shares of the other Baltic States. Table 1 presents the detailed list of the commodity groups that are included in the category of raw material-intensive goods with  $RCA > 1$ . It was found that the number of the commodity groups with revealed comparative advantage in this category of technological intensity is largest in Lithuania. Lithuania occupies the highest positions in industries 31 Fertilizers and 04 Dairy products, eggs, etc., Latvia—in industries 44 Wood and articles of wood, and 10 Cereals, while Estonia—in industries 44 Wood and articles of wood, and 18 Cocoa and preparations.

## 4 Conclusions

Concluding the results of the research on export specialization in the Baltic States, it is important to note that classification of different commodity groups by their technology intensity is applicable not only for assessment of the current situation, but also for tracking the changes in the long run. Different economic and political

**Table 1** Commodity groups with RCA > 1 by the categories of their technological intensity, 2014

| Lithuania  |     | Latvia                          |     | Estonia                        |     |
|--|-----|---------------------------------|-----|--------------------------------|-----|
| Commodity group                                      | RCA | Commodity group                 | RCA | Commodity group                | RCA |
| <i>Difficult-to-imitate research-intensive goods</i> |     |                                 |     |                                |     |
| 39 Plastics and articles                             | 1.8 |                                 |     | 85 Electrical machinery        | 1.6 |
| <i>Easy-to-imitate research-intensive goods</i>      |     |                                 |     |                                |     |
| 35 Albuminoidal substances                           | 2.0 | 30 Pharmaceutical products      | 1.1 | 36 Explosives, pyrotechnic     | 1.5 |
|  |     | 35 Albuminoidal substances      | 1.1 |                                |     |
| <i>Capital-intensive goods</i>                       |     |                                 |     |                                |     |
| 24 Tobacco and substitutes                           | 6.7 | 22 Beverages, spirits           | 8.5 | 32 Tanning or dyeing extracts  | 3.5 |
| 22 Beverages, spirits                                | 2.4 | 34 Soap, organic agents         | 2.0 | 22 Beverages, spirits          | 2.7 |
| 73 Articles of iron or steel                         | 1.2 | 73 Articles of iron or steel    | 1.9 | 73 Articles of iron or steel   | 1.6 |
| 32 Tanning or dyeing extracts                        | 1.2 | 72 Iron and steel               | 1.5 | 40 Rubber and articles         | 1.6 |
| 34 Soap, organic agents                              | 1.1 | 32 Tanning or dyeing extracts   | 1.1 |                                |     |
|  |     | 74 Copper and articles          | 1.1 |                                |     |
| <i>Labour-intensive goods</i>                        |     |                                 |     |                                |     |
| 53 Other vegetable fibres                            | 7.5 | 51 Wool, fine or animal hair    | 4.9 | 94 Furniture, bedding          | 4.5 |
| 94 Furniture, bedding                                | 4.9 | 49 Printed books, newspapers    | 3.7 | 43 Furskins and artificial fur | 4.3 |
| 51 Wool, fine or animal hair                         | 4.1 | 70 Glass and glassware          | 3.4 | 49 Printed books, newspapers   | 2.8 |
| 43 Furskins and artificial fur                       | 3.6 | 68 Articles of stone, plaster   | 2.4 | 51 Wool, fine or animal hair   | 2.6 |
| 56 Wadding, felt                                     | 3.5 | 50 Silk                         | 2.0 | 70 Glass and glassware         | 2.0 |
| 63 Other made textile articles                       | 1.8 | 43 Furskins and artificial fur  | 1.6 | 50 Silk                        | 2.0 |
| 68 Articles of stone, plaster                        | 1.7 | 66 Umbrellas, sun umbrellas     | 1.5 | 53 Other vegetable fibres      | 1.5 |
| 49 Printed books, newspapers                         | 1.4 | 58 Special woven fabrics        | 1.3 | 57 Carpets and other           | 1.5 |
| 96 Miscellaneous articles                            | 1.4 | 94 Furniture, bedding           | 1.2 | 68 Articles of stone, plaster  | 1.3 |
| 70 Glass and glassware                               | 1.4 | 54 Man—made filaments           | 1.1 | 95 Toys, games, and sports     | 1.2 |
| 55 Man—made staple fibres                            | 1.4 | 63 Other made textile articles  | 1.1 | 65 Headgear and parts          | 1.2 |
| 48 Paper and paperboard                              | 1.3 | 60 Knitted or crocheted fabrics | 1.1 | 63 Other made textile articles | 1.2 |

(continued)

**Table 1** (continued)

| Lithuania                           |      | Latvia                           |      | Estonia                       |      |
|-------------------------------------|------|----------------------------------|------|-------------------------------|------|
| Commodity group                     | RCA  | Commodity group                  | RCA  | Commodity group               | RCA  |
| 62 Articles of apparel              | 1.3  | 62 Articles of apparel           | 1.1  |                               |      |
| 83 Articles of base metal           | 1.1  |                                  |      |                               |      |
| <i>Raw material-intensive goods</i> |      |                                  |      |                               |      |
| 31 Fertilizers                      | 10.2 | 44 Wood and articles of wood     | 21.0 | 44 Wood, articles of wood     | 10.6 |
| 04 Dairy produce; birds' eggs       | 4.8  | 10 Cereals                       | 4.8  | 18 Cocoa and preparations     | 5.7  |
| 44 Wood and articles of wood        | 4.4  | 04 Dairy produce; birds' eggs    | 4.5  | 04 Dairy produce; birds' eggs | 2.9  |
| 11 Milling products                 | 4.1  | 16 Preparations of meat, of fish | 4.1  | 46 Pulp of wood               | 2.6  |
| 10 Cereals                          | 3.8  | 11 Milling products              | 2.7  | 21 Edible preparations        | 2.2  |
| 07 Edible vegetables                | 3.8  | 01 Live animals                  | 2.6  | 16 Preparations of meat, fish | 2.0  |
| 06 Live trees and other plants      | 3.4  | 25 Salt; Sulphur, earths         | 2.3  | 03 Fish and crustaceans       | 1.9  |
| 08 Edible fruit and nuts            | 2.9  | 19 Preparations of cereals       | 2.0  | 19 Preparations of cereals    | 1.5  |
| 16 Preparations of meat, fish       | 2.3  | 06 Live trees and other plants   | 1.9  | 01 Live animals               | 1.4  |
| 03 Fish and crustaceans             | 2.2  | 23 Residues and waste            | 1.7  | 25 Salt; sulphur, earths      | 1.3  |
| 01 Live animals                     | 2.1  | 03 Fish and crustaceans          | 1.3  | 10 Cereals                    | 1.1  |
| 23 Residues and waste               | 2.0  | 21 Edible preparations           | 1.2  | 11 Milling products           | 1.1  |
| 21 Edible preparations              | 1.9  | 09 Coffee, tea, mate and spices  | 1.2  |                               |      |
| 17 Sugars and confectionery         | 1.7  | 20 Preparations of vegetables    | 1.2  |                               |      |
| 18 Cocoa and preparations           | 1.7  | 12 Oil seeds, oleaginous fruits  | 1.2  |                               |      |
| 19 Preparations of cereals          | 1.6  |                                  |      |                               |      |
| 02 Meat and edible meat offal       | 1.3  |                                  |      |                               |      |

conditions as trade liberalization, economic and financial recession, Russian embargo, and other trade restrictions make a visible impact on the changes in international trade flows.

The analysis of export distribution has revealed that all the Baltic States produce not only raw material-intensive or labour-intensive commodity groups. The category

of difficult-to-imitate research-intensive goods makes almost one third of total export in Estonia, and one fifth of total export in Latvia and Lithuania. Nevertheless, this category of technological intensity of goods does not show any revealed comparative advantage except industry 85 Electrical machinery in Estonia, and industry 39 Plastics and articles in Lithuania (the indexes estimated for these industries fall into the interval  $1 < RCA < 2$ ). On the other hand, the export share of difficult-to-imitate research-intensive goods is larger than the share of raw material-intensive goods.

The shares of easy-to-imitate research-intensive goods in total exports are smallest (with one or two commodity groups with  $RCA > 1$ ) for all three Baltic States. While describing the shares of capital-intensive goods, it should be noted that all of the states have 4–6 commodity groups with  $RCA > 1$ . However, in Latvia this category makes a larger share (20%) than the one of labour-intensive goods (18.3%). Latvia dominates in industry 22 Beverages, spirits ( $RCA = 8.5$ ), while Lithuania has good positions in industry 24 Tobacco and substitutes ( $RCA = 6.7$ ), and Estonia—in industry 32 Tanning or dyeing extracts ( $RCA = 3.5$ ).

The export shares of raw material-intensive goods are largest in Lithuania (40.4%) and Latvia (37.3%), while Estonia has a slightly lower, although significant (29.2%), share of raw material-intensive goods in its total export. The states have a number of the same commodity groups with high values of RCA index: 44 Wood and articles of wood, 04 Dairy produce and birds' eggs, 10 Cereals, 16 Preparations of meat, of fish, 11 Milling products, and 19 Preparations of cereals. Competing with each other in foreign markets, food and wood industries have strong positions in the exports of all of the states. Nevertheless, there are some commodity groups with high RCA, in the exports of which the states do not compete: Lithuania has a strong comparative position in industry 31 Fertilizers ( $RCA = 10.2$ ), while Estonia—in industry 18 Cocoa and preparations ( $RCA = 5.7$ ). The category of labour-intensive goods makes a visible share, i.e. almost one-fifth of total export, in all of the states. Nearly all commodity groups with  $RCA > 1$  in Table 1 belong to textile and furniture industries. It should be noted that the Baltic States compete with each other in the exports of such commodity groups as 94 Furniture, bedding, 51 Wool, fine or animal hair, 49 Printed books, newspapers, 43 Furskins and artificial fur, 70 Glass and glassware, 68 Articles of stone, plaster, and 50 Silk. Unlike the other states, Lithuania has strong comparative advantage in industry 53 Other vegetable fibres ( $RCA = 7.5$ ), and industry 56 Wadding, felt ( $RCA = 3.5$ ).

Concluding the results of the empirical study we can state that the Baltic States have quite similar export specialization due to their similar production factors and similar processes of economic transformation and development. This is the main reason why the Baltic States need more efforts to compete in global markets and expand the shares of difficult-to-imitate research-intensive, capital-intensive, and easy-to-imitate research-intensive goods for diversification of their exports.

## References

- Amir, M. (2000). *Export specialization and competitiveness of the Malaysian manufacturing: Trends, challenges and prospects*. 5th annual conference on international trade education and research, Melbourne. Retrieved October 10, 2016, from <http://www.apec.org.au/docs/mahmood.pdf>.
- Balassa, B. (1965). Trade liberalization and revealed comparative advantage. *The Manchester School of Economic and Social Studies*, 119, 99–123.
- Banterle, A. (2005). *Competitiveness and agro-food trade: An empirical analysis in the European Union*. Retrieved November 18, 2016, from <https://ageconsearch.umn.edu/bitstream/24692/1/pp05ba01.pdf>.
- Benedictis, L., & Tamberi, M. (2001). *A note on the Balassa index of revealed comparative advantage*. Retrieved October 14, 2016, from <http://docs.dises.univpm.it/web/quaderni/pdf/158.pdf>.
- Bernatonyte, D., & Normandiene, A. (2009). Estimation of trade specialization: The case of Baltic States. *Inzinerine Ekonomika-Engineering Economics*, 2, 7–17.
- Bruneckiene, J., & Paltanaviciene, D. (2012). Measurement of export competitiveness of the Baltic States by composite index. *Inzinerine Ekonomika-Engineering Economics*, 1, 50–62.
- Erlat, G., & Erlat, H. (2008). *How has specialization in Turkish exports evolved over time? A study based on Galtonian regressions*. Retrieved November 18, 2016, from <http://meea.sites.luc.edu/volume10/PDFS/Paper%20by%20Erlat%20and%20Erlat.pdf>.
- Havrila, I., & Gunawardana, P. (2003). Analysing comparative advantage and competitiveness: An application to Australian's textile and clothing industries. *Australian Economic Papers*, 42(1), 103–117.
- Hilmola, O. P. (2013). From bubble to sustainable economy in the Baltic States. *Transport and Telecommunication*, 14(3), 237–249.
- Hoen, A. R., & Oosterhaven, J. (2006). On the measurement of comparative advantage. *The Annals of Regional Science*, 40, 677–691.
- Lall, S. (2000). The technological structure and performance of developing country manufactured exports, 1985–98. *Oxford Development Studies*, 28(3), 337–369.
- Laursen, K. (2015). Revealed comparative advantage and the alternatives as measures of international specialization. *Eurasian Business Review*, 5(1), 99–115.
- Pilinkiene, V. (2014). Evaluation of international competitiveness using the reveal comparative advantage indices: The case of the Baltic States. *Mediterranean Journal of Social Science*, 5(13), 353–359.
- Prasad, R. N. (2004). *Fiji's export competitiveness: A comparison with selected small island developing states*. Reserve Bank of Fiji, Working Paper.
- Remeikiene, R., Startiene, G., & Dumciuviene, D. (2015). Assessment of the industry competitiveness of the Baltic States in the EU during the period of economic recession. *Technological and Economic Development of Economy*, 21(1), 79–95.
- Saboniene, A. (2009). Lithuanian export competitiveness: Comparison with other Baltic States. *Inzinerine Ekonomika-Engineering Economics*, 2, 49–57.
- Staehr, K. (2015). *Economic growth and convergence in the Baltic States: Caught in a middle income trap?* Retrieved November 15, 2016, from <https://archive.intereconomics.eu/year/2015/5/economic-growth-and-convergence-in-the-baltic-states-caught-in-a-middle-income-trap/>.
- Stefaniak-Kopoboru, J., & Kuczevska, J. (2016). Export specialization in services of the visegrad countries. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 11(2), 265–284.
- United Nations. (2002). *Trade and development report*. Retrieved October 16, 2016, from [http://unctad.org/en/Docs/trd2002ch3a\\_en.pdf](http://unctad.org/en/Docs/trd2002ch3a_en.pdf).

**Part II**  
**Regional Studies**



# Analysis of the Global Market of Energy Resources



Ireneusz Miciuła and Paweł Stepień

**Abstract** The ongoing globalization processes and related solutions implemented internationally are gaining momentum. Solutions concerning sources of energy are among the fundamental areas of the contemporary political economy. The present paper, written on the basis of statistical data and inference, comprises an analysis of the current state of the market of energy resources and attempts to outline development perspectives for the global energy market by 2030 with particular emphasis on the situation in European countries. The aim of the article is a statistical analysis of the situation on the global energy commodity market in terms of their use. This analysis is important for current and future problems of political economy in the energy sector of European countries and allows for the development of recommendations in this area.

**Keywords** Energy resources · Political economy · Sustainable development · International finance

## 1 Introduction

Energy is the driving force of economies all around the world (European Union 2017). Access to energy sources is undoubtedly one of the basic factors in economic development. The energy sector gained importance with the first industrial revolution and the demand for energy has been on the increase since then. Nowadays, societies are dependent on constant supplies of energy. This is why currently access to energy resources constitutes one of the most serious issues of the contemporary global economy.

The aim of this paper is to study the condition of the global market of energy resources and present a forecast for development by 2030 to enable conclusions in

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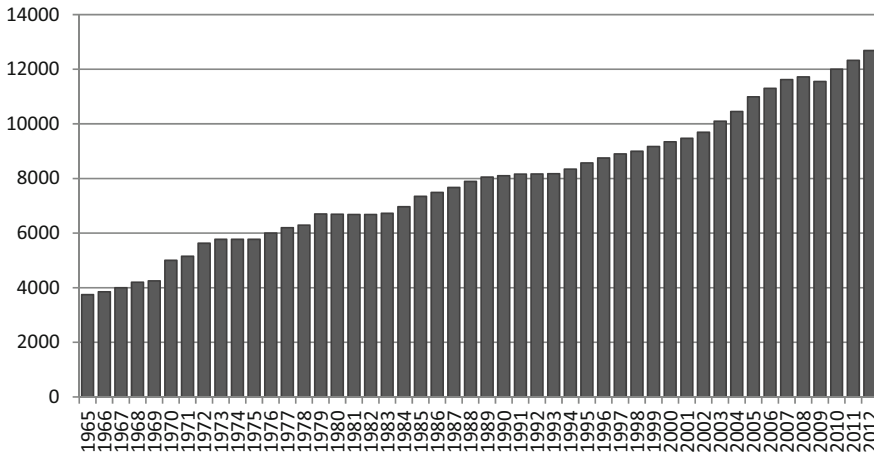
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terms of fundamental problems of the political economy in the energy sector in European countries and to present recommendations with regard to these questions. On the one hand it is particularly important to analyze the possibility of the development of renewable energy sources. On the other hand is the fundamental security of energy supply for the economy, which are mainly implemented through conventional energy sources. As part of the statistical analysis of the quantitative data presented in the article, the perspectives for the development of the use of conventional and renewable sources under the so-called energy mix in the European Union. These goals stem from the European Union's energy policy, which calls for establishing a competitive and efficient energy market that would provide prosperity and improving Europe's competitiveness in the global market. To date, national and EU legislators have focused on introducing market mechanisms in the trade of electricity. Markets in the EU Member States were liberalised, which allowed end users to order electricity from individual power generating entities of their own choosing. However, even though power generation and supply services are provided based on the principles of free-market competition, transmission and distribution networks are still subject to a natural monopoly. This competition-monopoly hybrid emphasises the importance of regulation mechanisms, which should aim towards eliminating monopoly rents. In recent decades, the development of renewable energy sources has become one of the major goals of the EU Member States' energy policy. Resulting from this policy was the establishment of mandatory share of renewable energy sources in the total national energy consumption. Undoubtedly, sustainable development of the power industry based on diversification of raw fuel sources, including renewable energy sources, is environmentally, economically and socially beneficial (Ang 2008). However, what is also important is the financial viability of changes related to raw fuels, which affect entire economies, and the possible pace of such changes in the context of environmental, socio-economic and technological constraints. Moreover, the EU climate policy enforces replacement of energy derived from coal with more environmentally friendly energy. This strategy is not beneficial for countries, where coal is currently the primary source of energy. This is clearly visible in the context of rapid changes, i.e. those to be made by 2030. These changes are not reasonably justified, nor financially viable as the substitute solutions offered will not be profitable without national or EU subventions or funding. Furthermore, the changes have caused unsettling occurrences and disturbances in the energy markets, affecting prices in the entire economy.

## **2 Current Status of the Global Market of Energy Resources**

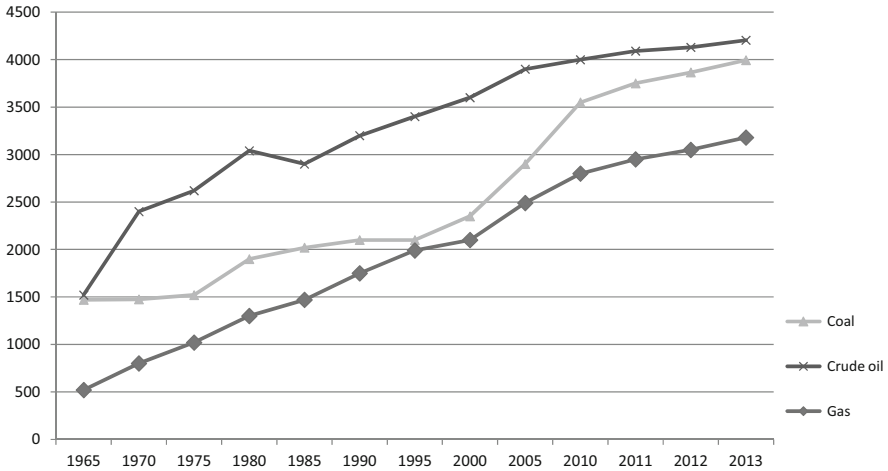
Global warming reached its peak in the 1940s, i.e. before the accelerated growth of CO<sub>2</sub> emissions from the combustion of fossil fuels took place. This means that man-made CO<sub>2</sub> does not have a significant impact on the climate. It should be borne in mind that human activity constitutes only an additional 3.5% of the CO<sub>2</sub> stream released to the atmosphere (World Health Organization 2017). This is comparable



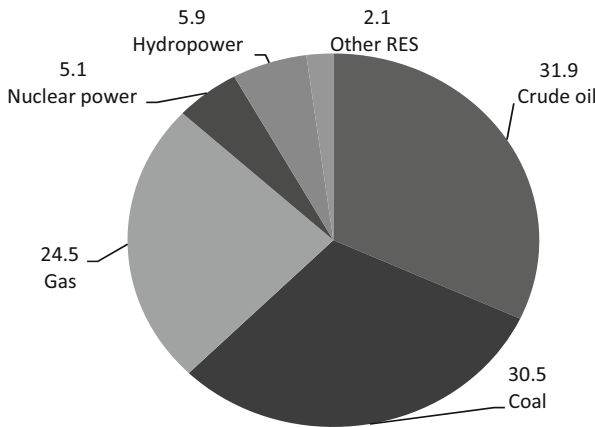
**Fig. 1** Global consumption of energy in the years 1965–2012 (in Mtoe). Source: Own work based on British Petroleum (2016)

with annual fluctuations in the whole CO<sub>2</sub> mass in the atmosphere (Goodstein and Intriligator 2013). SO<sub>2</sub> emissions entail an opposite phenomenon, i.e. climate cooling. It follows, therefore, that this problem is non-existent on a global scale and all the more so it is not a consequence of human activity. Still, in 2013 the World Health Organization (WHO) found that the problem of environment pollution is perceptible locally but it is due to all harmful chemical compounds and particles which lead among others to the creation of smog (World Health Organization 2017). This is why, contrary to the widespread belief concerning the alleged global warming and the need to reduce greenhouse gas emission and limit the production of energy from coal, the world fails to react and uses increasingly large amounts of coal (Kuzemko 2013). The first 15 years of the twenty-first century saw a very dynamic increase in coal consumption across virtually all configurations and categories, both globally, on particular continents, and in terms of geopolitics. The consumption of coal was limited only in the countries of the Old Continent which already depleted the majority of their resources, i.e. Belgium, France, Great Britain and—only in the case of hard coal—Germany (Miciuła and Miciuła 2014). For over half a century the world has been developing in terms of energy at a fast and stable pace. Between 1965 and 2012 the overall coal consumption increased from about 3750 million to 12,685 million toe, as shown in Fig. 1. According to forecasts for the global energy market, energy efficiency of all installations in the world is to increase from 5640 GW (gigawatt) in 2012 to 9266 GW in 2030. In the same period, the production of electrical energy is to increase from 22,441 TWh (terawatt hours) to 34,458 TWh (Thaler 2014).

The levels of energy production from all three main fuels are to increase and forecasts indicate that coal will become the dominant one (Dyer and Trombetta 2013). Currently, it constitutes almost 30% of the output of the existing installations and in 2030 it may constitute ca. 35% of energy produced and globally it will once



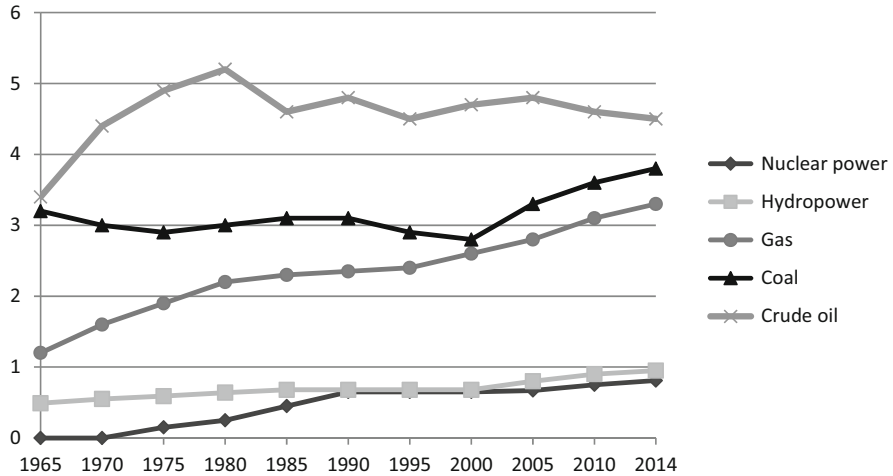
**Fig. 2** Consumption of the three main sources of energy worldwide in the years 1965–2013 (in Mtoe). Source: Own work based on British Petroleum (2016)



**Fig. 3** Energy from particular sources globally in 2013 (in %). Source: Own work based on International Energy Agency (2015)

again become the main energy resource. It is also expected that gas will quickly catch up and gain higher importance. These processes are already taking place, as indicated in Figs. 2 and 3, and the forecasts may become true much sooner.

Based on current media coverage, one may get the impression that renewable energy sources are thriving. This is, however, just an impression. According to statistics on the use of primary sources of energy in the twenty-first century, the reality is completely different than what the media present (Szczęśniak 2015). Oil is still leading, but the increase is insignificant and one can see stagnation caused by saturation of the market on the one hand and the appearance of an alternative,



**Fig. 4** Average annual consumption of energy per capita by source (in BOE—Barrel of oil equivalent, 1 barrel of oil = 42 gallons = 159 L). Source: Own work based on European Commission (2016)

i.e. bio-fuels and electric cars, on the other hand. This is why forecasts up to 2030 suggest that the significance of oil as a source of energy will decline and it will be taken over by coal and—by 2050—also by gas. Coal and gas are the two most dynamically developing sources of energy in the twenty-first century (Balmaceda 2013). Analyzing the energy situation since the year 2000, we can define the dynamics of increase in the consumption of particular raw materials which follows from changes of the order of millions toe. Generally, energy consumption increased by 37.5% and the increase in terms of particular energy resources was as follows: 70.2% coal, 51.4% natural gas, 19.5% hydropower, 16.8% crude oil and 6.3% nuclear energy.

Improvement in the situation with regard to coal results from the need to provide energy to satisfy the demand generated by economic development in China and other Asian countries and from an increase in extraction in most countries the world over. In the case of gas, this results from the demand for production systems which are cleaner and more flexible and from the increase in the global level of extraction (Havlik 2010). There was an immense increase in the production capacity in North America as a result of discovering rich reserves of shale gas and forecasts suggest a dynamic development of the gas energy industry also in the Middle East and China (Leveque et al. 2014). The chart (Fig. 4), which shows average annual global consumption of energy per capita broken down by energy sources, confirms such development trends.

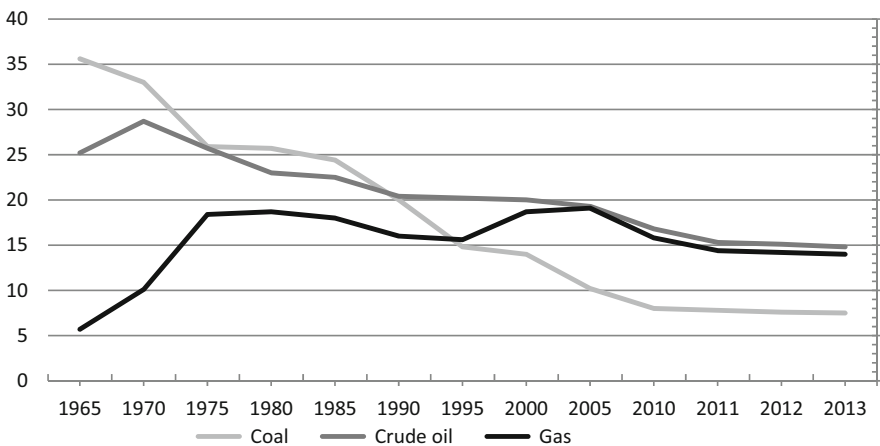
According to forecasts, in the twenty-first century coal will once again become the number one energy resource around the world. This trend is substantiated by global resources of coal, which are evenly distributed around the world and constitute 60% in relation to 40% (made up jointly by crude oil and natural gas) in the group of three main energy sources in the contemporary world.

### 3 Europe on the Energy Market

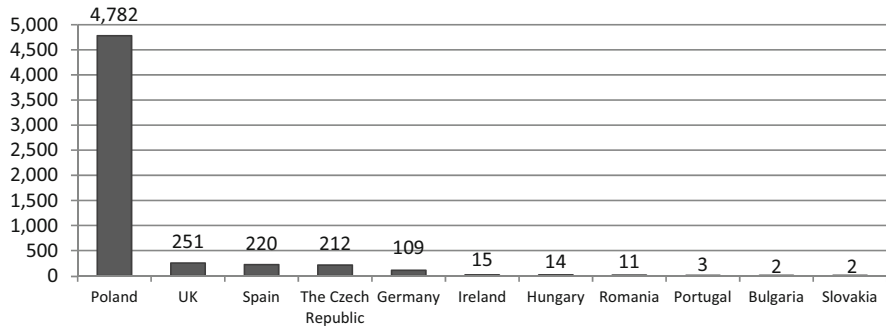
Europe is losing its importance on the global energy market. This is clearly visible when analyzing the global consumption of the three main energy resources, which best reflects energy trends in Europe. Crude oil consumption decreased from 29% in the 1970s to 15% in 2013. After a rapid increase at the beginning of the 1980s, when the share was 19%, there was a long period of stability and then, after 2005, crude oil consumption started decreasing until it reached 14% in 2013. Coal experienced the biggest fall; in 1965 Europe used 36% of the global balance, today the figure is less than 8% (Capros et al. 2010). This is a constant trend, which shows that there is demand for energy in other dynamically developing parts of the world and that EU member states experience problems and economic stagnation (Fig. 5).

Analysis of hard coal reserves in EU countries suggests that the era of extraction is over as no new resources have been found and the existing resources have been depleted. Poland stands out in that it currently has 86% of all reserves of hard coal in the European Union (Fig. 6).

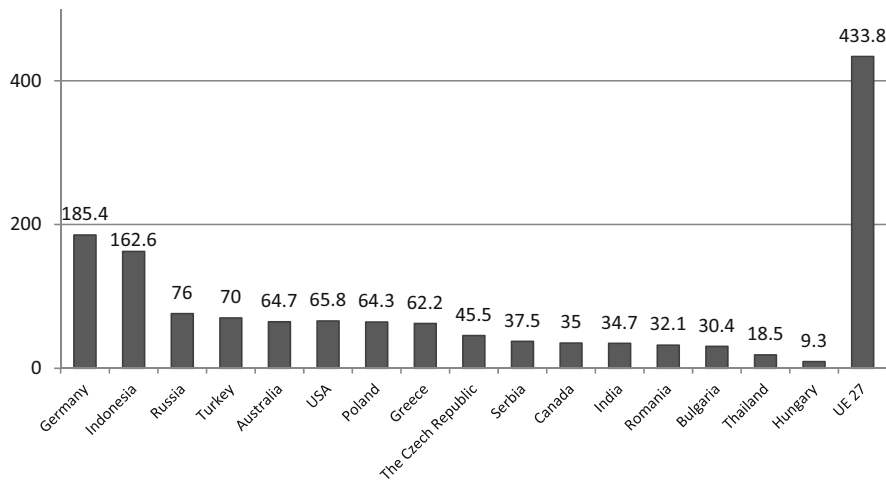
Conclusions for the coal industry, both in the global and European context, should be drawn from the analysis of all kinds of coal which are currently available. Many analyses which are to translate into strategic decisions in energy policy have been performed only on the basis of hard coal resources. EU member states are the best example, i.e. their climate and energy policy, at least in theory, based on EU legislation, intends to limit the use of coal as an energy resource due to the high level of carbon dioxide emissions (Brousseau and Glachant 2014). The situation looks completely different in practice, i.e. statistical data show that in spite of the depletion of hard coal resources its consumption continues to increase. Moreover, forecasts indicate that both global and EU consumption of coal will increase in spite of the



**Fig. 5** Share of Europe in global consumption of energy from three main resources (in %). Source: Own work based on International Energy Agency (2015)



**Fig. 6** Hard coal reserves in EU countries in 2013 (in millions of tons). Source: Own work based on Euracoal (2015)



**Fig. 7** Extraction of brown coal around the world in 2013 (in millions of tons). Source: Own work based on Euracoal (2015)

policy of limiting the so-called “dirty” energy, which involves the emission of a substantial amount of greenhouse gases (Moran and Russell 2009). Germany serves as a good example here. The country which bears the brunt of responsibility for the direction of contemporary climate and energy policy of the EU, as a result of the pressure exerted by the Green Party, is at the same time the biggest producer of coal in Europe and its brown coal extraction is of the biggest importance around the world (Stępień and Miciuła 2016). Moreover, Germany launched an investment involving the construction of six brown coal mines, which will further strengthen the country’s position as the world leader in brown coal extraction. Thus, the extraction of brown coal in Germany will exceed 200 million tons annually (Fig. 7).

In this context, strategies pursued by EU member states should be developed on the basis of investments carried out in practice by other member states, including

**Table 1** Extraction of hard coal and brown coal in 2013 (in millions of tons)

| Place in terms of extraction | Country            | Extraction of hard coal and brown coal |
|------------------------------|--------------------|--|
| 1                            | China              | 3730                                   |
| 2                            | USA                | 996                                    |
| 3                            | India              | 694                                    |
| 4                            | Indonesia          | 575                                    |
| 5                            | Australia          | 459                                    |
| 6                            | Russia             | 412                                    |
| 7                            | South Africa       | 291                                    |
| 8                            | Germany            | 198                                    |
| 9                            | Poland             | 144                                    |
| 10                           | Canada             | 132                                    |
| 11                           | Kazakhstan         | 125                                    |
| 12                           | Colombia           | 94                                     |
| 13                           | Turkey             | 81                                     |
| 14                           | Greece             | 69                                     |
| 15                           | Ukraine            | 64                                     |
| 16                           | The Czech Republic | 58                                     |
| 17                           | Vietnam            | 45                                     |
| 18                           | Serbia             | 39                                     |
| 19                           | Romania            | 35                                     |
| 20                           | Bulgaria           | 32                                     |

Source: Own work based on Euracoal (2015)

Germany, which are different from what is stipulated in the climate and energy policy. Moreover, Germany, whose share in the emission of carbon dioxide is the highest among EU countries, produces almost 50% of electric energy from coal, including 30% from the less efficient brown coal. The idea behind this is to balance the high costs of green energy and provide a source of electricity in the event of fluctuations in the production of electricity from renewable energy sources (RES). Therefore, Germany follows a rational energy policy, which is contrary to EU arrangements (Table 1).

It should be noted that in terms of value, Germany extracts and uses as much coal as all the other EU countries together (Poland excluded). This is why many EU resolutions, including the resolutions which refer to the values of 1990 as the base year, undoubtedly are to result in differences between the economies of EU member states being preserved. This is not in line with the very idea behind the European Union and leaves no doubt that there is a silent economic war in which the leading countries want to maintain their dominant position. Solidarity in the EU is visible only when member states have common interests with external countries. Unfortunately, such situations do not happen very often and many EU countries, including Germany, put their economic interests first to the detriment of the idea behind the EU and undertake projects which are contrary to the interests of the EU and other member states. Relations with Russia are the best example as they lead to divisions

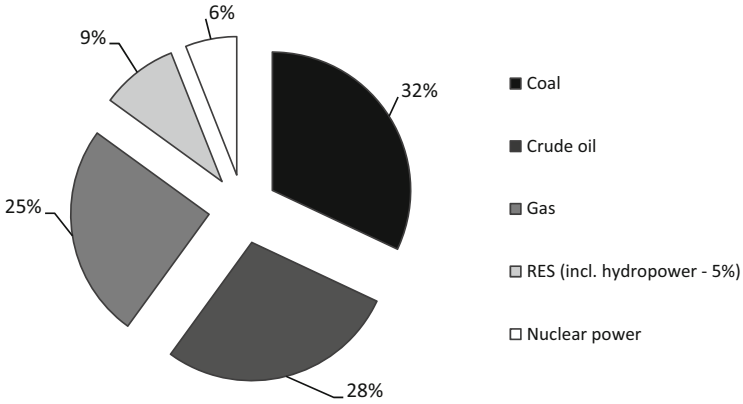


and dissenting voices within the EU. Problems in the EU energy policy result from the failure to develop a coherent policy and lack of abundant reserves of the main sources of energy.

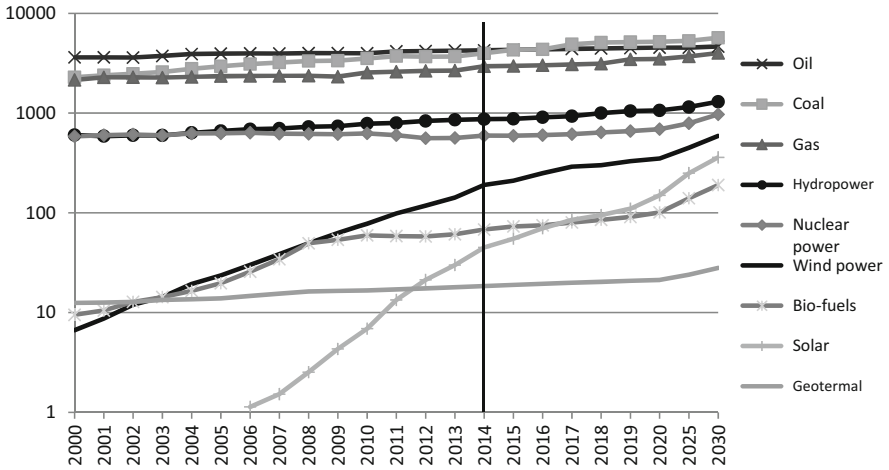
#### **4 Perspectives for the Development of Energy Sources by 2030**

The analysis of the situation and conditions in the energy sector may serve as the starting point for outlining an energy strategy that would involve defining risks and priorities as well as future trends, which will have the biggest impact on the global energy industry. The transportation sector also affects the global energy market. There is no denying that the American shale gas revolution is of great importance for the global crude oil market. Thanks to technological development, the production of crude oil in the USA has increased by 3.6 million barrels a day since 2010, but the market capacity has decreased by 3.3 million barrels a day. In Canada, an additional 1.5 million barrels a day is extracted from the tar sands. The increase in the supply of crude oil around the world is not attributable to North America alone. Other regions of the world contribute to it as well. After the war, Libya returned to the market with its oil, and so did many medium-sized producers. Moreover, production in the Middle East did not decrease in spite of the war. All this is happening in a situation when global consumption of crude oil has decreased by 5 million barrels a day. For a long time crude oil has not been subject to natural market processes to such an extent as it is now. The demand for crude oil may continue decreasing for many years to come as cars are becoming more and more economical; all the more so as the major importers of crude oil, i.e. the USA, Europe, India, China and Japan will want to put an end to the monopoly of crude oil as the source of energy in road transport.

The strong increase in demand for energy from renewable sources in the EU will slow down as a result of among others the need to comply with international agreements concerning climate change or the willingness to support new branches of green economy. The pace of implementing the idea of global low-emission society will remain slow (Heidari et al. 2015). This results mainly from the low efficiency characteristic of the majority of renewable sources of energy in comparison to conventional energy. As technology becomes increasingly complex and nuclear energy (danger, radioactive waste) and RES (high costs, insufficient efficiency) present numerous drawbacks, forecasts indicate that energy from gas will push the global energy sector towards production involving less carbon dioxide. It can already be seen that the majority of countries, Germany included, would like to withdraw from the restrictive EU climate policy which has no impact on the global scale. For the EU economy this means being more dependent on the external market, which is contrary to the objective of limiting carbon dioxide emissions and becoming more independent from external supplies at the same time (Fig. 8).



**Fig. 8** Forecast structure of consumption of primary energy in 2030 (in %). Source: Own work based on Enerdata (2016)



**Fig. 9** Consumption of energy depending on the source with forecast up to 2030 year (Mtoe). Source: Own work based on International Energy Agency (2015)

The trends in the structure of energy sources are confirmed by global forecasts (Fig. 9).

## 5 Conclusion

Forecasts suggest that by 2030 there will be no significant changes in the structure of consumption of energy sources apart from coal, which will recover its status of the leader. There are possibilities to use coal as a chemical resource and transport fuel,

which will also contribute to the wide use of this most plentiful and evenly distributed energy resource. In the twenty-first century, research and development in the scope of new technologies of generating energy will be of immense importance for the energy situation around the world. For instance, the development of clean coal technologies is related to the necessity of achieving higher energy efficiency in the use of coal, and higher economic efficiency. Therefore, there arises a need to develop more rational and highly-efficient technologies of coal use. In all scenarios, fossil fuels will play a leading role in the upcoming decades. A decrease in renewable energy prices will lead to a gradual introduction of clean energy, but a transformation of the global energy system is a difficult and, most importantly, expensive task. This is why even by 2050 none of the four main scenarios of global energy sector development modelled by IPCC will have shown significant benefits concerning the use of available renewable energy sources.

## References

- Ang, J. B. (2008). Economic development, pollutant emissions and energy consumption in Malaysia. *Journal of Policy Modeling*, 30(2), 271–278.
- Balmaceda, M. (2013). *The politics of energy dependency*. London: University of Toronto Press.
- BP (British Petroleum). (2016). *The BP statistical review of world energy – underpinning data 1965–2016*. Accessed May 4, 2017, from <https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html>
- Brousseau, E., & Glachant, J. M. (2014). *The manufacturing of Markets – Legal, political and economics dynamics*. Florence: Loyola de Palacio series on European Energy Policy.
- Capros, P., Mantzos, L., Tasios, N., De Vita, A., & Kouvaritakis, N. (2010). *European energy and transport trends to 2030 – update 2009*. Brussels: European Commission.
- Dyer, H., & Trombetta, M. J. (2013). *International handbook of energy security*. Cheltenham: Edward Elgar.
- Enerdata. (2016). *Global Energy Statistical Yearbook 2016*. Accessed February 14, 2017, from <https://yearbook.enerdata.net/2015/>
- Euracoal. (2015). *Annual Report 2015*. Accessed February 10, 2017, from <https://euracoal.eu/library/annual-reports/>
- European Commission. (2016). *EU energy in figures. Statistical Pocketbook 2016*. Accessed April 4, 2017, from <https://publications.europa.eu/en/publication-detail/-/publication/c3d179b2-9a82-11e6-9bca-01aa75ed71a1>
- European Union. (2017). *European energy policy*. Accessed March 10, 2018, from [http://www.europa.eu/legislation\\_summaries/energy/index\\_en.htm](http://www.europa.eu/legislation_summaries/energy/index_en.htm)
- Goodstein, D., & Intriligator, M. (2013). *Climate change and the energy problem*. Los Angeles: World Scientific.
- Havlik, P. (2010). *European Energy Security in view of Russian Economic and Integration Prospects*. Research Reports no. 362. Vienna: Vienna Institute for International Economic Studies.
- Heidari, H., Katircioglu, S. T., & Saeidpour, L. (2015). Economic growth, CO<sub>2</sub> emissions and energy consumption in the five ASEAN countries. *International Journal of Electrical Power & Energy Systems*, 64, 785–791.
- International Energy Agency. (2015). *World energy balances*. Accessed November 10, 2016, from <http://www.iea.org/statistics/topics/energybalances/>

- Kuzemko, C. (2013). *The energy security – Climate Nexus. International political economy series*. Hampshire: Palgrave MacMillan.
- Leveque, L. F., Glachant, J. M., Barquin, J., Holz, F., & Nuttall, W. (2014). *Security of energy supply in Europe. Natural gas, nuclear and hydrogen*. Florence: Loyola de Palacio.
- Miciuła, I., & Miciuła, K. (2014). Energia odnawialna i jej aspekty finansowe jako element zrównoważonego rozwoju Polski [Renewable energy and its financial aspects as an element of sustainable development of Poland]. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu [Scientific works of the University of Economics in Wrocław]*, 330, 239–247.
- Moran, D., & Russell, J. (2009). *Energy security and global politics*. New York: Taylor & Francis.
- Stępień, P., & Miciuła, I. (2016). Liberalisation of the Polish energy market and the EU commitments. *Czech Journal of Social Sciences, Business and Economics*, 5(2), 25–34.
- Szcześniak, A. (2015). *New themes*. Accessed September 10, 2016, from <http://szczesniak.pl/tematy>
- Thaler, H. (2014). *Prognozy dla globalnego rynku energetycznego [Forecasts for the global energy market]*. Warsaw: Frost & Sullivan.
- World Health Organization. (2017). *Global Health Observatory*. Accessed April 10, 2017, from <http://www.who.int/publications/en/>

# Regulation of the Wind Sector in Poland: Tasks of Municipalities in the Context of Public Procurement



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**Abstract** The wind sector is one of the sectors of the economy whose development influences environmental protection. It follows that wind, as a source of renewable energy, is one of the factors influencing growth in consumption of green energy when compared to the use of conventional energy. The generation of energy from renewable sources is one of the most important trends emerging in international environmental protection policy. At the European level, of importance are the postulates contained in the Europe 2020 Strategy, implemented by European Union Member States. This paper pointed out regulations of Polish law concerning the rules of building a wind power plant and pointed out specific rules concerning the sale of wind energy by the municipalities.

**Keywords** Renewable energy · Wind energy · Public procurement

## 1 Introduction

One of the primary assumptions of the Europe 2020 Strategy policy is 20% growth in the end use of energy from renewable sources by 2020 (Arasto et al. 2012). This objective and means of achieving it are also stated *expressis verbis* in Directive of the European Parliament and of the Council 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC [hereinafter: Renewable Energy Directive, RED] (Rahlwes 2013). The referenced Directive was implemented in national legislation in the form of the Renewable Energy Act of 20 February 2015 [hereinafter: RE Act] (the Journal of the Act No 9).

The primary objective of this article is to highlight the legal environment surrounding the construction of land-based wind power stations by local self-governments, in particular by communes. A secondary objective will also be

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achieved, specifically, a presentation of the rules governing the sale of renewable energy (from wind, but also from other renewable sources) by communes. In this respect, the most important thing will be an answer to the question of whether a commune, in selling this energy, is obliged to conduct public procurement proceedings (Barradale 2010).

## 2 The Legal Environment for Development of the Wind Energy Sector in Poland

Wind energy is one of the non-conventional sources of energy that EU Member States take advantage of on a large scale (Kulovesi et al. 2011). The construction of wind farms is a common phenomenon in Poland as well. It should, however, be pointed out that growth in the production of energy from wind is to a large degree dependent on legal regulations in place. The primary legal act influencing the development of production of energy from renewable sources, including wind, is the aforementioned RE Act (Szydło 2015). This Act's regulations govern the production of energy from renewable sources. Essentially, the right to produce such energy is granted to enterprises, apart from situations in which green energy is generated by a special category of producers referred to as "prosumer". A characteristic trait of production of energy from renewable sources is that the costs of such activity are far higher than those involved in the production of energy from conventional sources. As a result, EU law carves out an exception from provisions of EU founding treaties that entities engaged in such activity may apply for financial support. At the same time, the EU legislator has decided that Member States are competent to decide in which form they provide public aid to entities producing energy from renewable sources (Rofiegger 2013).

The construction of land-based wind farms in Poland, as opposed to other EU countries, is a source of numerous conflicts between the business community and society at large. The national legislator, in seeking to eliminate or at least alleviate such conflicts, has adopted particular regulations on the location of wind farms in Poland; these are enumerated in the Wind Energy Farm Investment Act of 20 May 2016 (hereinafter: Wind Farm Act, WFA), which has been in effect since 16 July 2016 (the Journal of the Act No 961). This Act sets out the legal framework for the location, construction and use of wind farms comprising the investment process for renewable energy installations using wind power in the generation of electric energy. It introduces the "distance principle", previously unknown in the Polish legal regime (Sokołowski 2017).

Adoption of the distance principle is intended to protect a number of values threatened by the building and operation of wind farms. Dangers associated with the functioning of such investments are various: health (from noise pollution), environmental (from threats to various elements of the natural environment) and aesthetic (due to disruptions of the landscape resulting from the erection of wind farms). The normative adoption of the distance principle is thus the legislator's response to the

protests of various groups in society caused by the location of wind farms (Sokołowski 2017).

The normative grounds of the distance principle are contained in Art. 4 of the Wind Farm Act. The nature of this Act is dichotomic, as it sets out: firstly, rules for the location of future wind farms in reference to: (1) a residential building and/or building of mixed purpose performing a residential function, and (2) specified forms of nature and promotional forest complexes, and secondly: the rules for the location of a residential building and/or mixed purpose building performing a residential function in relation to existing wind farms. Analysis of Art. 4 of the Wind Farm Act leads to the conclusion that, in adopting the normative distance rule, the legislator's intention was to protect two categories of goods (values), i.e.: (1) residential buildings and/or mixed purpose buildings performing a residential function, and (2) selected forms of nature protection, such as national parks, nature reserves, landscape parks, Nature 2000 zones, and promotional forest complexes. In other words, the distance regulated by the Wind Farm Act concerns both the location of wind farms in reference to residential construction (and also particularly environmentally valuable areas), and the location of residential construction in reference to wind farms. The distance at which wind farms can be located and erected must be at least equivalent to 10 times the height of the wind farm, measured from the level of the ground to the highest structural point, including technical elements such as the turbine and blades (total wind farm height). It should be pointed out here that this rule does not apply to the reconstruction, expansion, renovation or assembly of a residential building and/or mixed purpose building performing a residential function. It should also be emphasized that Art. 4(1) *in fine* of the Wind Farm Act holds "equal to or greater" (the Journal of the Act No 961) which means that the legislator sets out the minimum distance that it believes will directly ensure human safety and protection of the environment.

### **3 Supplying Electric Energy as a Task of the Commune in Poland**

The commune, much the same as every other unit of local self-government, may generate energy using wind and other renewable sources. At the beginning of deliberations in this section, we must first answer the question of for what purpose a county may undertake activity consisting in the generation of energy from renewable sources (Lüthi and Prässler 2011)?

It is worth to underline that every activity conducted by a commune is associated with the performance of public tasks. It is no different in respect to the production of energy from renewable sources, as the activity of a commune in this sphere can be classified as the performance of own tasks concerning the provision of electric energy. In accordance with Art. 7(1)(3) *in fine* of the Commune Self-Government Act of 8 March 1990 (the Journal of the Act No 1875): "meeting the collective needs

of the community is an own task of the commune. In particular, own tasks encompass matters concerning the supply of electric and heat energy, as well as gas.” It should be pointed out at once that it is not the commune which directly supplies electric energy (produced by renewable sources) to its residents, but rather this is done by an enterprise engaged in such activity. This is associated with the necessity of delivering the produced energy to a distribution network serviced by a given energy enterprise, which takes place via the sale of that energy; we are thus dealing with a contract for the sale of energy. In this context, an issue of fundamental significance is determining whether this sale meets the conditions of a public procurement, and whether the sale of energy referred to herein is governed by the provisions of the Public Procurement Act of 29 January 2004 (the Journal of the Act No 1579 Kosiński and Trupkiewicz 2016). This will be explored in the following deliberations.

The legislator’s classification of the supply of electric energy, heat energy and gas as own tasks of the commune necessitates the determination of whether such activity is at the same time a public utility task. Precision in this matter is significant as it allows us to determine the organizational and legal structures under which the commune can generate energy from renewable sources. It should first be pointed out that an immanent characteristic of public utility tasks is the “continual and uninterrupted satisfaction of collective social needs by way of the provision of generally available services.” In the subject literature we may encounter the opinion that activity performed by a commune consisting in the production of energy from renewable sources under the rules set out in the RE Act does not meet the criteria of continual and uninterrupted satisfaction of collective social needs by way of the provision of generally available services. This is related to the manner in which energy enterprises acting on the basis of the provisions of the Energy Act of 10 April 1997 (hereinafter: the Energy Act; the Journal of the Act No 755) are engaged in the direct satisfaction of needs in respect of electric energy production. This position is entirely correct, primarily when considering that the commune neither provides services in the scope under discussion, nor does it organize them directly through the preparation of the appropriate technical, organizational or financial conditions. This means that the production of electric energy from renewable energy sources by a commune should be classified as an activity outside the scope of public utility. The Municipal Management Act of 20 December 1996 (the Journal of the Act No 827), in turn, holds that outside the scope of public utility tasks a commune may not engage in municipal management activities in the form of self-government budgetary entities; it may only establish limited liability and/or joint-stock companies, as well as limited partnerships in the case of public-private partnerships (Kosiński and Trupkiewicz 2016). These entities are directly involved in activity concerning the production of energy from renewable sources, on condition that the premises set out in Art. 10 of the Municipal Management Act are fulfilled, which will be discussed in detail below.

The Municipal Management Act sets out conditions that must be met in order to establish a commercial company (*it is* limited liability and joint stock) for activities outside the scope of public utility tasks. Of the most importance in the context of this



issue is Art. 10(1) of the Municipal Management Act, which holds that “outside the scope of public utility tasks, a commune may establish and/or join a commercial company if each of the following conditions are fulfilled: (1) needs of the community encompassed by the local self-government unit are going unfulfilled on the local market, (2) unemployment in the commune is exerting a significant detrimental influence on the quality of life of the local community, and the application of other measures resulting from provisions of law in force has not led to professional activation, in particular to significant renewal of the local market and/or long-term reduction in unemployment” (the Journal of the Act No 827). The aforementioned provision does not directly indicate the possibility to establish commercial companies for the purpose of producing energy from renewable sources. It is thus worth examining the content of Art. 10(3) of the Municipal Management Act, which holds that “limitations concerning the establishment of commercial companies and on communes joining such companies referred to in para. 1 and 2 do not apply to the possession of shares by a commune in companies engaged in banking, insurance, consultation, promotional, educational and publishing activities on behalf of local self-government, as well as other companies significant in the development of the commune, including sports clubs operating in the form of a capital company”. The environmental, social and economic benefits that come from expansion of the production of energy from renewable sources justifies the view that communes may form commercial companies for the purpose of generating electric energy from renewable sources, and these companies are important for the development of the commune.

## **4 Sale of Wind Energy Produced by a Commune and Public Procurement Proceedings**

### ***4.1 Rules for the Sale of Renewable Energy and the RE Act***

Municipal commercial companies established by communes are classified as enterprises (as defined under the provisions of the Freedom of Establishment Act of 2 July 2004). This means that such a company must meet all requirements set out at the stage of commencement of commercial activity in respect of production of energy, including—in cases involving a renewable energy production facility with total capacity in excess of 200 kW—obtain a permit. At the same time, as an enterprise engaged in commercial activity, such a company can participate in the support mechanism (financial) available to producers of renewable energy pursuant to the provisions of the RE Act (Fouquet 2013).

The RE Act guarantees to every producer the sale of energy produced by a given renewable energy facility. The legislator has provided a 15-year guarantee period, which can, however, be restricted by the limit on public aid set out in Art. 39 of the RE Act. In other words, on the basis of the indicated provision a producer can

calculate the maximum value of financial assistance it may receive. If a green energy producer receives the permissible amount of support in a period of time less than 15 years, this is equivalent to reduction of the maximum statutory period. The final stage of the statutory guarantee of the sale of energy produced by renewable sources is the conclusion of a contract for the sale of energy. The parties to this contract are the producer of the energy and the obliged seller (to the purchase of that energy, which, as a rule, is an electric energy company engaged in the distribution of electric energy). In turn, the primary subject matter of the energy sale contract revolves around issues of deadlines for the supply of created energy and the price of that energy (Przybylska 2016).

Of significance in the context of the subject under consideration are the modes of the sale of energy created using renewable sources, and which the legislator has adopted in the RE Act. In reviewing the content of this Act, it can be held that the legislator has proscribed three versions. In the first, the producer concludes a contract for the sale of energy with the obliged seller after selecting that seller's offer by way of an auction. In this mode, the producer of energy from renewable sources submits an offer for the sale of the produced energy, while the price for the sale of energy given in the offer cannot exceed the so-called reference price, and thus the maximum price set in the relevant regulation by the minister responsible for matters related to energy. In the second, the producer of energy from renewable resources can sell the electric energy it produces to the obliged seller by way of submitting to that seller an offer. Under this procedure, energy is sold at the average market price for the sale of electric energy on the open market as published by the President of the Energy Regulatory Authority under Art. 23(2)(18a) of the Energy Act. In the third, the producer of energy from renewable sources can sell its energy to any energy company by way of submission of an offer, at prices and on conditions determined by the parties to the contract.

Having presented the primary regulations in effect for the sale of energy generated from renewable sources, the question should be asked as to whether and in what scope the conclusion of a contract for the sale of energy by a commune-owned company to an obliged seller is subject to the provisions of the Public Procurement Act? In other words, it must be determined whether, in the case under analysis, both the subjective and objective premises are met for public procurement proceedings to be conducted. Later, after conducting the relevant deliberations, an answer will be issued to the question posed above.

## ***4.2 Rules for the Sale of Wind Energy and Public Procurement Proceedings***

Whether a municipal commercial company, intending to sell energy produced by renewable sources, is obliged to conduct public procurement proceedings for the sale of this energy, is a matter to be decided by the general provisions of the Public

Procurement Act, but also detailed regulations contained in the RE Act. As mentioned previously, we should begin by determining both the subjective and objective scope of the concept of a public procurement order. In other words, it should be determined whether, firstly, under the Public Procurement Act a municipal company is an entity obliged to conduct public procurement proceedings, and secondly, whether the sale of energy produced by renewable sources is a public procurement order. There are no interpretative difficulties as regards the subjective aspect, as municipal companies are governed by the Public Procurement Act if the conditions set out in Art. 3(1)(3) therein are fulfilled (the Journal of the Act No 1579). As this provision states, “the Act shall be applied to public procurement proceedings [. . .] by juridical persons other than those enumerated in para. 1, established for the express purpose of meeting needs of a general nature not of an industrial or commercial character, insofar as the entities listed therein and in paras 1 and 2, either individually or jointly, through another entity: (a) finance over 50% of its activities, and/or (b) possess over one-half of shares, and/or (c) exercise oversight over the managerial body, and/or (d) have the right to appoint more than one-half of the supervisory and/or managerial body—insofar as the juridical person does not operate in normal market conditions, its objective is not the achievement of profit, and does not bear losses resulting from its activity” (Szydło 2016).

In turn, as regards the objective aspect, we should start by noting that under Art. 2 (13) of the Public Procurement Act, public procurement orders are defined as “for-fee contracts concluded between a contracting authority and a contractor, whose subject matter concerns services, supplies, or public works (the Journal of the Act No 1579).” This normative definition of public procurement is interpreted very broadly by scholars. According to Szydło (2016), the subject matter of every public procurement order is the consideration of the contractor provided to the benefit of the contracting authority. At the same time, he characterizes this obligation in the context of the elements comprising consideration in its civil law understanding. He emphasizes that both the theoretical and legal (it is expressed directly in legislation regulating the public procurement system in a given country) definition of consideration in the context of a contract for a public procurement order indicates that the subject matter of a such an order is consideration supplied by a contractor meeting the needs of the contracting authority; the meeting of the contracting authority’s needs should be understood and/or characterized in particular as meeting a specified need of the contracting party (Szydło 2016). Szydło also emphasizes that it is an absolute necessity to link the subject matter of a public procurement to the needs of the contracting authority and satisfaction thereof in the definition of a public procurement order, particularly considering the fact that all public tenders—and thus all consideration from contractors that is the subject matter of such orders—are simply a certain kind of instrument or means of satisfying the needs of the contracting authority (Szydło 2016). Here as well there is no doubt that a public procurement order is a contract concluded between the contracting authority and the contractor, as a result of which both the authority and the contractor obtain material benefits: the former in the form of services, supplies, or public works on its behalf, and the latter in the form of payment or other remuneration whose value can be

expressed in money. In accordance with the relevant definitions, a public procurement can encompass the provision of public works, supplies or services; this is not an enumerative catalogue, and thus contracts of a similar nature are also public procurement orders.

In order to link the preceding remarks to the subject matter under discussion, it should be indicated that under the RE Act “the obligation to purchase electric energy set out in Art. 41(1), in Art. 42(1), and in Art. 92(1) (the Journal of the Act No 9) (*it is* energy from renewable sources—WSJ) is performed by a seller of electric energy appointed by the President of the ERA (*it is* an obligated seller), on the basis of a contract referred to in Art. 5 of the Energy Act (the Journal of the Act No 755).” Here it becomes crucial to define the legal character of the aforementioned contract concluded between a municipal commercial company and an obligated seller in respect of the criteria set out in Art. 2(13) of the Public Procurement Act. We must begin with the premise that there is no doubt such a contract (*it is* a contract for the supply of renewable energy whose provisions are determined by the content of Art. 5 of the Energy Act) is a for-fee agreement. We are dealing with a classic exchange of financial consideration for material consideration, and the subject matter of such a contract is the supply of produced energy at a defined price. It must be emphasized that two regulations can be contained in the content of such a contract. Firstly, the municipal commercial company can sell the produced energy without desiring to take delivery of such energy in order to meet the needs of residents (in respect of supplying energy). It should be mentioned that in this version one of the criteria set out in Art. 3(1)(3) *in fine* of the Public Procurement Act will thus go unfulfilled, as such a municipal commercial company will sell the produced energy for the sole purpose of achieving a profit. Secondly, the municipal commercial company can sell the produced energy and simultaneously enter into an agreement with an energy company that the energy will be supplied to residents of the commune. In this case, activity in respect of the production of renewable energy and its subsequent sale will not be performed with a view to achieving a profit, but rather to meet the needs of residents. By the same token, the condition set out in Art. 3(1)(3) *in fine* of the Public Procurement Act is met—we are dealing with activity whose objective is not to achieve profit. The free choice of the supplier who will provide energy to residents of the local community is possible under Third Party Access (TPA) provisions in place in the Energy Act.

The deliberations conducted above lead us to the conclusion that the sale of energy produced by renewable sources by a municipal commercial company can meet the conditions for conducting proceedings to award a public tender, on condition that the premises set out in the Public Procurement Act (specifically, Art. 3(1)(3), and the monetary figures) are fulfilled. In turn, as regards the subject matter, a contract for the sale of energy (concluded between a municipal commercial company and energy company) will always be a for-fee contract, which demonstrates that the *sine qua non* condition set out in Art. 2(13) of the Public Procurement Act is met. These considerations should also be applied to the modes for the sale of renewable energy regulated by the RE Act. The first mode is auction proceedings for the sale of renewable energy. Every entity that is participating in such proceedings

(including a municipal commercial company) is governed by the law on renewable energy. In this respect, a municipal commercial company must fulfil all of the conditions set out by the RE Act, and in respect of the price of sale of produced energy, it is entitled to charge a price equal to (or lower than) the reference price, it is the price appointed by the minister responsible for matters of energy. Under the auction mode, a municipal commercial company thereby is subject to all of the provisions of the RE Act, but not the Public Procurement Act. An identical situation occurs when a municipal commercial company intends to sell energy generated by renewable sources via the submission of an offer to an obliged seller pursuant to Art. 42 RE Act. The for-fee nature of this contract is also exclusively governed by the regulation contained in the RE Act, not the Public Procurement Act. As mentioned previously, in such a situation the price of sale of energy generated from renewable sources is equal to the average price for sale of electric energy on the open market in the preceding quarter as announced by the President of the ERA under Art. 23(2) (18a) of the Energy Act. This means that a municipal commercial company, under the RE Act, may expect a specific price from an obligated seller (that is, the price announced by the President of the ERA). It is only when a municipal commercial company does not invoke one of the above modes, and thus decides to purchase generated energy pursuant to market rules (*id est* based on a consensual contract whose contents include the price of sale of energy), is it under a duty to conduct tender proceedings under the provisions of the Public Procurement Act (assuming the relevant subjective and objective conditions contained therein are fulfilled). However, this is exclusively the case when the receipt of the generated energy is correlated with the obligation to supply it to recipients living within the borders of a given commune.

## 5 Conclusion

The deliberations were focused on the rules for the sale of energy produced from wind (and other renewable sources) by municipal commercial companies. The primary objective was to find an answer to the question of whether municipal commercial companies producing energy from renewable sources are obliged to conduct public procurement proceedings for the sale of energy produced by unconventional sources. In this respect it has been determined that if a municipal commercial company established for the production of renewable energy assumes an organizational and legal form fulfilling the criteria of Art. 3(1)(3) Public Procurement Act, and the value of the sale of such energy exceeds the threshold set out in that Act, such a company is obliged to conduct public procurement proceedings only when it does not invoke one of the modes for the sale of energy regulated in the RE Act. In other words, such a company is governed by the provisions of the Public Procurement Act when it plans to sell energy on the open market rather than in another mode such as auction or offer under the provisions of the RE Act.

Following analysis of the provisions of the Public Procurement Act and the RE Act in respect of the subject matter addressed in this paper, one more conclusion can be drawn: invoking the doctrinal concept of the public procurement order, the sale of renewable energy by a municipal commercial company must be performed in order to perform public tasks by the contracting authority, *id est* to supply the local community with electric energy. Only in this case is the condition set out by the legislator in Art. 3(1)(3) of the Public Procurement Act met (“... the achievement of profit is not [the company’s] objective ...”). It should be added that a contract for the sale of electric energy between a municipal commercial company and an obligated seller (as a rule, a distribution company) must contain the relevant provisions: it must impose a duty on the obligated seller to supply energy to recipients within the borders of a given commune.

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## References

- Arasto, A., Kujanpää, L., Mäkinen, T., Zwart, R. W. R., Kiel, J. H. A., & Vehlow, J. (2012). Analysis and implications of challenges in achieving the targets of EU RES-E directive. *Biomass and Bioenergy*, 28, 109–116.
- Barradale, M. (2010). Impact of public policy uncertainty on renewable energy investment: Wind power and the production tax credit. *Energy Policy*, 38, 7698–7709.
- Fouquet, D. (2013). Policy instruments for renewable energy from an European perspective. *Renewable Energy*, 49, 15–18.
- Kosiński, E., & Trupkiewicz, M. (2016). Gmina jako podmiot systemu wspierania wytwarzania energii elektrycznej z odnawialnych źródeł energii [Commune as an entity of the system supporting the production of electricity from renewable energy sources]. *Ruch Prawniczy, Ekonomiczny i Socjologiczny*, LXXVIII(3), 93–106.
- Kulovesi, K., Morgera, E., & Munoz, M. (2011). Environmental integration and Multi-faceted international dimensions of EU law: Unpacking the EU’s 2009 climate and energy package. *Common Market Law Review*, 48, 829–891.
- Lüthi, S., & Prässler, T. (2011). Analyzing policy support instruments and regulatory risk factors for wind energy deployment – A developers’ perspective. *Energy Policy*, 39, 4876–4892.
- Przybylska, M. (2016). Achieving a 20% energy share from renewable sources: Policies and legal rules for Poland. *Renewable Energy Law and Policy Review*, 3, 35–45.
- Rahlwes, R. (2013). Renewable energy: Paving the way towards sustainable energy security: Lessons learnt from Germany. *Renewable Energy*, 49, 10–14.
- Rofiegger, U. (2013). Debate about the harmonization of the EU’s support instruments for renewables and binding targets’ relevance? *Renewable Energy Law and Policy Review*, 4, 254–267.
- Sokolowski, M. M. (2017). Discovering the new renewable legal order in Poland: With or without wind? *Energy Policy*, 106, 68–74.
- Szydło, M. (2015). How to reconcile national support for renewable energy with internal market obligations? The task for the EU legislature after *Ålands Vindkraft* and *Essent*. *Common Market Law Review*, 2, 489–510.

- Szydło, M. (2016). Spółki komunalne jako podmioty prawa publicznego w znolizowanym prawie zamówień publicznych [Municipal companies as entities governed by public law in the amended public procurement law]. *Samorząd Terytorialny*, 12, 62–72.
- The Journal of the Act No 1579: The Public Procurement Act of 29 January 2004. <http://prawo.sejm.gov.pl/isap.nsf/download.xsp/WDU20040190177/U/D20040177Lj.pdf>
- The Journal of the Act No 1875: The Commune Self-Government Act of 8 March 1990. <http://prawo.sejm.gov.pl/isap.nsf/download.xsp/WDU19900160095/U/D19900095Lj.pdf>
- The Journal of the Act No 755: The Energy Act of 10 April 1997. <http://prawo.sejm.gov.pl/isap.nsf/download.xsp/WDU19970540348/U/D19970348Lj.pdf>
- The Journal of the Act No 827: The Municipal Management Act of 20 December 1996. <http://prawo.sejm.gov.pl/isap.nsf/download.xsp/WDU19970090043/U/D19970043Lj.pdf>
- The Journal of the Act No 9: The Renewable Energy Act of 20 February 2015. <http://prawo.sejm.gov.pl/isap.nsf/download.xsp/WDU20150000478/U/D20150478Lj.pdf>
- The Journal of the Act No 961: The Wind Energy Farm Investment Act of 20 May 2016. <http://prawo.sejm.gov.pl/isap.nsf/download.xsp/WDU20160000961/O/D20160961.pdf>

# Assessment of the Role of MNCs in the Process of Manufacturing Industry Globalization



Irena Pekarskiene, Rozita Susniene, Asta Saboniene, and Akvile Cibinskiene

**Abstract** The development of economic globalization is commonly linked to the activities of multinational companies (MNCs) that are the main participants of the process of globalization. Activities of MNCs are very prominent in the manufacturing industry. MNCs that operate in manufacturing transfer their production to foreign countries that are closer to raw materials, labor resources or consumers in order to reduce production costs or find new sales markets. In this way, manufacturing MNCs “push” the process of globalization and have a significant impact on the development of manufacturing in host countries. Considering the expansion of international production and trade, manufacturing MNCs can be treated as the key channel for the transmission of globalization. This paper analyzes the role of MNCs in the process of manufacturing globalization applying the concept of cause and effect. After the analysis of the nature of MNCs’ activities, two groups of indicators have been selected and systematized following the cause and effect attitude: (1) the indicators that reflect the input of MNCs in the process of manufacturing industry globalization; (2) the indicators of manufacturing development that reflect the impact of globalization transmitted through the channel of MNCs. On the basis of indicators selected, the empirical research is conducted on an example of a small open economy.

**Keywords** Economic globalization · MNCs · Manufacturing · Channels of globalization · Impact of globalization

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## 1 Introduction

Globalization is a complicated phenomenon of the modern life development and a unique process without any alternatives. Over the last few decades, the process of globalization has covered all the areas of life and has become a high-speed world engine. The process of globalization is often equalized with economic globalization, which is treated as a dynamic multidimensional process of economic integration, i.e. an increasing integration of the goods and services markets, financial systems, corporations, industries, technologies and competition. Although the phenomena of economic globalization earn much attention, researchers have not still reached a consensus concerning the pace of globalization transmission and the boundaries of globalization development. In order to provide the discussions about the scope of globalization with empirical evidence, many studies employ statistical indicators and quantitative methods. Quantitative analysis of the processes of globalization highlights the main characteristics and manifestation forms of this phenomenon and provides the background for the logical analysis and qualitative assessment of globalization trends and effects. Statistical analysis of the components of economic globalization provides the opportunities to identify the links between the processes of globalization and the development of particular economic sectors, and so assess the impact of globalization on general economics.

A substantial part of studies focus on the processes of economic globalization: the impact of economic globalization on economics was researched by Brakman (2006), Castells (2011), Helpman (2006), Mukherjee (2008), Rugman (2012), Sirgy et al. (2004), Soubbotina and Sheram (2000), Sumner (2004) and others. The studies on manifestation of the processes of globalization, commonly concentrate on particular channels of economic globalization transmission: the processes and trends of economic globalization transmitted through the channel of international trade (Bems et al. 2011; Broda et al. 2006; Carneiro et al. 2015; Feenstra 2015; Helpman 2006; Lévy 2007; Lynch 2010; Xu 2012); the aspects of FDI in a global context (Agosin and Machado 2005; Casi and Resmini 2012; Ford et al. 2008; Gersbach 2002; Moura and Forte 2010; Osinubi and Amaghionyeodiwe 2010; Özkan-Günay 2011; Ozturk 2007; Pekarskiene and Susniene 2015; Prasad et al. 2007; Vetter 2014); peculiarities of MNCs' activities (Buckley 2009; Dunning 2013, 2014; Dunning and Lundan 2008; Jensen 2013; Sofka et al. 2014; Wagner 2013); international transmission of technologies in the context of global integration (Keller 2004; Savvides and Zachariadis 2005; Veugelers and Cassiman 2004; Xu and Chiang 2005); global aspects of labour force migration (Artuc et al. 2015; Collings 2014; Delogu et al. 2014; Docquier et al. 2014; Grogger and Hanson 2011; Grossmann and Stadelmann 2013; Marchiori et al. 2013; Özden et al. 2011; Peiperl et al. 2014; Pekarskiene et al. 2017), etc.

The development of economic globalization is often related to the activities of multinational corporations (MNCs), which are considered as main agents in the processes of economic globalization. As MNCs are extremely active in manufacturing industries, it is very important to evaluate the role of MNCs in manufacturing

globalization. For reduction of their production costs or looking for new product realization markets, MNCs transfer their activities to foreign countries closer to raw materials, labor resources or consumers. In this way, manufacturing MNCs “push” the process of globalization and have a significant impact on the development of manufacturing in host countries. While developing international production and international trade, MNCs serve as one of the main channels through which the process of globalization is transmitted. The processes of manufacturing globalization, in turn, directly and indirectly influence the trends of the overall economic development and global trends of a country. For this reason, it is extremely important to evaluate the degree of manufacturing integration in global economies and assess the impact of globalization on the development of manufacturing industries.

Manufacturing is one of the major industries in any national economy. With reference to the data of the European Commission (2010), the manufacturing industry creates nearly one-quarter of the total number of workplaces in the EU private sector and at least one-quarter of the total number of workplaces in the industrial service sector. What is more, manufacturing generates nearly 75% of the EU exports.

The development of the manufacturing industry under the conditions of modern economy is a common object of studies. For instance, Herrigel and Zeitlin (2010) researched the processes of internationalization in manufacturing companies, while Karuppiah and Karthikeyan (2013), Katz et al. (2011), Kletzer (2005), Pekarskiene and Susniene (2014), Pla-Barber and Puig (2009), Puig and Marques (2011), Sutcliffe and Glyn (2003) analyzed the development of the manufacturing industry through the prism of globalization, etc.. Nevertheless, previous studies were limited within the analysis of one or two channels of globalization transmission. The links between the process of globalization and manufacturing industries have not been comprehensively researched in the literature, which also lacks any general methodologies to disclose to which extent manufacturing is involved in the processes of globalization and how global processes affect the development of manufacturing industries. In this context, the important question then arises as to whether there exist any tools that could help to research and measure the trends of manufacturing globalization and assess the impact of globalization on the development of the manufacturing industry.

The purpose of this article is to assess the role of MNCs in the process of manufacturing globalization by applying the concept of cause and effect. In this article, we analyze the role of MNCs in the process of globalization from two following perspectives: a cause, i.e. the role of MNCs as of the main channel of globalization transmission, and an effect, i.e. the role of MNCs as of the channel through which globalization makes an impact on the manufacturing industry. The methods of the research include systematic and comparative analysis of the concepts, methodologies and conclusions announced in the literature, synthesis of the results and generation of conclusions.

## 2 The Trends of MNCs' Activities in the Context of Globalization

The establishment of modern multinational or transnational corporations (MNCs or TNCs) started just after World War II. Nowadays they are considered as a symbol of economic globalization. A number of studies (Buckley and Ghauri 2004; Ietto-Gillies 2012; Lévy 2007; Rugman 2012; Young and Hood 2000) are of the opinion that MNCs are the main driving force that initiates, supports and promotes the process of globalization, and MNCs' business strategies make a vital impact on the causes and effects of globalization. In global economics, MNCs are treated as the main channel through which the process of globalization is being transmitted to different sectors.

According to Rugman (2012), large MNCs control a wide network of companies with a managing parent company, which is linked to other business partners (main suppliers, customers, distributors, etc.) not through its business infrastructure (service companies, R&D partners, educational institutions, etc.), but on the basis of long-term contracts. By employing the principles of direct investment, joint venture, licensing, subcontracting and other tools of business start-up and development for the management of particular chains in their production processes, MNCs form large international networks, which are called 'global factories' (Buckley 2009). According to Buckley (2009), the global value creation chain can be divided into three main stages: (1) control—in this stage, owners of a brand control the production of original equipment, product design, technologies, R&D; (2) production—in this stage, subcontractors are widely employed to gain the benefits from cost economy; (3) warehousing, distribution and adaptation—in this stage, companies operate by employing mixed strategies: joint venture partnerships and subcontracts with local companies. The key incentives to extract a MNC's global value chain are economy of scale and exploitation of comparative advantage in different countries. Nevertheless, as it was stated by Buckley (2009), MNCs can successfully manage such large chains even without possessing property rights to separate elements of a chain. Having the aim to earn high profits, MNCs use the strategies that help geographically optimally distribute the value creation chain and choose the most beneficial forms of ownership, increasingly turning to outsourcings and offshores.

Supporting the attitude described above, it can be stated that such MNCs' activity characteristics as split-up of the value creation chain as well as the ability to plan, organize and directly control the business provide the opportunities to reduce production costs and gain comparative advantage against the entities which operate only in a single country and try to get involved in the global processes by expanding their exports.

Traditionally, MNCs are large corporations. For this reason, in discussions about globalization, the image of MNCs is often equalized with the image of large companies, especially minding the fact that large companies create a substantial share (nearly 30%) of global GDP (UNCTAD 2002). Nevertheless, as it was noted by Sutcliffe and Glyn (2003), the share of global GDP created by a small number of

**Table 1** The number of parent corporations and foreign affiliates, 1976–2010

|                                    | 1976   | 2002     | 2008     | 2010     |
|------------------------------------|--------|----------|----------|----------|
| Number of MNCs                     | 11,000 | 64,592   | 82,053   | 1,03,786 |
| Number of MNCs' foreign affiliates | 82,600 | 8,51,167 | 8,07,363 | 8,92,114 |

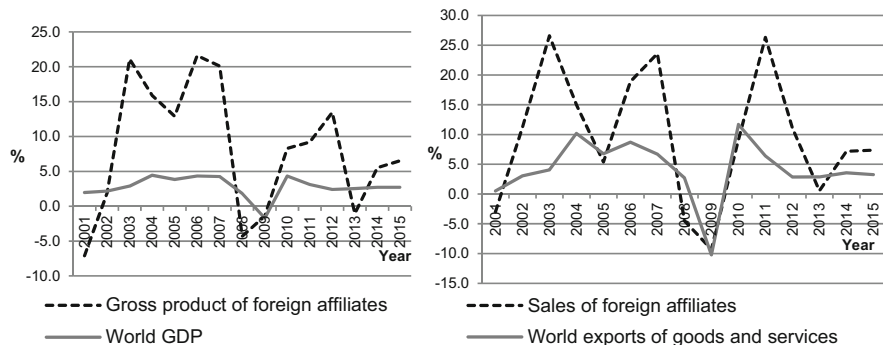
Source: Compiled by the authors based on the data of Dunning (2013), UNCTAD (2002, 2009, 2011)

business enterprises does not disclose any useful information about multinational aspects of these enterprises. By the nature of their operations, all of these enterprises can be treated as 100% national. Therefore, while speaking about globality of business enterprises, it is important to consider the multinational aspect. A company or a corporation can be classified as a MNC considering the geographical area of its production, sales, origin of the labor force, residence of general managers and headquarters, etc. Thus, it can be stated that not any single definition or indicator can be employed for a comprehensive description of a MNC.

With reference to the data of UNCTAD (2002), more than 65,000 MNCs with more than 85,000 affiliates, i.e. with the average of 13 affiliates for 1 MNC, operated all over the world in 2002. The number of MNCs and their affiliates had been rapidly growing over the last three decades of the twentieth century (see Table 1).

Since the first decade of the twenty-first century, the number of MNCs has kept growing, and in 2010 there were more than 1,03,000 MNCs with more than 9,00,000 affiliates operating all over the world. It is thought that such rapid growth in the number of MNCs was determined by the development of economic globalization: more and more advanced countries were expanding their businesses on an international scale; international operations were conducted not only by large, but also by medium and small enterprises; the number of international corporations operating in developing and transition economies started to grow. The share of GDP generated by MNCs' foreign affiliates (FCAs) is growing faster than the total amount of global GDP (see Fig. 1a); at the same time, the sales of FCAs are growing faster than the volumes of global export (see Fig. 1b).

The negative effects of the economic crisis of 2007 touched MNCs much sooner than the general global economics. The negative rates of GDP and sales generated by MNCs' foreign affiliates confirm that MNCs are sensitive to global economic shocks. However, it should not be overlooked that despite hard drops, the rates of GDP and sales generated by MNCs' foreign affiliates after the period of crisis started growing much sooner than the same indicators of the general global economics. The most plausible determinant of such fast recovery is diversification of activities that mitigated the decline of FCAs' sales as the effects of the economic crisis emerged in different countries at different times. According to Rugman (2012), the largest flows of international production and international trade are generated by the largest enterprises: 500 of the world's largest MNCs (mostly from the USA, Japan and the EU) generate nearly 90% of global FDI and a half of international trade flows.



**Fig. 1** The dynamics of FCAs’ GDP and sales in comparison to the dynamics of the global GDP and exports between 2001 and 2015, percent. Source: Compiled by the authors based on the data of UNCTADstat (2017) and The World Bank Group (2017)

Distribution of MNCs from developed, developing and transition economies is constantly changing on the list of 100 largest MNCs worldwide. MNCs worldwide significantly increased their assets, turnover (sales) and the number of employees between 2010 and 2012, but MNCs from developing and transition economies showed the trends of much faster growth than MNCs from developed economies and retained these trends even in later periods (see Table 2).

With reference to the data of UNCTAD (2013), some large MNCs from developed countries are changing their business strategies: they are closing down their foreign affiliates or moving them to home countries, while the top positions on the list of 100 largest MNCs worldwide are being taken by MNCs from developing and transition economies. Such rearrangement of large MNCs shows that an increasing number of MNCs from developing and transition economies are getting involved in the process of economic globalization and start playing an important role in global economics.

Meanwhile, representatives of the globalization sceptics theoretical school (Rugman 2012; Sutcliffe and Glyn 2003) propose that all statistics and estimations hardly disclose the real nature of MNCs as they are based on different interpretations of MNCs and exaggerate the role of MNCs in the process of globalization. As it was noted by Sutcliffe and Glyn (2003), if a MNC is treated as an entity which trades in foreign markets, then there are hundreds of thousands of such MNCs with tens of thousands of FCAs operating for decades. If a MNC is treated as an entity with a production affiliate in a foreign country, then thousands of such entities as well as several tens of the MNCs involved in international integrated production could be found worldwide. Substantial shares of the properties of some MNCs are located in different countries. Leaning on this argument, Kozul-Wright and Rowthorn (1998) and Rugman (2012) envisage an international rather than a local nature of MNCs’ activities. These insights are confirmed by some recent trends of large MNCs’ localization (UNCTAD 2012) and the decline in the number of FCAs.

**Table 2** Statistics of 100 largest non-financial MNCs worldwide and from developing and transition economies, 2010–2014

| Year  | 2010   | 2011   | 2010–2011 | 2012   | 2011–2012 | 2013   | 2012–2013 | 2014   | 2013–2014 |
|---|--------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|
| Variable                                      |        |        | % change  |        | % change  |        | % change  |        | % change  |
| Assets (billions of dollars)                  |        |        |           |        |           |        |           |        |           |
| Total MNCs worldwide                          | 11,939 | 12,531 | 5.0       | 13,363 | 6.6       | 13,382 | 0.1       | 13,231 | -1.1      |
| MNCs from developing and transition economies | 4311   | 4882   | 13.2      | 5531   | 13.3      | 5540   | 0.2       | 5948   | 7.4       |
| Sales (billions of dollars)                   |        |        |           |        |           |        |           |        |           |
| Total MNCs worldwide                          | 7723   | 8827   | 14.3      | 8957   | 1.5       | 9292   | 3.7       | 9042   | -2.7      |
| MNCs from developing and transition economies | 2918   | 3481   | 19.3      | 3863   | 11.0      | 4170   | 7.9       | 4295   | 3.0       |
| Employment (thousands)                        |        |        |           |        |           |        |           |        |           |
| Total MNCs worldwide                          | 16,134 | 16,496 | 2.2       | 16,937 | 2.7       | 16,461 | -2.8      | 15,816 | -3.9      |
| MNCs from developing and transition economies | 9044   | 10,197 | 12.7      | 10,596 | 3.9       | 11,447 | 8.0       | 11,534 | 0.8       |

Source: Compiled by the authors based on the data of UNCTAD (2011, 2013, 2014, 2015, 2016)

Such criticism can be accepted, and it can be agreed that the number of MNCs may vary due to the differences in estimation methodologies. Nevertheless, we suppose that regardless of the variety of criteria that can be employed for the assessment of MNCs' activities, MNCs' role in modern economy is really significant as they:

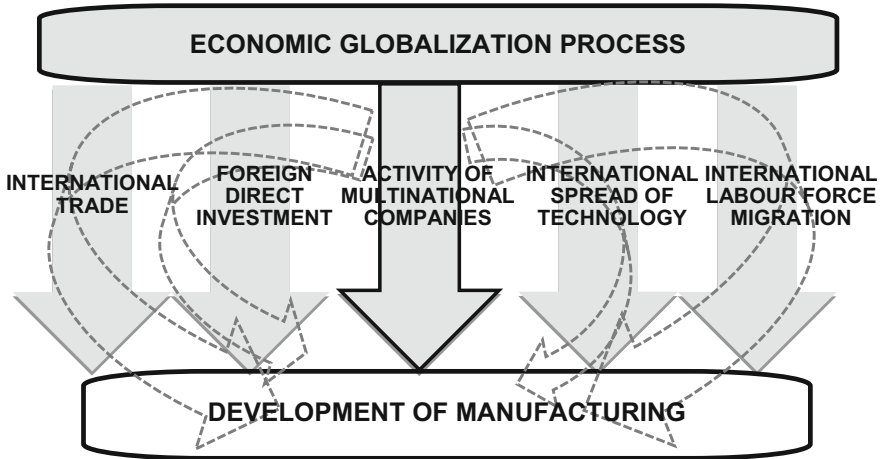
- initiate and promote organizational and technological innovations, at the same time prompting the development of production factors;
- carry out the largest number of international transactions;
- act as the only economic entity that is capable of planning, organizing and controlling a business in foreign countries;
- are able not only to effectively exploit, but also to improve and transmit the opportunities of information and communication technologies worldwide;
- actively participate in the process of globalization as a driving force and the main agent of this phenomenon.

Although traditionally MNCs are treated as large international enterprises, in practice they are not necessarily large organizations. This tendency reflects the peculiarities of the development of economic globalization over the last few decades: the process of globalization involves an increasing number of small and medium corporations. With the process of globalization gathering its pace, small and medium MNCs are becoming increasingly internationalized. It is obvious that the process of economic globalization is transforming, and SMEs are expanding their businesses on an international scale. One of the most evident peculiarities of the development of economic globalization is that more and more corporations follow global interests.

### **3 Analysis of MNCs' Activities as of the Main Channel of Globalization Transmission Following the Cause and Effect Attitude**

While assessing the role of MNCs in the process of globalization, it should be mentioned that MNCs serve not only as one of the main globalization transmission channels, but also promote transmission of globalization through the other channels by affecting FDI, international labor force migration, technology transfer and international trade (see Fig. 2). Hence, it can be stated that MNCs serve as one of the main driving forces of economic globalization.

The importance of the role of MNCs in the process of economic globalization has been confirmed in a number of studies. Altomonte et al. (2012), Bossard and Peterson (2005), Buckley (2009), Dunning (2013, 2014), Dunning and Lundan (2008), Jensen (2013), Krugman (2007), Kwok and Tadesse (2006), Rugman (2012), Sofka et al. (2014), Wagner (2013), Yamin and Sinkovics (2009) investigated MNCs' activity trends in the context of globalization. Different aspects of



**Fig. 2** The main channels of economic globalization transmission. Source: Compiled by the authors

MNCs’ activities related to international trade were researched by Baccini et al. (2015), Jensen (2013). The links between the channels of economic globalization transmission were analysed by Bjelić (2013), Cottier and Sieber-Gasser (2015), Grogard et al. (2005), Hausmann and Fernandez-Arias (2000), Ietto-Gillies (2003, 2012), Lévy (2007), Soubbotina and Sheram (2000), Sutcliffe and Glyn (2003).

The assessment of the level of globalization (the cause attitude) and its impact (the effect attitude) on the development of the manufacturing industry to a large extent depends on selection of research indicators. Consideration of different indicators may determine contradictory assessments of the process of globalization. According to Sutcliffe and Glyn (2003), consideration of different indicator groups may reveal completely different trends of globalization development. For instance, it can be found that business corporations are expanding their businesses in other countries, the number of MNCs is increasing, the sales of MNCs and their affiliates are making an increasing share of the world’s gross output, etc. These trends confirm that the process of globalization is developing and gathering pace. On the other hand, some other indicators may disclose that vast majority of the world’s output is consumed in the home country, and this tendency hardly shows any changes. We are of the opinion that the relative share of consumption may increase only due to rising shares of service sales because international service sales, which earlier used to compose only a small part of international trade, disproportionately grew and vastly increased the volumes of international trade. The share of the world’s gross output manufactured by the largest US corporations is dramatically decreasing, and Japanese MNCs’ (together with all affiliates) sales growth has recently become slower than the growth of the total global economics. In addition, the share of FDI in the world’s gross output is not increasing. The dynamics of such indicators do not reveal



any signs of intensive development of globalization. Hence, some indicator groups may show the trends of globalization development, while the other groups disclose the trends of intensive localization.

We suppose that the above-explicated arguments are reasonable, but contradiction between different groups of arguments determines the need to identify, analyze and critically assess the reflectors of the level of globalization, and present a complex assessment of the trends of globalization with consideration of the role of MNCs. Further in this research, MNCs will be analyzed as the channel of globalization transmission by employing the cause and effect attitude, i.e. we will select the indicators that reflect the causal aspect of globalization and will identify the indicators that reflect the impact of globalization on the development of the manufacturing industry (the effect of globalization).

### ***3.1 The Indicators of Economic Globalization Assessment with Consideration of the Role of MNCs***

While assessing the level of globalization in a single country or industry with consideration of the role of MNCs, the problem of data unavailability is often faced. The data on MNCs' activities are much harder to access in comparison to accessibility of the data on FDI or international trade. Statistical services in particular countries have been collecting the data on MNCs' economic activities (production outputs, number of employees, R&D, exports) for a comparatively short time, and, as it was noted by the OECD (2005), these data are limited in time and the number of positions; what is more, the content of the data may vary by country.

MNCs' activities are commonly assessed by the volumes of FDI, and, according to Bjelić (2013), they are best reflected in the movement of capital as FDI (FDI flows and FDI at the end of the year). With reference to UNCTAD (2002), the other indicators of MNCs' activities, such as gross output, value added, sales and exports of foreign affiliates, employment rates, profits and innovations, are no less important. For measuring of the level of economic globalization with consideration of the role of MNCs, the OECD (2005) proposes a much wider spectrum of indicators, which can be divided into three groups (see Table 3).

Following the recommendations of the OECD (2005), *the indicators of FCAs' activities* are not divided into the categories of globalization causes and effects; they are presented as the expression of the impact of foreign MNCs on the development of local economies. The share of value added generated by FCAs is introduced (OECD 2005) as the most comprehensive indicator of MNCs' activities, i.e. as the indicator that the most accurately reflects the trends of economic globalization with consideration of the role of MNCs. Meanwhile, we consider that FCAs' contribution to GDP (in particular, to value added) in the economic sector is more applicable for representation of the impact of globalization on the development of this sector rather than for revelation of the changes in the level of economic globalization. Value

**Table 3** Indicators of MNCs’ activities in the context of globalization

| Indicator group   | Indicators   |
|---|--|
| Extent of foreign control in the compiling country (total and by industry)              | Foreign CAs’ share of value added;<br>Foreign CAs’ share of turnover (sales) or gross production;<br>Foreign CAs’ share of gross fixed capital formation;<br>Foreign CAs’ share of employment;<br>Foreign CAs’ share of compensation for employees;<br>Foreign CAs’ share of the number of (consolidated) enterprises. |
| Extent of parent companies’ activities in the compiling country (total and by industry) | Parent companies’ share of value added;<br>Parent companies’ share of turnover (sales);<br>Parent companies’ share of gross fixed capital formation;<br>Parent companies’ share of employment;<br>Parent companies’ share of compensation for employees.   |
| Extent of MNCs’ activities in the compiling country (total).                            | MNCs’ share of value added;<br>MNCs’ share of gross fixed capital formation;<br>MNCs’ share of employment;<br>MNCs’ share of compensation for employees;<br>MNCs’ share of the number of consolidated enterprises.   |

Source: Compiled by the authors based on the data of the OECD (2005)

added is one of the main indicators of economic development, so it is applicable for reflection of globalization effects.

The share of FCAs’ gross production or turnover (sales) only partly reflects FCAs’ value added because the indicators of gross production or turnover (sales) cover the value of intermediate products. With reference to the recommendations of the OECD (2005), employment of these indicators for a comparative analysis of the level of globalization in different countries would inevitably mean data duplication, but we are of the opinion that this indicator can be applicable for assessment of the level of globalization in a single country or a single sector, especially when the data on value added are unavailable. The OECD presents the shares of FCAs’ gross production and turnover (sales) as alternative indicators, i.e. employment of one of the indicators is recommended.

The share of FCAs’ gross capital reflects the structure of their capital in MNCs. With reference to the recommendations of the OECD (2005), this indicator is applicable for assessment of the impact of globalization on the manufacturing industry with consideration of the role of MNCs.

We suppose that the level of globalization should be reflected by two following FDI indicators available in statistics: the share of FCAs’ authorized capital in manufacturing companies and the share of foreign capital in manufacturing companies. Used in combination, these indicators could reveal the impact of foreign capital on all manufacturing companies (even in those which are not controlled from abroad, i.e. the companies with the share of foreign capital smaller than 50%).

With reference to the recommendations of the OECD (2005), the share of FCAs’ compensation for employees is an extremely important indicator as it reveals several significant aspects of MNCs’ activities. First of all, this relative indicator shows

which part of compensation for employees is paid by foreign companies. Therefore, comparison of the average compensation for employees in foreign companies with the average compensation for employees in the local manufacturing industry discloses whether MNCs make a positive or negative impact on the average compensation for employees in the industry. Average compensations for employees are usually higher in FCAs because being much larger than local corporations, MNCs often invest in high technologies and establish their affiliates in high-technology sectors which are capital intensive and require well-paid labor force. Secondly, the differences between the shares of FCAs' compensation for employees can be determined by the situation in MNCs' home countries. The causes of these differences are very similar to the above-mentioned: different sizes of companies, specifics of the activities, varying labor productivity and skills, etc. We are of the opinion that the share of compensation for employees in the manufacturing industry could disclose the level of globalization in this industry, while comparison of the average compensation for employees in FCAs and the entire industry would reflect the impact of globalization on the development of manufacturing and welfare of the employees as higher or lower average compensations paid for employees in FCAs inevitably affect the rates of the average compensations in a country or its economic sector (comprising both local enterprises and FCAs).

Another relative indicator recommended by the OECD (2005) is the ratio of the number of FCAs to the total number of enterprises. This indicator reflects the impact of MNCs' on the level of globalization in the economic sector and reveals which part of enterprises in the sector is controlled by the foreign capital. Analyzed separately, this relative indicator does not provide any comprehensive information about the scale of business participation in the process of globalization because enterprises may largely differ by their size: MNCs often represent large enterprises, while local businesses are small and medium. Nevertheless, assessment of the number of enterprises in combination with the analysis of such relative indicators as the number of employees and the share of turnover allows to have a deeper insight in the level of globalization in the sector.

Employment of some indicators that reflect the extent of *parent MNCs' activities in their home countries* causes some reasonable doubts. While justifying the importance of these indicators, the OECD (2005) provides the following arguments: (1) parent MNCs make strategic decisions in the areas of funding, R&D and innovation, and these decisions are followed by all affiliates; (2) parent MNCs differ from local business enterprises by their structure and nature of operations, which makes them more similar (and comparable) to foreign MNCs. We consider that the indicators of parent companies are applicable for assessment of the impact of globalization on the manufacturing industry because they show which share of gross outputs in the industry is created by MNCs. What is more, local parent MNCs are managed by the residents, so the indicators of parent companies in their home countries are not separated, but estimated including the data of other local companies.

While analyzing the recommendations of the OECD (2005) concerning applicability of particular indicators for assessment of the level of globalization with

consideration of the role of MNCs, it should be noted that the majority of the indicators reflect only one direction of globalization, i.e. the activities of foreign MNCs and the activities of parent MNCs in their home countries, but another direction, i.e. the activities of parent MNCs in foreign countries, is not covered (the indicators that reflect the extent of parent MNCs' activities abroad are introduced only as additional because employment of these indicators would inevitably cause data duplication).

Such prevention of data duplication is certainly necessary when the level of globalization in several or many countries is assessed and compared. Nevertheless, for more accurate assessment of the level of globalization in a single sector, the indicators of both directions, i.e. the extent of foreign MNCs' activities in a country or a sector and the extent of parent MNCs' activities abroad, should be considered. Such attitude would reveal the links between the manufacturing industry and global economics, and would allow to assess the level of globalization in a more objective way. Unfortunately, even in this case the problem of data unavailability is faced: the data on MNCs' economic activities are usually limited with the information about the activities of FCAs and the activities of parent MNCs in their home countries because MNCs do not have to report the data on the activities of their FCAs abroad. One of the most serious problems is to obtain the data on the scopes of the services provided by MNCs. We support the opinion of Landefeld and Kozlow (2003), who state that this information gap can be filled by conducting direct research in MNCs' activities.

The third group of the indicators, which are proposed for assessment of the activities of all MNCs (including FCAs acting in the economic sector and local parent companies), represents the aggregate of the results obtained by employing the indicators of two previous groups. We are of the opinion that the indicators from this third group should not be considered while assessing the level of globalization in the manufacturing industry so that the problem of data duplication would be prevented.

Geographical transmission of MNCs' activities is another important factor to consider. A larger number of MNCs' operation countries indicate a high degree of the MNCs' globalization. The degree of MNCs' business diversification and geographical transmission can be assessed by employing Herfindahl concentration index. Herfindahl concentration index is recommended by the OECD (2005) as a supportive indicator for estimation of the level of economic globalization with consideration of the role of MNCs. If the scale of MNCs' activities abroad (assessing by the above-introduced indicators) in particular economic sectors is treated as equal, Herfindahl concentration index can help to find out in which of the sectors geographical concentration of MNCs' activities is higher or lower, i.e. it can disclose whether MNCs' activities are more or less geographically diversified, in other words, whether they are more or less global.

Employment of Herfindahl concentration index allows to assess the involvement of the manufacturing industry in global processes by both directions, i.e. by geographical concentration of both FCAs' and parent companies' turnover (sales), and FCAs' number of employees. Herfindahl geographical concentration index (HI) for

turnover (sales) of the FCAs operating in the economic sector is estimated by the formula:

$$HI = \left( \frac{AP_1}{\sum_{i=1}^n AP_i} \right)^2 + \left( \frac{AP_2}{\sum_{i=1}^n AP_i} \right)^2 + \dots + \left( \frac{AP_n}{\sum_{i=1}^n AP_i} \right)^2 = \sum_{i=1}^n \left( \frac{AP_i}{\sum_{i=1}^n AP_i} \right)^2; \quad (1)$$

Here:  $AP_i$ —FCAs' turnover (sales) in each home country;  $\sum_{i=1}^n AP_i$ —FCAs' turnover (sales) in all  $i$  home countries;  $n$ —the number of home countries. If FCAs' turnover (sales) in each of the home countries were equal, then  $AP_1 = AP_2 = \dots = AP_n$ , and the value of Herfindahl concentration index would be equal to  $\frac{1}{n}$ . In the same way, we can estimate Herfindahl geographical concentration index for CAs' turnover (sales) and Herfindahl geographical concentration index for FCAs' number of employees.

Employed for assessment of the level of globalization in the manufacturing industry with consideration of the role of MNCs, HI would reflect the degree of MNCs' activity concentration by home countries. A higher degree of geographical transmission of home countries of the MNCs operating in the manufacturing industry would determine a lower value of Herfindahl index, which should mean that the industry is more globalized. A complex assessment of the level of globalization in the economic sector and compliance of interpretations of all the indicators with their absolute values (0—a completely non-globalized economic sector, 1—a completely globalized economic sector) requires employment of such MNCs' activity (turnover, the number of employees) geographical transmission indicators that are estimated by extracting the value of Herfindahl geographical concentration index from 1 ( $1-HI$ ). Ietto-Gillies (2003) notes, that a larger scale transmission of MNCs' activities, i.e. a larger number of the countries with FCAs, indicates that MNCs possess a stronger negotiation power in relationship with foreign governments or labor organizations.

The analysis of the indicators, proposed by the OECD and researchers for assessment of the level of globalization with consideration of the role of MNCs has enabled to select the indicators, which, in our opinion, are applicable for assessment of the level of globalization in the economic sector (Table 4).

All of the relative indicators selected for this research can gain values from 0 to 1 (higher values of the indicators reflect higher levels of globalization). The level of globalization in the economic sector, estimated with reference to the values of the above-introduced indicators with consideration of the role of MNCs, makes the background for assessment of the impact of MNCs, as of one of the main channels of globalization transmission, on the development of the manufacturing industry.

**Table 4** The indicators selected for assessment of the level of globalization in the manufacturing industry with consideration of the role MNCs

| Indicator group  | Estimation of the indicator   | Meaning and interpretation of the indicator   |
|--|---|---|
| Assessment of the level of economic globalization with consideration of the role of FCAs | The rate of FCAs' gross production to the manufacturing industry's gross production   | Reflects the structure of the general production in the foreign manufacturing industry and shows closeness of the links between local and global manufacturing            |
|  | The rate of FCAs' turnover (sales) to the manufacturing industry's turnover (sales)   | Reflects FCAs' impact on the manufacturing industry's turnover, sales and globalization level   |
|  | The rate of FCAs' gross capital to the manufacturing industry's gross capital   | Reflects closeness of the links between the manufacturing industry and global economics and shows the level of the manufacturing industry's dependence on foreign capital |
|  | The rate of the number of FCAs' employees to the number of the manufacturing industry's employees                                       | Shows the scopes of local employees' participation in FCAs' activities and processes of economic globalization  |
|  | The rate of FCAs' expenditure on compensations for employees to the manufacturing industry's expenditure on compensations for employees | Shows which share of compensations for employees in the manufacturing sector is paid by foreign companies   |
|  | The rate of the number of FCAs to the number of manufacturing companies   | Shows which share of manufacturing companies is controlled by foreign capital and linked to global economics  |
|  | 1—the degree of FCAs' turnover/number of companies/ number of employees concentration   | Reveals FCAs' geographical transmission by MNCs' home countries   |
| Assessment of the level of economic globalization with consideration of the role of CAs  | The rate of CAs' turnover (sales) to the manufacturing industry's turnover (sales)  | Reflects the scopes of MNCs' activities abroad and the level of globalization in the manufacturing industry   |
|  | The rate of the number of CAs' employees to the number of the manufacturing industry's employees  | Reflects the level of employees' involvement in the processes of economic globalization in CAs  |
|  | The rate of the number of CAs to the number of manufacturing companies  | Reveals the scope of the transfer of parent MNCs' impact to foreign countries   |
|  | 1—the degree of CAs' turnover/number of companies/ number of employees concentration  | Discloses the scope of parent MNCs' geographical transmission   |

### ***3.2 The Impact of Globalization on the Development of the Manufacturing Industry with Consideration of the Role of MNCs***

As the majority of MNCs are large and powerful corporations, and turnover of some of them is equal to or exceeds the rates of national GDPs, MNCs inevitably affect not only the development of the economic sector, but also the development of home and host economies. MNCs' strategies are directed towards optimization of the main determinants of operational results under the conditions of international trade and liberalization of capital movement. Jetto-Gillies (2012) emphasizes that business strategies have a significant impact on global investment trends and directions; they also change economic and social environment in which other multinational or national business entities operate; finally, they affect governmental activities. Hence, MNCs' activities significantly affect the development of national economies. Nevertheless, as it was noted by Young and Hood (2000), it is obvious that the interests of MNCs and the countries where they operate not always match, and the processes of globalization can highlight these conflicts of interests.

MNCs' impact on the manufacturing industries in home and host countries should be analyzed considering different aspects.

#### **3.2.1 MNCs' Impact on the Development of the Manufacturing Industries in Home Countries**

MNCs' impact on the economies of home countries usually emerges as:

- An increase in gross national income;
- Promotion of international trade;
- The impact on the labor market;
- An increase in the global power.

The main determinant of MNCs' international value creation chains is the search for cheap raw materials and labor force. According to Bjelić (2013), by outsourcing their production from developed to developing or transition economies, MNCs promote industrialization in host countries, while developed home countries face the processes of deindustrialization: the share of manufacturing is decreasing, while the share of services is rising. In this regard, the impact of MNCs' activities should be reflected by the changes in value added. MNCs represent separate economic units aimed at high profits. Nevertheless, the profits earned by FCAs not always reach home countries of their parent companies, but are concentrated in offshores to avoid taxation, in particular, corporate profit taxes. We suppose that the analysis of MNCs' profitability indicators should cover assessment of the impact of MNCs' activities on the increase in gross national income in their home countries.

MNCs' activities are closely related to international trade, but the impact of MNCs' activities on international trade cannot be assessed unambiguously. It is

considered that MNCs are constantly increasing the volumes of the globally integrated production, which refers to assembly of the final product, made of the components manufactured in different factories all over the world. Hence, when MNCs expand their activities in foreign countries and outsource production to FCAs, the volumes of national exports are decreasing. The products, which were earlier manufactured in MNCs' home countries, at present are being manufactured in export countries and sold in their markets or exported to other countries. Due to exploitation of the benefits of the economy of scale and optimization of production costs, a substantial part of the products manufactured in FCAs return to MNCs' home countries as imports. MNCs' activities hereby change the flows of international trade. In addition, integrated production increases the volumes of international trade, which starts taking the shape of internal trade, i.e. the trade between separate departments inside a company. However, it is difficult to find reliable data which would reveal the impact and significance of this form of trade. Sutcliffe and Glyn (2003) state that the largest share of internal trade is occupied not by the globally integrated production, but by the activities of intensively developed MNCs' affiliates, in particular, by the ones operating in such industrial sectors as electronics, computer and car manufacturing.

Due to the impact of economic globalization, the markets of goods and services effectively integrate by making single regional markets. The single EU market can serve as an example of such regional goods and services markets. Labor markets, on the contrary, remain functionally separated at a national level, and, as it was noted by Buckley et al. (2001), their integration is hindered by national governments. Nevertheless, leaning on Buckley and Ghauri's (2004) arguments, regional integration with functionally separated labor markets is very beneficial. By taking advantage of wage differences, labor-intensive production chains can be transferred to the countries with lowest labor costs. We support the opinion that a qualitative integration of labor markets can provide benefits to both business companies operating in domestic goods and services markets and MNCs operating in regional goods and services markets. For reduction of their labor costs, MNCs, as the main agents of the process of economic globalization, use the following strategy: they divide their activities into separate small chains, and for their affiliates select the locations that help optimally exploit the benefits of segmentation and differentiation of national labor markets. The most significant differences of national labor markets are usually observed between developed and developing economies, which are located in different regions or participate in different alliance blocks. According to Bjelić (2013) and Epstein (2003), optimization of production on a global scale rarely corresponds to the interests of MNCs' home countries because when MNCs outsource their production to foreign countries, their home countries lose workplaces and start facing the problems of severe competition and decreasing wages in their labor markets; Krugman (2007) refers to this phenomenon as "labor export". The impact of MNCs' activities on the home labor market is revealed by the changes in wages in the home manufacturing sector.

By operating in different countries, MNCs not only optimize their production costs, but also find markets for their products and services. In order to retain and



expand their influence and obtain reliable and comprehensive information about the situation in foreign markets, MNCs send their employees, mostly business management and organization professionals, to work in FCAs. Although accumulated knowledge and experience are very useful, they are often lost because a substantial number of employees do not return to parent companies. As a result, parent companies are forced to look for new skilled employees, and this, in turn, raises their labor expenditure on wages, staff recruitment and training. Considering the arguments explicated above, we suppose that the analysis of the changes in compensations for employees and MNCs' profits would provide a deeper insight in the impact of MNCs on the development of the manufacturing industry.

### **3.2.2 MNCs' Impact on the Development of Economics in Host Countries**

The impact of MNCs on the development of general economics and particular economic sectors in host countries is really significant, although the significance of the impact depends on the size of a host country. MNCs' impact on small host countries is much more significant than the impact on large host countries. It should be noted that this impact can emerge as both positive and negative effects. The main areas of MNCs' impact on a host country's manufacturing industry are as follows:

- The impact on GDP;
- Promotion of business competitiveness;
- The impact on the labor market and productivity;
- Technological development.

Traditionally, MNCs are large corporations, and it is considered that their contribution to GDP of a host country is really significant. It should be noted that the size of a company is usually measured by its turnover, but Sutcliffe and Glyn's (2003) argument that evaluation of a company's contribution by its turnover does not reflect the reality as turnover does not reveal any contribution to creation of the value added must also be accepted. If the largest share of MNCs' costs comprises raw materials and intermediate products acquired from other enterprises, their turnover is extremely high. According to Bjelić (2013) and the OECD (2005), MNCs' contribution to GDP should be assessed by considering sales value added rather than sales volumes because sales value added more accurately reflects MNCs' impact on the development of the manufacturing industry and helps to prevent data duplication. We support the opinion that the changes in value added, especially in the manufacturing industry, reflect the impact of economic globalization (with consideration of the role of MNCs) on a host country's manufacturing industry with appropriate accuracy.

MNCs' impact on the competitiveness of a host country's manufacturing industry cannot be assessed unambiguously. On one hand, when MNCs expand their businesses abroad, local companies have more opportunities to make contracts with MNCs and become their subcontractors or compete with their affiliates (Buckley

2009). What is more, MNCs make foreign markets more accessible to local companies and help them get involved in international business, which, in turn, promotes the process of economic globalization in a country. On the other hand, large foreign MNCs can push small uncompetitive companies out of the market and lead them to bankruptcy. Developing and transition economies are “pressed” by large MNCs and are often forced to become a part of MNCs’ global production chain as manufacturers of labor-intensive products. Penetration to global networks is extremely difficult for companies from developing and transition economies; to achieve this purpose, they need to employ the whole range of measures: strong finances, efficient support, skilled and experienced staff and purposefully-developed long term business strategies. We are convinced that the ability of local manufacturing companies to compete not only in domestic, but also in international markets must be disclosed by the profitability, efficiency and export indicators.

When MNCs establish new affiliates and start-up a new business, they create new workplaces and hire new employees from the local labor market. This way, MNCs increase a host country’s employment rate. Nevertheless, it is important to note that the supply of labor force in the local labor market must match the demand in terms of qualification. MNCs often establish the factories in which local people can work with their current skills. In this case, MNCs do not need to invest in staff training and can optimize their costs by paying lower wages. In this respect, it can be stated that MNCs’ affiliates make a positive impact on a host country’s employment rate.

On the other hand, the impact of MNCs’ affiliates on a host country’s employment rate can be negative. Successfully competing with local companies, a newly established FCA may lead them to bankruptcy. In this case, the number of the employed in a host country starts to decrease. What is more, MNCs’ labor productivity is usually higher in comparison to the labor productivity achieved by local companies, which allows MNCs to hire fewer employees. A host country’s unemployment rate may also increase when MNCs outsource their affiliates to other countries or close them down due to the changes in business environment. As it was noted by Zilinske (2010), over the period of the global financial crisis of 2007–2008, some large MNCs (in particular, US car manufacturers) with many affiliates in the EU closed down their European affiliates, which, in turn, brought about catastrophic economic and social aftereffects.

In spite of the fact that MNC affiliate closures lead to higher unemployment rate, redundant employees (in particular, business or new technology managers) have better opportunities to find jobs in other local or foreign companies for higher compensations as they have gained higher qualification, new skills and competences (Sofka et al. 2014). On the other hand, redundant employees may have difficulties finding new jobs if their knowledge and skills are very specific and cannot be used in a new job.

The impact of globalization on a host country’s labor market and productivity with consideration of the role of MNCs can be assessed by employing such indicators as average compensation for employees and labor productivity (the above-mentioned indicators are compared for local companies and FCAs).

According to Altomonte et al. (2012), MNCs' impact on a host country's technological development depends on the differences between local and foreign companies in terms of their technological level. MNCs usually use advanced technologies and employ more modern business management and organization methods in comparison to local companies. MNCs are considered to be the main global developers of new technologies, which are transferred to their affiliates and implemented in them. According to Rugman (2012), a special advantage of large MNCs lies not in development of new technologies, but in capability to apply these technologies for mass production.

Under the conditions of economic globalization, MNCs transfer large shares of R&D activities to their foreign affiliates, this helps them reduce R&D costs, gain the benefits from the economy of scale, and, as it was noted by Hu (2004), exploit local R&D resources and design products around the market. Nevertheless, it should not be overlooked that MNCs not only transfer new technologies and R&D, but also take advantage of local business ideas for the development of new global products.

We are convinced that MNCs' impact on the development of a host country's economy in terms of technological development can be assessed by employing such manufacturing indicators as the number of manufacturing companies implementing innovation, the share of innovative manufacturing companies, the share of employees in innovative companies, expenditure on R&D and the number of R&D employees.

In order to make the results of this research practically applicable, we selected the indicators for assessment of the impact of economic globalization on the manufacturing industry with consideration of the role of MNCs. Our choice was based on the theoretical arguments and availability of the official statistical data for the economic sector. The assessment of the impact of economic globalization on the economic sector transmitted through the channel of MNCs will allow to identify positive and negative aspects of this impact, while consideration of MNCs' development determinants will help create the measures to diminish the negative and promote the positive effects of globalization.

Taking into consideration availability of the official statistical data for the economic sector and aiming at making the results of this research practically applicable, we selected the manufacturing industry indicators, which, in our opinion, best reflect MNCs' impact on the manufacturing industry. The indicators include: value added, labor productivity, average compensation for employees, corporate profitability indicators, expenditure on R&D and the number of R&D employees.

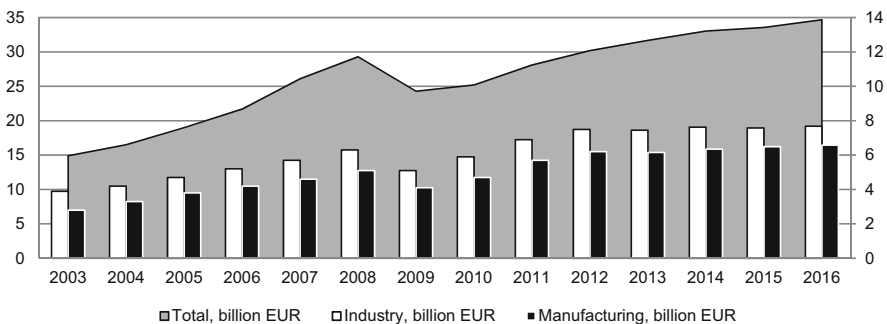
## 4 Assessment of MNCs' Activities in Lithuanian Manufacturing Industry

### 4.1 Development Trends of Lithuanian Manufacturing

Lithuania is a small open economy, strongly dependent on foreign resources and production markets. Therefore, the process of economic globalization has a direct impact on the development of Lithuanian economics. The manufacturing sector is extremely important for Lithuanian economics and industry. Integration into global markets has determined significant changes in the structure of the country's economics over the last two decades: the shares of wholesale and retail, transport and other services have substantially increased, while the share of manufacturing has dropped (from 26.17% in 2003 to 20.99% in 2009). As it can be seen in Fig. 3, from 2010 to 2014 the share of the value added generated in Lithuanian manufacturing industry had been gradually increasing, but in 2014 it dropped again. Lithuanian manufacturing industry generates more than one-fifth of the value added in the country (in 2012—24.83%, in 2014—23.09%, in 2015—22.53%, in 2016—22.13%).

The importance of the manufacturing industry for Lithuanian economics is confirmed by the statistical data: nearly 14% of the total number of the employed and 88% of the total number of industry workers work in Lithuanian manufacturing sector; manufacturing sector generates more than 80% of the total industry's value added and nearly 20% of the total economy's value added. The trends of manufacturing growth (see Fig. 4) show that Lithuanian manufacturing is more sensitive to economic shocks than other industrial sectors: in 2009, when the total economy's value added dropped by 17.1% and total industry's value added dropped by 19.0%, the decline in manufacturing value added composed 19.6%.

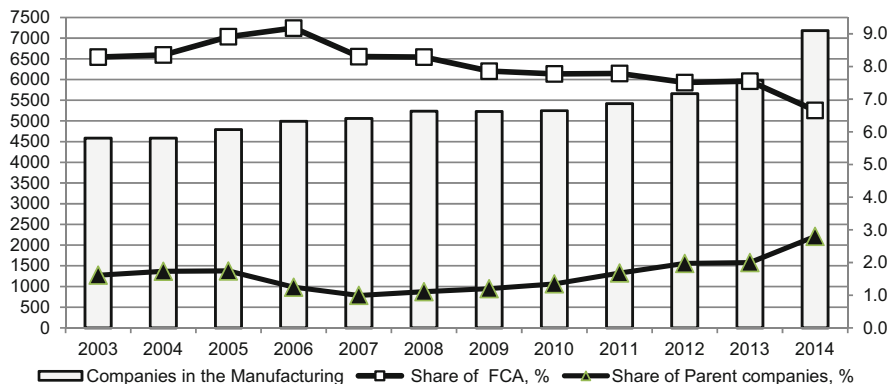
Although due to the destructive effects of the crisis manufacturing value added sharply dropped, in 2010 the manufacturing sector revived much faster than other



**Fig. 3** Value added generated in Lithuanian total economics, industry and manufacturing between 2003 and 2016, in current prices, billion euros. Source: Compiled by authors based on the data of Lithuanian Department of Statistics (2017)



**Fig. 4** The trends of value added growth in Lithuanian total economics, industry and manufacturing between 2004 and 2016, percent. Source: Compiled by the authors based on the data of Lithuanian Department of Statistics (2017)



**Fig. 5** The number of companies in Lithuanian manufacturing industry and comparative shares of FCAs and Lithuanian parent companies with foreign affiliates, percent. Source: Compiled by the authors based on the data of Lithuanian Department of Statistics (2017)

Lithuanian industries: in 2010, the growth of manufacturing value added amounted to 14.6%, and in 2011—to 21.3%. Despite its close links with global markets and extreme sensitivity to global economic shocks, Lithuanian manufacturing industry comparatively soon revives after economic declines and crises, which once again confirms the presumption that the manufacturing industry is extremely important for smooth operation of Lithuanian economics.

While assessing MNCs’ impact on the development of the manufacturing industry, it is purposeful to review the structure of Lithuanian manufacturing industry. Figure 5 illustrates that the number of enterprises in Lithuanian manufacturing industry shows the trends of growth. In 2014, the number of manufacturing

enterprises was extremely high: in comparison to 2013, it grew by 12%, and in comparison to 2003—by 56%.

During the period under consideration, the average share of FCAs in Lithuanian manufacturing industry amounted to nearly 8% of the total number of companies operating in this industry. The decline in the comparative share of FCAs (observed from 2006) shows that the number of FCAs in Lithuanian manufacturing industry is growing not so quickly as the total number of companies in this industry. Lithuanian parent companies with foreign affiliates represent a very small comparative share of the total number of companies in Lithuanian manufacturing industry: during the period under consideration, the average share of these companies amounted to nearly 1.6%. It can be concluded that globalization affects Lithuanian manufacturing industry through FCAs. Hence, this research will be limited to FCAs' statistical data.

## 4.2 *Research Methodology*

The period under consideration was determined by availability of the statistical data. The statistical data necessary for the analysis of the level of globalization in Lithuanian manufacturing industry were extracted from the databases of Lithuanian Department of Statistics and the Bank of Lithuania and provided by Lithuanian Department of Statistics at special requests. The data on FCAs' activities have been accumulated and analyzed by Lithuanian Department of Statistics since 2003. The newest were the data for 2014 provided to us at the special request. Therefore, the period under consideration covers 12 years—from 2003 to 2014.

The indicators that represent globalization transmission through the channel of MNCs were attributed to X indicator group, while the indicators that represent MNCs' impact on the development of the manufacturing industry were attributed to Y indicator group. X and Y indicators have been presented in Table 5.

As the variables employed for this research fall into particular intervals, prior to the conduct of the correlation analysis, we verified whether the variables are normally distributed. For this purpose, Jargue–Bera (JB) test was employed. Verification of normal distribution of FCAs' relative variables, which represent globalization transmission, was based on estimation of Jargue–Bera test values. As Jargue–Bera test values (when the selected level of significance is equal to 0.05) were lower than the theoretical values of normal distribution ( $\chi^2$ ), it was concluded that the variables are normally distributed. Verification of normal distribution of the variables that represent MNCs' impact on the manufacturing industry (effect variables) was also based on estimation of Jargue–Bera test values, which were lower than the theoretical values of normal distribution ( $\chi^2$ ). This confirmed that the variables representing the development of the manufacturing industry (effect variables) are normally distributed. Normal distribution of the variables from both groups under the 95% rate of statistical reliability allowed to conduct the correlation analysis for determination of strength of the relationship between particular variables. The value of the correlation coefficient must fall into the interval  $-1 \leq r \leq 1$ : when the

**Table 5** Research indicators representing globalization transmission through the channel of MNCs and MNCs' impact on the manufacturing industry

| Causal indicators (Group X)  | Effect indicators (Group Y)  |
|--|--|
| The share of FCAs' turnover ( $X_1$ )                                    | Value added, million euro ( $Y_1$ )  |
| The share of FCAs' gross production ( $X_2$ )                            | Labor productivity (Value added euro/per hour) ( $Y_2$ )   |
| The share of FCAs' authorized capital ( $X_3$ )                          | Gross profit, million euro ( $Y_3$ )   |
| The share of foreign capital in companies ( $X_4$ )                      | Net profit, million euro ( $Y_4$ )   |
| The share of FCAs' employees ( $X_5$ )                                   | Export, million euro ( $Y_5$ )   |
| The share of FCAs' expenditure on compensations for employees ( $X_6$ )  | Monthly compensations for employees (gross), euro ( $Y_6$ )  |
| Geographical transmission of FCAs' turnover by home countries ( $X_7$ )  | Expenditure on R&D, million euro ( $Y_7$ )   |
| Geographical transmission of FCAs' employees by home countries ( $X_8$ ) | The number of R&D employees, people ( $Y_8$ )<br>Gross profitability, percent ( $Y_9$ )<br>Net profitability, percent ( $Y_{10}$ ) |

absolute value  $r$  is getting closer to 1, linear relationship between the variables is stronger.

For assessment of the significance of the linear relationship, the following hypotheses were verified:

$H_0$ : correlation coefficient is equal to 0 (there is no significant linear relationship),

$H_1$ : correlation coefficient is not equal to 0 (there exists significant relationship).

For verification of the hypotheses, *Student's (t)* test was employed. Hypothesis  $H_0$  is accepted if the estimated probability exceeds significance level 0.05, i.e. the conclusions are formulated with a 95% reliability rate. If the estimated probability is lower than 0.05, hypothesis  $H_1$  is accepted.

### 4.3 Research Results

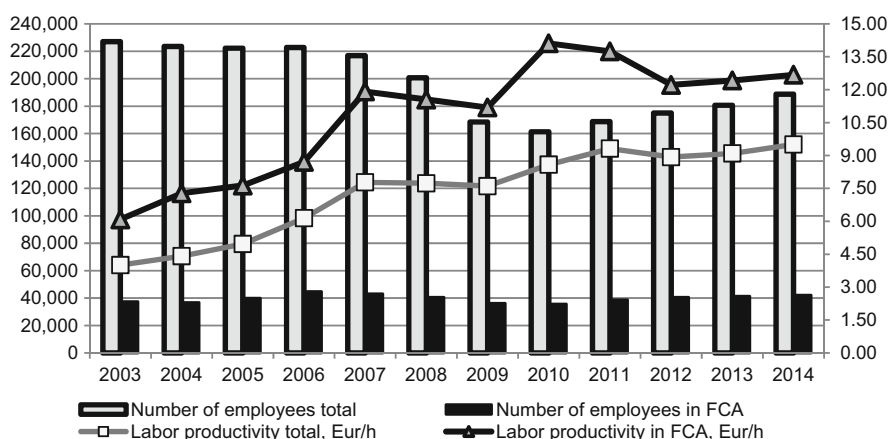
For assessment of the impact of globalization on the development of Lithuanian manufacturing industry and its particular sectors, the correlation analysis was conducted and the correlations between the indicators representing globalization transmission through the channel of MNCs and development indicators of Lithuanian manufacturing industry were identified. For the correlation analysis, *Pearson* correlation coefficient ( $r$ ) was estimated, and the variables that confirmed hypothesis  $H_1$  with statistically significant correlations (i.e. when *Student's (t)* test's probability  $p$  was lower than 0.05) were selected for further analysis. Correlation coefficients estimated for the indicators in Group X (i.e. the indicators of the level of globalization) and the indicators of gross and net profitability satisfied hypothesis  $H_1$ , but were excluded from further research as they did not satisfy *Student's (t)* criterion.

**Table 6** Coefficients of the correlation between the indicators representing the level of globalization and its impact on the development of Lithuanian manufacturing industry

|                | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>3</sub> | Y <sub>4</sub> | Y <sub>5</sub> | Y <sub>6</sub> | Y <sub>7</sub> | Y <sub>8</sub> |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| X <sub>1</sub> | 0.69           | 0.95           | 0.72           | 0.40           | 0.82           | 0.92           | 0.33           | 0.51           |
| X <sub>2</sub> | 0.69           | 0.95           | 0.72           | 0.41           | 0.82           | 0.93           | 0.36           | 0.50           |
| X <sub>3</sub> | 0.73           | 0.89           | 0.75           | 0.45           | 0.87           | 0.89           | 0.30           | 0.56           |
| X <sub>4</sub> | 0.78           | 0.95           | 0.80           | 0.54           | 0.89           | 0.91           | 0.36           | 0.57           |
| X <sub>5</sub> | 0.77           | 0.96           | 0.79           | 0.53           | 0.90           | 0.93           | 0.33           | 0.48           |
| X <sub>6</sub> | 0.57           | 0.89           | 0.61           | 0.40           | 0.76           | 0.85           | 0.21           | 0.41           |
| X <sub>7</sub> | 0.74           | 0.85           | 0.78           | 0.64           | 0.85           | 0.80           | 0.68           | 0.78           |
| X <sub>8</sub> | 0.83           | 0.84           | 0.84           | 0.77           | 0.88           | 0.74           | 0.16           | 0.63           |

Correlation coefficients that satisfied *Student's (t)* criterion have been presented in Table 6.

The results of the correlation analysis have revealed that there exist direct links between FCAs' relative indicators and the indicators that represent the development of Lithuanian manufacturing industry, i.e. the correlations between the indicators are positive, which proposes that the impact of MNCs (as of the main channel of globalization transmission) on the development of Lithuanian manufacturing industry can be considered as positive. It has also been revealed that the correlations between all FCAs' indicators and labor productivity are strong, which means that FCAs have a significant positive impact on labor productivity in Lithuanian manufacturing industry. These findings confirm the theoretical propositions about the positive effects that MNCs make on productivity of host countries by transferring their experiences, technologies and promoting innovations. The dynamics of the number of employees and labor productivity in Lithuanian manufacturing industry have been depicted in Fig. 6.



**Fig. 6** The dynamics of the number of employees and labor productivity in Lithuanian manufacturing sector between years 2003 and 2014. Source: Compiled by the authors based on the data of Lithuanian Department of Statistics (2017)



With reference to the data in Fig. 6, the number of employees in Lithuanian manufacturing industry had been decreasing since 2003 until in 2011 it started growing again. Nevertheless, in 2014 the total number of employees in Lithuanian manufacturing industry composed only 83% of the 2003s level. The number of employees in FCAs shows the trends of constant growth: in 2014, this number was by 12% larger than in 2003, which confirms the propositions that MNCs not necessarily make positive effects on the rate of employment in the manufacturing industry. However, it should be noted that labor productivity (in both FCAs and local companies) tended to grow during the period under consideration. Much higher labor productivity in FCAs had a positive impact on general labor productivity in Lithuanian manufacturing industry.

The results of the correlation analysis have disclosed that globalization transmission through the channel of MNCs positively affects the manufacturing industry's value added, gross profits, export and average compensation for employees. What concerns the links between MNCs' activities and R&D, the results of this research have not confirmed that MNCs promote R&D in Lithuanian manufacturing industry as the correlation between MNCs' indicators and the number of employees in R&D is only medium strong, and the correlation between MNCs' indicators and expenditure on R&D is weak.

The results of this research have revealed that MNCs' activities have a positive impact on the development of Lithuanian manufacturing industry: MNCs promote labor productivity growth (including labor productivity in FCAs), contribute to an increase in monthly gross wages, generate higher outputs, larger volumes of export and higher value added. Hence, this empirical research has confirmed the theoretical propositions about MNCs' positive impact on the development of the manufacturing industry in host countries.

## 5 Conclusion

MNCs are considered as the main force that initiates and prompts the process of globalization. MNCs' key characteristic which distinguishes them from other economic entities is the ability to plan, organize and control business activities in different countries. MNCs' activities affect the level of economic globalization in both home and host countries.

The research in the impact of globalization on the development of the manufacturing industry is restricted by unavailability of the statistical data. Aiming at making the results of this research practically applicable, we employed the statistical data which were available for particular economic sectors, i.e. the statistical data accumulated by the methodologies of the OECD and IMF were employed. One of the main features of economic globalization is that the manufacturing industry is not only passively affected by the processes of economic globalization, but also makes an active impact on them, i.e. globalization is transmitted bidirectionally: on one side, global economic processes affect the level of globalization in a

country's economic sector; on the other side, a country's economic sector contributes to the transmission of global economic processes. Considering a bidirectional nature of globalization transmission and minding unavailability of particular statistical data, we propose that a comprehensive study on the level of globalization in the manufacturing industry transmitted through the channel of MNCs should be based on employment of the following relative indicators representing the activities of FCAs and CAs abroad: share of FCAs' gross production, share of FCAs' turnover (sales), share of FCAs' authorized capital, share of FCAs' employees, share of foreign capital in companies, share of FCAs' expenditure on compensations for employees, geographical transmission of FCAs' turnover, enterprises and employees; share of CAs' turnover (sales), share of CAs' employees, share of the number of CAs' in the total number of manufacturing enterprises, geographical transmission of CAs' turnover, enterprises and employees.

The impact of MNCs as of a channel of globalization transmission on the manufacturing industries in home and host countries is assessed considering different aspects. MNCs contribute to the development of the manufacturing industry in a home country by increasing gross national income, promoting international trade, positively affecting the labor market and raising a home country's global power. MNCs contribute to the development of the manufacturing industry in a host country by raising gross GDP (value added), promoting business competitiveness, making a positive impact on the labor market and productivity and prompting a host country's technological development. The impact of MNCs on the development of the manufacturing industry in a host country is usually significant, but the significance of this impact depends on a host country's size: MNCs' impact on small host countries is much more significant than the impact on large host countries. What is more, MNCs' can bring about both positive and negative effects in host economies.

Taking into consideration availability of the official statistical data for the economic sector and aiming at making the research results practically applicable, we propose that the indicators best reflecting MNCs' impact on the development of the manufacturing industry should include value added, labor productivity, average compensation for employees, corporate profitability, expenditure on R&D and the number of R&D employees.

The analysis of MNCs' impact on Lithuanian manufacturing industry (i.e. the manufacturing industry of a small open economy) has revealed that MNCs' activities have a significant impact on the development of Lithuanian manufacturing industry: although the average share of FCAs in Lithuanian manufacturing industry amounts to only 8% of the total number of companies operating in this industry, FCAs generate one-third of the value added in the industry. The results of the correlation analysis have disclosed that the impact of MNCs (as of the main channel of globalization transmission) on the development of Lithuanian manufacturing industry can be considered as positive. Strong interdependence between all MNCs' relative indicators and labor productivity proposes that MNCs make the most significant impact on labor productivity in Lithuanian manufacturing industry, and this impact is primarily linked to an increase in value added, average compensation for employees, export and corporate profits.

## References

- Agosin, M. R., & Machado, R. (2005). Foreign investment in developing countries: Does it crowd in domestic investment? *Oxford Development Studies*, 33(2), 149–162.
- Altomonte, C., Saggiorato, L., & Sforza, A. (2012). TNCs' global characteristics and subsidiaries' performance across European regions. *Transnational Corporations*, 21(2), 1–20.
- Artuc, E., Docquier, F., Özden, Ç., & Parsons, C. (2015). A global assessment of human capital mobility: The role of non-OECD destinations. *World Development*, 65, 6–26.
- Baccini, L., Pinto, P. M., & Weymouth, S. (2015). *The distributional consequences of globalization: Firm-level evidence from US trade agreements*. Accessed June 10, 2017, from <http://faculty.msb.edu/sw439/documents/Baccini%20Pinto%20Weymouth%20MNCs.pdf>
- Bems, R., Johnson, R. C., & Yi, K. (2011). Vertical linkages and the collapse of global trade. *The American Economic Review*, 101(3), 308–312.
- Bjelčić, P. (2013). New approach in international trade analysis due to international factor movements. *Zbornik Radova Ekonomskog Fakulteta u Istočnom Sarajevu*, 7, 17–29.
- Bossard, A. B., & Peterson, R. B. (2005). The repatriate experience as seen by American expatriates. *Journal of World Business*, 40(1), 9–28.
- Brakman, S. (2006). *Nations and firms in the global economy: An introduction to international economics and business*. Cambridge: Cambridge University Press.
- Broda, C., Greenfield, J., & Weinstein, D. (2006). From groundnuts to globalization: A structural estimate of trade and growth. *NBER Working Paper*, 12512. Accessed October 12, 2016, from <http://www.nber.org/papers/w12512.pdf>
- Buckley, P. J. (2009). The impact of the global factory on economic development. *Journal of World Business*, 44(2), 131–143.
- Buckley, P. J., & Ghauri, P. N. (2004). Globalisation, economic geography and the strategy of multinational enterprises. *Journal of International Business Studies*, 35(2), 81–98.
- Buckley, P. J., Clegg, J., Forsans, N., & Reilly, K. T. (2001). Increasing the size of the “country”: Regional economic integration and foreign direct investment in a globalised world economy. *MIR: Management International Review*, 41(3), 251–274.
- Carneiro, J., Salter, S. B., & Punnett, B. J. (2015). Local responses to global challenges: Lessons from small economies. *Journal of Business Research*, 68(12), 2588–2592.
- Casi, L., & Resmini, L. (2012). Globalization, foreign direct investments and growth in European regions: An empirical assessment. In R. Capello & T. P. Dentinho (Eds.), *Globalization trends and regional development* (pp. 95–126). Cheltenham: Edward Elgar.
- Castells, M. (2011). *The rise of the network society: The information age: Economy, society, and culture* (2nd ed.). Oxford: Wiley.
- Collings, D. G. (2014). Integrating global mobility and global talent management: Exploring the challenges and strategic opportunities. *Journal of World Business*, 49(2), 253–261.
- Cottier, T., & Sieber-Gasser, C. (2015). Labour migration, trade and investment: From fragmentation to coherence. In M. Panizzon, G. Zurcher, & E. Fornale (Eds.), *The Palgrave handbook of international labour migration* (pp. 41–60). Hampshire: Palgrave Macmillan.
- Delogu, M., Docquier, F., & Machado, J. (2014). The dynamic implications of liberalizing global migration. *CESifo Working Paper Series No. 4596*.
- Docquier, F., Ozden, Ç., & Peri, G. (2014). The labour market effects of immigration and emigration in OECD countries. *The Economic Journal*, 124(579), 1106–1145.
- Dunning, J. H. (2013). *International production and the multinational enterprise (RLE international business)* (2nd ed.). London: Routledge.
- Dunning, J. H. (2014). *Economic analysis and multinational enterprise* (3d ed.). London: Routledge.
- Dunning, J. H., & Lundan, S. M. (2008). *Multinational enterprises and the global economy* (2nd ed.). Edward Elgar.
- Epstein, G. (2003). The role and control of multinational corporations in the world economy. In J. Michie (Ed.), *The handbook of globalisation* (pp. 150–164). Cheltenham: Edward Elgar.

- European Commission. (2010). An integrated industrial policy for the globalisation era. Putting competitiveness and sustainability at centre stage. *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*. Accessed January 5, 2017, from [http://ec.europa.eu/enterprise/policies/industrial-competitiveness/industrial-policy/files/communication\\_on\\_industrial\\_policy\\_en.pdf](http://ec.europa.eu/enterprise/policies/industrial-competitiveness/industrial-policy/files/communication_on_industrial_policy_en.pdf)
- Feenstra, R. C. (2015). *Advanced international trade: Theory and evidence* (2nd ed.). Princeton: Princeton University Press.
- Ford, T. C., Rork, J. C., & Elmslie, B. T. (2008). Foreign direct investment, economic growth, and the human capital threshold: Evidence from US states. *Review of International Economics*, 16(1), 96–113.
- Gersbach, H. (2002). Does and how does globalisation matter at the industry level? *The World Economy*, 25(2), 209–229.
- Grogaard, B., Gioia, C., Benito, G., & Robertstad, G. (2005). An empirical investigation of the role of industry factors in the internationalization patterns of firms. *SMG Working Paper*, 9. Accessed December 25, 2016, from <http://openarchive.cbs.dk/xmlui/bitstream/handle/10398/7477/cbs%20forskningsindberetning%20smg%2029.pdf>
- Grogger, J., & Hanson, G. H. (2011). Income maximization and the selection and sorting of international migrants. *Journal of Development Economics*, 95(1), 42–57.
- Grossmann, V., & Stadelmann, D. (2013). Wage effects of high-skilled migration: International evidence. *The World Bank Economic Review*, 27(2), 297–319.
- Hausmann, R., & Fernandez-Arias, E. (2000). Foreign direct investment: Good cholesterol? *Inter-American Development Bank Papers*. Accessed June 14, 2016, from [http://www.econstor.eu/bitstream/10419/87989/1/idb-wp\\_417.pdf](http://www.econstor.eu/bitstream/10419/87989/1/idb-wp_417.pdf)
- Helpman, E. (2006). Trade, FDI, and the organization of firms. *Journal of Economic Literature*, 44(3), 589–630.
- Herrigel, G., & Zeitlin, J. (2010). Inter-firm relations in global manufacturing: Disintegrated production and its globalization. In G. Morgan, J. L. Cambel, C. Crouch, O. Pedersen Kaj, & R. Whitley (Eds.), *The Oxford handbook of comparative institutional analysis* (pp. 527–564). Oxford: Oxford University Press.
- Hu, A. G. (2004). Multinational corporations, patenting, and knowledge flow: The case of Singapore. *Economic Development and Cultural Change*, 52(4), 781–800.
- Letto-Gillies, G. (2003). The role of transnational corporations in the globalisation process. In J. Michie (Ed.), *The handbook of globalisation* (pp. 139–149). Cheltenham: Edward Elgar.
- Letto-Gillies, G. (2012). *Transnational corporations and international production: Concepts, theories and effects* (2nd ed.). Cheltenham: Edward Elgar.
- Jensen, N. M. (2013). Domestic institutions and the taxing of multinational corporations. *International Studies Quarterly*, 57(3), 440–448.
- Karuppiah, M., & Karthikeyan, R. (2013). Impact of globalisation on growth of firms: An empirical analysis of Indian manufacturing industry. *Asian Journal of Research in Business Economics and Management*, 3(1), 170–180.
- Katz, R., Lawrence, R. Z., & Spence, M. (2011). Manufacturing globalization. *Foreign Affairs*, 90(6), 166–171.
- Keller, W. (2004). *International technology diffusion* (pp. 752–782). XLII: *Journal of Economic Literature*.
- Kletzer, L. G. (2005). Globalization and job loss, from manufacturing to services. *Economic Perspectives*, 29(2), 38–46.
- Kozul-Wright, R., & Rowthorn, R. (1998). Spoilt for choice? Multinational corporations and the geography of international production. *Oxford Review of Economic Policy*, 14(2), 74–92.
- Krugman, P. R. (2007). Trouble with trade. *The New York Times*, December 28, p. A23. Accessed October 20, 2016, from <http://www.nytimes.com/2007/12/28/opinion/28krugman.html>
- Kwok, C. C., & Tadesse, S. (2006). The MNC as an agent of change for host-country institutions: FDI and corruption. *Journal of International Business Studies*, 37(6), 767–785.

- Landefeld, J. S., & Kozlow, R. (2003). Globalization and multinational companies: What are the questions, and how well are we doing in answering them? *Statistical Journal of the United Nations Economic Commission for Europe*, 20(2), 111–120.
- Lévy, B. (2007). The interface between globalization, trade and development: Theoretical issues for international business studies. *International Business Review*, 16(5), 594–612.
- Lithuanian Department of Statistics. (2017). *Official statistics portal*. Accessed June 14, 2017, from <https://www.stat.gov.lt/home>
- Lynch, D. A. (2010). *Trade and globalization: An introduction to regional trade agreements*. Plymouth: Rowman and Littlefield.
- Marchiori, L., Shen, I., & Docquier, F. (2013). Brain drain in globalization: A general equilibrium analysis from the sending countries' perspective. *Economic Inquiry*, 51(2), 1582–1602.
- Moura, R., & Forte, R. (2010). The effects of foreign direct investment on the host country economic growth—theory and empirical evidence. *FEP Working Papers*, 390. Accessed January 6, 2017, from [http://www.fep.up.pt/investigacao/workingpapers/10.11.02\\_wp390.pdf](http://www.fep.up.pt/investigacao/workingpapers/10.11.02_wp390.pdf)
- Mukherjee, I. (2008). Impact of globalization on international trade. *ICFAI Journal of International Business*, 3(1), 28–45.
- OECD. (2005). *Measuring globalisation. OECD handbook on economic globalisation indicators*. Paris: OECD Publishing.
- Osinubi, T., & Amaghionyeodiwe, L. A. (2010). Foreign private investment and economic growth in Nigeria. *Review of Economic and Business Studies (REBS)*, 5, 105–127.
- Özden, Ç., Parsons, C. R., Schiff, M., & Walmsley, T. L. (2011). Where on earth is everybody? The evolution of global bilateral migration 1960–2000. *The World Bank Economic Review*, 25(1), 12–56.
- Özkan-Günay, E. N. (2011). Determinants of FDI inflows and policy implications: A comparative study for the enlarged EU and candidate countries. *Emerging Markets Finance and Trade*, 47(4), 71–85.
- Ozturk, I. (2007). Foreign direct investment-growth nexus: A review of the recent literature. *International Journal of Applied Econometrics and Quantitative Studies*, 4(2), 79–98.
- Peiperl, M., Levy, O., & Sorell, M. (2014). Cross-border mobility of self-initiated and organizational expatriates: Evidence from large-scale data on work histories. *International Studies of Management and Organization*, 44(3), 44–65.
- Pekarskiene, I., & Susniene, R. (2014). The assessment of the manifestation of economic globalization: The international trade factor. *Procedia-Social and Behavioral Sciences*, 156, 392–397.
- Pekarskiene, I., & Susniene, R. (2015). Features of foreign direct investment in the context of globalization. *Procedia-Social and Behavioral Sciences*, 213, 204–210.
- Pekarskiene, I., Laskiene, D., Saboniene, A., & Susniene, R. (2017). The impact of economic globalization on the labor market of an open small economy. *Financial environment and business development* (pp. 199–216). Springer International Publishing.
- Pla-Barber, J., & Puig, F. (2009). Is the influence of the industrial district on international activities being eroded by globalization? Evidence from a traditional manufacturing industry. *International Business Review*, 18(5), 435–445.
- Prasad, E. S., Rajan, R. G., & Subramanian, A. (2007). Foreign capital and economic growth, *NBER Working Paper*, 13619. Accessed February 10, 2017, from <http://www.econstor.eu/bitstream/10419/34518/1/55264496X.pdf>
- Puig, F., & Marques, H. (2011). *Territory, specialization and globalization in European manufacturing*. London: Routledge.
- Rugman, A. M. (2012). *The end of globalization*. London: Random House.
- Savvides, A., & Zachariadis, M. (2005). International technology diffusion and the growth of TFP in the manufacturing sector of developing economies. *Review of Development Economics*, 9(4), 482–501.
- Sirgy, M. J., Lee, D., Miller, C., & Littlefield, J. E. (2004). The impact of globalization on a country's quality of life: Toward an integrated model. *Social Indicators Research*, 68(3), 251–298.

- Sofka, W., Preto, M. T., & Faria, P. (2014). MNC subsidiary closures: What is the value of employees' human capital in new jobs? *Journal of International Business Studies*, 45, 723–750.
- Soubbotina, T. P., & Sheram, K. (2000). *Beyond economic growth: Meeting the challenges of global development*. World Bank Publications. Accessed January 29, 2017, from <http://www.worldbank.org/depweb/beyond/beyond.htm#english>
- Sumner, A. (2004). Why are we still arguing about globalization? *Journal of International Development*, 16(7), 1015–1022.
- Sutcliffe, B., & Glyn, A. (2003). Measures of globalisation and their misinterpretation. In J. Michie (Ed.), *The handbook of globalisation* (pp. 61–78). Cheltenham: Edward Elgar.
- The World Bank Group. (2017). *World Bank Open Data*. Accessed April 18, 2017, from <http://data.worldbank.org/>
- UNCTAD. (2002). *World investment report. Transnational corporations and export competitiveness*. New York: United Nations.
- UNCTAD. (2009). *World investment report. Transnational corporations, agricultural production and development*. New York: United Nations.
- UNCTAD. (2011). *World investment report. Non-equity modes of international production and development*. United Nations: New York.
- UNCTAD. (2012). *World investment report. Towards a new generation of investment policies*. United Nations: New York.
- UNCTAD. (2013). *World investment report. Global value chains: Investment and trade for development*. New York: United Nations.
- UNCTAD. (2014). *World investment report. Investing in the SDGs: An action plan*. New York: United Nations.
- UNCTAD. (2015). *World investment report. Reforming international investment governance*. United Nations: New York.
- UNCTAD. (2016). *World investment report. Investor nationality: Policy challenges*. Geneva: United Nations.
- UNCTADstat. (2017). *Data center*. Accessed May 28, 2017, from <http://unctadstat.unctad.org/EN/Index.html>
- Vetter, S. (2014). *Recent trends in FDI activity in Europe*. Deutch Bank Research. Accessed April 7, 2017, from [https://www.dbresearch.com/PROD/DBR\\_INTERNET\\_EN-PROD/PROD000000000340841/Recent+trends+in+FDI+activity+in+Europe%3A+Regaining.pdf](https://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD000000000340841/Recent+trends+in+FDI+activity+in+Europe%3A+Regaining.pdf)
- Veugelaers, R., & Cassiman, B. (2004). Foreign subsidiaries as a channel of international technology diffusion: Some direct firm level evidence from Belgium. *European Economic Review*, 48(2), 455–476.
- Wagner, S. M. (2013). Why do MNEs engage in MNE–Government relations? Empirical evidence from the European Union and the automotive industry. In G. Cook & J. Johns (Eds.), *The changing geography of international business* (pp. 54–76). Basingstoke: Palgrave Macmillan.
- Xu, Y. (2012). Understanding international trade in an era of globalization: A value-added approach. *Policy Analysis*. Accessed January 6, 2017, from [http://www.aspeninstitute.org/sites/default/files/content/upload/Understanding%20International%20Trade\\_0.pdf](http://www.aspeninstitute.org/sites/default/files/content/upload/Understanding%20International%20Trade_0.pdf)
- Xu, B., & Chiang, E. P. (2005). Trade, patents and international technology diffusion. *The Journal of International Trade and Economic Development*, 14(1), 115–135.
- Yamin, M., & Sinkovics, R. R. (2009). Infrastructure or foreign direct investment?: An examination of the implications of MNE strategy for economic development. *Journal of World Business*, 44(2), 144–157.
- Young, S., & Hood, N. (2000). Globalization, multinational enterprises and economic development. In S. Young & N. Hood (Eds.), *The globalization of multinational enterprise activity and economic development* (pp. 3–20). London: Macmillan Business.
- Zilinske, A. (2010). Incoming foreign investment: Holly water or menu of potential troubles. *Engineering Economics*, 21(5), 518–524.

# The Future of the World Trading System After 2017 and the Interests of the European Union



Wanda Dugiel

**Abstract** The aim of the article is to analyze of the future of the world trading system from the perspective of the interests of the European Union under the conditions of the growing position of emerging economies in international trade and the role of the United States in Eurasia. The article uses the analysis of statistical data and recent political and economic subjects relating to the world trading system. The study presents a diagnosis of membership benefits of China and other emerging economies in the WTO, the WTO membership enabled to become the main actor in international trade. The article analyzes of statistical data, the causes of the failure of the Doha Round negotiations, studies the negotiating positions of WTO members in the context of the possibility of the resumption of multilateral negotiations of the Doha Round. Trade liberalization in a multilateral context (WTO) and in bilateral trade agreements associated with incurring high social and economic costs in the European Union. The failure of the Doha Round was due to the weak benefits achievable through multilateral trade liberalization and the reluctance of developing countries to implement the liberalization of international trade including the Singapore issues.

**Keywords** International trade · WTO · Doha Round · Trade policy · European Union · FDI

## 1 Introduction

In 2017, new challenges emerged for the failed Doha Development Round, a global trading system that includes the rise of protectionist tendencies in the United States, and the announcement by President Donald Trump of Fair Trade and China's growing international trade. It is impossible to continue the process of liberalizing international trade in the WTO, at least in the short term. Firstly, the multilateral

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trade negotiations of the ninth Doha Development Round virtually ended in a failure. Secondly, the interest of the United States, the hegemon in the global trading system, the further liberalization of international trade in the WTO, the declaration of Donald Trump about, the withdrawal of the US from the WTO, have weakened.

So far, the post-war history of the world trading system has not stopped the process of liberalization of international trade in the multilateral forum (Krugman 2016). Despite protectionist tendencies in various periods after the Second World War, especially in the 1980s, states in the multilateral forum liberalized trade. The failure of the Doha Development Round is due to a number of premises, the most important being the submission by the WTO member countries of a controversial liberalization program for international trade. The conflict of interest of developed and developing countries concerned both protectionism in agriculture, social standards as well as Singapore issues, including competition policy and trade, public procurement and trade, investment and trade, trade facilitation.

Following the global crisis, there has been a slight increase in protectionism in the various states of the world. The reason for such weak protectionism, especially in developed countries, has been the processes of creating global supply chains of these countries in emerging economies. Developed countries, which have failed to push through to the global trading system of the Singapore issues in the face of the economic slowdown and competitive pressure from emerging economies, must adopt an appropriate trade policy strategy that favors the economic interests of those countries.

The aim of this article is to analyze the future of the world trading system from the perspective of the interests of the European Union in the context of the growing position of emerging economies in international trade and the role of the United States in Eurasia. The first section presents the reasons for the failure of the Doha Development Round and the importance of the collapse of the ninth multilateral trade negotiations for the world trading system and the interests of the European Union. The second section contains an analysis of how the United States maintains a hegemonic position in the world trading system, despite the growing position of China and other emerging economies. The third section characterizes the future of the global trading system in the context of structural change in the global economy and the pursuit of the interests of the European Union.

## **2 Reasons for Failing to Negotiate the Doha Development Round**

The World Trade Organization (WTO) is one of the most important international organizations in the world. WTO rules allow for a stable development of trade relations between states, in particular through a dispute resolution mechanism that can prove extremely helpful during periods of trade wars and intensified protectionist actions (International Monetary Fund, World Bank and World Trade



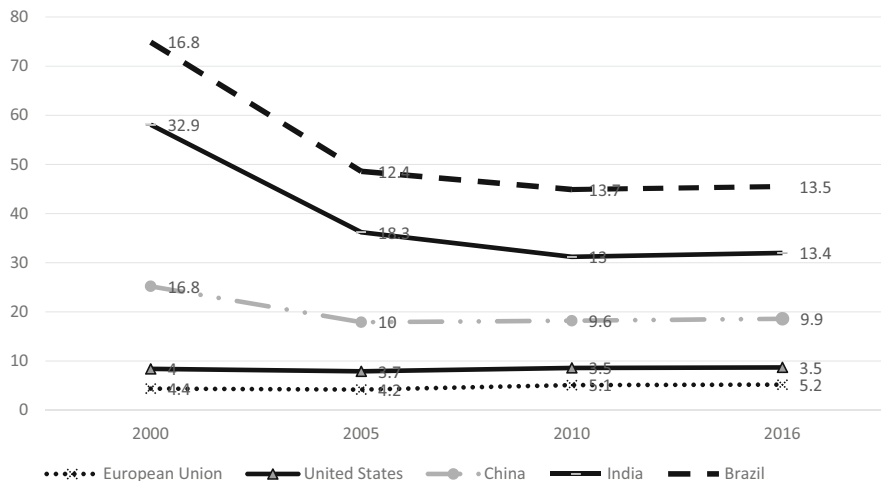
Organization 2017). Importance of the WTO is linked to a stable legal basis for the functioning of an international organization. The global crisis of 2008–2009 and the withdrawal of the United States from the Transpacific Partnership have confirmed the weakness of trade regulation in mega-regional trade agreements. Opportunities for signing the second megaregional trade agreement The Transatlantic Trade and Investment Partnership (TTIP) is also practically insignificant. The enormous opposition of Western European societies and less involvement of Central Eastern European societies in the initiative to block the negotiations between the United States and the European Union reaffirms the tenet of the stable legal basis of the WTO. In addition, signing the Transatlantic Trade and Investment Partnership will not be an easy task in the context of changing the direction of trade policy for Donald Trump's presidency, from liberal to protectionist (Hufbauer and Cimino-Isaacs 2017).

The Doha Development Round of Doha Round of WTO Trade Negotiations, launched in 2001, were intended to contribute to the reform of the world trading system and to address new problems of labor standards, competition policy, public procurement and trade facilitation. These problems mainly presented by the United States and the European Union have not been approved by developing countries. The prolonged multilateral trade negotiations with the Doha Round have failed, and the continuation of the international trade liberalization process is currently not possible due to conflicts of interest between the 164 WTO members (Heribert et al. 2016).

For the first time in the history of the world trading system after the Second World War, the process of liberalizing international trade stopped. Also for the first time to the fiasco of many years, since 2001, the multilateral trade negotiations, the Doha Round. Doha Round negotiations ended in a virtually fiasco for two main reasons. First and foremost, a broadly differentiated program of international trade liberalization, with the exception of enhancing market access by reducing tariffs on industrial and agricultural products, trade and competition issues, investments, public procurement, trade facilitation. Second, a large number of WTO member states and conflicts of interest, with a shift in the geographic structure of international trade to the benefit of emerging economies, in particular China and India.

The failure of the Doha Round stems from the striking differences in the interests of WTO members. The North-South conflict of interest was already at the heart of the liberalization of international trade at the end of the 1990s and the failed attempt to launch the millennium round at the Seattle Ministerial Conference in 1999, and later in 2001, with a successful attempt to launch the ninth Rounds of multilateral trade negotiations.

Conflict of interest was evident during more than 16 years of negotiations. Developed countries, including the European Union, did not want to give up huge protectionism in agricultural trade, with the postulates of developing countries on greater access to agricultural markets. Negotiations Ministerial Conference in Buenos Aires, Argentina, scheduled for December 2017, confirm the thesis on the limited possibilities for the states to agree on a trade liberalization program even in a very restrictive exchange of goods. The developed countries were mainly interested



**Fig. 1** Average customs tariff in selected countries of the world, 2000, 2005, 2010, 2016 (in %). Source: The World Bank Data 2017; World Trade Organization, International Trade Center and United Nations Conference on Trade and Development (2011, 2017) and World Trade Organization (2006)

in the liberalization of trade in industrial goods, the strengthening of intellectual property protection, the regulation of competition policy and the flow of foreign direct investment in international forums facilitating the economic transactions of companies from developed countries in developing countries.

The Doha Development Round Failure, with the existing resumption of rounds, does not mean to undermine the rules of international trade. The WTO has legal regulations under the GATT 1994 on the movement of goods. Another important issue in the WTO rules is the provisions on the flow of services contained in the GATS and the TRIPs Agreement. The trade policy review mechanism makes it easier for WTO members to inform each other of the commercial policy tools they have used to prevent trade conflicts. Failure of the Doha Round does not imply a weakening of the international organization itself as the WTO. The world trading system has been very successful since its inception after the Second World War, on the basis of the establishment of a General Agreement on Tariffs and Trade (GATT). There has been a decline in tariffs from over 40% after World War II to about 7% in 2016.

The main players in international trade have significantly lowered the level of customs duties as members of the WTO, particularly emerging economies. The level of the average tariff in Brazil, China, India still exceeds the average level of customs duties in the developed countries, the European Union and the United States (Fig. 1). The average level of customs duties in the United States was in 2016, only 3.5%, in the European Union, 5.2%; in Brazil 13.5%; in China 9.9%; while in India 13.4%.

Countries still maintain many non-tariff barriers such as anti-dumping, government procurement, national requirements. The world trading system has been extremely important for small states with a small share of international trade that

could benefit from the WTO dispute settlement system. So over 20 years of operation of the WTO has brought positive results in the form of raising incomes of societies in developing and developed countries (World Bank Group and World Trade Organization 2015). For the world trading system in 2017, the most important is trying to develop a common position framework for the international trade liberalization program that will allow for the resumption of the Doha Round.

Developing approximate positions is possible after the tenth Ministerial Conference in Nairobi on 15–16 December 2015. In Nairobi, the developed countries largely supported the development of a new mandate for multilateral trade negotiations to continue the liberalization of international trade (World Trade Organization 2015a). Many developing countries and emerging economies: China, India, and South Africa were supporters of the liberalization of international trade based on the Doha Ministerial Declaration (International Centre for Trade and Sustainable Development 2015).

The Bali Ministerial Conferences in 2013 and in Nairobi in 2015 are punts for the continuation of the work on the international trade liberalization program. First and foremost, the issue of trade facilitation at the Bali ministerial conference will lead to speeding up customs clearance and faster international trade. The Ministerial Conference in Nairobi has managed to eliminate the controversial throughout the global trading system of export subsidies.

Developing countries will eliminate export subsidies until the end of 2018, given the importance of the agricultural sector in their economies. A shorter elimination deadline is foreseen for developed countries that have removed export subsidies from trade policy as of January 1, 2016. They have positively removed developing countries from setting up a special safeguard mechanism for developing countries, which may be the starting point for future WTO trade negotiations (World Trade Organization 2015b). The creation of an international trade liberalization program in the future will be extremely difficult due to differences in interests, particularly those related to the liberalization of agricultural trade. Differences are visible in preparations for the eleventh WTO Ministerial Conference in Buenos Aires in December 2017. India, with great potential for agricultural development, is interested in limiting domestic support (amber box). In the future process of multilateral trade negotiations, it is important to liberalize market access in agriculture (Azevedo, Hufbauer 2015; Hufbauer et al. 2015). The elimination of international export subsidies, as a result of the 2015 decision of the Ministerial Conference in Nairobi, will not change the world trade position of developing countries.

The problem of liberalization of agricultural trade on a multilateral basis in the WTO is controversial because of the persistence of comparative advantages in agricultural production by developed countries and the support for agricultural development by the European Union and the United States, often precisely targeted at improving productivity and quality of production and ecological activities. The most competitive countries in international trade are the European Union countries, including the Netherlands, Denmark, Spain and the countries of North America (Jambor and Babu 2017). Developed countries, despite their comparative

**Table 1** Largest world exporters in years 2000, 2005, 2010, 2016 (in bln, percentage change)

| Country                  | Share in world export |      |      |      | Value                       |      | Changes in 2016 against 2000 in % <sup>a</sup> |
|--------------------------|-----------------------|------|------|------|-----------------------------|------|--|
|                          | 2000                  | 2005 | 2010 | 2016 | 2000                        | 2016 | 2000-100                                       |
| European Union—28        | 41.9                  | 44.2 | 39.3 | 37.7 | EU-15<br>230.9 <sup>b</sup> | 598  | 158.9  |
| United States of America | 13.0                  | 9.7  | 10.5 | 10.4 | 70.9                        | 165  | 132.7  |
| Brazil                   | 2.8                   | 4.1  | 5.0  | 4.9  | 15.4                        | 77   | 400  |
| China                    | 3.0                   | 3.4  | 3.8  | 4.8  | 16.4                        | 76   | 363.4  |
| Canada                   | 6.3                   | 4.8  | 3.8  | 4.0  | 34.7                        | 63   | 81.5   |
| Indonesia                | 1.4                   | 1.6  | 2.6  | 2.4  | 7.7                         | 38   | 393.5  |
| Argentina                | 2.2                   | 2.2  | 2.5  | 2.3  | 11.97                       | 37   | 209.1  |
| Thailand                 | 2.2                   | 2.1  | 2.6  | 2.3  | 13.28                       | 37   | 178.6  |
| Australia                | 3.0                   | 2,5  | 2.0  | 2.1  | 16.37                       | 34   | 107.7  |
| India                    | 1.1                   | 1.2  | 1.7  | 2.1  | 6.4                         | 34   | 431.3  |

Source: World Trade Organization (2001, p. 100, 2017a, p. 112)

<sup>a</sup>Own calculations based on WTO reports

<sup>b</sup>World Trade Organization (2014, p. 68)

advantages, will not give up protectionism in agriculture, wanting to remain self-sufficient and leading in international trade.

Protectionism is supported by domestic support (amber box, blue box, green box). The largest share of domestic support expenditure is classified as a green box, which is not subject to reduction. Green box support tools are not subject to agricultural trade liberalization, leaving great potential for protectionism in this form in various countries around the world. The various forms of domestic support for domestic support are most nominally used not only by the developed countries: the European Union, the United States, but also the emerging economies of China and India, which have increased their share of world trade (South Centre 2017).

The dynamics of changes in international trade since 2000, since the beginning of the reform of the world trade system in the Millennium Round, confirms the growing importance of international agricultural commodities in emerging economies, Brazil (increase in world exports compared to 2000, amounted to 400%); In the case of China 363%; India, 431.3% (Table 1).

Trends to liberalize agricultural trade may be weakened due to persistently high levels of tariffs in emerging economies. In India, the average level of MFN tariffs in India reached 32.7% in 2016, compared to 5.2% in the United States (Table 2).

There is an emerging problem of potential losses for developing countries due to the failure of the Doha Round. Prolonging since 2001, with each year of multilateral trade negotiations, the Round did not bring significant losses to developing countries whose economic interests have become a priority in the Doha Round. One of the priorities of the Doha Round was to accelerate economic development in developing countries by improving access to developed country markets. Protectionism in agriculture in developed countries has not been limited to the Doha Round due to

**Table 2** Average level of customs duties on agricultural commodities in %

| Country                  | MFN applied |
|--------------------------|-------------|
| European Union—28        | 11.1        |
| United States of America | 5.2         |
| Brazil                   | 10          |
| China                    | 15.5        |
| Canada                   | 15.6        |
| Indonesia                | 8.4         |
| Argentina                | 10.3        |
| Thailand                 | 31          |
| Australia                | 1.2         |
| India                    | 32.7        |

Source: World Trade Organization, International Trade Center and United Nations Conference on Trade and Development (2017)

the support of domestic support, so most developing countries, where agriculture plays a major role in the economy, do not suffer losses due to prolonged multilateral negotiations Doha Round.

Economic forecasts show that in 2050 the most powerful economies in terms of GDP will be China, India and the United States (Hawksworth and Chan 2015). These studies confirm the view that developed countries liberalizing international trade will lead to geographical change in trade flows for the benefit of emerging economies. The source of conflicts between developed and emerging economies will be competition policy, which should foster market access by market forces in different countries in the world. The biggest proponents of the introduction of international competition policy standards are the European Union and the United States, which recognize the need to include state-owned enterprises in competition policy, particularly in China (Williams 2015).

In 1996, a working group was established in the WTO that examined trade relations and competition. The working group in the report acknowledged that adherence to competition policy rules could have an effect on the exchange of international trade by cartel formation, abuse of dominant position, vertical market restrictions, mergers and acquisitions to dominate the international market (World Trade Organization 1998).

The problem of adherence to competition policy rules appeared in the late 1990s, as there were many mergers and acquisitions in the world. The European Union, the United States, is a proponent of introducing competition policy issues into the WTO's multilateral trade negotiations. The issue of competition policy is one of the Singapore issues presented in the International Trade Liberalization Program at the 1996 Ministerial Conference in Singapore. Controversy over competition policy in WTO regulations raises the prevailing policy concerns of public sector companies in various countries. The use of competition policy tools would reduce the ability of governments to support companies in industrial policy (Lee and Morand 2003; Singh 2014).

The European Union was primarily a proponent of the ban on cartels and the principle of non-discrimination. Antitrust law, the ban on abuse of a dominant position, is subject to the actions of governments of many countries, including emerging economies, particularly China, which simultaneously pursue the interests of industrial policy to strengthen state-owned enterprises. (Bush and Bo 2011; Horton 2016). In 2017, the chances of multilateral cooperation on trade links and competition policy are negligible. Competition policy has been a source of conflict between the developed and developing countries in the Doha Round. Many countries continue to use the opportunities to support state-owned enterprises that continue to play a large role in countries like China, India, Russia, United Arab Emirates (Motta 2016).

The main motive for trying to incorporate another important Singapore issue: investing in the rules of the global trading system was the existing barriers to market access to the international flow of investment. Proponents of the issue of investing in the trade liberalization program were the European Union, the United States and Japan. Also a working group established in 1996 under the WTO to examine trade and investment flows on a global scale, recognized trade and foreign direct investment as complementary (World Trade Organization 1996).

Opponents of the issue of investment in the liberalization program of international trade draw attention to the effects of capital outflows and wage declines in countries of origin. In the capital-receiving countries, however, the inflow of investments into the deterioration of the balance of payments is adversely affected. Proponents of barriers to access to the foreign direct investment market underline that trade policy tools that restrict access to the world market in the world intensify the flow of FDI (World Trade Organization 1996).

Still a major challenge for the global trading system is the issue of labor standards. By joining the reform of the world trade system in the late 1990s, developed countries, particularly the United States and the European Union, have called for the inclusion of labor standards and international trade in WTO rules. Developing countries, including India, have recognized attempts to introduce a system of trade in trade union rights and to organize themselves as protectionist tools that violate comparative advantages and cost competitiveness.

In the second decade of the twenty-first century, the geographical structure of international trade has changed in favor of emerging economies, which do not respect certain labor standards, in particular the right to form trade unions and for forced child labor. First and foremost, there is moral pressure on the societies of developed countries on the problems of low wages and low labor standards in developing countries, which creates a sense of moral responsibility for maintaining high standards of work and increasing acceptance of non-compliance with work rules by companies in developed countries.

Basic labor standards of The International Labor Organization has recognized the freedom of association and the protection of trade union rights, as defined in ILO Convention No. 87, which clearly states the right to form trade unions. The conventions have not ratified the main players in international trade, both Brazil, China and India. Other standards of work include the right to organize and bargain collectively;

ban on forced labor, lowest age allowed for employment; eliminate child labor; right to equal pay; the right to equal treatment of employment and profession.

International trade in the form of a global supply chain intensifies the flow of foreign direct investment and the process of relocating production to low-cost countries, which discourages those countries from enforcing higher standards of work (Brown et al. 1996). International capital flows enable transnational corporations to set up subsidiaries and branches in different countries around the world. Competition for attracting foreign direct investment in the countries that seek FDI inflows (The Economist 2013; Davies and Vadlamannati 2013). In many countries, the so-called “Race down” both in developing countries as well as OECD (Olney 2013; Davies and Vadlamannati 2013). Research has confirmed that emerging economies making direct foreign investment choose low labor standards (Duanmu 2014).

There are many arguments for increasing unemployment and lowering wages of unskilled labor in developed countries in trade with developing countries. There is no evidence of mutual relations between trade and observance of labor standards (Bhagwati 2001; Irwin 2015; Carbaugh 2014). Placing labor standards in the WTO’s multilateral trade negotiations will lead to the resignation of many developing countries and emerging economies from the negotiations on the liberalization of international trade.

Since the start of the Doha Development Round, which adopted the program of reform of the world trading system, since 2001, after sixteen years of multilateral trade negotiations, the global trading system has failed to reform. The ambitious plans of developed countries to broaden their trade liberalization program have proven unacceptable to developing countries. The single-undertaking principle has attracted the interest of developed countries to include the controversial issues of reforming the world trade system into regional trade agreements. The United States has signed a number of free trade agreements, which dealt with labor standards. The processes of increased international trade exchange are connected with the flow of FDI, which is aimed at intensifying trade and often finding an export platform. The emphasis on lowering production costs and prices in the modern world economy is causing lower standards in both developed and developing countries.

New challenges for the WTO concern labor standards for the protection of workers’ rights, because the motivation for non-observance of labor standards by developing countries as part of the comparative advantage of these countries appears to be unacceptable in today’s world. Certainly introducing trade barriers or sanctions to under-performing countries would be a very technically difficult solution, and developing countries could not agree to reform the world trade system.

### 3 Hegemony of the United States in the World Trading System

The United States has played a very important role since the onset of the world trade system, with the GATT/WTO regulations in place. Thanks to economic and military power, the United States has strengthened the political position of other states, including Western Europe, opening up the US market to goods and services from those countries and providing financial assistance (Baldwin 1986). Under the aegis of the United States, all rounds of the GATT/WTO multilateral trade negotiations took place, where the United States gained access to the markets of the major economic partners of the European Union and Japan.

The issue of international trade was one of Donald Trump's most important economic policy issues, stressing unfair trade internationally to the United States in the WTO and regional integration agreements. The idea of fair trade proposed by the President of the United States and the slogan "America first" is based on the premise of providing the United States with fair competition on the world market and eliminating unfair trade barriers blocking US exports.

President Donald Trump's postulate, "America first," means tightening protectionist action against states with whom the United States maintains a balance of trade deficit. The return to mercantilist trade policy is reflected in United States legal regulations. In March 2017, President Trump commissioned a document, The Omnibus Report on Significant Trade Deficits, recognizing that WTO membership did not bring significant benefits to the United States. The document identifies trade partners with whom the United States has experienced a significant trade deficit. The second document is an order dated 31 March 2017 to prepare a set of anti-dumping and countervailing duties applicable to trading partners using unfair commercial practices.

Further protectionist actions, mainly due to growing competitive pressures from emerging economies and the migration crisis, led to President Donald Trump's release of the "American and Hire American" executive regulation on April 18, 2017, requiring federal agencies to oversee companies using First-class products and components and employing employees from the United States (Hufbauer and Cimino-Isaacs 2017).

President Donald Trump introduced a new trade policy strategy to Congress, which launched a fair trade policy of encouraging other countries to trade liberalization, mainly bilaterally, rather than multilateral negotiations in the WTO; And the creation of new and better commercial contracts with selected trading partners in key export markets (USTR 2017). Still in his election campaign, President Donald Trump threatened to withdraw the United States from the WTO. The exit of the United States from the WTO would mean a change of leadership in the global trading system and the creation of a multilateral trade liberalization program, a loss of access to foreign markets for US exports under the MFN clause. The advantage of the WTO is the possibility for the state to apply the principle of the WTO, the most favored nation, on the basis of which the United States accounts for about 60% of all



trade. The United States could raise tariffs in any way that is regulated by the WTO under customs tariffs (da Costa and Cimino-Isaacs 2016).

The US withdrawal option may not seem likely due to the importance of US export industries in international trade. The competitiveness of the US economy will determine the direction of change in US trade policy. After a decade of rapid economic growth and enormous competitiveness of the US economy in the 1990s, after 2000 there was a period of weakening of the competitiveness US economy as a result of a decline in labor productivity and investment (Porter et al. 2016). The weakening and the need to improve the competitive position of the United States does not mean that the US loses its leading position in the world economy. The United States still plays the role of a hegemon in the global trading system involved in the economic affairs of Eurasia. The competitiveness of China's economy is definitely weaker compared to American and European. China occupies the 28th position among the most competitive economies in the world according to the Global Competitiveness Report, while the United States ranks third (Schwab and Sala-i-Martin 2016, p.7).

Protectionist tendencies in the United States will deepen the pressure on trade unions to protest against the decline in employment as a result of relocating companies to countries with lower labor costs (Feenstra 2017). The largest federation of trade unions in the United States, AFL-CIO, strongly opposed signing the TPP (Graceffo 2017). US protectionist tendencies are driven by political pressure from some sectors and industries, particularly the agricultural, automotive, steel and aluminum sectors. President Donald Trump's announcement of the imposition of duties also concerns potentially the European Union automotive industry, competing for the American industry.

The premise of fair trade is mainly the loss of jobs due to offshoring, the relocation of jobs from the United States to lower-wage countries, the growing US trade deficit and the enormous competitive pressures in globalization forced by trading partners through the use of unfair practices in international trade (unfair practices such dumping, subsidized imports). The priority of US trade policy in the form of Fair Trade will be implemented using section 201 of the Trade Act 1974, whereby the President of the United States may impose customs duties on imports that cause serious injury to the domestic industry. The second tool in trade policy to take action against unfair commercial practices is Section 301. The presented new strategy of US trade policy clearly reflects the problems not solved in the Doha Development Round on competition policy, which reflects market forces, infringements of intellectual property rights and the failure to adhere to labor standards that lead to undersupply of social and work standards in developed countries.

The need to negotiate new and better trade agreements by the United States is due to slowing GDP growth, low employment growth, a decline in output, the negative effects of the global economic crisis in 2008–2009. Growing trade deficit on industrial goods from \$ 317 billion in 2000 to \$ 648 billion in 2016, in particular the growing trade deficit with China, which increased from \$ 81.9 billion in 2000 to \$ 334 billion in 2015, they may tighten the protectionist actions of the United States.

US protectionist actions will be directed against China due to a large drop in US production.

The sign of a new approach to concluding trade agreements in US trade policy is the withdrawal of the United States from the Transpacific Partnership. The United States has terminated the Transpacific Partnership Agreement, recognizing that TPPs do not apply competition policy in some countries, and that the activities of state-owned enterprises are not conducive to market rights in the economy. TPP states have limited US investment and could open up markets for products of minor importance to US producers. The available economic analyzes did not confirm the significant benefits of the US participation in the TPP (Jackson 2016; Signoret et al. 2016), and some pointed to losses for the US economy (Jomo 2016; Capaldo et al. 2016).

Withdrawing from TPP means that from a geopolitical standpoint, the United States will not support trade liberalization processes in Asia as part of a regional grouping, but only with certain Asian countries, opening the US market to those countries in the region. Due to the geopolitical importance of Japan and the Asia region, the United States is interested in signing a trade agreement with Japan (Donnan and Harding 2017). The new protectionist trends in trade policy do not mean that the United States has relinquished its continuation of its market opening policy, only the form of cooperation with both developed and developing countries has changed. Encouraging other states to open markets for goods and services from the United States will involve reducing barriers to trade and reducing the use of non-tariff barriers in political relations. Japan may be an important partner of the United States in international peace efforts, and close political relations with Japan will help maintain international standing. The United States will strengthen its trade relations with Japan, which will allow us to increase the importance of the US in Asia and contribute to Japan's global leadership (Brzeziński 1997).

The withdrawal of the United States from the Transpacific Partnership will not adversely affect the future of the global trading system. On the contrary, megaregional TPP trade agreements have led to a weakening of the WTO credibility. The failure of the TPP, a megaregional trade agreement in the world economy, confirms the immense importance of the WTO as an organization regulating international trade, which rules cannot be arbitrarily changed.

Opposition to the processes of liberalization of international trade in the United States is linked to income inequalities among workers in the state. The problem of income inequality also appears in other countries in the world. Employees in a sector where production is slowing down as a result of free trade often cannot retrain and find employment in other sectors of the economy. Income inequalities in the United States deepened after 1989, part of society does not benefit from economic growth (Obstfeld 2016).

The weak interest of the United States in the liberalization of international trade at the WTO at the beginning of the twenty-first century is due to structural changes in the world economy, increased competition from China and other emerging economies, and slow economic growth after 2015, 6 years after the global economic crisis ended. After 2000, there was a change in the geographical structure of international trade. The share of US exports fell from 9.8% in 2003 to 9.4% in 2015. While

China's position is clearly leading, China's share of global exports rose from 5.9% in 2003 to 14.2% in 2015, China's share of global GDP grew from 3% in 2000 to 9.6% in 2015. China's share in global imports increased from 3% in 2000 to 10% in 2015 (International Monetary Fund 2016).

Support for the liberalization of international trade in the United States may be the focus of export industry companies and the increase in the share of US added value in Chinese exports. The increase in Chinese exports has contributed significantly to the growth of exports of its trading partners, including many South East Asian countries. The United States maintains a hegemonic position in the global trading system, given the high competitiveness of the US economy, and China's unwillingness to claim hegemony in the global economy. China maintains its position as a major exporter in the global trading system mainly in the economic interests (Alterman 2017). China is largely interested in US economic solutions due to its accession to the WTO and the benefits of its participation in the global trading system. In addition, the hegemon of the United States is based on compliance with national competition regulations, while China continues to lead the world in terms of enormous corruption in the economy.

The raising of customs tariffs for imports from China and the European Union announced by President Donald Trump may trigger China's retaliation and lead to trade wars. China intends to exacerbate the quality control of imported food (meat, dairy) from the United States (McDonald and Wong 2017). Geopolitical relations between the United States and China, based on mutual cooperation, consist in avoiding confrontation in political and commercial relations with the United States. The "America first" strategy presented by President Donald Trump represents some limited future cooperation opportunities in the Asia region, but a variant of US isolation in trade cooperation is unlikely.

The future of the world trading system depends on the economic interests of the United States, the largest economy in the world, whose position in international trade is weakened by emerging economies, in particular China. The United States will not support the further opening of markets in the absence of reciprocity and the maintenance of non-tariff barriers by trading partners who use industrial policy tools to strengthen their competitive position in international trade and disregard competition and investment protection regulations in the developed world.

The further process of liberalization of international trade entails gaining significant benefits for the national economy for the United States. Inclusion of the subject matter of Singapore's labor standards and issues: competition policy, investment, future public procurement for WTO regulation would limit the emerging economies and developing countries' international trade. Emerging economies that have achieved enormous success in international trade through WTO membership will not support the inclusion of this subject in the future international trade liberalization program, fearing a deterioration in their trade position. With such a large difference in the interests of the WTO member states, the liberalization program of international trade in the future may cover only selected issues of market opening, narrowing it to the flow of goods and services.

## 4 The European Union and the Future of the Global Trading System

The European Union is one of the most important players in the global trading system (World Trade Organization 2015c). EU is the world's leading exporter, and in 2016 it ranked second in international trade (15.4% in world trade), followed by China (world trade 16.8%), which has been in the top spot for a few years. The European Union also occupies a major international trade position as a global importer (14.8%), after the United States (17.6% share) (World Trade Organization 2017a).

Europe's open market policy is a priority, with the share of trade in GDP at 34.1% in 2015 (World Trade Organization 2017b), while the average level of applied tariffs on all commodities was 5.2% in 2016, agricultural commodities 11.1%, for industrial goods 4.2% (World Trade Organization 2017a). This low level of customs duties is a result of EU participation in the global trading system in successive rounds of multilateral trade negotiations, during which trade was liberalized. Openness policy in international trade is linked to the high competitive position of European Union countries in the world economy. According "The Global Competitiveness Report 2016–2017" to the Netherlands, it ranked fourth in the list of countries with the highest competitive position, Germany in fifth, Sweden in sixth, United Kingdom in seventh, Finland in 10th place. These countries are ahead of China in terms of competitive position, which has taken the 28th place (Schwab and Sala-i-Martin 2016, p. 7).

Openness policy in international trade has remained in the European Union throughout the post-war period. The liberal form of EU trade policy is confirmed by European Commission documents on the adopted EU trade policy strategy by 2020 (European Commission 2010). The concept of liberal trade policy adopted by the European Union is conducive to economic growth, but it is opposed by some industries to low market protection, in particular heavy industry, textiles (Cleppe 2016; European Commission 2017). There is a social pressure on the fight against unfair trade practices by foreign partners in the form of dumping and subsidizing exports (Kempa and Larue 2016).

The rules of the global trading system remain a guarantee for the European Union to stabilize international trade and protect against possible spiral of protectionism in the world, especially under the conditions of the Doha Development Round and the protectionist activities of the BRICS countries, particularly Brazil, China and India (Evenett 2015). Also developed countries, mainly the United States from the beginning of 2017. In future multilateral trade negotiations, the European Union will push for protection of intellectual property, Singapore topics, including investment policy and competition. These themes were not realized in the Doha Development Round. Hence the weak interest of the European Union, like the United States, to speed up negotiations since the end of 2001. According to economic estimates, the positive conclusion of the Doha Development Round would bring EU GDP growth of only

1% by 2020 (European Commission 2010). Other economic estimates also do not give much benefit to the European economy (Decreux and Fontagné 2009).

For many countries, services play a significant role in the economy. Countries such as the United Kingdom, Finland, Sweden and Germany use innovations for the development of the services sector (Schwab 2014). Investment policy is of great importance for the European Union due to the increase in foreign direct investment flows from the EU to third countries. At the beginning of the second decade of the twenty-first century, more than half of the trade took place between the branches of transnational corporations (European Commission 2012).

Due to the withdrawal of investment issues from the Doha Development Round and the fact that these issues are not being addressed in the global trading system, the European Union is trying to solve the problem of investment flows in bilateral trade agreements with China, Canada, India (Pelkmans et al. 2016; Bickenbach et al. 2015). The European Union was one of the most interested parties in international trade, taking into account competition policy in the global trading system. The rules of international competition would allow increased access to emerging market and developing countries, which are based on the adoption of national competition rules. The European Union, working with the Doha Development Round, proposed a detailed regulation on competition in the WTO, addressing the issue of the application of the principles of non-discrimination in competition policy and the so-called hard cartels (hardcore cartels). Hardcore cartels lead to market sharing and to limiting the positive effects of liberalization of international trade, especially for emerging economies, which play an increasingly important role in international trade. Proposals on non-discrimination in competition policy met with opposition from developing countries wishing to retain the ability to influence mergers and acquisitions in their markets (Evenett 2005).

The resolute opposition of developing countries has led to the abandonment of competition policy in the Doha Round trade liberalization program on 1 August 2004. Developing countries in the Doha Round have also dispensed with competition and trade issues, and therefore the activity of developed countries, including the European Union, has been strengthened to meet the demands of regulating competition policy in regional trade agreements (Laprévôte et al. 2015). More than 80% of trade agreements contain competition policy issues, and these issues have also been attempted to incorporate into megaregional trade agreements: TTIP and TPP.

The weakness of the global trading system, which consisted in abandoning the subject of competition policy, led to the signature by the European Union of free trade agreements containing competition policy regulations with Albania, Ukraine, Serbia and Turkey. Many EU free trade agreements include abuses of dominant positions, such as the EU-Peru agreement. Some contracts include provisions on the abuse by one or more undertakings of a dominant position of "abuse by one or more undertakings of a dominant position". So the European Union has signed agreements with Algeria, Albania, Serbia; Montenegro. The rules of the global trading system remain a guarantee for the European Union to stabilize international trade and protect against possible spiral of protectionism in the world, especially under the

Doha Development Round and the United States protectionist action since early 2017.

The elimination of the Doha Development Round in Singapore has shifted the interest of developed countries to the bilateral trade agreements, undermining the credibility of the global trading system. An important issue in the European Union's trade policy is that the public procurement market, which accounts for about 10% of GDP in developed countries, provides potentially high revenue for competing companies from the European Union, particularly in the transport, medical and pharmaceutical sectors. Developing countries, for reasons of weak economic development, have forsaken the Doha Round in the program of liberalization of international trade on the subject of public procurement (European Commission 2013). Some countries, such as China, which occupy a leading position in international trade, are difficult to rank among economies with low economic potential. The European Union has taken intensive steps on China's accession to the Public Procurement Agreement (GPA).

Strategic trading partners of the European Union remain the United States, China, Japan, in the near future also the United Kingdom after leaving the European Union. China's industrial policy may tighten protectionist tendencies in the European Union. China still maintains barriers to market access in services, public procurement, and non-compliance with intellectual property rights.

Agriculture of the European Union has great difficulty in adapting to the conditions of international competition. In future multilateral trade negotiations, the European Union will want to preserve agricultural trade protectionism as a barrier to market access and direct support in the form of a green box that guarantees European farmers a stable production and income while also ensuring the ecological character of crops. The gradual change in the form of protectionism from the partial reduction of official prices and the reduction of customs barriers with the increase of direct support in the form of direct payments has continued practically since 1992, the reform of Mc Sharry. The new form of protectionism in EU agricultural trade takes the form of direct support combined with environmental protection. With direct support, the European Union has practically abandoned post-2013 agricultural subsidies, which have been controversial in developing countries, practically after 2013.

## 5 Conclusions

The world trading system, despite the failure of the Doha Development Round, is still the most important achievement in regulating international trade, ensuring transparency of trade for states and businesses. WTO rules are not so easy to reverse, such as the withdrawal of regional trade agreements, which some observers have virtually replaced, following the failed WTO Doha Round negotiations.

Developing countries, thanks to the rules of the world trade system, benefit from not always applying the principle of competition policy, in 2017 they belong to the

most competitive economies in the world. The future of the global trading system requires the agreement of developed countries with those developing countries and emerging economies that have achieved a high international trade position. They should also take responsibility for the future of the global trading system and the resumption of the Doha Development Round.

The importance of the Fair Trade concept, developed by the United States and the European Union, is growing in the context of bilateral trade agreements, mainly due to increasing competitive pressures on emerging economies and developing countries, which have prevented the introduction of a competitive trade regime, Public procurement and protection of investor interests in international markets. The future of international trade liberalization is, however, threatened by the global economic downturn, which is not conducive to market opening. Structural changes in the world economy require changes in the program of liberalization of international trade in the future.

## References

- Alterman, J. B. (2017). *The other side of the world: China, The United States, and the struggle for middle east security*. Washington, DC: Center for Strategic and International Studies (CSIS).
- Azevedo, R., & Hufbauer, G. C. (2015). *The WTO at 20*. Washington, DC: Peterson Institute for International Economics.
- Baldwin, R. E. (1986). *The new protectionism: A response to shifts in national economic power*. NBER Working Paper Series, No. 1823.
- Bhagwati, J. (2001). *Free trade and labour*. Accessed August 12, 2017, from [http://www.columbia.edu/~jb38/papers/pdf/ft\\_lab.pdf](http://www.columbia.edu/~jb38/papers/pdf/ft_lab.pdf)
- Bickenbach, F., Liu, W.-H., & Li, G. (2015). *The EU-China bilateral investment agreement in negotiation: Motivation, conflicts and perspectives*. Kiel Policy Brief, No. 95.
- Brown, D. K., Deardorff, A. V., & Stern, M. R. (1996). International labor standards and trade: A theoretical analysis. In J. Bhagwati & R. E. Hudec (Eds.), *Fair trade and harmonization: Prerequisites for free trade?*, Vol. 1. *Economic analysis*. Cambridge, MA: MIT Press.
- Brzezinski, Z. (1997). A geostrategy for Eurasia. *Foreign Affairs*, 76, 50–64.
- Bush, N., & Bo, Y. (2011). Disentangling industrial policy and competition policy in China. *The Antitrust Source*. Accessed August 12, 2017, from [https://www.americanbar.org/content/dam/aba/migrated/2011\\_build/antitrust\\_law/feb11\\_bush2\\_23f.authcheckdam.pdf](https://www.americanbar.org/content/dam/aba/migrated/2011_build/antitrust_law/feb11_bush2_23f.authcheckdam.pdf)
- Capaldo, J., Izurieta, A., & Jomo, K. S. (2016). *Trading down: Unemployment, inequality and other risks of the trans-pacific partnership agreement*. Global Development and Environment Institute, Working Paper No. 16(1).
- Carbaugh, R. J. (2014). *International economics* (15th ed.). Cincinnati, OH: South-Western College Pub.
- Cleppe, P. (2016). *Regulation, then protectionism: Is Europe going the way of its aluminium sector?* Open Europe, EURACTIV. Accessed August 7, 2017, from <https://www.euractiv.com/section/trade-society/opinion/regulation-then-protectionism-is-europe-going-the-way-of-its-aluminium-sector>
- da Costa, P. N., & Cimino-Isaacs, C. (2016). *US exit from WTO would unravel global trade*. Washington, DC: Peterson Institute for International Economics.
- Davies, R. B., & Vadlamannati, K. C. (2013). A race to the bottom in labour standards? An empirical investigation. *Journal of Development Economics*, 103, 1–14.



- Decreux, Y., & Fontagné, L. (2009). *Economic impact of potential outcome of the DDA*. Final report commissioned by the European Commission. CEPII WP, No 2009-01.
- Donnan, S., & Harding, R. (2017). US plans fresh push for talks on bilateral trade deal with Japan. *The Financial Times*, [online] 2 February. Accessed August 7, 2017 from <https://www.ft.com/content/052cf600-e95b-11e6-893c-082c54a7f539>
- Duanmu, J. L. (2014). A race to lower standards? Labor standards and location choice of outward FDI from the BRIC countries. *International Business Review*, 23(3), 620–634.
- European Commission. (2010). *Trade, growth and world affairs trade policy as a core component of the EU's 2020 strategy*. Brussels: European Commission.
- European Commission. (2012). *Trade, growth and development tailoring trade and investment policy for those countries most in need*. Brussels: European Commission.
- European Commission. (2013). *Trade, growth and jobs commission contribution to the European Council*. Brussels: European Commission.
- European Commission. (2017). *Directorate-general for research and innovation directorate D – Industrial technologies*. Industry in Europe. Facts and figures on competitiveness and innovation, Publications Office of the European Union. Luxembourg: European Commission.
- Evenett, S. J. (2005). What can we really learn from the competition provisions of regional trade agreements? In P. Brusick, A. M. Alvarez, & L. Cernat (Eds.), *Competition provisions in regional trade agreements: How to assure development gains* (pp. 37–63). New York: United Nations Conference on Trade and Development.
- Evenett, S. J. (2015). *The BRICS trade strategy: Time for a rethink. The 17th GTA report*. London: Centre for Economic Policy Research.
- Feenstra, R. C. (2017). *Statistics to measure offshoring and its impact*. NBER Working Paper Series. Working Paper 23067.
- Graceffo, A. (2017). Trump's new protectionism: Economic and strategic impact, Feb 1, 2017, Asia Pacific, *Foreign Policy Journal*. Accessed August 12, 2017, from <https://www.foreignpolicyjournal.com/2017/02/01/trumps-new-protectionism-economic-and-strategic-impact>
- Hawksworth, J., & Chan, D. (2015). *The World in 2050. Will the shift in global economic power continue?*. London: PricewaterhouseCoopers LLP. Accessed July 27, 2017, from <https://www.pwc.com/gx/en/issues/the-economy/assets/world-in-2050-february-2015.pdf>
- Heribert, D., Langhammer, J. R., Bungenberg, M., Freytag, A., Grant Makokera, C., Berger, A., & Brandt, C. (2016). Nach der WTO-Konferenz von Nairobi: Wie geht es weiter mit der Welthandelsorganisation? [After the WTO conference in Nairobi: What is the future of the World Trade Organization?]. *ifo Schnelldienst*, 69(5), 3–17.
- Horton, T. J. (2016). Antitrust or industrial protectionism?: Emerging international issues in China's anti-monopoly law enforcement efforts. *Santa Clara Journal of International Law*, 14(1). Accessed August 12, 2017, from <http://digitalcommons.law.scu.edu/scujil/vol14/iss1/6>
- Hufbauer, G. C., & Cimino-Isaacs, C. (2017). *“Buy American, Hire American!”: A worrisome slogan, trade & investment policy watch*. Washington, DC: Peterson Institute for International Economics.
- Hufbauer, G. C., Jung, E., Miner, S., Moran, T., & Schott, J. J. (2015). *From drift to deals: Advancing the WTO Agenda, Commissioned by the ICC World Trade Agenda*. Washington, DC: Peterson Institute for International Economics.
- International Centre for Trade and Sustainable Development. (2015). WTO ministerial: A time for reflection in Nairobi on the future of global trade, *Bridges*, 19(42).
- International Monetary Fund. (2016). *World economic outlook: Subdued demand – Symptoms and remedies international monetary*. International Monetary Fund: Washington, DC.
- International Monetary Fund, World Bank and World Trade Organization. (2017). *Making trade an engine of growth for all: The case for trade and for policies to facilitate adjustment*. Washington, DC: World Bank Group.
- Irwin, D. A. (2015). *Free trade under fire* (4th ed.). Princeton, NJ: Princeton University Press.



- Jackson, K. J. (2016). *The trans-pacific partnership (TPP): Analysis of economic studies*. Washington, DC: Congressional Research Service.
- Jambor, A., & Babu, S. (2017). *Competitiveness of global agriculture: Policy lessons for food security*. Washington, DC: International Food Policy Research Institute.
- Jomo, K. S. (2016). *Some real costs of the trans-pacific partnership: Lost jobs, lower incomes, rising inequality*. Global Development and Environment Institute Tufts University, Policy Brief, No. 16-01.
- Kempa, N. C., & Larue, B. (2016). Patterns in the European Union anti-dumping injury investigations. Accessed August 12, 2017, from [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2858005](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2858005)
- Krugman, P. (2016). Leave Zombies Be. *Finance and Development*, 53(4), 11.
- Lapr v te, F.-C., Frisch, S., & Can, B. (2015). *Competition policy within the context of free trade agreements. The E15 initiative strengthening. The global trade and investment system for sustainable development*. Geneva: International Centre for Trade and Sustainable Development (ICTSD).
- Lee, M., & Morand, C. (2003). *Competition policy in the WTO and FTAA: A Trojan horse for international trade negotiations?* Ottawa: Canadian Centre For Policy Alternatives.
- McDonald, J., & Wong, G. (2017). *China's trading partners alarmed by food import controls*. The Associated Press, [online] 20 March. Accessed August 7, 2017, from <https://www.apnews.com/7f8d733c5a0c4cdbc5cd0c883e1967ad>
- Motta, E. P. (2016). *Competition policy and the trade system: Challenges and opportunities. E15 Initiative*. Geneva: International Centre for Trade and Sustainable Development (ICTSD) and World Economic Forum. Accessed August 12, 2017, from <http://e15initiative.org/wp-content/uploads/2015/09/E15-Competition-Motta-Final.pdf>
- Obstfeld, M. (2016). Get on track with trade. *Finance and Development*, 53(4), 12–16.
- Olney, W. W. (2013). A race to the bottom? Employment protection and foreign direct investment. *Journal of International Economics*, 91(2), 191–203.
- Pelkmans, J., Hu, W., Mustilli, F., Di Salvo, M., Francois, J. F., Bekkers, E., Manchin, M., & Tomberger, P. (2016). *Tomorrow's silk road: Assessing an EU-China free trade agreement*. Brussels: Centre for European Policy Studies (CEPS).
- Porter, E. M., Rivkin, W. J., Desai, A. M., & Raman, M. (2016). *Problems unsolved and a nation divided. The state of U.S. competitiveness 2016 including findings from Harvard Business School's 2016 surveys on U.S. competitiveness*. Boston: Harvard Business School Survey on U.S. Competitiveness.
- Schwab, K. (2014). *The Europe 2020 competitiveness report. Building a more competitive Europe*. Geneva: World Economic Forum.
- Schwab, K., & Sala-i-Martin, X. (2016). *The global competitiveness report 2016–2017. World economic forum Geneva*. Geneva: World Economic Forum.
- Signoret, J., et al. (2016). *Trans-pacific partnership agreement: Likely impact on the U.S. economy and on specific industry sectors*. Washington, DC: United States International Trade Commission.
- Singh, A. (2014). *Competition, competition policy, competitiveness, globalisation and development*. Centre for Business Research, University of Cambridge, Working Paper No. 460.
- South Centre. (2017). *The WTO's agriculture domestic supports negotiations. Analytical note*. Geneva: South Centre and African Trade Policy Centre of the United Nations Economic Commission for Africa (UNECA). Accessed August 7, 2017, from [https://www.southcentre.int/wp-content/uploads/2017/01/AN\\_TDP\\_2017\\_1\\_The-WTO%E2%80%99s-Agriculture-Domestic-Supports-Negotiations\\_EN.pdf](https://www.southcentre.int/wp-content/uploads/2017/01/AN_TDP_2017_1_The-WTO%E2%80%99s-Agriculture-Domestic-Supports-Negotiations_EN.pdf)
- The Economist. (2013). Racing to the bottom: Labour standards. *The Economist Online*, [online] 27 November. Accessed August 7, 2017, from <https://www.economist.com/blogs/freexchange/2013/11/labour-standards>

- The World Bank Data. (2017). *Tariff rate, most favored nation, simple mean, manufactured products (%)*. Accessed July 27, 2017, from [http://data.worldbank.org/indicator/TM.TAX.MANF.SM.FN.ZS?end=2015&start=2000&year\\_low\\_desc=false](http://data.worldbank.org/indicator/TM.TAX.MANF.SM.FN.ZS?end=2015&start=2000&year_low_desc=false)
- USTR. (2017). *2017 Trade Policy agenda and 2016 annual report of the president of the United States on the trade agreements program*. Washington, DC: Office of the United States Trade Representative.
- Williams, M. (2015). *Rule of law in China: Chinese law and business. Competition Policy and Law, The Foundation for Law, Justice and Society in collaboration with The Centre for Socio-Legal Studies*. Oxford: University of Oxford.
- World Bank Group and World Trade Organization. (2015). *The role of trade in ending poverty*. Geneva and Washington, DC: World Bank Group and World Trade Organization.
- World Trade Organization. (1996). Trade and foreign direct investment. *WTO News: 1996*. Press Releases, Press/579, 9 October 1996. Accessed August 12, 2017, from [https://www.wto.org/english/news\\_e/pres96\\_e/pr057\\_e.htm](https://www.wto.org/english/news_e/pres96_e/pr057_e.htm)
- World Trade Organization. (1998). *Synthesis paper on the relationship of trade and competition policy to development and economic growth, note by the secretariat*. Geneva: World Trade Organization.
- World Trade Organization. (2001). *International trade statistics 2001*. Geneva: World Trade Organization.
- World Trade Organization. (2006). *Trade profiles 2006*. Geneva: World Trade Organization.
- World Trade Organization. (2014). *International trade statistics 2014*. Geneva: World Trade Organization.
- World Trade Organization. (2015a). *Ministerial conference tenth session, Nairobi 15–18 December 2015, Ministerial declaration and decisions. WT/MIN(15)/DEC*. Geneva: World Trade Organization.
- World Trade Organization. (2015b). *Special safeguard mechanism for developing country members*. Ministerial decision of 19 December 2015. Accessed August 12, 2017, from [https://www.wto.org/english/thewto\\_e/minist\\_e/mc10\\_e/briefing\\_notes\\_e/brief\\_agriculture\\_e.htm#specialsafeguard](https://www.wto.org/english/thewto_e/minist_e/mc10_e/briefing_notes_e/brief_agriculture_e.htm#specialsafeguard)
- World Trade Organization. (2015c). *Trade policy review, Report by The European Union. WT/TPR/G/317*. Geneva: World Trade Organization.
- World Trade Organization. (2017a). *World trade statistical review*. Geneva: World Trade Organization.
- World Trade Organization. (2017b). *Trade policy review. Report by the European Union*. Geneva: World Trade Organization.
- World Trade Organization, International Trade Center and United Nations Conference on Trade and Development. (2011). *World tariff profiles 2011*. Geneva: World Trade Organization, the International Trade Centre and the United Nations Conference on Trade and Development.
- World Trade Organization, International Trade Center and United Nations Conference on Trade and Development. (2017). *World tariff profiles 2017*. Geneva: World Trade Organization, International Trade Center and United Nations Conference on Trade and Development.

# Legal Instruments of Supervision over Public Procurement Market in Poland



Sebastian Bobowski, Jan Gola, and Wojciech Szydło

**Abstract** The paper concerns the functioning of the juridical instruments of public procurement control in Poland. Their proper operation can help to minimize the risk of irregularities in the public procurement. The shortcomings of their functioning will be addressed. Attention will be also paid to improper regulations that should be changed by the Polish legislature and regulations of the European Union in this matter. Among others, administrative preventive measures in the field of public contracts will be presented, falling clearly within the legal forms of public administration's functioning, understood as a certain type of specific activities used by the government to deal with specific issue. The conclusions and proposals presented in the paper may contribute to the effective functioning of the public procurement market in Poland.

**Keywords** Public procurement · Supervision · Control · Poland

## 1 Introduction

Public supervision of the public procurement market is a constant area of focus for legal and economic scholars alike. Its structure, functions and importance reflect the model of a legal regime governing the expenditure of public funds in a specific state. Correct legal solutions concerning the supervision of the redistribution of public funds have a positive impact on the rational allocation of public funds and the economy as such. Supervision helps to eliminate pathologies in public administration, including corruption or paid protection, and boosts competitiveness on relevant markets. A well-functioning supervision model requires the existence of a variety of legal measures and mechanisms embedded in public administration processes whose importance for the regulation of the public procurement system, both at the national and supranational level, including the European Union, is indisputable. In

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consequence, there are no reasons to challenge the necessity of supervisory instruments in a public procurement system. Rather, the dispute focuses on the development and implementation of optimum legal solutions in this respect.

The correct functioning of the public procurement market in the European Union and in specific European Union member states is guaranteed by public supervision authorities, duly established and assigned correctly defined tasks. Such public supervision authorities exercising oversight of the public procurement markets can be perceived as diverse entities with respect to public procurement as such. They are not involved in the preparation, awarding or execution of public contracts; neither do they become parties to such publicly awarded contracts. Rather, the public procurement system assigns to them specific rights and obligations related to the supervision of public procurement markets. Their basic role is to supervise the conduct of market participants (contracting institutions and contractors), the process of public contract performance by contractors and to oversee specific objective phenomena other than the conduct and activities of the relevant market participants. From this it follows that the authorities have the right to implement authoritative and secondary adjustments to the rights and duties of contracting institutions and contractors, originally defined in the law. Public procurement market supervision as construed in this way has the nature of administrative substantive legal oversight.

## 2 The Importance of Public Supervision Institutions

The origins of the term “supervision” can be dated back to the turn of the eighteenth and nineteenth centuries (Filipowicz 1984). Supervisory activity does not constitute a separate branch of administrative law, and its key purpose is to guarantee that the supervised parties would perform their duties in compliance with the rules laid down in the law, and, should such rules be breached, intervene with the aim to correct the improper activities of the supervisee or cause a change to existing or future facts (Stasikowski 2009). Administrative law doctrine points out that supervision should also ensure the protection of persons affected by the supervisees (Stasikowski 2009).

One could conclude that the supervision is a complex of legal relationships that the administration can establish with entities which, as a rule, do not have the status of administrative entities with respect to such relationships. The purpose of such relationships is to mitigate the risks to assets belonging to the society as such and to eliminate threats to good practice. The relationships can be established, modified and terminated both within and outside administrative procedures, especially in the course of control and auditing activities (Chmielnicki 2006). Administrative law doctrine has defined the following categories of supervision, which are applicable also to supervision in the field of public procurement law. These are: directional supervision (establishing the dependencies between entities functioning within a centralized administrative structure), verification supervision (covering the dependencies between entities functioning within the decentralized administrative structure, mostly in the relationships between the state and local governments) and the

substantive law supervision (establishing the dependencies between various entities based on the effective substantive administrative law rules, mostly between the state and individuals) (Chmielnicki 2006). Typical supervisory measures include: the possibility to quash a settlement issued by a lower instance authority, the possibility to suspend such a settlement, the approval of settlements issued by lower instance authorities and the option to suspend the operation of a lower instance authority for a specified period of time (Ura and Ura 2009).

Supervision authorities co-administer and bear co-responsibility for the activity of the supervised body. They participate in the process of conduct, as broadly construed, undertaken and carried out in the pursuit of specified activities. In consequence, supervision is treated as an active function. Importantly, measures aimed at effective supervision should encompass a broad range of influencing tools supporting the functioning of supervised entities (Jagielski 1999). It must be emphasized that supervision can have the quality of verification (*ex post* oversight) or prevention (*ex ante* oversight), but always involves an element of authority, which gives public administration bodies the option to exert influence on the activity of its subordinate bodies or institutions (Wacinkiewicz 2007). In consequence, an institution supervising a public procurement market is engaged in activity that involves both control and the competence to correct the activity of the supervised body from substantive perspective in the context of public procurement. Meanwhile, the control itself is construed as the observation and active analysis of activities undertaken by the controlled entity, a comparison of results of the analysis against the models of such activities and the drawing of further conclusions (Gola 2013).

One should bear in mind that control activities in the field of public procurement are of substantive and technical nature, and are not undertaken in order to cause specified legal effects, but rather to cause the occurrence of certain facts. The literature also points out to a specific type of control, namely the self-control, which involves self-auditing by the public administration in the sphere of internal relations, which exists alongside other types of control, including preventive control, the control of legality of the acts issued by the government and the control of legality of the acts issued by local government (Corso 2004). From the perspective of this reasoning, it is also useful to mention the classification into direct and indirect control. The former involves the examination and assessment of the functioning of the controlled body by the controlling institution by means of direct verification of its operation in the place where such operation takes place. Indirect control, on the other hand, is exercised by the assessment of the activity of the controlled entity based on the documents, analyses and other materials that have been supplied to the auditing person (Wacinkiewicz 2007). With regard to the control functions, we can distinguish between the informative function, the correction of the decisions made, the reinforcement of the correct conduct models, the function of strengthening the rule of law guarantees and the function of general improvement of the work ethics (Wacinkiewicz 2007).

### 3 Supervision of Public Procurement Markets as a Substantive Administrative Law Oversight

Public supervision of public procurement markets is a type of administrative substantive law supervision. This means that such supervision is exercised by specialized authorities or other administrative bodies. What is more, it is both a specific supervision, meaning that it has been established purposefully with the needs of the public procurement market in mind, and a universal supervision, because it extends to the entire public procurement markets as such, inclusive of all contracting parties and contractors, and all specified objective phenomena that take place on such markets (Szydło 2014).

Substantive administrative law supervision can be defined through the type of legal relationships established between supervisory bodies (between bodies or other administrative entities) and supervised entities (including both private and public entities, also administrative authorities), within which the aim of the supervisory bodies is to ensure that the conduct of supervised bodies is compliant with law and that such conduct neither infringes nor threatens the infringement of goods protected by law. In such a case, the supervisory activity of supervisory bodies focuses on the conduct of supervised entities which are subject to supervisory bodies' control. If such conduct turns out to be illegal, including the cases when such conduct infringes or threatens the infringement of goods protected by law, it is corrected in an authoritative manner, either preventively or repressively (Szewczyk 1995; Boć 2000; Chełmoński 2000; Kosikowski 2011).

However, it can be assumed that the institution of substantive administrative law supervision within the framework of oversight of public procurement markets should be construed much more broadly, comprising not only the assurance that supervised entities comply with the law, but also that entire specified areas of social and economic life that fall within the substantive scope of competence of the said supervisory authorities function in compliance with the standards defined by legal norms, including specific legal rules, in a way that allows for the attainment of specific values (Szydło 2014). What is more, public authorities responsible for supervision should exercise due care to ensure that the areas covered by their supervision are characterized by the consistent compliance with legal standards, including legal rules and axiological values, which have been identified as required and desirable by the legislator. In consequence, the sphere of influence of the supervisory authorities exercising substantive administrative law oversight should comprise, apart from the conduct of supervised entities, also certain objective phenomena, independent from the conduct of supervised entities and rooted in economic, political, social, technical or climate-environmental factors, or third party activities. As a result, the influence of public bodies supervising public procurement markets on the conduct of contracting institutions and the conduct of contractors alike should not be limited to the correction of such conduct should it be found incompliant with legal standards (legal rules and objectives) laid down in the public procurement law, but should also involve supervisory actions taken in

response to the conduct of supervised entity, including: (1) the correction of conduct of both contracting institutions and contractors which cannot be classified as illegal conduct, provided that such corrections lead to a fuller realization of the legal standards enshrined in the public procurement regulations (e.g. decisions on whether a specific legal entity is bound to apply the public procurement law when awarding contracts); (2) supporting such conduct of contracting institutions and contractors that contributes to the attainment of relevant legal standards on public procurement markets (e.g. by issuing official interpretations of the public procurement law thereby providing assistance to contracting institutions and contractors in defining their conduct; an extensive information activity involving the dissemination of information among public procurement market participants on the functioning of such markets); (3) discouraging contracting institutions and contractors from engaging in conduct that turns out to be incompliant with public procurement law standards by, among other things, imposing fines, keeping lists of unreliable contractors that failed to perform or improperly performed a public contract (Szydło 2014).

Official actions by public bodies entrusted with public procurement market supervision undertaken with respect to the conduct of contracting authorities and contractors and referring to the specific objective phenomena occurring on such markets should involve: (1) audit activities, comprising the control and verification of supervised entities' conduct and specific objective phenomena occurring on the markets from the perspective of their compliance with legal standards laid down in the public procurement law; (2) sanctioning activities, such as imposing fines on the contracting authorities and contractors engaging in illegal conduct or ordering contracting authorities and contractors to remedy their illegal conduct; (3) rationing activities, manifested by, among other things, granting consent to contracting parties to the performance of specific activities within the tender procedure, issuing decisions on applicability or non-applicability of the public procurement rules to certain entities or markets; (4) information activities, involving, among other things, the dissemination of information on the situation on public procurement markets; (5) legislative actions involving the promulgation of certain normative acts, including executive acts in particular, in the field of public procurement, and the involvement in the development of the drafts of new legislation; (6) judiciary activities, comprising the settlement of legal disputes between contracting authorities and contractors; (7) analytical activities, such as theoretical and empirical research on a number of problems related to the functioning of public procurement markets.

#### **4 The Status of Public Bodies Supervising Public Procurement Markets**

Public bodies supervising public procurement markets obviously have and should retain their public body status. Their detailed status and legal rules governing them vary depending on how a relevant legislator (either national or supranational)



resolves the issue their independence from other public bodies and private entities on the legal-organizational, functional-decision-making, financial-property and personal-management level. When it comes to supervisory authorities, economics has developed a special numerical ratio measuring the independence of supervisory authorities, which can be used to measure such independence in various areas. The ratio can be used to measure the extent of the guarantee of independence of supervisory bodies at the normative level and at the level of implementation of legal provisions alike, which significantly facilitates even more far-reaching implementation of legal norms that guarantee such independence in the legal and social spheres of life (Tenbücken and Schneider 2004; Gilardi 2008).

The independence of public authorities supervising public procurement markets is of crucial importance both from legal and practical perspective, as such authorities should act in an impartial and objective manner, thereby ensuring that legal rules and the legal objectives of public procurement are complied with in the public procurement markets. The legal and actual independence gives public authorities supervising public procurement markets freedom to act in a way that does not cause groundless preference or discrimination against certain participants of supervised markets, is not subject to any undue influence or pressure exerted by any other public entities (e.g. government administration) or private entities, and represents an appropriately high quality and high level of professional reliability, always in compliance with their main mission enshrined in the relevant legislation (Szydło 2014). When enjoying sufficient freedom, public authorities supervising public procurement market can independently determine and pursue their own priorities to ensure the compliance with relevant legal standards in the public procurement markets, confirming their credibility in the eyes of the public procurement markets participants. Undoubtedly, this in turn would motivate such participants to be more active on the relevant markets, boosting their engagement in the performance of public contracts and attracting new investments (Szydło 2013a, b; Majone 2005).

Apart from legal and actual guarantees of independence of public bodies supervising public procurement markets, it is necessary to implement specific mechanisms of accountability applicable to such bodies, in order to prevent their absolute autonomy, detrimental to the values of a state of law. When discussing such accountability, one could mention: (1) accountability towards citizens, materialized, among other things, by listening to the problems and needs brought up by the participants of public procurement markets, consultations with participants of such markets and the drafting of publicly available reports reflecting the activity of the authority; (2) accountability under substantive law, realized by imposing on the authorities a number of legally binding tasks to be performed within their activity; (3) procedural accountability introduced by way of transparent formal rules governing the process of taking legally relevant actions; (4) accountability before courts, manifested by the verifications of decisions issued by public supervision authorities by independent courts; (5) personal accountability, realized through the competence of public bodies (external with respect to public supervision bodies) to appoint (and dismiss) officers of such bodies; (6) reporting accountability, realized by the submission to public entities (e.g. the parliament, the government), oral or



written information on the activity of such bodies; (7) accountability for effectiveness, manifested, among other things, by the obligation to employ appropriately qualified staff and submit itself to external specialist auditing (Szydło 2013a).

Specialized public authorities supervising public procurement markets that *de lege lata* exist in many countries worldwide, including the United States, where the Office of Federal Procurement Policy was established by Congress in 1974 and in EU member states. Before the effective date of the directives: the directive of the European Parliament and the Council 2014/24/EU of 26 February 2014 on public procurement and repealing the directive 2004/17/EC and the directive of the European Parliament and the Council 2014/25/EU of 26 February 2014 on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC, the establishment of public authorities supervising public procurement markets was optional and dependent on the decision of each single member state. However, once the directives 2014/24/EU and 2014/25/EU came into force, each EU member state has a legal duty to establish at least one body or entity responsible for the monitoring of the compliance with public procurement law in that state. Pursuant to the directives, supervisory authorities from EU member states tasked with the supervision of national public procurement markets should, among other things, prepare reports on market monitoring, identifying the sources of incorrect application of law and disclosing the data on the prevention, identification and appropriate notification of the cases of fraud, corruption, conflict of interest and other serious shortcomings in the area of public procurement. Furthermore, they should provide, free of charge, information and guidelines on the interpretation and application of EU public procurement law and support the contracting institutions with respect to planning and carrying out of procedures to award a public contract.

Supervisory authorities from various EU member states should assist each other and engage in effective cooperation. Currently no single common public authority supervising public procurement markets exists at the international (supranational) level. This kind of international (supranational) authorities supervising public procurement markets are absent even from the European Union and the World Trade Organization, despite the fact that those international (or supranational) integrational organizations imposed on their member states binding international law rules concerning public procurement. The inexistence of international supervision authorities of this type is mostly a consequence of the lack of willingness to transfer the rights to control the expenses incurred on public contracts by the contracting institutions subject to their jurisdiction to the international level and the unfeasibility of the plan to establish a single international supervisory authority that could effectively guarantee the compliance with legal standards applicable to public procurement in so many different states and within such vast territories, covering innumerable contracting institutions and contractors and the immense volume of purchased goods, not to mention linguistic difficulties and other country-specific conditions (Trepte 2006). Therefore it seems reasonable to establish separate national supervisory authorities, while defining international rules governing their mutual, effective and far-reaching cooperation, involving, among

other things, mutual exchange of information or experiences relevant to the process of supervising national public procurement markets, joint execution of control activities with respect to trans-border public contracts, legal assistance or mutual recognition by decisions issued by such authorities (Szydło 2014).

In Poland, the legislator found it necessary to introduce a control function to the public procurement market as a competence assigned to the President of the Public Procurement Office (UZP President). The control involves the verification of compliance of the procedure to award a public contract with the provisions of the Polish Public Procurement Law Act of 29 January 2004. In consequence, the verification is carried out from the perspective of a sole criterion—the criterion of compliance with law. It can be preceded by a preliminary procedure aimed at determining the occurrence of an infringement of the Act that could have impact on the outcome of the tender. Structural elements of the control include the UZP President's right to request the manager of the contracting authority to submit true copies of documents related to the procedure to award a public contract certified by the manager of that contracting authority. Furthermore, the UZP President has the right to request written clarifications concerning matters related to the control from the manager of the contracting institutions and employees engaged in the activities throughout the contract-awarding procedure. One cannot disregard the fact that the UZP President is obliged to determine the facts of the case on the basis of documents collected during the explanatory or control procedure (Gola 2013). The second legal tier of public supervision in the public procurement market in Poland involves *ex-ante* control. *Ex-ante* control applies to orders or framework agreements co-financed with European Union funds. The control involves the assessment of legal compliance of the procedure following the auditing, assessment and selection of the best bid. It is carried out on the basis of contract documentation sent by the contracting authority (Przeszło 2013).

When exercising the substantive supervision as discussed above, the UZP President acts upon their control competence with respect to entities that are independent from it from organizational perspective and having the exact same legal position towards the President in their capacity of contracting authorities, regardless of their public or private law status. The supervision of the public procurement market takes place in the sphere of substantive administrative law, and the possibility to classify the analyzed groups of tasks as supervisory tasks is a result of the fact that the legislator associated the control of public contract awarding procedure with such instruments as the administrative decision to impose a fine or a claim to invalidate an awarded contract (Horubski 2015). Furthermore, public procurement control has characteristics typical of the control activities within the ongoing supervision model. It has been emphasized that “the nature of the relationships between the discussed legal instruments and the control activities that precede them justify the use of the concept-instrument of supervision in the form that it gains, pursuant to legal sciences, in the field of substantive administrative law, with respect to the consecutive actions by the UZP President, and in the case of a claim to invalidate the contract—also the actions of the relevant common courts. The discussed legal measures of supervision of processes observed in the public procurement market, due to the fact

that they involve sanctions (administrative fine, contract invalidation), also perform prevention function typical of supervision as regards the protection of values that underpin the legal system of public procurement (Horubski 2015).

## 5 Conclusion

The institutions of supervision and control are inherent to the legal system governing public procurement. Correctly executed supervisory processes help to reduce the incidence of abuse with respect to public expenditures, contributing to the increased growth of the economy in the state concerned. In Poland, control activities are carried out by the President of the Public Procurement Office, who, by way of applying authoritative instruments, can exert influence both on the contracting institutions and contractors. However, the activities of supervisory authorities should not be limited to the correction of illegal conduct of the supervised bodies—they should also guarantee the implementation of standards and values identified by the legislator in that area of life, and support such conduct of the supervised entities that contributes to the implementation of standards identified by the legislator in that area of life, discouraging supervised entities from taking up actions contrary to legislator's expectations. To minimize the risk of shortcomings in the field of public procurement, it is necessary to implement a multidimensional supervisory model, which necessitates a broader use of transparent control mechanisms and building up the professionalism of the persons in charge of executing such activities.

Public procurement law offers a number of specific instruments which, when applied by competent public bodies, effectively contribute to ensuring that the performances contracted in a public procurement procedure (awarded public contracts) are actually performed by the contractor within the agreed timeframe and in compliance with all other legal obligations inherent to such a performance. If such instruments were non-existent or were not applied, public procurement procedure (contracting in public procurement cases) would be highly risky for the contracting institutions and would generate unwanted economic and social loss.

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## References

- Boć, J. (2000). Nadzór prawny [Legal supervision]. In J. Boć (Ed.), *Prawo administracyjne [Administrative law]*. Wrocław: Kolonia Limited.
- Chelmoński, A. (2000). Nadzór policyjny i reglamentacyjny w administracyjnym prawie gospodarczym [Police and regulatory supervision in administrative business law]. In A. Borkowski, A. Chelmoński, M. Guziński, K. Kiczka, L. Kieres, & T. Kocowski (Eds.),

- Administracyjne prawo gospodarcze [Administrative business law]*. Wrocław: Kolonia Limited.
- Chmielnicki, P. (2006). *Acts of supervision over local government activity*. Warsaw: Lexis Nexis.
- Corso, G. (2004). *Manuale di diritto amministrativo [Manual of administrative law]*. Torino: G. Giappichelli Editore.
- Filipowicz, A. (1984). *Pojęcie i funkcje nadzoru w administracji [The concept and functions of supervision in administration]*. Wrocław: Wydawnictwo Polskiej Akademii Nauk.
- Gilardi, F. (2008). *Delegation in the regulatory state. Independent regulatory agencies in Western Europe*. Cheltenham: Edward Elgar.
- Gola, J. (2013). Control of the president of the public procurement office as instrument preventing corruption in public administration. In T. Kocowski & J. Sadowy (Eds.), *Public procurement control*. Wrocław – Warsaw: Public Procurement Office.
- Horubski, K. (2015). Kontrola udzielania zamówień publicznych a nadzór w materialnym prawie administracyjnym [Control of public procurement and supervision in substantive administrative law]. In *Studia Prawa Publicznego [Public law studies]*. No. 12. Poznań: Wydawnictwo Naukowe UAM.
- Jagielski, J. (1999). *Kontrola administracji publicznej [Control of public administration]*. Warsaw: LexisNexis.
- Kosikowski, C. (2011). *Publiczne prawo gospodarcze Polski i Unii Europejskiej [Public economic law of Poland and the European Union]*. Warsaw: LexisNexis.
- Majone, G. (2005). Strategy and structure of the political economy of agency independence and accountability. In *OECD working party on regulatory management and reform: Designing independent and accountable regulatory authorities for high quality regulation*. Paris: Organisation for Economic Co-Operation and Development.
- Przeszło, E. (2013). *Kontrola udzielania zamówień publicznych [Control of public procurement]*. Poznań: IURIS.
- Stasikowski, R. (2009). *Funkcja regulacyjna administracji publicznej. Studium z zakresu nauki prawa administracyjnego oraz nauki administracji [Regulatory function of public administration. A study in the field of administrative law and administrative science]*. Bydgoszcz – Katowice: Oficyna Wydawnicza Branta.
- Szewczyk, M. (1995). *Nadzór w materialnym prawie administracyjnym. Administracja wobec wolności i innych praw podmiotowych jednostki [Supervision in substantive administrative law. Administration towards freedom and other subjective rights of an individual]*. Poznań: Wydawnictwo Naukowe UAM.
- Szydło, M. (2013a). Principles underlying independence of national data protection authorities: *Commission v. Austria. Common Market Law Review*, 50.
- Szydło, M. (2013b). *Krajowy parlament jako regulator sektorów sieciowych [National parliament as a regulator of network sectors]*. Warsaw: C.H. Beck.
- Szydło, M. (2014). *Prawna koncepcja zamówienia publicznego [Legal concept of public procurement]*. Warsaw: C.H. Beck.
- Tenbücken, M., & Schneider, V. (2004). Divergent convergence: Structures and functions of national regulatory authorities in the telecommunications sector. In J. Jordana & D. Levi-Faur (Eds.), *The politics of regulation*. Cheltenham: Edward Elgar.
- Trepte, P. (2006). *Regulating procurement. Understanding the ends and means of public procurement regulation*. Oxford: Oxford University.
- Ura, E., & Ura, E. (2009). *Prawo administracyjne [Administrative law]*. Warsaw: Lexis Nexis.
- Wacinkiewicz, D. (2007). *Kontrola i nadzór w prawie komunalnym [Control and supervision in the communal law]*. Warsaw: C.H. Beck.

# The Offence of Money Laundering and Its Aggravated Types in Poland and France



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**Abstract** The basic purpose hereof is to characterise the structure of the aggravated types of the offence of money laundering in Poland and France. For this purpose, the concept of the aggravated type of offence will be explained. Moreover, the aggravation circumstances entailing aggravated liability of the culprit of money laundering in the Polish Penal Code (commitment of the attributes of the offence by the culprit in agreement with other persons or obtaining of a significant property benefit as a consequence of realisation of its attributes) and in the French Penal Code (realisation of the attributes of money laundering in a usual way or by entities that due to the performed professional activity use the occasion to commit it or commitment of the offence in an organised criminal group) will be discussed and compared. In the further part of the article, the statistical data relating to the number of convictions for the characterised phenomenon will be compiled and the trends in the field of the frequency of its realisation will be determined.

**Keywords** Money laundering · Pathology of the economy · Aggravated type of crime

## 1 Introduction

Money laundering is not only one of the most serious pathologies in the economic dimension but it is mainly an offence being subject to penalisation in the Penal Codes of the individual states, constituting an extremely significant threat to correct and efficient functioning of business activity as well as financial and fiscal systems. The process of complication of the money laundering phenomenon as well as its advanced multidimensionality result in the fact that the shape of the penal provisions typifying the indicated type of the criminal offence usually remains expanded. At the same time, it should be emphasised already at the beginning that none of the

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typological constructions of the offence of money laundering (even the most complex one), regardless of its character, is able to eliminate the indicated phenomenon but it constitutes only a peculiar legislative ‘dam’, the objective of which is to minimise the effects of its spreading in the social space as well as in the organisational and financial structures of individual states (Pływaczewski 1993). Taking into account the fact that the money laundering practice is aimed mainly at concealment of the source of its criminal origin, it should be emphasised that it is connected smoothly with a number of other illegal and extremely dangerous offences, such as: counterfeiting of cash and securities, drugs or arms trafficking, corruption, frauds, extortion of ransom or human trafficking, and clearly supports the development of organised crime (Górniok 1993; Beernaert et al. 2008). It is estimated that these offences generate losses from USD590 billion to USD1500 billion every year (FINTRAC 2015). Thus, the money laundering phenomenon implies specific consequences in macro- and micro-scale, the most serious of which include partial destabilisation as well as strong disturbance of the financial and tax system of states, violation of economic ratios and economic competition principles (e.g. abuse of the dominant position) (Quirk 1996; Tanzi 1996). However, the most far-reaching negative implications are related to occurrence of the analysed practice on the plane of the monetary and fiscal policy, being reflected in the distortion of the macroeconomic parameters (Wójcik 2014). Moreover, what is important, the money laundering phenomenon from the criminological perspective remains connected directly with the organised crime which clearly constitutes an additional, extremely significant threat to the public security of the state structures (Zoll 2008; Pływaczewski 1993).

## 2 The Concept of the Aggravated Type of Offence

Taking into account the topic hereof, the concept of the aggravated type of the offence of money laundering requires explanation. In the criminal law, we may distinguish the basic type of offence as well as its modified types that may acquire two forms: privileged and aggravated. The basic type remains in the constructional sense the least expanded, yet it constitutes the base or basis that may undergo transformations into the modified types. On the other hand, these types may acquire two forms: privileged and aggravated. Taking into account the limited frames hereof, only the basic features of the aggravated type will be determined. The discussed aggravated type of offence is characterised by specific properties; firstly, in the constructional sense, it always contains the additional attributes; they are the so-called modifying attributes, called also the aggravating attributes. They differentiate the structure of the aggravated type in relation to the basic type, allowing not only for separation of the indicated types from each other but also resulting in narrowing of the scope of regulation of the aggravated type. Thus, it relates in fact to special, exceptional cases of offences, selected on the basis of observations of the legislator. In formal sense, introduction of the additional attributes to the

construction of the type of offence results in specific consequences; in case of the aggravated types, they are connected with increase of the level of social harm of the offence, which means that from the perspective of the social consequences of its realisation, it always remains a more serious threat to the individual legal rights than an analogical offence in the basic type (Zoll 2008). Therefore, occurrence of the indicated modified types in the structure of the Penal Code reflects vigilance of the legislator that protects all legal rights against their violation, especially when the level of the risk and the probability of their actualisation are serious. Moreover, one of the most significant consequences of occurrence of the aggravated type is the increase of its penalisation in relation to the basic type. The higher sanction is a response to particularly dangerous behaviours of the culprit and may even lead to change of the gravity of the offence (the offence being a transgression in the basic types becomes a felony in the aggravated type). Taking into account the remarks presented above, it should be stated that every additional circumstance in the structure of the provision, entailing higher penalisation of the money laundering phenomenon, will have the character of an aggravating attribute.

### 3 Poland

Originally, the Polish law did not provide for typification of the offence of money laundering in the Penal Code as this offence was penalised in art. 5 of the Act on Protection of Business Trading and Change of Some Other Criminal Law Provisions of 1994 (Journal of Laws No. 126, item 615). However, next, the legislator decided on the necessity to change the formula of its penalisation and transferred the crime to the Penal Code, where it was placed in chap. XXXVI devoted to protection of business trading.

In compliance with art. 299 § 1 of the Polish Penal Code, the offence of money laundering consists in acceptance, possession, use, provision or export, hiding, transferring or conversion, assistance in transfer of ownership or possession of means of payment, financial instruments, securities, foreign currencies, property rights or other movable property or real estates, originating from benefits connected with commitment of a criminal act, or in taking of other activities that may prevent or hamper ascertainment of criminal origin or place of placement of these means, their detection, seizure or adjudication of forfeiture. The culprit of this offence is subject to imprisonment for the period from 6 months to 8 years.

Moreover, the culprit being an employee or acting on behalf or to the benefit of a bank, a financial or a credit institution or another entity, which under legal provisions is obliged to register transactions and persons performing transactions, accepts—contrary to legal provisions—means of payment, financial instruments, securities, foreign currencies, performs their transfer or conversion or accepts them in other circumstances raising a justified suspicion that they constitute the subject of a criminal offence determined in § 1 or renders other services aimed at concealment

of their criminal origin or services in protection against forfeiture, is subject to the same penalty.

Penalisation of the aggravated type of money laundering has been provided for by the Polish legislator in paragraph 5 and 6 of the indicated provision (art. 299 of the Penal Code). According to § 5, it has been stated that if the culprit commits the offence determined in § 1 or 2 art. 299 of the Penal Code acting in agreement with other persons, they shall be subject to imprisonment for the period of one year to 10 years. On the other hand, in § 6 it is stated that the culprit who commits the offence determined in § 1 or 2 and obtains a significant property benefit is subject to the same sanction (determined in § 5).

On the basis of the provisions determined above, it should be stated that the Polish Penal Code provides for two cases of the aggravated types of the offence of money laundering. The first one has subjective character as it relates to the configuration of the culprits participating in realisation of the attributes of the discussed offence. On the other hand, the second one refers to the objective aspects of money laundering and is connected with obtaining of a specific, i.e. significant, property benefit from the committed offence. Therefore, the Polish legislator makes the actualisation of the circumstances determining increase of the penalty for money laundering dependent on extension of the personal ‘composition’ of the culprits of the offence or on obtaining of increased financial resources, obtained in connection with its commitment.

The personal aggravating circumstance refers directly to the situation, in which the culprit of the offence of money laundering realises the attributes of the basic type of the offence (§ 1 or 2 of art. 299 of the Penal Code) in agreement with other persons. Therefore, it should be noted that the aggravated type of the offence of money laundering may be committed by minimum three persons as the causative configuration provided for by the Polish legislator assumes that the culprit will be acting with minimum two other persons. At the same time—which is right—the legislator does not determine the upper limit of the number of culprits of the indicated offence, deciding only to specify their minimum number.

Specifying the relation connecting the culprit of the offence of money laundering with other persons, it may be stated that it is based on their mutual agreement. Taking into account the fact that the causative form of every offence based on co-perpetration consists in acting of the culprits ‘jointly and in agreement’, the configuration of the attributes presented in the aggravated type of the offence of money laundering exceeds the indicated relation as it does not cover their joint action. This means that the legislator has taken into account the possibility of separate category of entities, i.e. others, who conclude an agreement with the main culprit as to participation in the offence but do not act jointly with them in money laundering.

On the other hand, the second aggravating circumstance contained in art. 299 of the Penal Code is obtaining of a significant property benefit from the money laundering procedure. This concept should be interpreted on the basis of the arrangements contained in art. 115 § 5 of the Penal Code, in compliance with



which a benefit of significant value means such financial gain, the value of which exceeds the two hundred times the amount of the lowest monthly remuneration.

In art. 115 § 4 of the Penal Code, the legislator specifies that the property benefit should be understood as a gain obtained not only for the culprit themselves but also for 'somebody else'. Therefore, this concept should be understood not only as assets obtained by natural persons but also by legal persons as well as by organisational units not having legal personality. The indicated financial gain may acquire any form that may be estimated in money, so the value of the benefit is measurable by means of a specific monetary sum; therefore, it has economic character. Obtaining of a specific property benefit will be usually connected with expansion of the property possessed by the culprit through an increase of the previous assets or a decrease of the possessed liabilities. As it is emphasised by Majewski (2012), this benefit may acquire various forms: the form of money, object, service, property right, release from debt, waiver of claim or loan or another favourable agreement.

The aggravating attribute of obtaining of a significant property benefit means that the culprit has obtained a specific gain of significant value (in significant size). However, it should be clearly emphasised that the indicated gain may not be interpreted as receipt of any means in exchange of provision of dirty money by these benefits must exceed the values being the equivalent of the dirty money obtained by the culprit on the basis of art. 299 § 1 or 2 of the Penal Code. Therefore, a specific benefit obtained in exchange of a transaction performed with participation of illegal capital in the form of dirty financial means will be such benefit.

## 4 France

Penalisation of the offence of money laundering was introduced to the Penal Code of France on 13 May 1996 on the basis of fulfilment of international obligations by France through ratification of the Strasbourg Convention of 1990 as well as of the United Nations Convention against Narcotic Drugs and Psychotropic Substances of 19 December 1988 and the United Nations Convention against Transnational Organized Crime of December 2000, the Palermo Convention.

In compliance with art 324-1 (and art. 324-2 to 324-4) of the French Penal Code (Code Pénal 2017), money laundering is a behaviour that consists in facilitation of any hiding of the illegal origin of goods or income coming directly or indirectly from a crime. A behaviour consisting in participation in the operation of investment, transfer or conversion of income coming directly or indirectly from a crime is also money laundering. The culprit of the indicated crime is subject to the penalty of 5 to 10 years in prison and from 375,000 to 750,000 Euro of fines (depending on the type of crime, in the basic type the sanction is clearly lower, while in the qualifying is increased) (Koutouzis and Thony 2005; Rassat and Roujou de Boubée 2008). When analysing the normative form of art. 324-1 of French p.c., it should be emphasized that behaviours that are subject to penalties are all financial activities aimed at locating, hiding or converting products derived from crime. Moreover, given the

nature of the offence, which displays high social harm, the legislator penalizes any form of assistance in the pursuit of financial operations intended to conceal the true origin of illegal capital. In the course of the analysed crime, three main forms can be distinguished (Benissad 2014; Cutajar 2016):

1. placement—this phase consists in introduction of specific sums of money obtained as a result of a crime to the financial system. These operations usually last for a longer time since they consist in depositing of the means and their introduction to bank accounts. For the purposes of distraction from the performed financial operations, the obtained sums are divided into numerous smaller amounts in order to facilitate their depositing on bank accounts (Vernier 2013). The division of the great amounts obtained as a result of money laundering allows for hiding of their real origin due to actually insignificant value of the transactions performed (even many times) (Cutajar 1990);
2. layering—this stage consists in performance of diversified operations with the use of modern technologies. It is extremely important as it makes it difficult for the prosecution authorities to detect the illegal financial operations and performance of transactions of illegal origin. In order to hide the actual origin of capital, the culprits of money laundering exchange the financial means collected on bank accounts into other forms of the means of payment (e.g. cheques). On this stage, the indicated financial means are also often placed on accounts located in the so-called financial and tax heavens (offshore countries, e.g. Bermuda Islands, Cayman Islands, Luxembourg, Monaco) (Benissad 2014);
3. integration—it consists in the transfer of the illegal financial means from the sphere of actions of the criminal groups to numerous diversified investments and projects, the character of which is compliant with the law. This stage is important due to the fact that the dirty capital acquires ‘legal’ origin. The culprits dispose of the possessed assets in the form of luxurious goods, art works and profitable investments, acquired in the previous phases, thus obtaining capital of legal origin (Benissad 2014; Broyer 2000).

Each of the above defined illegal phases is independent of the others, so the perpetrator of the money laundering can be assigned one of them, their chosen configuration, and the cumulation of all the abusive behaviour (Pereira 2011). At the same time, it is being currently noticed more and more often that the indicate phases presented above have a model character and at present, fulfilment of their essence and maintenance of the order of their realisation are often not performed by the culprits who dispose of the illegal financial assets pretty freely, changing the order of their acquisition and disposal as well as accumulation and redistribution into diversified form of activity (Vernier 2013; Spreutels and Gijseels 1998).

In the French Penal Code, there are three basic categories of the aggravating circumstances (art. 324-2) (Lepage et al. 2015):

1. money laundering in the usual way—according to French jurisprudence, the custom is preserved if the crime has been committed twice and retains its successive character,

2. use of privileges resulting from the professional activities facilitating money laundering—such offences may be committed by persons performing specific professions to which the obligation to submit declarations is addressed, related to business activities specified by TRACFIN.
3. committing money laundering in an organized criminal group—expresses the French legislature's desire to combat organized crime of an international nature. Acting in organised criminal group—it is emphasised in French doctrine that it is necessary to penalize the preparation for the operation, which consists in hiding the origin of the capital or helping to carry out the indicated procedure by the offending association.

The first one of the aggravating circumstances is commitment of the offence of money laundering in a usual way, i.e. through repetitiveness of realisation of its attributes, required in this case. Some doubts may arise due to the fact of interpretation of the indicated repetitiveness on the basis of already two-time realisation of the indicated criminal offence in the doctrine. It seems that the usual way requires rather making money laundering a regular source of income by the culprits.

The next category entailing aggravation of the criminal liability of the culprit is money laundering by entities that take advantage of the facilitations connected with performance of professional activity by them (Quemener 2015). The French legislator rightly does not specify the indicated subjective category since it may include persons connected with the financial market (employees of banks, insurance companies, brokerage companies, employees of stock exchanges, etc.), with the legal service market, intermediating in performance of numerous, sometimes extremely complicated financial operations (notaries public, attorneys, legal counsels, etc.), representatives of the service sector (e.g. employees of exchange offices), of the world of politics or entertainment industry (owners of casinos) (Cesoni 2013; Cutajar 2016). The spectrum of entities that may potentially participate in the transactions, in which the offence is realised, is extremely vast and differentiated. The French legislator decided to make the indicated attribute the aggravating one due to the fact that the indicated categories of entities should be particularly sensitive to correct functioning of the financial and monetary market and tightening of the gaps occurring in this field, and should not lead to their uncritical expansion (Hotte and Hemm 2004).

The last one of the aggravating circumstances is performance of money laundering in an organised criminal group (Montebourg and Peillon 2000). This attribute is aimed at drawing attention to development of illegal communities of established structure which on the occasion of money laundering commit other specific categories of offences (e.g. drugs or arms trafficking), connected with the starting offence, committed in order to obtain illegal financial gains (Pradel 2007). The legislator decided to penalise this category of the offence due to the necessity to counteract the phenomenon of the organised crime that develops as a consequence of the money laundering procedure.

If, however, the offence is combined with the occurrence of specific qualifying marks, the penalty increases twice, reaching the level of 10 years in prison and

750,000 Euro (Quemener 2015; Broyer 2000). The offence of money laundering is also linked to the possibility of applying additional penalties to the perpetrator, including:

- (a) complementary penalties, such as:
  - confiscation of crime-related products or tools, including items that served or have been used for committing a crime, confiscation of certain goods not directly related to the offence (e.g. cars, related to smuggling); confiscation of all or part of the sentenced person's property that is movable or immovable (divisible or indivisible) and
- (b) penalties depriving of rights or ability to exercise rights, such as:
  - prohibition of exercising civil or family rights for 5 years or more, prohibition of performing public functions or professional activities, prohibition of commercial or industrial activities, management, administration, control activities on behalf of third persons, on own account or on behalf of other entities, prohibition of driving for 5 years or more, prohibition of possession or retention of weapons for a period of 5 years or more (Beernaert et al. 2008).

## 5 Analysis of Statistical Data in Poland and France

The following statistical summaries (Figs. 1 and 2) constitute exemplification of the cases of convictions for the offence of money laundering made in Poland and France and are aimed at assessment of the trend of frequency of its realisation in years 2003–2012. In case of Poland, the available statistics show the general picture of the analysed offence, without consideration of the detailed breakdown into the basic and aggravated types; on the other hand, in relation to the statistical data in France, it has been possible to indicate the distinction between the frequency of the offence with consideration of its type difference.

The presented statistical summaries (Figs. 1 and 2) indicate that the frequency of convictions for the offence of money laundering in years 2003–2012 demonstrated a growing trend both in Poland and France. At the same time, it should be noticed that the general number of the convicts in the examined period (2003–2012) was much higher in Poland than in France and it respectively amounted to: 2164 and 1667 cases (difference of 497 convictions). What is more, the observations relating to the frequency of the characterised convictions are a bit different. In Poland, they demonstrated permanent, insignificant but regular growing trend. On the other hand, in France, cyclical growing trends in the following three periods, 2003–2005, 2006–2008 and 2009–2012, are more noticeable. At the same time, the French statistics indicate that the growing trend of the number of convictions was stronger in relation to the basic type of money laundering (covering in fact the entire examined period) than in case of aggravated types of the crime (it lasted only until 2008) (Depuis-Danon 2006; Cutajar 1990; Rapport 2014).

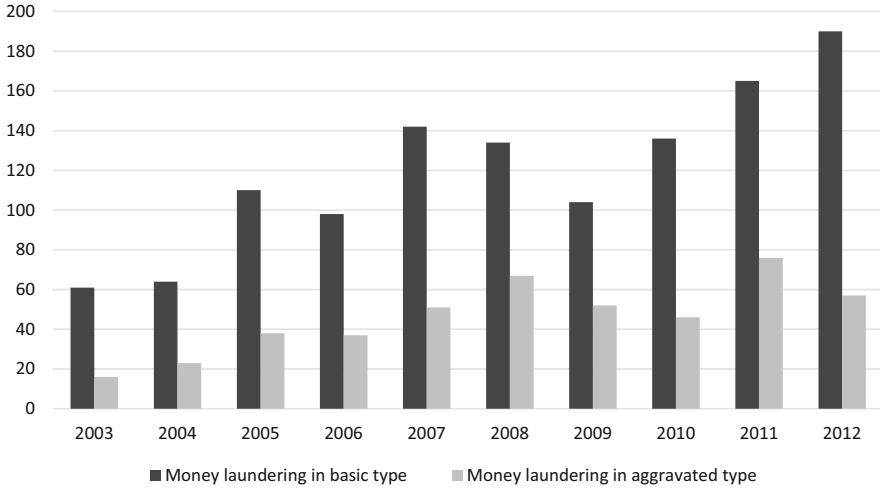


Fig. 1 Number of convictions for money laundering in France. Source: TRACFIN (2014)

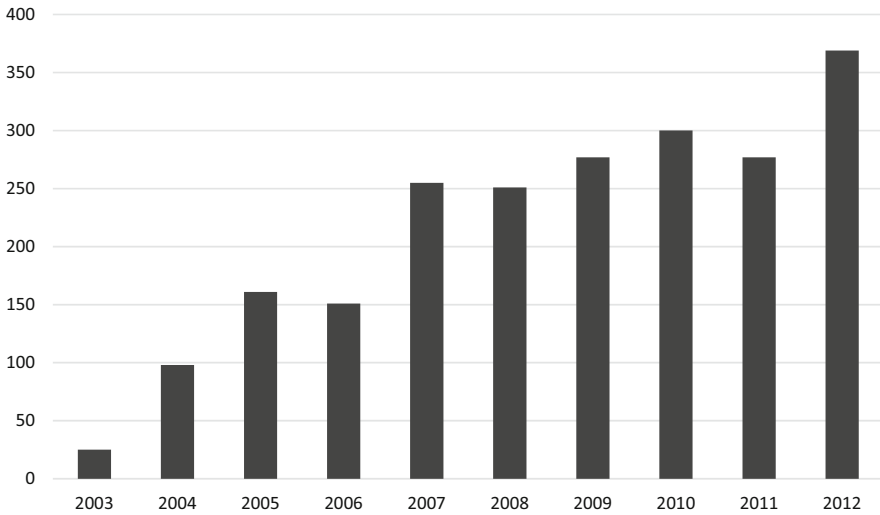


Fig. 2 Number of convictions for money laundering in Poland. Source: KGP (2016)

## 6 Conclusion

In conclusion, it should be stated that the catalogue of the aggravating circumstances of the offence of money laundering is more expanded in the Penal Code of France. The French legislator concentrated on separation of three categories of circumstances entailing aggravation of the liability for the examined offence, conditioned by different prerequisites. Firstly, it is the way in which this offence is realized—

usual commitment of its attributes. Secondly, it is the scope of entities, the professional activity of which facilitates taking advantage of the possibility to realise the attributes of laundering of capital of illegal origin. Thirdly, it is the special form of a criminal organisation, which commits the crime, of an organised character.

On the other hand, in the Polish Penal Code, two circumstances, the occurrence of which decides on actualisation of the attributes of the offence of money laundering, have been indicated, among which the action of the culprit in agreement with other persons (minimum two) as well as obtaining of a significant property value should be indicated as a result of realisation of the attributes of the offence analysed.

Considering the indicated regulations, it should be stated that there is no repetitiveness of any of the aggravating attributes in the indicated Penal Codes. Each of the normative orders concentrates on a different set of prerequisites determining stricter liability of the culprit of illegal income laundering. At the same time, the frequency, manner and causative configuration of commitment of the attributes of the examined offence play an important role in their selection.

On the other hand, while analysing the frequency of commitment of the offence of money laundering over 10 years (2003–2012), it should be stated that in the examined period, it was higher in Poland. In this context, particularly the regular growing trend is worrying, indicating the tendency towards establishment of this extremely serious pathology in both states.

In conclusion, it should be stated unfortunately that regardless of the scope and degree of specification of the aggravating attributes in the provision typifying the offence of money laundering, the frequency of convictions both in Poland and France is growing continuously while the legislative efforts of the Polish and French legislator in the field of counteracting one of the most serious economic pathologies seem not to fulfil the requirements set to them.

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## References

- Act on Protection of Business Trading and Change of Some Other Criminal Law Provisions. (1994). (Art. 5). *Journal of Laws*, No. 126. item 615.
- Beernaert, M. A., Bosly, H. D., & Cesoni, M. L. (2008). *Les infractions: les infractions contre les biens* [Crimes: Crimes against good] (Vol. 1). Bruxelles: Larcier.
- Benissad, H. (2014). *Blanchiment des capitaux. Aspects économiques et juridiques* [Money laundering. Economic and legal aspects]. Paris: Economica.
- Broyer, P. (2000). La lutte contre le blanchiment face au développement des nouvelles technologies de l'infraction et de la communication [Money laundering from the perspective of new technologies and communication]. In *Rapport moral sur l'argent dans le monde 1998* [Money report in the world in 1998]. Paris: Montchrestien.
- Cesoni, M. L. (2013). *La lutte contre le blanchiment en droit belge, suisse, français, italien et international. Incrimination et confiscation, prévention entraide judiciaire* [Anti-money

- laundrying in Belgian, Swiss, French, Italian and international law. Criminalization, confiscation and prevention]. Bruxelles: Bruylant.
- Cutajar, C. (1990). La description du processus de blanchiment [Process of money laundering]. In *Droit penal des affaires, t. 1. Partie generale: responsabilite, procedures et sanctions* [Criminal business law, t.1. General part: Responsibility, procedures and sanctions]. Paris: PUF.
- Cutajar, C. (2016). *Blanchiment d'argent. Prevention et repression* [Money laundering. Prevention and repression]. Paris: Francis Lefebvre.
- Depuis-Danon, M.-C. (2006). Blanchiment d'argent; illusions, realites, impact [Money laundering: Illusions, realities factor]. In *Rapport moral sur l'argent dans le monde 2005* [Money report in the world in 2005]. Paris: PAU.
- FINTRAC. (2015). *Qu' est-ce que le blanchiment d'argent?* [What is money laundering]. [online]. Accessed August 3, 2017, from <http://www.fintrac-canafe.gc.ca/fintrac-canafe/definitions/money-argent-fra.asp>
- French Penal Code [Code Penal]. (2017). (Art. 324-1 and Art. 324-2 to 324-4). [online]. Accessed July 18, 2017, from [https://www.legifrance.gouv.fr/affichCode.do;jsessionid=75559FF28D740DEE4DD6D12229688987.tplgfr29s\\_2?idSectionTA=LEGISCTA000006165345&cidTexte=LEGITEXT000006070719&dateTexte=20180414](https://www.legifrance.gouv.fr/affichCode.do;jsessionid=75559FF28D740DEE4DD6D12229688987.tplgfr29s_2?idSectionTA=LEGISCTA000006165345&cidTexte=LEGITEXT000006070719&dateTexte=20180414)
- Górnio, O. (1993). Podstawy karania za tzw. pranie pieniędzy w obowiązujących i projektowanych przepisach polskiego prawa karnego [Punishment for money laundering in applicable and proposed polish regulations of criminal law]. In *Proceder prania brudnych pieniędzy. Studia i materiały* [Money laundering phenomenon. Studies and materials]. Toruń: TNOIK "Dom Organizatora".
- Hotte, D., & Hemm, V. (2004). *La lutte contre le blanchiment des capitaux* [Anti-money laundering]. Paris: LGDJ.
- KGP. (2016). *Komenda Główna Policji* [Police Headquarters]. [online]. Accessed July 20, 2017, from <http://statystyka.policja.pl/st/kodeks-karny/przestepstwa-przeciwno-17/63924,Pranie-pieniedzy-art-299.html>
- Koutouzis, M., & Thony, J.-F. (2005). *Le blanchiment* [Money laundering]. Paris: PUF.
- Lepage, A., Maistre du Chambon P., & Salomon, R. (2015). *Droit penal des affaires* [Criminal law in business]. Paris: LexisNexis.
- Majewski, J. (2012). *Kodeks karny z komentarzem. Część szczególna, T. 1* [Penal code with comments. Special Part, T.I]. Warsaw: Wolters Kluwer.
- Montebourg, A., & Peillon, V. (2000). *La lutte contre le blanchiment des capitaux en France: un combat a poursuivre, Rapport d'information* [Anti-money laundering in France. Information report]. Paris: Assemblée Nationale.
- Pereira, B. (2011). Blanchiment, soupçon et securite financiere [Money laundering, suspicion, and financial security]. *Revue internationale de droit economique*, No. 1, t. XXV. Paris: De Boeck.
- Pływaczewski, E. (1993). *Pranie brudnych pieniędzy* [Money laundering]. Toruń: TNOIK "Dom Organizatora".
- Polish Penal Code. (2017a). (Art. 299 § 1-2 and Art. 299 § 5-6). [online]. Accessed July 18, 2017, from <http://kodeks-karny.org/czesc-szczegolna/przestepstwa-przeciwno-obrotowi-gospodarczemu>
- Polish Penal Code. (2017b). (Art. 115 § 4 and Art. 115 § 5). [online]. Accessed July 18, 2017, from <http://kodeks-karny.org/czesc-szczegolna/przestepstwa-przeciwno-obrotowi-gospodarczemu>
- Pradel, J.. (2007). Le droit compare du blanchiment [Comparative law money laundering]. In *La lutte internationale contre le blanchiment et le financement du terrorisme, Societe de la legislation compare* [International anti-money laundering and financing of terrorism]. Paris: Dalloz.
- Quemener, M. (2015). *Criminalite economique et financiere. A l'ere numerique* [Economic crime. In the digital age]. Paris: Economica.

- Quirk, P. J. (1996, June). *Macroeconomic implications of money laundering*. [online]. Accessed July 20, 2017, from <https://www.imf.org/en/Publications/WP/Issues/2016/12/30/Macroeconomic-Implications-of-Money-Laundering-2055>
- RAPPORT 2014. (2015). *La prevention de la corruption en France: etat des lieux, chiffres clés, perspectives, jurisprudence. La protection des lanceurs d'alerte. La prevention de la corruption: un impératif pour les entreprises francaises* [Prevention of the corruption in France: Data, perspective, jurisprudence. Protection of the whistle—Blower. Prevention of the corruption: Imperative for French companies]. Paris: Dalloz.
- Rassat, M. L., & Roujou de Boubee, G. (2008). *Droit penal special* [Special penal law]. Paris: Dalloz.
- Spreutels, J., & Gijseels, C. (1998). *Un nouveau pas dans la lutte contre le blanchiment* [New measures to combat money laundering]. [online]. Accessed July 20, 2017, from [http://www.ctif-cfi.be/website/images/NL/pub\\_art/s4frBLANCH.pdf](http://www.ctif-cfi.be/website/images/NL/pub_art/s4frBLANCH.pdf)
- Tanzi, V. (1996). *Money laundering and the international financial system*. [online]. Accessed July 18, 2017, from <https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Money-Laundering-and-the-International-Financial-System-23838>
- TRACFIN. (2014). *Rapport d'activite. Traitement du Renseignement et Action Contre les Circuits Financiers Clandestins* [Activity report, 2014. Processing of intelligence and action against illegal financial circuits]. [online]. Accessed July 20, 2017, from <https://www.economie.gouv.fr/tracfin/accueil-tracfin>
- Vernier, E. (2013). *Techniques de blanchiment et moyens de lutte* [Money laundering techniques and measures to combat money laundering]. Paris: DUNOD.
- Wójcik, J. W. (2014). Pranie brudnych pieniędzy jako przykład przestępstwa gospodarczego. *Wojskowy Przegląd Prawniczy*. Warsaw: Nr 4.
- Zoll, A. (2008). *Kodeks karny z komentarzem. Część szczególna. T. III* [Penal code with comments. Special part. T. III]. Warsaw: Wolters Kluwer.



# Does Cluster Participants' Cooperation Really Promote to Territorial Development: Empirical Evidence from Russia



Julia Dubrovskaya and Elena Kozonogova

**Abstract** Global practice of innovation policies of the recent decade has demonstrated the wide use of cluster concept for economic development promotion. The results of the research on the impact of clusters upon socioeconomic features of territories within developed countries have already proved there exists a positive correlation between them. Also, widely acknowledged is the fact that successful functioning of clusters depends greatly on their interaction with power bodies, manufacturing enterprises and research institutes. At the same time, the analysis of clusters' functioning in a range of developing countries proved that cluster creation as such does not necessarily lead to the desired economic effects. The aim of this study is to assess the importance and the role of clusters' members' interaction for regional development of Russian Federation. Common database was formed taking into consideration with indicators of 79 Russian Federation regions for 2015. The obtained results confirm the high level of functional dependence of territorial development from the efficient interaction of manufacturing enterprises, public bodies and science community.

**Keywords** Territorial development · Cluster · Cooperation · Innovative potential

## 1 Introduction

In recent years there has been a growing interest in the role of cluster cooperation. Term “cluster” involves such meanings as swarm, bunch, accumulation, group, and is used in many fields of science and technology. In economic research clusters are understood as «geographic agglomerations of companies, suppliers, service providers, and associated institutions in a particular field, linked by externalities and complementarities of various types» (Porter et al. 2007). The first research works to

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study clusters were published back in the 1990s (Englmann and WaIz 1995; Feser 1998; Bergman and Feser 1999; Bartik 1985; Becattini et al. 1990). It should be mentioned that the literature began to speak about clusters as about serious “applied key factors” due to the work of Porter (1993). But the very idea of enterprises’ cooperation aimed at cost reduction and competitiveness improvement was originated in the middle of the nineteenth century. It became the basis of localization theory presented by Thünen (1926) in 1826. Later it was developed by Marshall (1920) in his description of industrial regions of Great Britain in 1890, as well as by Weber (1929) in his industrial location theory in 1929.

Scientists made profound analysis of economic relations in the frames of producers’ cooperation. At that, despite the different denominations, such as clusters, blocks of development, industrial units, territorial-production complexes, scientific-production associations, etc., in the frames of these formations economic subjects act as the elements of the single territorial innovative system. According to European experts (Lindqvist et al. 2013), formal cluster policies and programs have gained legitimacy across the world, and today almost every country, region and international aid agency has some form of a cluster program. The cluster concept has become an increasingly popular topic for researchers and policy makers operating at different levels (Bek et al. 2013; Hernández-Rodríguez and Montalvo-Corzo 2012; Lindqvist et al. 2013; Meier zu Kocker and Muller 2015). The number of articles on clusters augmented over the year, reaching up to 200 articles per year in 2010 (Lazzeretti et al. 2012). And this is totally understandable: the research results prove the positive influence of clusters on the socioeconomic features of the territories (Kulakova 2013; Inshakov and Inshakova 2016; Parauljic et al. 2014).

Analysis of the available literature on this research topic has revealed that the following factors are usually named as the basic ones for clusters’ formation: proximity of cluster’s participants’ location to each other; critical number of cluster-specific companies; common goals; active interaction with each other (Ketels 2004); well-developed urban environment; dominance of private initiatives; inside-cluster competition; openness to the external world (Kutsenko 2015); cluster participants’ awareness concerning their own interconnectedness and belonging to the same community (Akinfeyeva 2008); active role of local authorities in the process of cluster formation; local traditions of territorial economic planning (Ksenofontova 2015).

The problem of combination of indicators for evaluating clusters’ effectiveness continuous to be debatable. Andersson et al. (2004) single out such indicators as: the number of firms in cluster, employment, production rate (efficiency), export, the number of innovative projects, profits and modification of these indicators in time. Naumov (2006) and Kostyukevich (2009) propose to use the following characteristics as criteria: production structure of cluster, resource potential, investment activity, economic indexes. Zadorova (2009) applies only four indicators for evaluation of the clusters’ efficiency: cluster’s share in industrial production of the region, cluster’s share in total number of employed people, index of labor productivity at the enterprises of cluster, cluster’s share in the export structure of the region.

We think that all these factors mentioned above to some extent display the results of specific economic subjects' performance, and these subjects are represented in the following core institutional sectors—public authorities, business and science. This statement can be also confirmed in the frameworks of the world-known Triple Helix concept of Etzkowitz and Leydesdorff (2000). According to this concept, cooperation of public sector, science and industrial enterprises is always of key importance for the emergence of synergy effects in the process of cluster's functioning. Stemming from all of the above, productive (efficient) cooperation is a necessary element in the development of cluster networks and their further successful functioning.

It should be noted that clusters are defined as being networks of production of strongly interdependent firms (including specialized suppliers) linked to each other in a value-adding production chain (Roelandt and Hertog 1999). Except basic economic entities (industrial and service companies) that are associated with each other in the value chain and operated in a similar market environment cluster's structure involves the following types of participants: innovative-research and educational institutions; group of companies providing related facilities (financial and insurance institutes, consulting companies and etc.); federal/regional local authorities. Within the cluster, it is possible to unite the main innovative infrastructure actors from industry, government and education. So successful cluster functioning depends greatly on their interaction. The aim of our study is to assess the importance and the role of clusters' members' interaction for clusters quality and for territorial development as well.

## 2 Date and Methodology

We carried out our study on the example of the Russian regions. In Russia clusters support at the state level began only in 2012 when the Government approved the list of 25 territorial innovation clusters. They were structured into six branch-wise directions (“Modern materials”, “Production of aircraft and spacecrafts, shipbuilding”, “Pharmaceutics, biotechnologies and medical industry”, “Chemistry and petro chemistry”, “Information technologies and electronics” “Atom and radiation technologies”).

By now, in Russia clusters are supported by the state on the territory of 22 regions, which is 26% of the total number of regions. According to the data of the Ministry for economic development of Russian Federation, during the last 4 years (2013–2016) the innovation clusters obtained over 100 bln RUB (1.7 bln USD) from the budgets of various level and also over 400 bln RUB (6.7 bln USD) additionally in the form of investments from various non-budget sources (IPSD 2015). Despite the significant volumes of cluster's financing by public authorities, our research fails to confirm any significant influence of clusters on the indicators of regional development in Russia. There may be the following reasons for that: first of all, it is too early to tell since clusters have been functioning on the territory of our country for a short period of time so far; secondly, most of clusters have been formed

by the top-down principle, that is, the vector of their development has been initially determined by the federal authorities; thirdly, the size of the country serves as a hindering factor in establishing cooperation due to significant cross-regional differences; fourthly, despite the large size of the country and radical differences between its regions, norms and rules of spacial organization are rather unified, disregarding regional specifics; fifthly, low level of cooperation between the clusters' participants which is partially predetermined by the dominating role of large enterprises in clusters' structure and functioning. Solving all these problems outlined above would increase the quality of clusters' overall functioning and would also have its positive influence on the parameters of regional and national development. In this study we will try to measure the importance of cluster participants' interaction for territorial development on the study case of Russia's regions.

Theoretical and methodological grounds for this study have been shaped by numerous works in the field of geopolitics, production forces allocation, network economy, industrial regions' development and clusters. The information and empirical basis for this research consists of Russian legislation and regulatory acts; information & analytical databases available online on the site of the Federal Service for Public Statistics of Russian Federation; results of the sociological surveys; other materials published in Russian and foreign research sources; media sources. Common database was formed taking into consideration with indicators of 79 Russian Federation regions for 2015.

Several key approaches are suggested for application in this study. First of all, the methodology within institutional evolutionary economic theory. It would enable defining the regularities in formation and development of the institutes needed for the functioning of cluster structures as the leading form of cooperation between economic subjects. The second approach is based on the ideology of hierarchical analysis of territorial economic systems. Within the framework of the hierarchical approach we study the processes taking place at various levels of the economy. This approach also includes the analysis of the hierarchical structure of the participants and their interconnection within particular regions. It also covers the determination of opportunities for their efficient cooperation. Thirdly, we aim at application of mathematical statistics methods (including correlation and regression analysis, grouping/clustering method and cluster analysis).

This study includes the following parts:

- grouping of the regions by the level of clusters' development;
- designing of a indicators system, describing the level of development of scientific, state administrative and industrial potential by regions;
- calculating of an integral indicators of clusters' successful development;
- mathematical evaluation of the indicators' influence on the level of regional development.

### 3 Results and Discussion

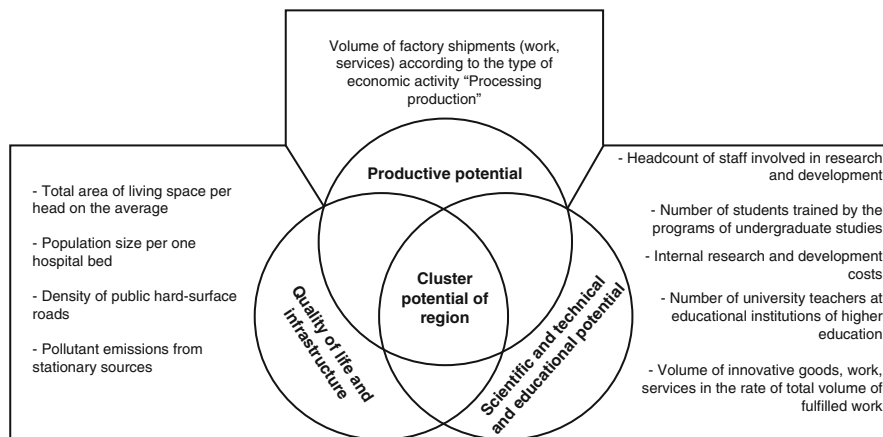
To reach the aim of the study firstly we have classified the regions by the level of clusters' development by dividing all territories into three groups (Fig. 1).

The first group (regions are marked in dark blue) includes the regions whose applications were supported by the RF Ministry of Economic Development. They have got funding. All of them are regions with a high level of development. The second group (regions are marked in purple) includes regions that have applied for cluster support. However, for different reasons RF Ministry of Economic Development did not support these applications. This is due to the fact that the readiness for clustering in these regions was not enough. Finally, the third group (regions are marked in grey) includes regions that even did not apply for participation in the competition. There are no clusters on their territory, or even if they are—they are in the initial stage of development.

After all these, we developed a system of indicators, describing the scientific and technical potential, production capacities and social infrastructure development by regions. The system was based on the "Triple Helix Model" by Etzkowitz-Leydesdorff. According to this model, the key importance in the innovative development of the region belongs to the cooperation of science, business and authorities. We have chosen the next indicators of grouping: quality of life and social infrastructure development (as a result of the government work); production potential and capacities (as indicator of industrial development); scientific and technical and educational potential (as a result of innovative-research and educational institutions work) (Fig. 2).



**Fig. 1** Grouping of the RF regions by the level of clusters' development. Source: Authors own study



**Fig. 2** Indicators of grouping for regional typology. Source: Authors own study

Common database was formed taking into consideration with 10 indicators of 79 Russian Federation regions for 2015. To calculate integral indexes X, Y, Z it was defined the levels of every indicator’s importance in their groups of factors with the help of expert appraisal. Integral indexes were calculated by formulae (1)–(3):

$$X = \sum_{i=1}^n \alpha_i x_i \tag{1}$$

where  $x_i$ — $i$ -factor, characterizing the indicator of “Quality of life and infrastructure”,  $i = \overline{1, n}$ ,  $n$ —total number of factors,  $\alpha_i$ —expert appraisal of  $i$ -factor weight, though  $\sum_{i=1}^n \alpha_i = 1, \alpha_i \in [0, 1]$ .

$$Y = \sum_{j=1}^m \beta_j y_j \tag{2}$$

where  $y_j$ — $j$ -factor, characterizing the indicator of “Productive potential”,  $j = \overline{1, m}$ ,  $m$ —total number of factors,  $\beta_j$ —expert appraisal of  $j$ -factor weight, though  $\sum_{j=1}^m \beta_j = 1, \beta_j \in [0, 1]$ .

$$Z = \sum_{k=1}^l \gamma_k z_k \tag{3}$$

where  $z_k$ — $k$ -factor, characterizing the indicator of “Scientific and technical and educational potential”,  $k = \overline{1, l}$ ,  $l$ —total number of factors,  $\gamma_k$ —expert appraisal of  $k$ -factor weight, though  $\sum_{k=1}^l \gamma_k = 1, \gamma_k \in [0, 1]$ .

All factors used for calculation of integral indexes of the X, Y, Z were standardized by linear transformation according to the formula (4):

$$y(x) = \frac{x - x_{min}}{x_{max} - x_{min}} \quad (4)$$

To confirm the assumption, that successful functioning of clusters depends greatly on the interaction with main innovative infrastructure subjects from industry, government and university (Triple Helix actors), the pair correlation coefficients between government and industry, government and university, industry and university were determined. Actually, in regions where clusters function successfully (the first group), the intensity of interaction between participants is higher. For example, the correlation coefficient between government and industry in the first group is 0.44, and in the third group it is only 0.05 (Table 1).

Thirdly, we have carried out the mathematical evaluation of the indicators' influence on the level of GRP per capita as significative of region economic development. To prove the hypothesis, multiple correlation coefficients were calculated for all groups of regions. In the first group of regions, the coefficient of multiple correlation is higher than in the second and the third (Table 2).

The pair correlation coefficients between GRP per capita and each individual integral indicator of quality of institutions of government, university and science were also calculated. The impact of each individual institution on GRP per capita is much lower than their combined effect (Table 3).

## 4 Conclusion

The obtained results confirm the high level of functional dependence of territorial development from the efficient interaction of manufacturing enterprises, public bodies and science community. The achieved estimations prove that artificial creation of clusters by means of public pressure is not expedient. Cluster unions which later on are not supported by the real cooperation between their participants, cannot have any positive impact on territorial development. Moreover they are able to decelerate considerably the realization of system innovations which are the foundation of progressive and uniform development of all national economy.

Therefore, the main task of government is to develop favorable institutions to enhance interaction between cluster members. This conclusion creates certain pre-conditions for further research in this direction, namely, on the selection of practical instruments for regional cluster policy implementation. It will make possible to define principally new vector of managerial influence on formation of favorable institutional conditions providing creation of valid system of cluster nets as the accelerator of national economy's innovative development.

**Table 1** Calculation of pair correlation coefficients between cluster participants

| Correlation coefficients       | Groups of regions   |   |   |
|--------------------------------|---|---|---|
|                                | Group 1   | Group 2   | Group 3   |
| Government/industry            | 0.44  | 0.17  | 0.05  |
| Government/university          | 0.45  | 0.34  | -0.15   |
| Industry/university            | 0.78  | 0.77  | 0.65  |
| <i>Mathematical evaluation</i> |   |   |   |
| Government/industry            | $ r  (=2.01) < t_{Critical} (=2.11) \Rightarrow$ the correlation coefficient is not significant | $ r  (=0.76) < t_{Critical} (=2.05) \Rightarrow$ the correlation coefficient is not significant | $ r  (=0.19) < t_{Critical} (=2.05) \Rightarrow$ the correlation coefficient is not significant |
| Government/university          | $ r  (=2.05) < t_{Critical} (=2.11) \Rightarrow$ the correlation coefficient is not significant | $ r  (=1.48) < t_{Critical} (=2.05) \Rightarrow$ the correlation coefficient is not significant | $ r  (=0.64) < t_{Critical} (=2.05) \Rightarrow$ the correlation coefficient is not significant |
| Industry/university            | $ r  (=5.20) > t_{Critical} (=2.11) \Rightarrow$ the correlation coefficient is significant     | $ r  (=4.98) > t_{Critical} (=2.05) \Rightarrow$ the correlation coefficient is significant     | $ r  (=3.51) < t_{Critical} (=2.05) \Rightarrow$ the correlation coefficient is significant     |

Source: Authors own study



**Table 2** Mathematical evaluation of the indicators' influence on the level of GRP per capita

|   | Groups of regions  |   |  |
|---|--|---|--|
|   | Group 1  | Group 2   | Group 3  |
| Multiple correlation coefficient                      |  |   |  |
| GRP per capita/industry and university and government | 0.82   | 0.81  | 0.67   |
| Mathematical evaluation                               | $F_{Calc}(=9,9) > F_{critical}(2,3) \Rightarrow$ the multiple correlation coefficient is significant | $F_{Calc}(=16,2) > F_{critical}(1,9) \Rightarrow$ the multiple correlation coefficient is significant | $F_{Calc}(=7,1) > F_{critical}(1,9) \Rightarrow$ the multiple correlation coefficient is significant |

Source: Authors own study

**Table 3** The impact of institutions on GRP per capita

| Correlation coefficients       | Groups of regions   |   |   |
|--------------------------------|---|---|---|
|                                | Group 1   | Group 2   | Group 3   |
| GRP per capita/<br>government  | 0.12  | -0.37   | -0.60   |
| GRP per capita/<br>industry    | 0.71  | 0.61  | 0.16  |
| GRP per capita/<br>university  | 0.74  | 0.23  | 0.39  |
| <i>Mathematical evaluation</i> |   |   |   |
| GRP per capita/<br>government  | $ t  (=0.51) < t_{Critical} (=2.11) \Rightarrow$ the correlation coefficient is not significant | $ t  (=1.64) < t_{Critical} (=2.05) \Rightarrow$ the correlation coefficient is not significant | $ t  (=3.10) > t_{Critical} (=2.05) \Rightarrow$ the correlation coefficient is significant     |
| GRP per capita/<br>industry    | $ t  (=4.14) > t_{Critical} (=2.11) \Rightarrow$ the correlation coefficient is significant     | $ t  (=3.17) > t_{Critical} (=2.05) \Rightarrow$ the correlation coefficient is significant     | $ t  (=0.68) < t_{Critical} (=2.05) \Rightarrow$ the correlation coefficient is not significant |
| GRP per capita/<br>university  | $ t  (=4.57) > t_{Critical} (=2.11) \Rightarrow$ the correlation coefficient is significant     | $ t  (=0.99) < t_{Critical} (=2.05) \Rightarrow$ the correlation coefficient is not significant | $ t  (=1.72) < t_{Critical} (=2.05) \Rightarrow$ the correlation coefficient is not significant |

Source: Authors own study

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## References

- Akinfeyeva, E. V. (2008). *Formation and development of regional clusters* [pdf]. Accessed May 30, 2016, from <http://riep.ru/upload/iblock/103/103a3a3fa5e5a0dca75838b37af5a83d.pdf>
- Andersson, T., Schwaag-Serger, S., Sorvik, J., & Hansson, E. W. (2004). *The cluster policies Whitebook* (266 p). Holmbergs: IKED.
- Bartik, T. (1985). Business location decisions in the United States: Estimates of the effects of unionization, taxes, and other characteristics of states. *Journal of Business and Economic Statistics*, 1, 14–22.
- Becattini, G., Pyke, F., & Sengenberger, W. (Eds.). (1990). *The Marshallian industrial district as a socio-economic notion. Industrial districts and inter-firm cooperation in Italy*. Geneva: International Institute for Labour Studies.
- Bek, M. A., Bek, N., Sheresheva, M. Y., & Johnston, W. J. (2013). Perspectives of SME innovation clusters development in Russia. *The Journal of Business and Industrial Marketing*, 28, 240–259.
- Bergman, E. M., & Feser, E. J. (1999). *Industrial and regional cluster: Concepts and comparative applications* [online]. Accessed April 3, 2017, from <http://www.rrl.wvu.edu/WebBook/Bergman-Feser/contents.htm>
- Englmann, F., & Waiz, U. (1995). Industrial clusters and regional growth in the presence of local inputs. *Journal of Regional Science*, 35, 3–27.
- Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From National Systems and “mode 2” to a triple Helix of university-industry-government relations. *Research Policy*, 29 (2–3), 109–123.
- Feser, E. J. (1998). Old and new theories of industry clusters. *London Clusters and Regional Specialisation: On Geography, Technology, and Networks*, 8, 18–40.
- Hernández-Rodríguez, C., & Montalvo-Corzo, R. F. (2012). Entrepreneurial clusters in China and Mexico—Implications for competitiveness. *Globalization, Competitiveness and Governability*, 6(1), 55–90.
- Inshakov, O. V., & Inshakova, E. I. (2016). The policy of innovative clustering on the basis of public-private partnership in modern Russia. *Bulletin of Volgograd State University. Series 3. Economics Ecology*, 3(36), 79–92.
- IPSD. (2015). *About the implementation of programs to support and further develop the network of innovative territorial clusters* [pdf]. Accessed April 10, 2017, from <http://dppkk.ru/upload/iblock/b8d/b8d94d9c7206e42f0027a670f99394d4.pdf>
- Ketels, Ch. (2004). *European clusters—Structural change in Europe. Innovative city and business regions* [pdf]. Hagbarth. Accessed June 15, 2016, from [http://abclusters.org/wpcontent/uploads/2013/12/Ketels\\_European\\_Clusters\\_2004.pdf](http://abclusters.org/wpcontent/uploads/2013/12/Ketels_European_Clusters_2004.pdf)
- Kostyukovich, D. V. (2009). Evaluation and organization of cluster interactions of entrepreneurial structures. Ph.D. Saint-Petersburg State University of Engineering and Economics.
- Ksenofontova, O. L. (2015). Industrial clusters as a factor in the development of the region: The theoretical aspect. *Modern High Technology Regional Annex*, 4(44), 66–71.
- Kulakova, L. I. (2013). Cluster approach is the basis for effective development of regions. *Russian Entrepreneurship*, 22(244), 121–130.
- Kutsenko, E. (2015). Pilot innovative territorial clusters of Russia: A model of sustainable development. *FORSIGHT*, 9(1), 32–55.
- Lazzeretti, I., Sedita, S., & Caloffi, A. (2012). *The birth and the rise of the cluster concept* (“Marco Fanno” Working Paper 144).

- Lindqvist, G., Ketels, C., & Solvell, O. (2013). *The cluster initiative Greenbook 2.0* [pdf]. Stockholm: Ivory Tower. Accessed March 22, 2017, from <http://cluster.hse.ru/doc/getpdf.pdf>
- Marshall, A. (1920). *Principles of economics: An introductory volume* (9th ed.). London: Macmillan.
- Meier zu Kocker, G., & Muller, L. (2015). *Cluster programmes in Europe*. European Commission [online]. Accessed March 21, 2017, from <http://ec.europa.eu/DocsRoom/documents/12925>
- Naumov, V. A. (2006). Economic efficiency of cluster formation in oil and gas region. *Electronic Scientific Journal "Oil and Gas Business"*, 2 [pdf]. Accessed March 12, 2017, from [http://ogbus.ru/authors/Naumov/Naumov\\_1.pdf](http://ogbus.ru/authors/Naumov/Naumov_1.pdf)
- Parauljic, V., Cvijanovic, D., Mihailovic, B., & Veljkovic, K. (2014). Correlation between the state of cluster development and national competitiveness in the global competitiveness report of the world economic forum 2012–2013. *Economic Research–Ekonomska Istranivanja*, 27(1), 662–672.
- Porter, M. (1993). *International competition: Competitive advantages of countries*. Moscow: International Relationships.
- Porter, M., Ketels, C., Delgado, M., & Bryden, R. (2007). *Competitiveness at the crossroads: Choosing the future direction of the Russian economy*. Moscow: Center for Strategic Research.
- Roelandt, T., & Hertog, P. (1999). *Summary report of the focus group on clusters* [pdf]. Accessed March 30, 2017, from <http://www.oecd.org/sti/inno/2369025.pdf>
- Thünen, J. H. (1926). *Isolated state*. Moscow: Economic Life.
- Weber, A. (1929). *Theory of the location of industries*. Chicago: University of Chicago Press.
- Zadorova, T. V. (2009). Evaluation of the efficiency of industrial clusters as a necessary condition for the implementation of regional cluster policy (on the example of the Chuvash Republic). *Bulletin of the Chuvash University*, 3, 12–16.

# The Method of Regions' Typology by the Level of Cluster Potential



Elena Kozonogova and Julia Dubrovskaya

**Abstract** The most widely spread form of spatial organization in many countries is clustering. In Russia, cluster policy belongs to the key priorities of the country's innovative development. This is why special importance get the issues of regional specialization and clusters' localization. The aim of this research is to present the authors' typology method for the regions of Russia which is based on such feature of regions as cluster structures' maturity. The initial theoretical precondition for this research is the statement that successful functioning of a cluster would be possible in a region with high cluster potential as such. At this, under successful functioning of a cluster the authors understand constant improvement of cluster's performance indicators, regardless state support and participation (or lack of). The offered here typology of territories can be used to define the development strategies for the regions with average and low cluster potentials.

**Keywords** Cluster potential · Territorial development · Regions' typology · Economic mathematical methods

## 1 Introduction

International experience in the field of innovative development confirms that increasing competitiveness of territories rests on the development of separate economic segments, or the so-called sectors of growth. This re-emphasizes the issues related to taking into account territorial specialization in the process of development and implementation of the regional strategy of innovative development. And cluster structures, inter alia, are used in the process of these strategies' development.

Ketels (2009) mentions that clusters affect prosperity through their impact on productivity, innovation, and entrepreneurship. This statement has already found enough proof in numerous empirical studies. The presence of clusters has positive

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impact on such vital parameters of economic development of territories as employment growth, growth of wages, patenting, number of establishments (Delgado et al. 2012), survival rates (Wennberg and Lindqvist 2008), firm growth (Audretsch and Dohse 2007). According to European Commission (2006), companies in clusters are more than twice as likely to source out research to other firms, universities or public labs than were the average European innovative firms. Importantly, the presence of strong clusters in a region enhances growth opportunities in other industries and clusters (Delgado et al. 2012).

Despite the fact that cluster policy has already become the basis for regional development strategies in many countries, still debating remains the issue of cluster policy efficiency. The evidence of a positive relationship between well-developed clusters and strong economic performance is of little policy relevance, if we do not have the understanding and the ability to influence the reasons that lead to the emergence of strong clusters.

In Russia cluster policy belongs to the key directions in the reforms related to import substitution and support for non-resource-based export. This is why of special importance become the issues related to determining the base conditions for the efficient clusters' functioning, and these issues include, inter alia, localization of these clusters. The experience of developed countries in the field of clusters' formation and functioning confirms the necessity of thorough and preliminary typology of territories by the parameter of cluster structures' availability and development level (Ketels 2004; Porter 2000; Varga et al. 2013; Woodward 2012; Barkley and Henry 2002; Moreno et al. 2012). This can be explained by several factors. The first of them is the necessity to increase the efficiency of spending of rather limited in volume budget resources allocated on clusters' support. Secondly, typology is needed in order to take into account the territorial specialization and the level of region's development at the stage of cluster strategy development. For example, priorities of regional development, including those directly related to budget spending, can differ between the regions, depending on the level of a particular territory development (Todtling and Trippel 2005; Ahmetova 2016).

In order to determine the level of innovative development and to estimate the capacities for potential clusters' formation in the regions researchers and practitioners use a range of methods. To the most known among them belong: Smart Specialization Platform, is used to determine cluster specialization (European Commission 2017b); European Innovation Scoreboard (EIS), usually applied for comparative analysis of innovation performance in EU Member States, other European countries, and regional neighbors (European Commission 2017a); Exploratory Approach to Innovation Scoreboards (the improved version of the EIS method) puts emphasis on the firm-level activities and includes quite a wide range of indicators (Arundel and Hollanders 2004); Data-base of Innovation Policy Measures, applied for assessing the contribution of innovation to achieve social and economic objectives, and for benchmarking innovation performance and conditions for innovation to those of other countries (The Innovation Policy Platform 2017), Knowledge Assessment Methodology is used to help countries identify the challenges and opportunities they face in making the transition to the knowledge-based

economy (Chen and Dahlman 2005); Science-Metrix is an independent research evaluation firm specializing in the assessment of science and technology (S&T) activities (Science-Metrix 2017); The Organization for Economic Co-operation and Development (OECD) provides a forum in which governments can work together to share experiences and seek solutions to common problems (OECD 2017); The EU Industrial R&D Investment Scoreboard provides economic and financial data and analysis of the top corporate R&D investors from the EU and from abroad (European Commission 2017c).

Along with these foreign methods we can also mention the methodology of the Ministry of economic development of Russia, which has been developed specifically for the selection of innovative territorial clusters in Russia in 2012. In the course of cluster applications' consideration the public authorities were evaluating such indicators as scientific, technical and education potential of a region, its production potential, quality of life, the level of infrastructure development and the level of cluster's organizational development. In the last 4 years clusters selected as territorial innovative have already granted more than 700 billion rubles from different sources including budget.

It should be mentioned that this methodology of clusters' selection was common for all regions of Russian Federation. As a result, budget support got the most developed regions of the countries, and this has only increased the already significant cross-regional differentiation. This fact has been proved in several studies (Eferina et al. 2017; Zubarevich 2014; Cervantes and Dubrovskaya 2016).

Thus cluster policy did not promote to economic growth in Russia. We carried out regression analysis and it did not reveal a significant correlation between the cluster availability and regional development in Russia. The results we have obtained are also confirmed by the official statistics of the Federal Service of State Statistics (Table 1).

Table 1 presents the data as of 2012 (when the clusters did not have subsidies) and also as of 2015 (to the beginning of the year 2016 the financial support has been carried out for 3 years). According to this table, despite the significant growth of spending on technological innovations, we can clearly observe rather insignificant growth of such important indicators of innovative activity as the share of organizations using technological innovations and the share of technological innovations'

**Table 1** Key indicators of innovative activity

| Key indicators of innovative activity  | 2012      | 2016        |
|--|-----------|-------------|
| Spending on technological innovations, mln RUB   | 904,560.8 | 1,203,638.1 |
| The share of technological innovations' spending in the total volume of shipped goods and delivered works and services, %  | 2.5       | 2.6         |
| The share of organizations using technological innovations in the overall number of the studied organizations, %   | 9.1       | 8.3         |
| The share of innovative goods, services and works carried out by the organizations using technological innovations, in the overall volume of shipped goods and delivered works and services, % | 8.0       | 8.4         |

Source: Based on Kevesh (2016)

spending in the total volume of shipped goods (and delivered works and services). Besides that, we can also observe the reducing share of organizations using technological innovations in the overall number of the studied organizations. This is due to the following features of the Russian economy:

- a significant area of our country, that slowing the diffusion of innovation;
- over-centralization of power and over-concentration of resources. According to the domestic statistics, in Russia about 10% of the total number of regions form more than half of the total GRP of the country.
- the competition of regions for subsidies leading to the appearance of autarkic tendencies;
- the sharp cross-regional differentiation. The difference between the level of GRP per capita in the richest and the poorest regions of Russia is about 25 times.

The sharp cross-regional differentiation leads to the expansion of the number of regions with lower income per capita than the national average. So it is necessary to develop various policies and support conditions for different regions, rather than unified norms and rules as of now. As a result of this research, we would like to present the original method of regions' typology by the level of cluster structures' maturity.

## 2 Data and Methodology

For further typology of regions by the level of their cluster potential we have used 13 indicators of socioeconomic development of 80 regions in Russian Federation, data as of 2015. The selected data demonstrate the rate of regions' development in three directions: Quality of life and infrastructure (QLI), Productive potential (PPI), Scientific and technical and educational potential (STI). The source of data is again the Federal Service of State Statistics of Russian Federation (Kevesh 2016). Table 2 provides an overview of the variables.

All factors used for calculation of integral indexes of the QLI, PPI, PPI were standardized by linear transformation. Calculation of the integral indices of regions' cluster development is performed through summing up the corresponding indicators with the equal weight values. This approach to calculation has found grounding in the results of our research which proves that application of different weights does not lead to significant changes in the final results, but at the same time different weights increase the subjectivity of the method applied overall. Typology of the regions by the level of their cluster potential is carried out using cluster analysis methods. Cluster analysis assumes dividing a particular group of objects into the subgroups, called clusters, so that each of them consists of similar objects, while objects from different clusters differ from each other (Lutsenko and Korzhakov 2011). Further, in order to reduce the uncertainty, we would operate the notion "grouping" instead of "cluster analysis". Thus, grouping of the regions has been performed by means of the self-organizing Kohonen maps or networks (SOM). The main reason for using the



**Table 2** Integral groups of indicators for estimation of regions' readiness to effective clustering

| Var. name   | Definition  | Units of measure                                       |
|---|---|--|
| Index of Quality of life and infrastructure (QLI)                 |   |  |
| QLI <sub>1</sub>  | Total area of living space per head on the average  | sq. m.   |
| QLI <sub>2</sub>  | Population size per one hospital bed  | men  |
| QLI <sub>3</sub>  | Density of public hard-surface roads  | km of roads per 10,000 sq. km of territory             |
| QLI <sub>4</sub>  | Pollutant emissions from stationary sources   | ths. Tons  |
| Index of Productive potential (PPI)                               |   |  |
| PPI <sub>1</sub>  | Volume of factory shipments (work, services) according to the type of economic activity "processing production"   | mln. RUB   |
| PPI <sub>2</sub>  | Investments in fixed assets (without budget funding) per capita   | RUB  |
| PPI <sub>3</sub>  | The ratio of fixed assets' renewal  | %  |
| PPI <sub>4</sub>  | Circulation of products (services) produced by small enterprises, including microenterprises and sole proprietors | ths. RUB   |
| Index of Scientific and technical and educational potential (STI) |   |  |
| STI <sub>1</sub>  | Headcount of staff involved in research and development   | men  |
| STI <sub>2</sub>  | Number of students trained by the programs of undergraduate studies   | MA course and five-year studies per 10,000 people, men |
| STI <sub>3</sub>  | Internal research and development costs   | mln. RUB   |
| STI <sub>4</sub>  | Number of university teachers at educational institutions of higher education                                     | men  |
| STI <sub>5</sub>  | Volume of innovative goods, work, services in the rate of total volume of fulfilled work                          | %  |

Source: Authors own study

SOM is that this method does not require any a priori assumptions about the distribution of data. Self-organizing Kohonen maps as a set of analytical procedures and algorithms transform the traditional description of a set of objects in a multidimensional ( $n > 3$ ) space features into a flat database of a two-dimensional map (Pogodaeva et al. 2016). Grouping of the regions using neural computation by means of self-organizing Kohonen maps has been carried out at the analytical platform Deductor Academic 5.3.

### 3 Results and Discussion

The methodology is based on the widely known concept of triple helix by Etzkowitz and Leydesdorff (2000). At the first stage of our research the system of indicators describing the cluster potential of a region was developed. At the second stage we carried out the sampling of statistical indicators and then calculated these indicators for Russian regions. Common database was formed taking into consideration

13 indicators of 80 Russian Federation regions for 2015. The third stage is grouping the regions by the level of their cluster potentials, using the Self-organizing Kohonen maps. As a result, we got four groups of regions with different level of cluster potential.

To calculate integral indexes QLI, PPI, STI it was assumed that the levels of every indicator's importance in their groups of factors are the same. Integral indexes were calculated by formulae (1), (2), and (3):

$$QLI = \alpha \sum_{i=1}^n QLI_i \quad (1)$$

where  $QLI_i$ — $i$ -factor, characterizing the indicator of “Quality of life and infrastructure”,  $i = \overline{1, n}$ ,  $n$ —total number of factors,  $\alpha$ —factor weight, though  $\alpha = 1/n$ ,  $\alpha \in [0, 1]$ .

$$PPI = \beta \sum_{j=1}^m PPI_j \quad (2)$$

where  $PPI_j$ — $j$ -factor, characterizing the indicator of “Productive potential”,  $j = \overline{1, m}$ ,  $m$ —total number of factors,  $\beta$ —factor weight, though  $\beta = 1/m$ ,  $\beta \in [0, 1]$ .

$$STI = \gamma \sum_{k=1}^l STI_k \quad (3)$$

where  $STI_k$ — $k$ -factor, characterizing the indicator of “Scientific and technical and educational potential”,  $k = \overline{1, l}$ ,  $l$ —total number of factors,  $\gamma$ —factor weight, though  $\gamma = 1/l$ ,  $\gamma \in [0, 1]$ .

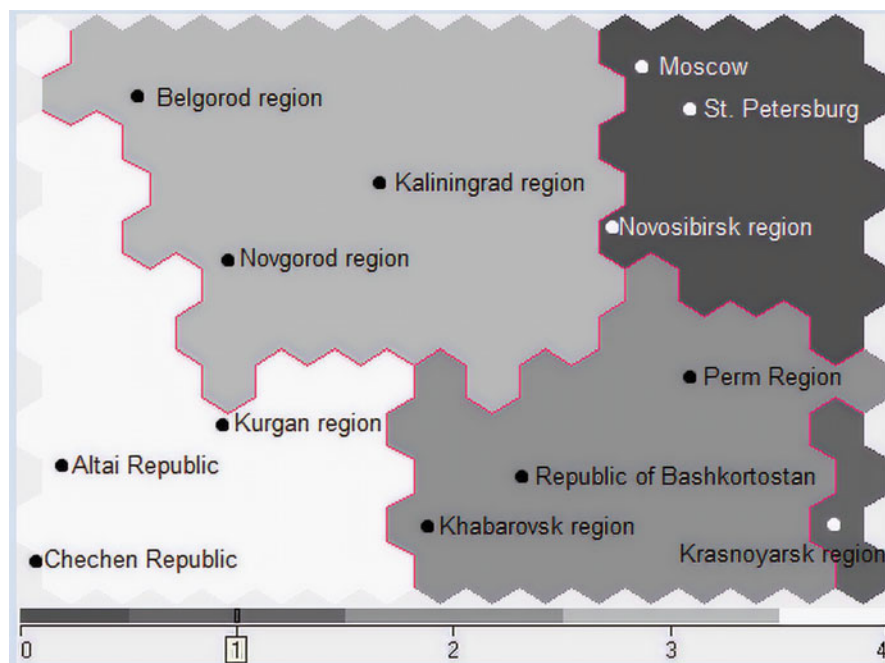
All factors used for calculation of integral indexes of the X, Y, Z were standardized by linear transformation according to formula (4):

$$y(x) = \frac{x - x_{min}}{x_{max} - x_{min}} \quad (4)$$

Grouping of the regions by the level of scientific and technical, productive and infrastructural potentials was carried out according to three integral values on the base of cluster analysis technique in Deductor Academic 5.3. By means of SOM the regions of Russian Federation have been divided into five groups (Fig. 1).

Thereby we have got 5 clusters—5 groups of regions. However, Group 1 consists of two regions only, and by some of their features they are very much similar to the regions in Group 0, therefore, we choose to unite Groups 0 and 1. General quantitative characteristics of groups are presented in Table 3.

The four groups of regions are presented in Fig. 2. Indicators of life quality and infrastructure level are reflected in the QLI-axis, while PPI-axis shows the level of



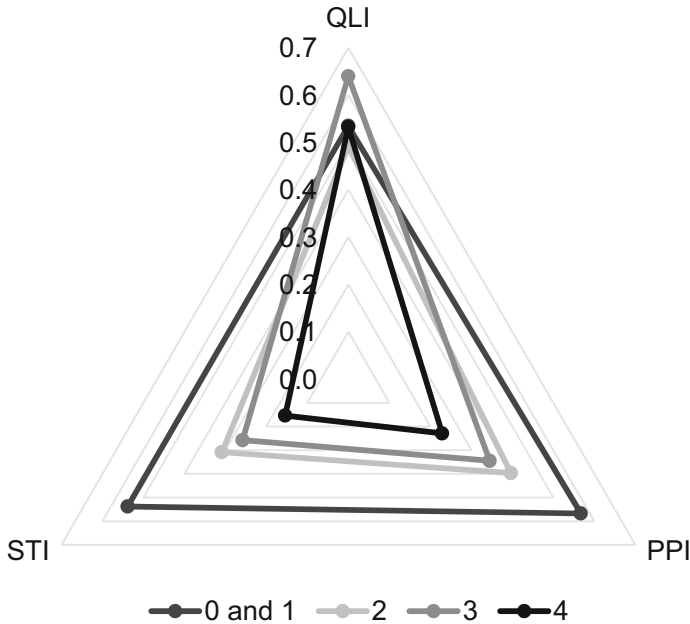
**Fig. 1** Grouping of the Russian regions by the level of the level of their cluster potential. *Source:* Authors own study

**Table 3** General quantitative characteristics of groups

| Number of group | Number of regions in | Level of the cluster potential | Indexes | Mean  | Min   | Max   | Standard deviation |
|-----------------|----------------------|--------------------------------|---------|-------|-------|-------|--------------------|
| 0 and 1         | 12                   | High                           | QLI     | 0.535 | 0.284 | 0.701 | 0.128              |
|                 |                      |                                | PPI     | 0.567 | 0.457 | 0.789 | 0.095              |
|                 |                      |                                | STI     | 0.538 | 0.350 | 0.959 | 0.167              |
| 2               | 21                   | Above the mean                 | QLI     | 0.492 | 0.429 | 0.551 | 0.033              |
|                 |                      |                                | PPI     | 0.397 | 0.328 | 0.492 | 0.049              |
|                 |                      |                                | STI     | 0.308 | 0.186 | 0.496 | 0.090              |
| 3               | 26                   | Below the mean                 | QLI     | 0.640 | 0.585 | 0.734 | 0.034              |
|                 |                      |                                | PPI     | 0.345 | 0.220 | 0.496 | 0.071              |
|                 |                      |                                | STI     | 0.258 | 0.118 | 0.372 | 0.075              |
| 4               | 21                   | Low                            | QLI     | 0.533 | 0.434 | 0.645 | 0.059              |
|                 |                      |                                | PPI     | 0.229 | 0.150 | 0.303 | 0.043              |
|                 |                      |                                | STI     | 0.154 | 0.019 | 0.299 | 0.078              |

*Source:* Authors own study

productive potential and STI-axis—the level of scientific and technical and educational potential. Regions from the first group have highest average values of the cluster potential indexes.



**Fig. 2** General quantitative characteristics of groups. *Source:* Authors own study

According to the data of the Russian Cluster Observatory, 108 clusters of various levels of organizational development are officially registered on the territory of Russia. Cluster may have four statuses:

1. included into the list of pilot innovative territorial cluster (ITC);
2. included into the list of industrial clusters (IC) which is approved by the Ministry of Industry and Trade of Russia;
3. included into the list of clusters getting support from the Center of cluster development (CCD) within the frameworks of Ministry's of Economic Development programme aimed at support of small and medium-sized entrepreneurship;
4. does not belong to any of these lists (Table 4).

From our analysis, clusters are usually supported in the regions which have already high cluster potential. For example, in Group 4 (which has low cluster potential) there is only one cluster, included into the ITC list, and also two clusters, included into the CCD list of innovative-territorial clusters.

**Table 4** Estimation of the localization of clusters

| Number of the group | Total number of regions in the group | Total number of clusters | The share of clusters in the group in the total number of clusters in the country (%) | The number of the regions on the territory of which there are clusters | The share of regions with clusters in the group (%) | The number of clusters/regions of clusters' localization included into the ITC list | The number of clusters/regions of clusters' localization included into the IC list | The number of clusters/regions of clusters' localization included into the CCD list |
|---------------------|--------------------------------------|--------------------------|---|--|---|---|--|---|
| 0 and 1             | 12                                   | 43                       | 39.81   | 11   | 91.67   | 12/8  | 3/3  | 17/4  |
| 2                   | 21                                   | 30                       | 27.78   | 15   | 71.43   | 10/9  | 2/2  | 8/4   |
| 3                   | 26                                   | 30                       | 27.78   | 13   | 50.00   | 4/3   | 2/2  | 14/6  |
| 4                   | 21                                   | 5                        | 4.63  | 3  | 14.29   | 1/1   | 0/0  | 2/2   |

Source: Authors own study

## 4 Conclusion

The obtained results have confirmed the original priorities of government in selection of clusters formed in the territories with highly developed infrastructure. In the last 4 years clusters selected as innovative territorial have already got more than 700 billion rubles (11.6 billion dollars) from different sources including budget. However, the competent decision by authorities about the localization cluster structures implies not only financial support of enterprises on the territories of regions with high cluster potential.

The presented method of regions' typology is aimed at regional strategies' development for the territories with average and low cluster potential. The results of the proposed typology of regions on the basis of the cluster potential allow to determine a tentative strategies for regions further development and new direction of management actions of the authorities. This method is quite universal and can be applied in a different national context, in any country which has a cluster policy as such.

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## References

- Ahmetova, M. I. (2016). Features of formation of cluster-network models of post-industrial economy in the regions of Russia. *Regional Economy and Management: Electronic Scientific Journal*, 4(48), 1–14.
- Arundel, A., & Hollanders, H. (2004). *European innovation scoreboard—EXIS: An exploratory approach to innovation scoreboards*. Brussels: European Commission.
- Audretsch, D., & Dohse, D. (2007). Location: A neglected determinant of firm growth. *Review of World Economics*, 143(1), 79–107.
- Barkley, D., & Henry, M. (2002). *Targeting industry clusters for regional development: An overview of the redrl approach*. Research report 05–2002-03 by Regional Economic Development Research Laboratory Clemson University Clemson, South Carolina.
- Cervantes, R., & Dubrovskaya, J. (2016). Differences of regional development in Russia and Mexico: Is cluster policy reducing the gap? *International Journal of Environmental and Science Education*, 11(18), 12875–12890.
- Chen, D., & Dahlman, C. (2005). *The knowledge economy, the KAM methodology and World Bank operations* [pdf]. Washington, DC: The World Bank. Accessed April 10, 2017, from [http://siteresources.worldbank.org/KFDLP/Resources/KAM\\_Paper\\_WP.pdf](http://siteresources.worldbank.org/KFDLP/Resources/KAM_Paper_WP.pdf)
- Delgado, M., Porter, M., & Stern, S. (2012, July). *Clusters, convergence, and economic performance* (NBER Working Papers No. 18250).
- Eferina, T. V., Lizunova, V. O., Prosyanyuk, D. V., & Shinova, D. A. (2017). Innovative infrastructure as a factor of interregional differentiation in the Russian Federation. *Issues of State and Municipal Management*, 1, 191–212.
- Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From national systems and "mode 2" to a triple Helix of university-industry-government relations. *Research Policy*, 29(2–3), 109–123.

- European Commission. (2006, July). *Innobarometer on cluster's role in facilitating innovation in Europe*. Analytical Report [pdf]. Accessed March 18, 2017, from [http://cordis.europa.eu/pub/innovation/docs/innobarometer\\_2006.pdf](http://cordis.europa.eu/pub/innovation/docs/innobarometer_2006.pdf)
- European Commission. (2017a). *European innovation scoreboard* [online]. Accessed April 10, 2017, from [http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards\\_en](http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en)
- European Commission. (2017b). *Smart specialisation platform* [online]. Accessed April 10, 2017, from <http://s3platform.jrc.ec.europa.eu/>
- European Commission. (2017c). *The EU industrial R&D investment scoreboard* [online]. Accessed April 10, 2017, from <http://iri.jrc.ec.europa.eu/scoreboard.html>
- Ketels, Ch. (2004). *European clusters. Structural change in Europe. Innovative city and business regions* [pdf]. Hagbarth. Accessed March 20, 2017, from [http://abclusters.org/wp-content/uploads/2013/12/Ketels\\_European\\_Clusters\\_2004.pdf](http://abclusters.org/wp-content/uploads/2013/12/Ketels_European_Clusters_2004.pdf).
- Ketels, Ch. (2009). *Clusters, cluster policy, and Swedish competitiveness in the Global Economy*. Expert report number 30 to Sweden's Globalisation Council, Stockholm.
- Kevesh, A. L. (2016). *Regions of Russia. Socio-economic indicator*. Moscow: Rosstat.
- Lutsenko, E. V., & Korzhakov, V. E. (2011). Some problems of classical cluster analysis. *Bulletin of the Adyghe State University. Series 4: Natural-Mathematical and Technical Sciences*, 2, 91–102.
- Moreno, R., Paci, R., & Usai, S. (2012). Geographical and sectoral clusters of innovation in Europe. *The Annals of Regional Science*, 39, 715–739.
- OECD. (2017). *About the OECD* [online]. Accessed April 10, 2017, from <http://www.oecd.org/about/>
- Pogodaeva, T., Zhaparova, D., & Rudenko, D. (2016). Modeling of the natural resources' intensive use regions' innovative development: Problems of circumpolar area innovative system formation. In *Financial Environment and Business Development: Proceedings of the 16th Eurasia Business and Economics Society Conference* (633 p).
- Porter, M. (2000). Location, competition, and economic development: Local clusters in a global economy. *Economic Development Quarterly*, 14(1), 15–34.
- Science-Metrix. (2017). *Who we are* [online]. Accessed April 10, 2017, from <http://www.science-metrix.com>
- The Innovation Policy Platform. (2017). *Measurement for policy* [online]. Accessed April 10, 2017, from <https://www.innovationpolicyplatform.org/content/measurement-policy>
- Todtling, F., & Trippl, M. (2005). One size fits all? Towards a differentiated regional innovation policy approach. *Research Policy*, 34, 1203–1219.
- Varga, S., Vujisic, D., & Zrakovic, M. (2013). State aid for innovation clusters in the republic of Serbia. *The International Journal of Public Sector Management*, 2(26), 102–110.
- Wennberg, K., & Lindqvist, G. (2008, June). The effect of clusters on the survival and performance of new firms. *Small Business Economics*.
- Woodward, D. P. (2012). Industry location, economic development incentives, and clusters. *The Review of Regional Studies*, 42, 5–23.
- Zubarevich, N. V. (2014). Regional development and regional policy in Russia. *ECO Journal*, 4, 7–27.

# Official Development Assistance (ODA) of Japan in the Twenty-First Century: Implications for Connectivity of ASEAN Region



Sebastian Bobowski

**Abstract** ASEAN region, embracing ten member states, namely, Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam, has become an economic community in the end of 2015, aimed at establishment of single market and production base. Rapidly growing economies inhabited by nearly 600 million of people with rising middle class have become an attractive destination for international business, however, intra-regional connectivity continues to be a challenge and the bottleneck of the region. The main objective of the paper is to indicate the role of the Official Development Assistance (ODA) of Japan in years 2001–2016 in terms of improving physical connectivity within ASEAN for the purposes of deepening integration, increasing stability and prosperity of the region, with special regard to projects financed by the Japan International Cooperation Agency (JICA).

**Keywords** Official Development Assistance · Japan · ASEAN · Connectivity

## 1 Introduction

Official Development Assistance, according to Development Assistance Committee (DAC) of the Organization for Economic Co-operation and Development (OECD), must fill requirements as follows (OECD 2017):

- it has to be undertaken by the government or government agencies;
- it has concessional terms, includes a grant to at least 25% of total contribution;
- the main objective is the promotion of economic development and welfare of developing countries.

Japan's Official Development Assistance (ODA) program was established in 1954 as a technical cooperation after the country's accession to the Colombo Plan.

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Since 1978, Japan has significantly increased the value of its loans and grants—bilateral net flows increased from less than USD 900 million to USD 1.53 billion compared to the previous year, with a growing number of development aid recipients. In 1989, Japan overtook the United States for the next 12 years as the largest donor country in the world (Kawai and Takagi 2004).

Working for the development of human resources of developing countries, the Japan International Cooperation Agency (JICA), established in 1974, has sent more than 126 thousand international visitors, experts and advisors to the other countries, whereas training nearly 516 thousand people in Japan—1 of them was José Ramos-Horta, future president of East Timor, winner of the Nobel Peace Prize.

ODA is provided both in the form of bilateral or multilateral assistance, depending whether support is addressed directly to developing countries or through international organizations. JICA provides bilateral assistance in the form of Japanese ODA Loans, Grant Aid and Technical Cooperation.

Over the past six decades, the ODA program has focused on three priority areas (MOFA 2017):

- supporting self-help, involving education and development of human resources needed for the long-term economic growth of developing countries;
- ensuring humanitarian safety by protecting communism in various parts of the world from threats such as hunger, infectious diseases, natural disasters and armed conflicts;
- promoting sustainable economic growth, by expanding and modernizing transport and community infrastructure, improving physical communication, stimulating private investment, consumption, employment and growth. The latter priority area proved to be significantly important in regards of supporting regional integration of ASEAN member states.

The Association of Southeast Asian Nations (ASEAN) involving, to date, Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam, used to be recognized as one of the most successful integration projects in the developing world for decades, mainly due to highly ambitious agenda of cooperation among member states.

Advancing agenda through the years toward economic development, social progress and security, accompanied by post Cold War accession of the four communist Southeast Asian states, namely, Cambodia, Lao PDR, Myanmar and Vietnam (CLMV), of which three were recognized as least developed countries (LDCs) by the United Nations, raised the concerns whether real convergence, perceived as *sine qua non* to build and strengthen internal cohesion and unity of ASEAN, is feasible. Thus, the issue of connectivity, with special regard to provision of physical infrastructure connections among CLMV and more advanced member states, has become a trigger of ASEAN Economic Community (AEC) establishment in the late 2015. As stated in the Declaration of ASEAN Concord II (Bali Concord II) agreed in Bali, Indonesia, on 7 October 2003, future ASEAN Community, consisting of ASEAN Economic Community (AEC), Socio-Cultural Community (ASCC) and Political-Security Community (APSC), will act in the common interest and prerogatives of peace,

stability and prosperity of the region (Bobowski 2017). However, both financial and technical assistance of Dialogue Partners, including Japan, was expected to face development gap inside ASEAN.

The main objective of the paper is to indicate the role of the Official Development Assistance (ODA) of Japan in years 2001–2016 in terms of improving physical connectivity within ASEAN for the purposes of deepening integration, increasing stability and prosperity of the region, with special regard to projects financed by the Japan International Cooperation Agency (JICA).

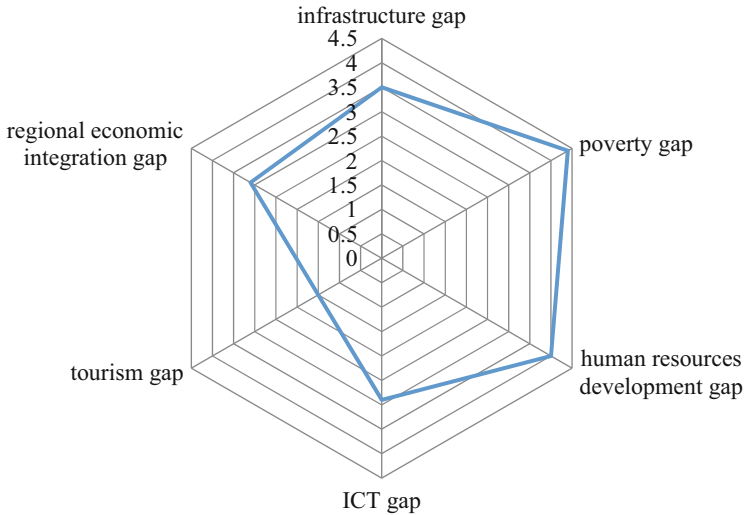
## 2 ASEAN Connectivity and Connectivity Plus: Implications for the Japan-ASEAN Partnership

The context of intra-ASEAN connectivity was effectively addressed under Initiative for ASEAN Integration (IAI), launched in November 2000 at the Informal ASEAN Summit. Its aim was to reduce the distance and divisions among the member states by sharing resources, expertise and experiences between leading members (ASEAN-6) and followers, namely, CLMV.

IAI, under two comprehensive work plans for years 2002–2008 (IAI Work Plan I) and 2009–2015 (IAI Work Plan II), focused its intervention on support of CLMV's governments to build capacities and address regional commitments in regards of connectivity and convergence within the future three-pillar ASEAN Community. IAI Work Plan II, embracing 182 action lines, addressed AEC (94 lines), ASCC (78), and APSC (6), whereas 78 were related to policy development and implementation, 85—capacity building and training. Among others, CLMV's high officials were provided with translation of a primer on rules of origin for the purposes of improving negotiation skills and expertise (Bobowski 2017).

The scale of development gap between ASEAN-6 and CLMV may be indicated using a set of variables in six policy areas, namely, poverty, human resource development, infrastructure, tourism, ICT, trade and investment (see: Fig. 1). Noteworthy, variables were normalized and indexed into a scale between 0 (no gap) to 10 (widest gap) base points. For each variable the ASEAN development gap was defined by the difference between the average indices of ASEAN-6 and CLMV. As shown in the *ASEAN Integration Report 2015*, development gaps between ASEAN-6 and CLMV still exist, with special regard to poverty-related indicators (4.4), as well as human resources development (4.0) and infrastructure gap (3.5).

Japan's policy towards ASEAN in the twenty-first century is characterized by striving to constrain a new regional sustaining order, and possibly increase its influence in East Asia in the light of the observed changes in the power system in the region. The purpose of Japan is to promote and support regional initiatives to stabilize regional order and prosperity in the region. Critical in the context of the Japan-ASEAN partnership are collective actions toward improvement of the ASEAN connectivity and connectivity plus, as well as the successful conclusion



**Fig. 1** Development gaps between ASEAN-6 and CLMV. Source: ASEAN (2015, p. 85)

of the Regional Comprehensive Economic Partnership (RCEP) trade negotiations. Balancing China's influence in the region will be conducive to the dynamic development of the CLMV countries, and consequently, the reduction of the development gap to the more developed Member States of ASEAN, accompanied by active US diplomacy.

The global financial crisis of the first decade of the twenty-first century has inspired studies by the Economic Research Institute for ASEAN and East Asia (ERIA), established during the third term of the former Japan's Prime Minister Junichiro Koizumi, on the opportunities for deepening economic integration in East Asia. During the 5th East Asia Summit in October 2010, the "Comprehensive Asia Development Plan" (CADP) was submitted, whereas at the 16th ASEAN Summit, the leaders of the Member States adopted the "Master Plan for ASEAN Connectivity" (MPAC), which was the direct effect of discussions on the concept of ASEAN connectivity established by the ERIA during the 15th ASEAN Summit in Cha-am Hua Hin, Thailand in October 2009. The ASEAN connectivity concept has also focused on intra-regional connectivity within the ASEAN countries, particularly within the four LDCs, namely Cambodia, Laos, Myanmar and Vietnam. The MPAC pointed to the three dimensions of ASEAN connectivity, namely, physical, institutional and interpersonal connectivity (Shiraishi and Kojima 2014). Projects initiated within MPAC were derived from experiences and plans covered by CADP.

Japan, for its part, promoted the concept of ASEAN connectivity. During the 13th ASEAN Summit in Japan on October 29, 2010, the then Prime Minister of Japan, Naoto Kan, announced the "Initial Plan for Cooperation on ASEAN Connectivity", on the occasion of the next Summit in November 2011, another Japanese Prime Minister on behalf of the Democratic Party of Japan (DPJ), Yoshihiko Noda, has

announced the “List of flagship projects for enhancing ASEAN connectivity”, while declaring increase in support for the “Formation of the Vital Artery for East-West and Southern Economic Corridor” and “Maritime Economic Corridor” (Sudo 2015).

In November 2011, the “Sixth East Asia Summit (EAS) Declaration on ASEAN Connectivity” was adopted, in which the leaders of the 18 states (ASEAN Plus China, Japan, Republic of Korea, Australia, India, New Zealand, Russia and the United States) made a commitment to strengthen ASEAN connectivity, opening the discussion on an expanded regional connectivity concept beyond the ASEAN framework.

On the occasion of the 10th EAS meeting organized in Kuala Lumpur, Malaysia, in November 2015, ERIA experts presented the “Comprehensive Asia Development Plan 2.0” (CADP 2.0), which extended the concept of original CADP with a new development strategy, emphasizing selection of projects in hard and soft infrastructure for connectivity and innovation. CADP 2.0 has highlighted the qualitative aspects of infrastructure, pointing at 120 out of 761 infrastructure projects submitted in accordance to rank, sector and target criteria, i.e., connectivity or innovation. The document also outlined the prospect of soft and hard infrastructure development by 2030, using the geographic simulation model IDE/ERIA-GSM (ERIA 2015).

As already stated, promoting connectivity within South East Asian region was critical in the context of the 2015 ASEAN Economic Community project, under which active engagement of the ASEAN’s Dialogue Partners, including Japan, was expected. For its part, Japan responded to the needs of ASEAN countries in an attempt to strengthen its political position in East Asia.

### **3 Official Development Assistance (ODA) of Japan for ASEAN Countries in the Twenty-First Century**

Japan’s Official Development Assistance (ODA) program evolved through the years, the turn of twentieth and twenty-first century was the period of revisions aimed at adjustment to rapidly changing international environment after the end of the Cold War, including emergence of multi-polar world and technological revolution (Solis and Urata 2007). An important step toward modernization of ODA was adoption of ODA Charter in 1992 to outline the agenda of the program for the twenty-first century. In the following years two revisions of ODA Charter were made, in 2003 and 2014.

The latter, announced on the occasion of the 60th anniversary of the program, embraced three main directions of change, addressed by the head of Japanese diplomacy Kishida in his speech of March 28, 2014 entitled “An Evolving ODA: For the World’s Future and Japan’s Future” (Kishida 2014):

- promoting inclusiveness, sustainable development and flexibility in global debates on social inequalities, women’s rights, health and climate change;

- peace, stability and security as foundations of development (engagement in peacekeeping missions, democratization, security structures reform, in cooperation with NGOs and international organizations);
- strengthening partnerships with a variety of actors, i.e. the business community, non-governmental organizations, local governments, international and regional organizations, to achieve synergies.

Ishikane, already mentioned Director General of the International Cooperation Office of MOFA, spoke in this context about the need for development cooperation in the ODA format of both public and private actors at local, national and transnational level to address the economic and political challenges of the twenty-first century (Kawasaki 2014).

In view of the available data for the 1960–2014 period, the cumulative net flows of Japan's Official Development Assistance for nearly 190 countries and territories exceeded USD 241.94 billion, of which only in 2001–2014—USD 98.23 billion. Between 2001 and 2014, the net payers were not only the two largest ASEAN economies, Indonesia and Thailand, but also the Republic of Korea (negative cumulative net flows for 2001–2004 of USD 623.74 million). The Republic of Korea's participation in the Japan's ODA program covers the years 1962–2004, cumulative net flows have reached USD 495.93 million, the negative annual balance occurred between 1983–1986, 1993–1994 and 1996–2004. China maintained a cumulative balance of USD 2.63 billion (a drop in net flows from 2006 to 2014 from a positive balance USD 1.06 billion to a negative USD 885.67 million). China has been participating in Japan's ODA program since 1979, cumulative net flow at the end of 2014 has reached USD 17.9 billion, a negative annual balance has been recorded since 2010. A significant recipient of ODA in the period 1960–2014 was India, which recorded a cumulative net development assistance of USD 14.15 billion, remaining net beneficiary throughout this period (World Bank 2017).

The net flows of Official Development Assistance from Japan to the ASEAN countries reached USD 14.58 billion between 2001 and 2014, with the positive balance for the four least-developed ASEAN Member States, CLMV, exceeding USD 18 billion. Vietnam (USD 11.87 billion), followed by Myanmar (USD 3.3 billion), Cambodia (USD 1.72 billion), and Laos (USD 1.12 billion) were the largest net recipients. ASEAN countries with the highest income per capita, i.e. Brunei Darussalam and Singapore, participated in the 2001–2004 ODA flows, receiving USD 980,000 and USD 9.04 million, respectively, whereas the two largest nominal economies of ASEAN, i.e. Indonesia and Thailand, were the net payers in years 2001–2014, with a negative balance of USD 1.11 billion and USD 3.36 billion, respectively. The positive net balance of the Philippines and Malaysia has also gradually declined, with the value of loan repayments gradually increasing over the value of ODA payments at the end of the first decade of the twenty-first century.

### **3.1 Review of ODA Projects in ASEAN, Funded by JICA, 2001–2016**

The following part of the paper is the review of projects implemented in the ASEAN countries under ODA by the JICA loan fund (see: Tables 1, 2, 3, 4, 5, 6, 7, 8). Loans offered to ASEAN countries under ODA have three characteristics, namely, preferential interest of 0.01–1% (rarely, 1.1–2.2%), maturity period of 30–40 years (rarely 20–25 years) and a 10-year grace period.

Between 2001 and 2016, eight ASEAN countries—with the exception of Singapore and Brunei Darussalam—have been provided with 313 low-interest loans under Official Development Assistance from JICA amounted to JPY 5.01 trillion. The majority, namely, 37.84% of the total amount, i.e. JPY 1.89 trillion, was received in the form of 124 loans by Vietnam, followed by Indonesia (26.45%, i.e. JPY 1.33 trillion in 86 loans) and the Philippines (17.08%, i.e. JPY 855.88 billion in 48 loans). The remaining five JICA beneficiary countries, i.e. Cambodia, Lao PDR, Malaysia, Myanmar and Thailand, received 55 loans amounted to JPY 933.88 billion. To a large extent, due to Vietnam, four less developed ASEAN member countries (CLMV) have received a total of 48.08% of allocation, then, nearly JPY 2.41 trillion under 164 loans. The 109 loans redistributed among eight ASEAN states addressed transport sector, namely, roads (49), railways (26), bridges (20), airports and maritime ports (19). Another 55 loans were allocated from JICA funds for projects in the social services and energy sectors—in case of the former, mainly for water supply and sewerage projects (26), infrastructure in urban and rural areas (10), education (8), in case of the latter—power plants (34), transmission lines and distribution networks (14). Furthermore, 40 projects were dedicated to commodity loans, 28—irrigation and flood protection. In the Philippines, Indonesia and Vietnam, individual projects in the fields of agriculture, fisheries, forestry or multi-sectoral environmental protection were also implemented.

Vietnam, the largest beneficiary of ODA among ASEAN countries in the analyzed period, has raised JICA funds for 53 projects in the transport sector, including 21 for roads, 16—bridges and 9—railways. The most important projects include the expansion of the urban rail network in the metropolitan area of Ho Chi Minh City within the districts of Ben Thanh and Suoi Tien (the three stages of the project were financed by loans of JPY 155.37 billion in 2007, 2012 and 2016) and bridge construction Nhat Tan Bridge, known as the “Bridge of Friendship between Vietnam and Japan”, funded with loans totaling JPY 54.17 billion in 2006, 2011 and 2013. Another 24 loans were granted to projects in the social services sector in Vietnam, in particular, water supply and sewage (16), i.e. improvement of water quality in metropolitan Ho Chi Minh City (five loans in 2003, 2006, 2008, 2010 and 2016 for the amount of JPY 55.82 billion). In the context of social services, it is also worth recalling the project of Cho Ray Hospital expansion in Ho Chi Minh City, called the “Vietnam-Japan Friendship Hospital”, to which JICA has granted a loan of JPY 28.61 billion in 2015. The third largest pool of projects was implemented by JICA in the energy sector (21), with 17 projects involving the construction/modernization of

**Table 1** Projects qualified for funding in Cambodia under ODA by JICA loan fund in 2001–2016

| Project title (date of approval)  | Sector  | Budget (billion JPY) | Project title (date of approval)  | Sector  | Budget (billion JPY) |
|---|---|----------------------|---|---|----------------------|
| Sihanoukville Port Urgent Expansion Project (2004)  | Transport (ports)   | 4.32                 | Greater Mekong Telecommunication Backbone Network Project (Cambodia Growth Corridor) (2005)                 | Telecommunication   | 3.03                 |
| Sihanoukville Port SEZ Development Project (E/S) (2006)                                     | Mining and Production   | 0.32                 | Greater Mekong Power Network Development Project (Cambodia Growth Corridor) (2007)                          | Electricity and gas (transmission lines and distribution systems) | 2.63                 |
| Poverty Reduction and Growth Operation (2007)   | Commodity loans   | 1.00                 | Sihanoukville Port Special Economic Zone Development Project (2008)   | Mining and Production (Mining)                                    | 3.65                 |
| Niroth Water Supply Project (2009)  | Social services (water supply, sewage)                            | 3.51                 | Sihanoukville Port Multipurpose Terminal Development Project (2009)   | Social services (ports)   | 7.18                 |
| West Tonle Sap Irrigation and Drainage Rehabilitation and Improvement Project (2011)        | Irrigation and flood protection                                   | 4.27                 | Siem Reap Water Supply Expansion Project (2012)   | Social services (water supply, sewage)                            | 7.16                 |
| National Road No. 5 Improvement Project (Battambang-Sri Sophorn Section) (2013)             | Transportation (roads)  | 8.85                 | Southwest Phnom Penh Irrigation and Drainage Rehabilitation and Improvement Project (2014)                  | Irrigation and flood protection                                   | 5.61                 |
| Phnom Penh City Transmission and Distribution System Expansion Project (2014)               | Electricity and gas (transmission lines and distribution systems) | 6.48                 | National Road No. 5 Improvement Project (Prek Kdam-Thlea Ma'am Section) (I) (2014)                          | Transportation (roads)  | 1.70                 |
| Phnom Penh City Transmission and Distribution System Expansion Project (Phase 2) (I) (2015) | Electricity and gas (transmission lines and distribution systems) | 3.82                 | National Road No. 5 Improvement Project (Thlea Ma'am-Battambang and Sri Sophorn-Poipet Sections) (I) (2015) | Transportation (roads)  | 19.21                |
| National Road No. 5 Improvement Project (Prek Kdam—Thlea Ma'am Section) (II) (2016)         | Transportation (roads)  | 17.30                |   |   |                      |

Source: Own elaboration based on JICA (2017)

**Table 2** Projects qualified for funding in Indonesia under ODA by JICA loan fund in 2001–2016

| Project title (date of approval)  | Sector  | Budget (billion JPY) | Project title (date of approval)  | Sector                             | Budget (billion JPY) |
|---|---|----------------------|---|------------------------------------|----------------------|
| Rural Areas Infrastructure Development Project (III) (2001)                               | Social services (urban/rural public infrastructure) | 20.04                | Project Type Sector Loan For Water Resources Development II (2001)                            | Irrigation and flood protection    | 18.68                |
| Batang Hari Irrigation Project (Phase II) (2001)  | Irrigation and flood protection                     | 7.64                 | Railway Electrification and Double-double Tracking of Java Main Line Project (I) (2001)       | Transport (railways)               | 41.03                |
| Maritime Education and Training Improvement Project (2001)                                | Transport (maritime transport)                      | 7.67                 | Water Resources Existing Facilities Rehabilitation and Capacity Improvement Project (2002)    | Irrigation and flood protection    | 14.69                |
| Decentralized Irrigation System Improvement Project in Eastern Region of Indonesia (2002) | Irrigation and flood protection                     | 27.04                | South Sumatra-West Java Gas Pipeline Project (2003)   | Electricity and gas (gas)          | 49.09                |
| Muara Tawar Gas Fired Power Plant Extension Project (2003)                                | Electricity and gas (power plants)                  | 18.18                | Muara Karang Gas Power Plant Project (2003)   | Electricity and gas (power plants) | 55.75                |
| The Urgent Rehabilitation Project of Tanjung Priok Port (2004)                            | Transport (ports)                                   | 12.05                | Tanjung Priok Gas Fired Power Station Extension Project (2004)                                | Electricity and gas (power plants) | 58.68                |
| Surabaya Airport Construction Project (II) (2004)   | Transportation (airports)                           | 15.00                | Semarang Power Plant Rehabilitation and Gasification Project (2004)                           | Electricity and gas (power plants) | 8.69                 |
| Rehabilitation and Improvement Project of Jakarta Fishing Port (2004)                     | Agriculture, forestry and fisheries                 | 3.44                 | Railway Double Tracking on Java South Line (II) (2004)  | Transport (railways)               | 10.35                |
| Maritime Telecommunication System Development Project (IV) (2004)                         | Transport (maritime transport)                      | 5.57                 | Lahendong Geothermal Power Plant Project (2004)   | Electricity and gas (power plants) | 5.87                 |
| Development Policy Loan (2005)  | Commodity loans                                     | 10.79                | Urgent Disaster Reduction Project for Mt. Merapi/Progo River Basin and Mt. Bawakaraeng (2005) | Irrigation and flood protection    | 16.44                |

(continued)



Table 2 (continued)

| Project title (date of approval)  | Sector  | Budget (billion JPY) | Project title (date of approval)  | Sector  | Budget (billion JPY) |
|---|---|----------------------|---|---|----------------------|
| Ulubelu Geothermal Power Plant Project (2005)   | Electricity and gas (power plants)                    | 20.29                | Tanjung Priok Access Road Construction Project (I) (2005)   | Transportation (roads)  | 26.31                |
| North Java Corridor Flyover Project (2005)  | Transportation (roads)                                | 4.29                 | Lower Solo River Improvement Project (II)   | Irrigation and flood protection                                   | 9.35                 |
| Komerang Irrigation Project (II-2) (2005)   | Irrigation and flood protection                       | 13.79                | Keramasan Power Plant Extension Project (2005)  | Electricity and gas (power plants)                                | 9.74                 |
| Engineering Services for Asahan No. 3 Hydroelectric Power Plant Construction Project (2005) | Electricity and gas (power plants)                    | 0.86                 | Development of Faculty of Medicine and Health Sciences of Syarif Hidayatullah State Islamic University (2005) | Social services (education)                                       | 2.98                 |
| Development Policy Loan (II) (2006)   | Commodity loans                                       | 11.73                | Tanjung Priok Access Road Construction Project (II) (2006)  | Transportation (roads)  | 26.62                |
| Professional Human Resource Development Project (III) (2006)                                | Social services (improving administrative management) | 9.72                 | Integrated Water Resources and Flood Management Project for Semarang (2006)                                   | Irrigation and flood protection                                   | 16.30                |
| Engineering Services for Kamojang Geothermal Power Plant Extension Project (2006)           | Electricity and gas (power plants)                    | 0.99                 | Asahan No. 3 Hydroelectric Power Plant Construction Project (2006)  | Electricity and gas (power plants)                                | 27.64                |
| Engineering Services For The Jakarta Mrt System Project (2006)                              | Transport (railways)                                  | 1.87                 | Infrastructure Reform Sector Development Program (2007)   | Commodity loans   | 11.78                |
| Development Policy Loan (III) (2007)  | Commodity loans                                       | 11.78                | North-West Sumatra Inter-connector Transmission Line Construction Project (2007)                              | Electricity and gas (transmission lines and distribution systems) | 16.12                |
| Regional Infrastructure for Social and Economic Development Project (2007)                  | Social services (urban/rural public infrastructure)   | 23.52                | Railway Double Tracking on Java South Line Project (III) (Engineering Service) (2007)                         | Transport (railways)  | 0.98                 |

|  |                                    |       |  |   |       |
|--|------------------------------------|-------|--|---|-------|
| Peusangan Hydroelectric Power Plant Construction Project (2007)                                | Electricity and gas (power plants) | 26.02 | National Geo-Spatial Data Infrastructure Development Project (2007)                  | Social services (improving administrative management)             | 6.37  |
| ICT Utilization Project for Educational Quality Enhancement in Yogyakarta Province (2007)      | Social services (education)        | 2.91  | Hasanuddin University Engineering Faculty Development Project (2007)                 | Social services (education)                                       | 7.80  |
| Aceh Reconstruction Project (2007)   | Other                              | 11.59 | PLN Operation Improvement System Project for Supporting Generation Facilities (2007) | Electricity and gas (other)                                       | 4.50  |
| Disaster Recovery and Management Sector Program Loan (2007)                                    | Commodity loans                    | 23.18 | Development Policy Loan (IV) (2008)  | Commodity loans   | 22.08 |
| Railway Double Tracking on Java South Line Project (III) (2008)                                | Transport (railways)               | 18.82 | Participatory Irrigation Rehabilitation and Improvement Management Project (2008)    | Irrigation and flood protection                                   | 12.31 |
| Development of World Class University at University of Indonesia (2008)                        | Social services (education)        | 14.64 | Denpasar Sewerage Development Project (II) (2008)                                    | Social services (water supply, sewage)                            | 6.00  |
| Decentralized Irrigation System Improvement Project in Eastern Region of Indonesia (II) (2008) | Irrigation and flood protection    | 8.97  | Climate Change Program Loan (2008)   | Commodity loans   | 30.77 |
| Infrastructure Reform Sector Development Program (II) (2009)                                   | Commodity loans                    | 9.29  | Development Policy Loan (V) (2009)   | Commodity loans   | 9.29  |
| Urban Flood Control System Improvement in Selected Cities (2009)                               | Irrigation and flood protection    | 7.49  | Engineering Services for Java—Sumatra Interconnection Transmission Line Project      | Electricity and gas (transmission lines and distribution systems) | 3.89  |
| Development of Bandung Institute of Technology (III) (2009)                                    | Social services (education)        | 5.66  | Countermeasure for Sediment in Wonogiri Multipurpose Dam Reservoir (I) (2009)        | Electricity and gas (multi-purpose dam)                           | 6.06  |
| Construction of Jakarta Mass Rapid Transit System Project (I) (2009)                           | Transport (railways)               | 48.15 | Climate Change Program Loan (2) (Economic Stimulus and Budget Support Loan) (2009)   | Commodity loans   | 37.44 |

(continued)

Table 2 (continued)

| Project title (date of approval)   | Sector  | Budget (billion JPY) | Project title (date of approval)   | Sector                                  | Budget (billion JPY) |
|--|---|----------------------|--|---|----------------------|
| Development Policy Loan (6) (2010)   | Commodity loans   | 9.00                 | Regional Solid Waste Management for Maminasata (2010)  | Social services (water supply, sewage)  | 3.54                 |
| Java-Sumatra Interconnection Transmission Line Project (1) (2010)                                | Electricity and gas (transmission lines and distribution systems) | 36.99                | Climate Change Program Loan (3) (2010)   | Commodity loans                         | 27.20                |
| Development Policy Loan (7) (2010)   | Commodity loans   | 8.39                 | Infrastructure Reform Sector Development Program (3) (2011)  | Commodity loans                         | 8.29                 |
| Lumut Balai Geothermal Power Plant Project (2011)  | Electricity and gas (power plants)                                | 26.97                | Development Policy Loan (VIII) (2013)  | Commodity loans                         | 15.49                |
| Upper Citarum Basin Flood Management Sector Loan (2013)  | Social services (other)   | 3.31                 | Indramayu Coal Fired Power Plant Project (E/S) (2013)  | Electricity and gas (power plants)      | 1.73                 |
| Geothermal Development Acceleration Program (Tulehu Geothermal Power Plant Project (E/S)) (2013) | Electricity and gas (power plants)                                | 5.10                 | Urgent Disaster Reduction Project for Mount Merapi and Lower Progo River Area II (2014)  | Irrigation and flood protection         | 5.11                 |
| Rural Settlement Infrastructure and Kabupaten Strategic Area Development ((RISE) II) (2014)      | Social services (urban/rural public infrastructure)               | 10.03                | Railway Double Tracking on Java South Line Project (IV) (Kroya-Kutoarjo Phase II) (2014)   | Transport (railways)                    | 16.88                |
| Professional Human Resource Development (IV) (2014)  | Social services (improving administrative management)             | 7.08                 | Metropolitan Sanitation Management Investment Program: Engineering Service for Sewerage System Development in DKI Jakarta (2014) | Social services (water supply, sewage)  | 1.97                 |
| JABODETABEK Railway Capacity Enhancement Project (I) (2014)                                      | Transport (railways)  | 16.32                | Countermeasure for Sediment in Wonogiri Multipurpose Dam Reservoir (II) (2014)   | Electricity and gas (multi-purpose dam) | 4.95                 |
| Construction of Jakarta Mass Rapid Transit Project (II) (2015)                                   | Transport (railways)  | 75.22                | Engineering Services for Jakarta Mass Rapid Transit East-West Line Project (Phase D) (2015)                                      | Transport (railways)                    | 1.92                 |

Source: Own elaboration based on JICA (2017)

**Table 3** Projects qualified for funding in Lao PDR under ODA by JICA loan fund in 2001–2016

| Project title (date of approval)                                  | Sector                             | Budget (billion JPY) | Project title (date of approval)                                  | Sector  | Budget (billion JPY) |
|---|------------------------------------|----------------------|---|---|----------------------|
| Second Mekong International Bridge Construction Project (2001)    | Transport (bridges)                | 4.01                 | Greater Mekong Power Network Development Project (Lao PDR) (2005) | Electricity and gas (transmission lines and distribution systems) | 3.33                 |
| Second Poverty Reduction Support Operation (2007)                 | Commodity loans                    | 0.50                 | Third Poverty Reduction Support Operation (2008)                  | Commodity loans   | 0.50                 |
| Budget Strengthening Support Loan (2009)                          | Commodity loans                    | 1.50                 | Southern Region Power System Development Project (2012)           | Electricity and gas (transmission lines and distribution systems) | 4.17                 |
| Nam Ngum 1 Hydropower Station Extension Project (2013)            | Electricity and gas (power plants) | 5.55                 | Ninth Poverty Reduction Support Operation (2014)                  | Commodity loans   | 0.50                 |
| Vientiane International Airport Terminal Expansion Project (2014) | Transportation (airports)          | 9.02                 | Vientiane Capital Water Supply Expansion Project (2016)           | Social services (water supply, sewage)                            | 10.27                |

Source: Own elaboration based on JICA (2017)

**Table 4** Projects qualified for funding in Malaysia under ODA by JICA loan fund in 2001–2016

| Project title (date of approval)  | Sector                                 | Budget (billion JPY) | Project title (date of approval)                | Sector                      | Budget (billion JPY) |
|---|--|----------------------|---|-----------------------------|----------------------|
| Pahang-Selangor Raw Water Transfer Project (2005)                                   | Social services (water supply, sewage) | 82.04                | Higher Education Loan Fund Project (III) (2006) | Social services (education) | 7.64                 |
| Development Project for Malaysia-Japan International Institute of Technology (2011) | Social services (education)            | 6.70                 |   |                             |                      |

Source: Own elaboration based on JICA (2017)

the power plants, i.e. the power plant in Thai Binh province, financed by loan of JPY 54.98 billion approved in 2016. Vietnam has also received 15 commodity loans to finance subsequent loan programs to reduce poverty, adapt to climate change, and to improve competitiveness and economic governance. Two projects in the irrigation and flood protection sector concerned the area between Phan Thiet and Phan Ri

**Table 5** Projects qualified for funding in Myanmar under ODA by JICA loan fund in 2001–2016

| Project title<br>(date of approval)  | Sector  | Budget<br>(billion JPY) | Project title<br>(date of approval)                                    | Sector  | Budget<br>(billion JPY) |
|--|---|-------------------------|--|---|-------------------------|
| Social and Economic Development Support Loan (2013)                                  | Social Services (Other Services)                                  | 198.88                  | Urgent Rehabilitation and Upgrade Project Phase I (2013)               | Electricity and gas (other)                                       | 14.05                   |
| Regional Development Project for Poverty Reduction Phase I (2013)                    | Social services (urban/rural public infrastructure)               | 17.00                   | Infrastructure Development Project in Thilawa Area Phase I (2013)      | Other   | 20.00                   |
| Yangon-Mandalay Railway Improvement Project Phase I (I) (2014)                       | Transport (railways)  | 20.00                   | The Infrastructure Development Project in Thilawa Area Phase II (2014) | Transportation (roads)  | 4.61                    |
| Irrigation Development Project in Western Bago Region (2014)                         | Irrigation and flood protection                                   | 14.87                   | Greater Yangon Water Supply Improvement Project (2014)                 | Social services (water supply, sewage)                            | 23.68                   |
| National Power Transmission Network Development Project Phase I (2015)               | Electricity and gas (transmission lines and distribution systems) | 24.68                   | Communication Network Improvement Project (2015)                       | Telecommunication   | 10.50                   |
| Project for the Development of Finance for Small and Medium-sized Enterprises (2015) | Other   | 5.03                    | Power Distribution Improvement Project in Yangon Phase I (2015)        | Electricity and gas (transmission lines and distribution systems) | 6.11                    |
| Infrastructure Development Project in Thilawa Area Phase I (II) (2015)               | Transport (ports)   | 14.75                   |  |   |                         |

Source: Own elaboration based on JICA (2017)

(2006, JPY 4.87 billion) and Nghe province in the north of the country (2013, JPY 19.12 billion).

The second largest beneficiary of JICA loans was Indonesia, which carried out mainly investments in the energy sector (23) and transport (17) in the analyzed 16 year period. In the first of the mentioned sectors were obtained, among others. Fifteen loans for the expansion of the power plant network, i.e. two power plants

**Table 6** Projects qualified for funding in the Philippines under ODA by JICA loan fund in 2001–2016

| Project title (date of approval)  | Sector  | Budget (billion JPY) | Project title (date of approval)   | Sector  | Budget (billion JPY) |
|---|---|----------------------|--|---|----------------------|
| The Laoag River Flood Control and Sabo Project (2001)   | Irrigation and flood protection                     | 6.31                 | Sustainable Environmental Manage. Project In Northern Palawan (2001)                           | Social services (multi-sectoral environmental protection) | 2.03                 |
| Selected Airports (Trunkline) Development Project Phase II (2001)   | Irrigation and flood protection                     | 11.74                | Rural Road Network Development Project—Phase III (2001)  | Transportation (roads)                                    | 6.21                 |
| Mindanao Sustainable Settlement Area Development Project (2001)   | Social services (urban/rural public infrastructure) | 6.52                 | Metro Manila Interchange Construction Project (Phase V) (2001)                                 | Transportation (roads)                                    | 5.54                 |
| Help For Catubig Agricultural Advancement Project (2001)  | Social services (urban/rural public infrastructure) | 5.21                 | Arterial Road Links Development Project—Phase V (2001)   | Transportation (roads)                                    | 8.29                 |
| Agno River Flood Control Project—Phase II-B (2001)  | Irrigation and flood protection                     | 2.79                 | Subic-Clark-Tarlac Expressway Project (2001)   | Transportation (roads)                                    | 59.04                |
| Urgent Bridges Construction Project for Rural Development (2002)  | Transport (bridges)                                 | 18.49                | Northern Luzon Wind Power Project (2002)   | Electricity and gas (power plants)                        | 5.86                 |
| New Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) Systems Development Project (2002) | Transportation (airports)                           | 22.05                | Improvement of the Marine Disaster Response and Environmental Protection System Project (2002) | Transport (maritime transport)                            | 9.36                 |
| Iloilo Flood Control Project (II) (2002)  | Irrigation and flood protection                     | 6.79                 | Bago River Irrigation System Rehabilitation and Improvement Project (2002)                     | Irrigation and flood protection                           | 3.22                 |
| Arterial Road Links Development Project (VI) (2002)   | Transportation (roads)                              | 6.72                 | Subic Bay Freeport Environment Management Project (Phase II) (2003)                            | Transport (ports)   | 0.99                 |

(continued)

**Table 6** (continued)

| Project title (date of approval)  | Sector  | Budget (billion JPY) | Project title (date of approval)   | Sector  | Budget (billion JPY) |
|---|---|----------------------|--|---|----------------------|
| Autonomous Region In Muslim Mindanao Social Fund For Peace and Development Project (2003) | Social services (urban/rural public infrastructure) | 2.47                 | Central Mindanao Road Project (2003)                                     | Transportation (roads)                              | 3.72                 |
| Arterial Road Bypass Project—Phase I—Plaridel i Cabanatuan (2004)                         | Transportation (roads)                              | 6.22                 | Pasig-Marikina River Channel Improvement Project (Phase II) (2007)       | Irrigation and flood protection                     | 8.53                 |
| Pinatubo Hazard Urgent Mitigation Project (Phase III) (2007)                              | Irrigation and flood protection                     | 7.60                 | Agrarian Reform Infrastructure Support Project (Phase III) (2007)        | Social services (urban/rural public infrastructure) | 11.80                |
| Environmental Development Project (2008)  | Social Services (Other Services)                    | 24.85                | Development Policy Support Program (II) (2009)                           | Commodity loans                                     | 9.29                 |
| Logistics Infrastructure Development Project (2009)                                       | Social Services (Other Services)                    | 30.38                | Agricultural Credit Support Project (2009)                               | Social Services (Other Services)                    | 14.61                |
| Emergency Budget Support Japanese ODA Loan (2010)   | Commodity loans                                     | 13.83                | Development Policy Support Program (3) (2010)                            | Commodity loans                                     | 9.22                 |
| Post Ondoy and Pepeng Short-Term Infrastructure Rehabilitation Project (2010)             | Other   | 9.91                 | Road Upgrading and Preservation Project (2011)                           | Transportation (roads)                              | 40.85                |
| Forestland Management Project (2012)  | Agriculture, forestry and fisheries (forestry)      | 9.24                 | Pasig-Marikina River Channel Improvement Project (Phase 3) (2012)        | Irrigation and flood protection                     | 11.84                |
| National Irrigation Sector Rehabilitation and Improvement Project (2012)                  | Irrigation and flood protection                     | 6.19                 | Mindanao Sustainable Agrarian and Agriculture Development Project (2012) | Agriculture, forestry and fisheries (agriculture)   | 6.06                 |
| Flood Risk Management Project for Cagayan River, Tagoloan River and Imus River (2012)     | Irrigation and flood protection                     | 7.55                 | Central Luzon Link Expressway Project (2012)                             | Transportation (roads)                              | 22.79                |

(continued)

**Table 6** (continued)

| Project title (date of approval)   | Sector                          | Budget (billion JPY) | Project title (date of approval)  | Sector                 | Budget (billion JPY) |
|--|---------------------------------|----------------------|---|------------------------|----------------------|
| Arterial Road Bypass Project (Phase 2) (2012)  | Transportation (roads)          | 4.59                 | Development Policy Support Program-Investment Climate (2012)                | Commodity loans        | 7.78                 |
| New Bohol Airport Construction and Sustainable Environment Protection Project (2013) | Transportation (airports)       | 10.78                | Capacity Enhancement of Mass Transit Systems in Metro Manila Project (2013) | Transport (railways)   | 43.25                |
| Post Disaster Stand-by Loan (2014)   | Commodity loans                 | 50.00                | Metro Manila Interchange Construction Project (VI) (2015)                   | Transportation (roads) | 7.93                 |
| Flood Risk Management Project for Cagayan de Oro River (2015)                        | Irrigation and flood protection | 11.76                | Metro Manila Priority Bridges Seismic Improvement Project (2015)            | Transport (bridges)    | 9.78                 |
| Davao City Bypass Construction Project (South and Center Sections)                   | Transportation (roads)          | 23.91                | South Commuter Railway Project (Malolos—Tutuban) (2015)                     | Transport (railways)   | 241.99               |

Source: Own elaboration based on JICA (2017)

located in the northern part of Jakarta—Tanjung Priok (2004: JPY 58.68 billion) and Muara Karang (2003: JPY 55.75 billion). There is also a project funded by two loans from 2010 and 2015, to build transmission lines linking the islands of Java and Sumatra, totaling JPY 99.9 billion. Among the transport undertakings, the railway investment was of key importance in the period under consideration—out of the ten JICA loans, two of them were awarded in 2009 and 2015 for the construction of the Jakarta Rapid Transit System, for a total of JPY 123.37 billion. Like Vietnam, the largest economy in ASEAN has raised 15 commodity loans distributed through development policy programs, infrastructure reforms, revitalization and natural disaster management, and adaptation to climate change. Twelve loans from 2001 to 2016 were allocated from JICA funds to projects in the irrigation and flood protection sector (the largest pool of the eight ASEAN countries analyzed), 11 in the social services sector. Key projects in the first of these sectors include the construction of a decentralized irrigation system in the eastern region of Indonesia (2002, JPY 27.04 billion), as well as investments in the Progo River Basin, mountain



**Table 7** Projects qualified for funding in Thailand under ODA by JICA loan fund in 2001–2016

| Project title (date of approval)   | Sector                                 | Budget (billion JPY) | Project title (date of approval)   | Sector  | Budget (billion JPY) |
|--|--|----------------------|--|---|----------------------|
| Second Mekong International Bridge Construction Project (2001)                     | Transport (bridges)                    | 4.08                 | Transmission System and Substation Development Project (2002)  | Electricity and gas (transmission lines and distribution systems) | 2.33                 |
| Second Bangkok International Airport Development Project (V) (2002)                | Transportation (airports)              | 34.78                | Construction of 230 kV Underground Transmission Line between Bangkok and Chidlom Substation Project (2002) | Electricity and gas (transmission lines and distribution systems) | 10.39                |
| Second Bangkok International Airport Development Project (VI) (2002)               | Transportation (airports)              | 44.85                | Second Bangkok International Airport Development Project (VII) (2005)                                      | Transportation (airports)   | 35.45                |
| Mass Transit System Project in Bangkok (Purple Line) (I) (2008)                    | Transport (railways)                   | 62.44                | Mass Transit System Project in Bangkok (Red Line) (I) (2009)   | Transport (railways)  | 63.02                |
| Eighth Bangkok Water Supply Improvement Project (2009)                             | Social services (water supply, sewage) | 4.46                 | Mass Transit System Project in Bangkok (Purple Line) (2) (2010)  | Transport (railways)  | 16.64                |
| Chao Phraya River Crossing Bridge at Nonthaburi 1 Road Construction Project (2010) | Transportation (roads)                 | 7.31                 | Mass Transit System Project in Bangkok (Red Line) (II) (2015)  | Transport (railways)  | 38.20                |

Source: Own elaboration based on JICA (2017)

ranges of Merapi and Bawakaraeng (2005, JPY 16.44 billion), and the city of Semarang (2006; JPY 16.30 billion). Interestingly, in the second of the areas of intervention, projects in the field of education dominated—funding for infrastructure development and development of research facilities were obtained by, among others, Syarif Hidayatullah State Islamic University, University of Indonesia, Hasanuddin University and Bandung Institute of Technology. Three water and sewage projects concerned Denpasar, Mamminasata and Jakarta.

Of the 48 loans granted to Philippines during the same period, 20 addressed transport sector, in particular road investments (12). The most important projects in this sector include the construction of the Subic-Clark-Tarlac four-lane expressway

**Table 8** Projects qualified for funding in Vietnam under ODA by JICA loan fund in 2001–2016

| Project title (date of approval)   | Sector                                 | Budget (billion JPY) | Project title (date of approval)  | Sector  | Budget (billion JPY) |
|--|--|----------------------|---|---|----------------------|
| Bay Chay Bridge Construction Project (2001)  | Transport (bridges)                    | 6.80                 | Tan Son Nhat International Airport Terminal Construction Project (2002)             | Transportation (airports)                           | 22.77                |
| Saigon East-West Highway Construction Project (II) (2002)  | Transportation (roads)                 | 10.93                | Red River Bridge Construction Project (II) (2002)                                   | Transportation (roads)                              | 14.86                |
| O Mon Thermal Power Plant and Mekong Delta Transmission Network Project (II) (2002)              | Electricity and gas (power plants)     | 15.59                | Hai Van Tunnel Construction Project (III) (2002)                                    | Transportation (roads)                              | 3.36                 |
| Third National Highway No. 1 Bridge Rehabilitation Project (2003)                                | Transport (bridges)                    | 5.01                 | Small-Scale Pro Poor Infrastructure Development Project (2003)                      | Social services (urban/rural public infrastructure) | 10.56                |
| Saigon East-West Highway Construction Project (III) (2003)                                       | Transportation (roads)                 | 6.77                 | O Mon Thermal Power Plant and Mekong Delta Transmission Network Project(III) (2003) | Electricity and gas (power plants)                  | 21.69                |
| North-South Submarine Fiber Optic Cable Link Project (2003)                                      | Telecommunication                      | 19.50                | Ho Chi Minh City Water Environment Improvement Project (II) (2003)                  | Social services (water supply, sewage)              | 15.79                |
| Transport Sector Loan for National Road Network Improvement (2004)                               | Transport (bridges)                    | 9.53                 | Thac Mo Hydropower Station Extension Project (2004)                                 | Electricity and gas (power plants)                  | 5.97                 |
| Southern Viet Nam Water Supply Project (II) (Dong Nai and Ba Ria-Vung Tau Provinces (II)) (2004) | Social services (water supply, sewage) | 3.31                 | Red River Bridge Construction Project (III) (2004)                                  | Transport (bridges)                                 | 2.42                 |
| Power Sector Loan (2004)   | Electricity and gas (other)            | 3.19                 | O Mon Thermal Power Plant Unit No. 2 Construction Project (2004)                    | Electricity and gas (power plants)                  | 27.55                |
| Hanoi-Ho Chi Minh City Railway Line Bridges Safety Improvement Project (2004)                    | Transport (railways)                   | 8.22                 | Dai Ninh Hydropower Project (III) (2004)  | Electricity and gas (power plants)                  | 19.14                |

(continued)

Table 8 (continued)

| Project title (date of approval)   | Sector  | Budget (billion JPY) | Project title (date of approval)   | Sector                                       | Budget (billion JPY) |
|--|---|----------------------|--|--|----------------------|
| Third Poverty Reduction Support Credit (2004)  | Commodity loans                                     | 2.00                 | Small and Medium-Sized Enterprises Finance Project (II) (2005)                   | Mining and Production                        | 6.15                 |
| Saigon East-West Highway Construction Project (IV) (2005)  | Transportation (roads)                              | 19.07                | Ninh Binh II Thermal Power Plant Construction Project (I) (2005)                 | Electricity and gas (power plants)           | 4.43                 |
| New National Highway No. 3 and Regional Road Network Construction Project Section Hanoi—That Nguyen (I) (2005) | Transportation (roads)                              | 12.47                | Hai Phong City Environmental Improvement Project (I) (2005)                      | Social services (water supply, sewage)       | 1.52                 |
| Cai Mep—Thi Vai International Port Construction Project (2005)   | Transport (ports)                                   | 36.36                | Fourth Poverty Reduction Support Credit (2005)                                   | Commodity loans                              | 2.50                 |
| Small-Scale Pro Poor Infrastructure Development Project (II) (2006)  | Social services (urban/rural public infrastructure) | 14.79                | Second Ho Chi Minh City Water Environment Improvement Project (I) (2006)         | Social services (water supply, sewage)       | 1.56                 |
| Second Hanoi Drainage Project for Environmental Improvement (I) (2006)   | Social services (water supply, sewage)              | 3.04                 | Regional and Provincial Hospital Development Project (2006)                      | Social services (public health and medicine) | 1.81                 |
| Red River Bridge Construction Project (IV) (2006)  | Transport (bridges)                                 | 13.71                | Phan Ri-Phan Thiet Irrigation Project (2006)                                     | Irrigation and flood protection              | 4.87                 |
| Ninh Binh II Thermal Power Plant Construction Project (II) (2006)  | Electricity and gas (power plants)                  | 29.42                | Nhat Tan Bridge(Vietnam-Japan Friendship Bridge) Construction Project (I) (2006) | Transport (bridges)                          | 13.70                |
| Higher Education Development Support Project on ICT (2006)   | Social services (education)                         | 5.42                 | Vinh Phuc Province Investment Climate Improvement Project (2007)                 | Mining and Production                        | 11.72                |
| Southern Binh Duong Province Water Environment Improvement Project (2007)                                      | Social services (water supply, sewage)              | 7.77                 | Rural Community Internet Use Development Project (2007)                          | Telecommunication                            | 3.60                 |

|   |   |       |  |  |       |
|---|---|-------|--|--|-------|
| O Mon Thermal Power Plant and Mekong Delta Transmission Network Project (IV) (2007) | Electricity and gas (power plants)                                | 9.36  | Northern Vietnam National Roads Traffic Safety Improvement Project (2007)                                | Transportation (roads)                 | 6.56  |
| Nghi Son Thermal Power Plant Construction Project (I) (2007)                        | Electricity and gas (power plants)                                | 20.94 | Ho Chi Minh City Urban Railway Construction Project (Ben Thanh—Suoi Tien Section (Line 1)) (I) (2007)    | Transport (railways)                   | 20.89 |
| Hanoi-HCMC Railway Line Bridges Safety Improvement Project (II) (2007)              | Transport (railways)  | 11.74 | Fifth Poverty Reduction Support Credit (2007)  | Commodity loans                        | 2.50  |
| Sixth Poverty Reduction Support Credit (2008)                                       | Commodity loans   | 3.50  | Second Ho Chi Minh City Water Environment Improvement Project (II) (2008)                                | Social services (water supply, sewage) | 13.17 |
| Power Transmission And Distribution Network Development Project (2008)              | Electricity and gas (transmission lines and distribution systems) | 10.91 | North-South Expressway Construction Project (Ho Chi Minh City—Dau Giay) (2008)                           | Transportation (roads)                 | 16.64 |
| Hue City Water Environment Improvement Project (2008)                               | Social services (water supply, sewage)                            | 20.88 | Hanoi City Urban Railway Construction Project (Line 1) (E/S) (2008)                                      | Transport (railways)                   | 4.68  |
| Hanoi City Ring Road No. 3 Construction Project (2008)                              | Transportation (roads)  | 28.07 | Transport Sector Loan for National Road Network Improvement (II) (2009)                                  | Transport (bridges)                    | 17.92 |
| Second Hanoi Drainage Project for Environmental Improvement (II) (2009)             | Social services (water supply, sewage)                            | 29.29 | Hanoi City Urban Railway Construction Project (Niam Thang Long—Tran Hung Dao Section (Line2)) (I) (2009) | Transport (railways)                   | 14.69 |
| Hai Phong City Environmental Improvement Project (II) (2009)                        | Social services (water supply, sewage)                            | 21.31 | Thai Binh Thermal Power Plant and Transmission Lines Construction Project (2009)                         | Electricity and gas (power plants)     | 20.74 |
| Small-scale Pro Poor Infrastructure Development Project (3) (2009)                  | Social services (other)   | 17.95 | Small and Medium-sized Enterprises Finance Project (3) (2009)  | Social services (other)                | 17.38 |
| National Highway No. 1 Bypass Road Construction Project (2) (2009)                  | Transportation (roads)  | 4.14  | Energy Efficiency and Renewable Energy Promoting Project (2009)  | Electricity and gas (other)            | 4.68  |

(continued)

Table 8 (continued)

| Project title (date of approval)   | Sector                    | Budget (billion JPY) | Project title (date of approval)   | Sector  | Budget (billion JPY) |
|--|---------------------------|----------------------|--|---|----------------------|
| Eighth Poverty Reduction Support Credit (Economic Stimulus Support) (2009)                 | Commodity loans           | 54.90                | Third National Highway No. 1 Bridge Rehabilitation Project (2) (2010)                                | Transport (bridges)                             | 1.04                 |
| Terminal 2 Construction Project in Noi Bai International Airport (2010)                    | Transportation (airports) | 12.61                | Noi Bai International Airport to Nhat Tan Bridge Connecting Road Construction Project (2010)         | Transportation (roads)                          | 6.55                 |
| Hoa Lac Hi-tech Park Infrastructure Development Project (E/S) (2010)                       | Mining and Production     | 1.01                 | Cuu Long (Can Tho) Bridge Construction Project (2) (2010)  | Transport (bridges)                             | 4.63                 |
| Saigon East-West Highway Construction Project (5) (2010)                                   | Transportation (roads)    | 14.06                | Ho Chi Minh City Water Environment Improvement Project (3) (2010)                                    | Social services (water supply, sewage)          | 4.33                 |
| Support Program to Respond to Climate Change (1) (2010)                                    | Commodity loans           | 10.00                | Ninth Poverty Reduction Support Credit (2011)  | Commodity loans                                 | 3.50                 |
| Nhat Tan Bridge (Vietnam-Japan Friendship Bridge) Construction Project (2) (2011)          | Transport (bridges)       | 24.83                | Nghi Son Thermal Power Plant Construction Project (2) (2011)   | Electricity and gas (power plants)              | 29.85                |
| North-South Expressway Construction Project (Ho Chi Minh City-Dau Giay Section) (2) (2011) | Transportation (roads)    | 25.03                | North-South Expressway Construction Project (Da Nang-Quang Ngai Section) (1) (2011)                  | Transportation (roads)                          | 15.91                |
| Support Program to Respond to Climate Change (2) (2011)                                    | Commodity loans           | 10.00                | Project for Disaster and Climate Change Countermeasures Using Earth Observation Satellite (1) (2011) | Other (multi-sectoral environmental protection) | 7.23                 |
| North-South Expressway Construction Project (Ben Luc-Long Thanh Section) (1) (2011)        | Transportation (roads)    | 14.09                | Nghi Son Thermal Power Plant Construction Project (3) (2011)   | Electricity and gas (power plants)              | 40.33                |
| Lach Huyen Port Infrastructure Construction Project (Road and Bridge) (1) (2011)           | Transport (bridges)       | 9.07                 | Lach Huyen Port Infrastructure Construction Project (Port) (1) (2011)                                | Transport (ports)                               | 11.92                |

|   |  |       |   |  |       |
|---|--|-------|---|--|-------|
| Terminal 2 Construction Project in Noi Bai International Airport (2) (2012)                       | Transportation (airports)                      | 20.58 | Tenth Poverty Reduction Support Credit (2012)   | Commodity loans                              | 3.50  |
| Southern Binh Duong Province Water Environment Improvement Project—Phase 2 (2012)                 | Social services (water supply, sewage)         | 19.96 | Regional and Provincial Hospital Development Project (2) (2012)                                     | Social services (public health and medicine) | 8.69  |
| Protection Forests Restoration and Sustainable Management Project (2012)                          | Agriculture, forestry and fisheries (forestry) | 7.70  | New National Highway No. 3 and Regional Road Network Construction Project (2) (2012)                | Transportation (roads)                       | 16.49 |
| Hoa Lac Science and Technology City Development Project (1) (2012)                                | Mining and Production                          | 15.22 | Ho Chi Minh City Urban Railway Construction Project Ben Thanh-Suoi Tien Section (Line 1) (2) (2012) | Transport (railways)                         | 44.30 |
| Support Program to Respond to Climate Change (III) (2013)   | Commodity loans                                | 15.00 | Second Transport Sector Loan for National Road Network Improvement (2013)                           | Transport (bridges)                          | 24.77 |
| O Mon Thermal Power Plant Unit No. 2 Construction Project (II) (2013)                             | Electricity and gas (power plants)             | 6.22  | North Nghe An Irrigation System Upgrading Project (2013)  | Irrigation and flood protection              | 19.12 |
| Noi Bai International Airport to Nhat Tan Bridge Connecting Road Construction Project (II) (2013) | Transportation (roads)                         | 11.54 | Nhat Tan Bridge (Vietnam-Japan Friendship Bridge) Construction Project (III) (2013)                 | Transport (bridges)                          | 15.64 |
| Hanoi City Yen Xa Sewerage System Project (I) (2013)  | Social services (water supply, sewage)         | 28.42 | Hanoi City Urban Railway Construction Project (Line 1) Phase I—Ngoc Hoi Complex (I) (2013)          | Transport (railways)                         | 16.59 |
| Hanoi—Ho Chi Minh City Railway Line Bridges Safety Improvement Project (III) (2013)               | Transport (railways)                           | 13.79 | Economic Management and Competitiveness Credit (I) (2013)   | Commodity loans                              | 15.00 |
| Cai Mep—Thi Vai International Port Construction Project (II) (2013)                               | Transport (ports)                              | 8.94  | Da Nhim Hydropower Plant Expansion Project (2014)   | Electricity and gas (power plants)           | 7.52  |
| Support Program to Respond to Climate Change (IV) (2014)  | Commodity loans                                | 10.00 | Economic Management and Competitiveness Credit (II) (2014)  | Commodity loans                              | 15.00 |
| North-South Expressway Construction Project (Ho Chi Minh City—Dau Giay Section) (III) (2014)      | Transportation (roads)                         | 18.46 | North-South Expressway Construction Project (Da Nang-Quang Ngai Section) (II) (2014)                | Transportation (roads)                       | 30.01 |

(continued)

Table 8 (continued)

| Project title (date of approval)  | Sector                                       | Budget (billion JPY) | Project title (date of approval)  | Sector  | Budget (billion JPY) |
|---|--|----------------------|---|---|----------------------|
| Lach Huyen Port Infrastructure Construction Project (Road and Bridge) (II) (2014)       | Transport (bridges)                          | 16.91                | Lach Huyen Port Infrastructure Construction Project (Port) (II) (2014)                                    | Transport (ports)   | 21.05                |
| Thai Binh Power Plant and Transmission Lines Construction Project (II) (2015)           | Electricity and gas (power plants)           | 36.39                | North-South Expressway Construction Project (Ben Luc-Long Thanh Section) (II) (2015)                      | Transportation (roads)  | 31.33                |
| Support Program to Respond to Climate Change (V) (2015)                                 | Commodity loans                              | 15.00                | Thai Binh Thermal Power Plant and Transmission Lines Construction Project (III) (2015)                    | Electricity and gas (power plants)                                | 9.87                 |
| Hai Long City Water Environment Improvement Project (E/S) (2015)                        | Social services (water supply, sewage)       | 1.06                 | Dong Nai Province Water Infrastructure Construction Project (2015)  | Social services (water supply, sewage)                            | 14.91                |
| Can Tho University Improvement Project (2015)   | Other (other)                                | 10.46                | Second Power Transmission and Distribution Network Development Project (2015)                             | Electricity and gas (transmission lines and distribution systems) | 29.79                |
| Cho Ray Viet Nam-Japan Friendship Hospital Development Project (2015)                   | Social services (public health and medicine) | 28.61                | Support Program to Respond to Climate Change (VI) (2016)  | Commodity loans   | 10.00                |
| North-South Expressway Construction Project (Da Nang & Quang Ngai Section) (III) (2016) | Transportation (roads)                       | 30.00                | Lach Huyen Port Infrastructure Construction Project (Road and Bridge) (III) (2016)                        | Transport (bridges)   | 2.28                 |
| Lach Huyen Port Infrastructure Construction Project (Port) (III) (2016)                 | Transport (bridges)                          | 32.29                | Thai Binh Thermal Power Plant and Transmission Lines Construction Project (IV) (2016)                     | Electricity and gas (power plants)                                | 54.98                |
| Second Ho Chi Minh City Water Environment Improvement Project (III) (2016)              | Social services (water supply, sewage)       | 20.97                | Ho Chi Minh City Urban Railway Construction Project (Ben Thanh & Suoi Tien Section (Line 1)) (III) (2016) | Transport (railways)  | 90.18                |

Source: Own elaboration based on JICA (2017)

in the north of Manila, with JICA financing of JPY 59.04 billion (allocation in 2001), and two ODA projects in rail transport—construction of a fast rail link between Malolos City and Tutankhanen in Manila, where the JICA loan amounted to JPY 241.99 billion (2015) and the expansion of the metro network in Manila at JPY 43.25 billion (2013). The Philippines also implemented the second largest number of projects (after Indonesia) in the irrigation and flood protection sector (11), with special regard to Pasig-Marikina River's total investment of JPY 11.84 billion (2012) and the flood control system on the Cagayan de Oro River in Mindanao (JPY 11.76 billion). Between 2001 and 2016, the Philippines received eight loans from the JICA funds to the social services sector, i.e. logistics infrastructure development (2009, JPY 30.38 billion), environmental development (2008, JPY 24.85 billion) and agricultural loans (2009, JPY 14.61 billion). There were also five commodity loans dedicated to the development policy program, reserve fund for ODA loan funds and assistance in the face of natural disasters. The only energy project financed by ODA loan was the construction of a wind farm in the northwest part of the Philippines' most populated island, Luzon (2002, JPY 5.86 billion).

The fourth largest number of JICA loans in ASEAN in the analyzed period was granted to Cambodia—17, however, the value of funding was significantly lower than that of Myanmar and Thailand—JPY 100.04 billion, compared to 374.16 and 323.95 billion, respectively (the latter two countries received 13 and 12 loans, respectively). Nearly half of the funds addressed to Cambodia was spent on projects in the transport sector (five loans), in particular, the development of road connections of the national road no. 5 i.e. Thlea Ma'am—Battambang, Sri Sophorn—Poipet, Prek Kdam—Thlea Ma'am and Battambang—Sri Sophorn (four loans totaling JPY 47.06 million in years 2013–2016). Three energy projects have also been implemented, namely the development of the Greater Mekong Region's energy network (2007; JPY 2.63 billion) and two transmission line and distribution network projects around Phnom Penh City (2014–2015, JPY 10.30 billion), two water and sewage projects in Siem Reap in the north-west of the country (2012, JPY 7.16 billion) and Niroth (2009, JPY 3.51 billion). Between 2004 and 2009, four projects were implemented to develop the seaport infrastructure in Sihanoukville Province in the south-west of the country, including the construction of a multipurpose terminal and the development of a special economic zone for a total of JPY 15.47 billion. Two projects in the irrigation and flood protection sector were carried out in the south-western part of Phnom Penh City (2014, JPY 5.61 billion) and on the west side of Tonle Sap (2011, JPY 4.27 billion). The Greater Mekong Region also implemented a project to develop a telecommunications network (the so-called Cambodia Growth Corridor), worth of JPY 3.03 billion (2002). For the purpose of fighting poverty, a loan of JPY 1 billion was acquired in 2002.

Myanmar, which in the same period acquired 13 ODA loans from JICA, has spent most of its funds to support social and economic development (2013, JPY 198.88 billion). Transit projects involved modernizing the railway connection Yangon-Mandalay (2014, JPY 20 billion), developing port and road infrastructure in the Thilava Special Economic Zone (three loans in 2013–2015, JPY 39.36 billion). Using ODA loans, nationwide transmission line and distribution system projects



were funded (two loans amounted to JPY 30.79 billion in 2015), as well as Cambodia's telecom network expansion project (2015, JPY 10.50 billion). In the above mentioned agglomeration of Yangon—former capital of the country—a water and sewerage project worth JPY 23.68 billion (2014) was also implemented. It is also worth noting that the SME loan of JPY 5.03 billion was granted in 2015 to finance small and medium enterprises.

Thailand has implemented 12 projects under ODA loans, 9 of which in the transport sector—4 concerning rail infrastructure and 3 air transport. Construction of high-speed rail network within the so-called red and purple threads in the metropolitan area of Bangkok were financed by four loans from 2008 to 2010 and 2015 with a total value of JPY 180.3 billion. In 2002 and 2005, three projects related to the development of Bangkok International Airport totaling JPY 115.08 billion were implemented. In addition, two energy projects were implemented in the capital city concerning the construction of transmission lines and distribution systems within the Bangkok and Chidlom districts, totaling JPY 12.72 billion (2002). In 2009, a loan of JPY 4.46 billion for a water and sewerage investment in Bangkok was obtained. One year later, funding for the bridge over the Chao Phraya River was awarded (JPY 7.31 billion).

Among Laos's 10 ODA projects, commodity loans for poverty reduction and central budget support were dominant. Energy projects related to the construction of a hydroelectric power plant on the Nam Ngum River (2013, JPY 5.55 billion), transmission lines and distribution systems within the Greater Mekong Region (2005, JPY 3.33 billion) and the South Region (2012, JPY 4.17 billion). The only water and sewerage project in the analyzed period covered Vientiane (2016, JPY 10.27 billion), where also JICA funds of JPY 9.02 billion allocated in 2014 financed the extension of the international airport terminal. The second project in the transport sector, financed by the loan of JPY 4.01 billion from 2001, involved the construction of an international bridge over the Greater Mekong Region.

Three projects funded by JICA in Malaysia concerned social services, specifically education and water and sewage networks. The grant was awarded to the Malaysia-Japan International Institute of Technology (2011, JPY 6.70 billion), the Higher Education Loan Fund (2006, JPY 7.64 billion), and the construction of a water and sewage system linking the third largest city in the country—Pahang with the state on the West Coast of the Malaysian Peninsula—Selangor (2005, JPY 82.04 billion).

### ***3.2 ODA Projects in ASEAN Under Multilateral Assistance Programs***

By implementing in practice the concept of partnership with international organizations, as articulated by Minister Kishida in 2014, Japan spends ODA funds on initiatives undertaken under the auspices of international organizations and agencies, dedicated in particular to humanitarian and environmental issues.

An example of this kind of cooperation was announced by Japan in March 2015 on the occasion of the 3rd United Nations World Conference on Disaster Risk Reduction—Sendai Cooperation Initiative for Distinctive Risk Reduction, under which USD 4 billion of financial assistance and training of 40 thousand government officials and local leaders in years 2015–2018 were announced (MOFA 2015). In Vietnam a technical assistance project has been launched to raise awareness and prepare the public for the risk of natural disasters. The Philippines became the beneficiary of special ODA loans for the recovery of Yolanda's tsunami (November 2013)—SECURE (Stand-by Emergency Credit for Urgent Recovery) (Trajano 2016).

In parallel to the JICA funds, the central and eastern territories affected by the aforementioned cataclysm in 2014 were funded by a USD 20 million grant from the Japan Fund for Poverty Reduction (JFPR). In the same year, Myanmar received USD 22 million under two grants to improve the quality of life in rural areas and the prevention of HIV/AIDS, while Cambodia and Thailand received two grants and technical assistance for the development of flood infrastructure. The JFPR, established in May 2000 in the structure of the Asian Development Bank (ADB), offers assistance to emerging member states of this regional financial institution in the form of project grants and technical assistance. Poverty reduction initiatives assume direct involvement of non-governmental organizations and various civil society organizations. In total, in the years 2001–2014, seven ASEAN countries received 55 project grants: Philippines (10 grants, USD 36 million), Indonesia (8, USD 16.45 million), Cambodia (13, USD 24.22 million), Laos (8, USD 11.36 million), Myanmar (3, USD 26 million), Thailand (1, USD 1.2 million) and Vietnam (12, USD 16.53 million). The support was addressed to, among others, poorer social groups living in the provinces of Negros Occidental, Manila and Mindanao in the Philippines, Aceh in Indonesia, Phnom Penh, Tonle Sap lakes and central and southern areas of Cambodia, Houaphanh province and territories around the Nam Ngum river in Laos, and Thanh Hoa and Quang Nam provinces in Vietnam. Funds were spent on infrastructure projects in the sectors of communal economy, agriculture and health care, as well as women's social promotion and micro-entrepreneurship. ASEAN countries also received two regional grants dedicated to the Greater Mekong Subregion, Indonesia and the Philippines, aimed at increasing the well-being of fishing communities and residents of urban transit areas (ADB 2016).

## 4 Conclusions

ASEAN, highly successful 50-year old grouping, initially established as anti-communist coalition of Southeast Asian states, evolved and enlarged through the decades to address socio-economic and security agendas. Contemporary intraregional challenges involve development gaps in terms of, among others, poverty, humans resources development and infrastructure between more developed

ASEAN-6 and the followers, namely, CLMV. Recognizing the importance of narrowing the distance and induce convergence of the lower income societies in the region, ASEAN is seeking for financial and technical assistance through dialogue partnerships with countries like Japan.

The 60-year old Official Development Assistance (ODA) program by Japan proved to be appropriate addressee of ASEAN's demands in regards of physical, as well as institutional and interpersonal connectivity. The majority of 313 low-interest loans provided by JICA to eight ASEAN member states in years 2001–2016, amounted to JPY 5.01 trillion, addressed infrastructure gap, then, would contribute to improvement of physical connectivity of Southeast Asia. As indicated above, 109 JICA loans addressed transport sector in ASEAN, 55—social services and energy sector, 28—irrigation and flood protection, whereas 40 were redistributed in the form of commodity loans i.e. to combat poverty or respond to climate changes. Noteworthy, four less developed countries, awarded with 164 loans accounting for 48.08% of total regional allocation, were the largest net recipients of assistance, with positive net balance exceeding USD 18 billion only in years 2001–2014.

Japan proved to be solid, trustworthy partner of ASEAN for the last 40 years. Thus, financial and technical support provided through JICA, as well as JFPR in the form of bilateral or multilateral assistance under international organizations and agencies' initiatives and programs contribute to progress of regional integration processes centered around ASEAN. An emphasis put on inclusiveness, sustainable development, peace, security and stability as foundations of development, as well as partnerships with NGOs, businesses, international organizations, local governments and the other private actors in the revised ODA agenda would better serve Southeast Asia, challenged not only by the infrastructure and poverty gap, but also political instability, health or environmental threats.

## References

- ADB. (2016). *Japan fund for poverty reduction. Annual report 2014*. Accessed March 24, 2017, from <https://www.adb.org/sites/default/files/institutional-document/181392/jfpr-annual-report-2014.pdf>
- ASEAN. (2015). *ASEAN integration report 2015*. Jakarta: The ASEAN Secretariat.
- Bobowski, S. (2017). ASEAN and trade regionalism. An opportunity for convergence or threat of “two speeds”? In *Country experiences in economic development, management and entrepreneurship. Eurasian studies in business and economics* (pp. 31–61). No. 5. Springer International Publishing.
- ERIA. (2015). *The Comprehensive Asian Development Plan 2.0 (CADP 2.0): Infrastructure for connectivity and innovation*. Jakarta: Economic Research Institute for ASEAN and East Asia.
- JICA. (2017). *ODA Loan Project Data* [online]. Accessed February 15, 2017, from [https://www2.jica.go.jp/en/yen\\_loan/index.php/module/search?anken\\_name=&area1=1&area2=0&area3=0&country1=0&country2=0&country3=0&section1=0&section2=0&section3=0&industry1=0&industry2=0&industry3=0&shotatsu\\_kubun=0&from\\_year=2001&to\\_year=2016&offset=300](https://www2.jica.go.jp/en/yen_loan/index.php/module/search?anken_name=&area1=1&area2=0&area3=0&country1=0&country2=0&country3=0&section1=0&section2=0&section3=0&industry1=0&industry2=0&industry3=0&shotatsu_kubun=0&from_year=2001&to_year=2016&offset=300)

- Kawai, M., & Takagi, S. (2004). Japan's official development assistance: Recent issues and future directions. *Journal of International Development*, 16(2), 255–280.
- Kawasaki, T. (2014). *Sixty years of Japanese ODA*. Accessed April 5, 2017, from [http://dwl.gov-online.go.jp/video/cao/dl/public\\_html/gov/pdf/hlj/20140801/06-07.pdf](http://dwl.gov-online.go.jp/video/cao/dl/public_html/gov/pdf/hlj/20140801/06-07.pdf)
- Kishida, F. (2014). *An evolving ODA: For the World's future and Japan's future*. Accessed March 2, 2017, from [http://www.mofa.go.jp/ic/ap\\_m/page3e\\_000169.html](http://www.mofa.go.jp/ic/ap_m/page3e_000169.html)
- MOFA. (2015). *Sendai cooperation initiative for disaster risk reduction*. Accessed March 20, 2017, from <http://www.mofa.go.jp/files/000070664.pdf>
- MOFA. (2017). *Official development assistance*. Accessed March 12, 2017, from <http://www.mofa.go.jp/policy/oda/>
- OECD. (2017). *Net ODA*. Accessed March 14, 2017, from <https://data.oecd.org/oda/net-oda.htm>
- Shiraishi, T., & Kojima, T. (Eds.). (2014). *ASEAN – Japan relations* (pp. 63–64). Singapore: Institute of Southeast Asian Studies.
- Solis, M., & Urata, S. (2007). Japan's new foreign economic policy: A shift toward a strategic and activist model? *Asian Economic Policy Review*, 2(2), 227–245.
- Sudo, S. (2015). *Japan's ASEAN policy*. In *Search of proactive multilateralism* (pp. 220–227). Singapore: Institute of Southeast Asian Studies.
- Trajano, J. C. I. (2016). *Building resilience from within: Enhancing humanitarian civil-military coordination in post-Haiyan Philippines*. NTS Report no. 6. Singapore: Centre for Non-Traditional Security Studies (NTS), S. Rajaratnam School of International Studies and Nanyang Technological University.
- World Bank. (2017). *World development indicators*. Accessed from [http://databank.worldbank.org/data/reports.aspx?Code=NY.GDP.MKTP.KD.ZG&id=af3ce82b&report\\_name=Popular\\_indicators&populartype=series&ispopular=y#](http://databank.worldbank.org/data/reports.aspx?Code=NY.GDP.MKTP.KD.ZG&id=af3ce82b&report_name=Popular_indicators&populartype=series&ispopular=y#)

# Oversight of National Pharmacies Market Regulations Exercised by the Court of Justice of the European Union



Wojciech Szydło

**Abstract** The experiences of many EU Member States have demonstrated that the proper functioning of pharmacies is impossible in conditions of total liberalization of regulations governing their establishment. For this reason, in many Member States existing anti-concentration regulations related to the pharmacy market are being continually expanded. The aim of the present paper is to demonstrate, based on conclusions from judgements and rulings issued by the Court of Justice of the European Union, that anti-concentration regulations concerning the pharmacies market are designed to protect effective competition by being functional instruments for achieving the ultimate goals such as: lowered prices of pharmaceuticals and medical products; enhanced availability and diversity of such products in the form of alternatives and substitutes; forcing greater effort to care for the good of consumers in pharmacies, and encouraging activities to boost quality and innovation; reducing the market strength of large enterprises operating in the framework of consortiums (including international capital groups), which frequently apply exclusionary policies detrimental not only to the interests of smaller enterprises, but also of consumers of pharmacies. The analyses will also demonstrate that the introduction of anti-concentration regulations is compatible with the Treaty on the Functioning of the European Union in respect of freedom of enterprise and provision of services. Indeed, the above-mentioned limitations can infringe the right to free trans-border commercial activity and provision of trans-border services contained in Art. 49 and Art. 56 TFEU, but at the same time they are enacted for realization of the so-called imperative requirements in the general interest, for protection of human health and life, and for the safety of patients; additionally, they must meet the test of proportionality in respect to those values.

**Keywords** Sectoral regulation · Pharmacies market · Anti-concentration regulations · Court of Justice of the European Union · EU freedom to conduct a business · EU freedom to provide services

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## 1 Introduction

Among the objectives of sectoral antitrust regulations is reduction of the level of concentration of market strength in a given sector of economy. These regulations are a component of efforts to bring down the level of concentration in a given market sector measured in particular through the market share and market strength of individual entities operating in a given sector (Skoczny 2009; Motta 2004; Szydło 2010a). Thus, while the immediate objective of anti-concentration regulations is to satisfy the need to reduce economic concentration in a given sector, of no lesser importance is achievement of certain desirable conditions from the general economic and social perspective. By the same token, the most important objective of this type of regulation would seem to be protection of effective competition on the market, as well as ensuring the occurrence of socially desirable effects, such as: greater allocational efficiency (manifested in lower prices and greater accessibility of goods for consumers, as well as greater diversity and quality); greater production efficiency (manifested in efforts by enterprises to reduce their costs or prevent the increase in the costs); greater dynamic efficiency (understood as technical and/or technological progress, bringing new products to market, innovation in production, refinements in consumer service processes); reduction in the market strength of the largest entities with a dominant and/or monopolist position (whose influence in the public sphere can pose a threat to democratic political processes); consistent dispersion of market strength across a greater number of market participants and protection of the interests of small and medium-size enterprises, which is always a desirable element in the structure of economic entities active on the market (Szydło 2006; Nazzini 2011; Blair and Sokol 2012).

## 2 The Necessity of Anti-concentration Regulations on the Pharmacies Market

Anti-concentration regulations within the framework of the pharmaceutical market and referring to the pharmacies sector can be found in every EU Member State. For example, in Polish pharmaceutical legislation this role is played by Art. 99(3) of the Pharmaceutical Law of 6 September 2001. Their objective is to protect efficient competition in particular pharmacies markets, i.e. local, regional, and national markets. They facilitate the achievement of ultimate aims, such as: reduction in the prices of pharmaceuticals and medical products; increased availability and diversity in the form of alternative products; greater attention to the good of consumers of pharmacies, as well as initiatives and measures aimed at improving quality and innovation; reduction in the market strength of large enterprises operating within the framework of consortia (including international capital groups) and frequently

engaged in exclusionary practices (Kohutek 2012), harmful not only to the interests of smaller enterprises but also to those of consumers. Without legal restrictions, there will be a greater number of pharmacies, which can be disadvantageous to participants of the sector under discussion. Market practices, including policies for the sale of medicinal products, those of large capital groups operating a massive number of pharmacies (so-called network pharmacies), dictated purely by economic interests aimed at achieving the highest possible profits, would appear to be harmful to individuals using pharmacies. Among these practices we may identify the following: supplying pharmacies primarily with those pharmaceuticals that sell quickly and in volume; suspending supplies of pharmaceuticals that are sold in small quantities and do not generate large profits for owners of pharmacies in spite of their importance in protecting the health and life of patients; frequent infringements of restrictions on advertising pharmacies and their activities; forcing pharmacists and their owners to engage in unethical or even unlawful actions that generate tremendous profits for the owners of large capital groups and entities operating network pharmacies (e.g. ordering them to sell restricted pharmaceuticals without a prescription, recommending that prescriptions be filled after expiration or filling duplicates of prescriptions from other pharmacies, requiring point-of-sale marketing, financial blackmail used against pharmacists and other employees for failure to meet sales targets, forcing those employees to engage in unlawful advertising of medicinal products). Networks of pharmacies operated by highly-concentrated capital groups are quite frequently used to generate illegal income, such as their involvement in the so-called “reversed pharmaceuticals supply chain”. This practice consists in the unlawful obtaining of medicinal products for export, and hampers the provision of needed pharmaceuticals to pharmacies in the country, as well as leads to the acquisition of substances used in the production of narcotics. Another frequent practice is that of entities operating pharmacies being linked by capital groups with enterprises operating pharmaceutical wholesalers or as intermediaries in the sale of medicinal products, which places the pharmacies linked by capital with those enterprises in a privileged position. Pharmacies operated by enterprises acting as individual entities (individual pharmacies) are thereby discriminated against in respect of supplies of pharmaceuticals at the hands of large networks of pharmaceutical wholesalers which are themselves frequently owners of pharmacy networks (Justification for the draft bill on amending the Pharmaceuticals Act 2016; Szydło 2017). The continually growing concentration of the pharmacies market is causing a rise in the occurrence of the pathologies detailed above, which is detrimental to both competition and consumers.

Anti-concentration regulations counteract the phenomena listed above, provide for higher levels of competition, and protect the interests of consumers. They are enacted in the public interest, in order to protect consumers from actions that threaten their health, life, and safety. By the same token, they are beneficial in materializing the right of individuals to protection of their health, and they also shield enterprises and consumers from dishonest market practices. They lead to greater economic and social efficiency of the general pharmacies market, as well as greater care for the

good of individual pharmacies on the part of entities operating them by reducing their market strength.

One element of the anti-concentration regulations is the introduction of a requirement that pharmacies be operated exclusively by a pharmacist in possession of a license to practice the profession, or a company the focus of whose activities are limited to the operation of pharmacies and whose partners are exclusively licensed pharmacists. Indeed, only pharmacists, engaged in the practice of a profession of public trust, as members of the pharmacists' professional governing autonomous and subject to the principles of professional ethics and deontology, can ensure the proper functioning of a pharmacy while fully respecting the law and acting in the best interests of patients.

Another manner of effecting anti-concentration in the pharmacies market is the severing of all capital and/or corporate ties between entities operating pharmacies accessible to the general public, and enterprises operating pharmaceutical wholesalers and/or engaged as intermediaries in the sale of medicinal products. In the literature it is held that this is a sort of unbundling in the pharmacies sector, analogous to the obligatory unbundling present in some of the so-called network sectors of the economy (Szydło 2010b). This means that individuals operating pharmacies or the owners (partners) of entities operating pharmacies cannot at the same time be partners in companies operating pharmacy wholesalers and/or engaged as intermediaries in the sale of medicinal products.

In the scholarship of public commercial law, legal regulations limiting the number of entities that can be issued administrative permits to conduct a given type of commercial activity in a given geographical area are referred to as limits. Quotas constructed in this way are applied for various reasons and to achieve various goals. This is most frequently done out of a desire to avoid to prevent so-called ruinous competition on the market (Kühling 2004), which occurs when an excessive degree of competition emerges, and the results of this competition are frequently ineffective market outcomes. These include forced withdrawal of competitors from a market, or the absence of profitability, which makes conducting normal commercial activity impossible (Schmidt 2005; Berringer 2004). Quotas in the pharmacies sector are thus intended to prevent dishonest competition among an excessive number of pharmacies on a given market, thereby facilitating the profitable operation of particular pharmacies and the performance of pharmacies' public mission.

### **3 Role of the CJEU in Examining Compliance of Member States' National Antitrust Regulations with EU Freedom of Economic Activity and Provision of Services**

Antitrust regulations of the pharmacy sector in particular Member States—including primarily regulations reserving the operation of pharmacies exclusively for pharmacists or companies formed exclusively by pharmacists which also set up restrictions



on saturation of pharmacies on particular markets—are not incompatible with the provisions of the Treaty on the Functioning of the European Union (TFEU) concerning freedom of economic activity and provision of services. It may seem that these restrictions are in violation of the rights to free trans-border economic activity and trans-border provision of services that result from the provisions of Art. 49 TFEU (freedom of establishment) and Art. 56 TFEU (freedom to provide services). However, if we hold that these limitations are set up in order to realize so-called imperative requirements in the public interest, including protection of human health and life and patients' safety, and are proportional in respect of those values, they will not be held as incompatible with the provisions of the TFEU (Szydło 2006). This has been indicated on multiple occasions by the Court of Justice of the European Union (CJEU), in its assessments of national regulations in effect in many Member States and their compliance with art. 49 and art. 56 TFEU.

Community law cannot infringe on the competences of Member States in respect to enacting regulations addressing the organization of health care services, including those provided by pharmacies. Public health is a good of such a significance that each Member State has the competence to determine the rules used in ensuring its protection. As a result, the level of this protection may differ across Member States (Case C-322/01; Case C-141/07). It is obvious that in the enactment of legislation in this sphere the Member States should respect community law, in particular the provisions of the Treaty on freedom of movement, enterprise, and provision of services, as well as Directive 2005/36/EC by refraining from introducing unjustified limitations in the exercise of those freedoms in the sphere of health care (Case C-372/04).

Among the many examples of CJEU judgements, we may point to one in the case of *Commission v. Italy*, in which the Court held that the assignment to EU Member States of competences in respect to decisions concerning protection of public health leads to the conclusion that the Member States may require medical products to be distributed by pharmacies enjoying real professional independence. Member States may also employ all means to eliminate or reduce threats associated with violation of such independence, as its infringement may impact on the certainty and quality of provision to the general population of medicinal products. In this context, the Court has held that three categories of potential entities capable of operating pharmacies can be distinguished. They include natural persons possessing a qualification in pharmacy, persons conducting activity in the medicinal products sector as producers and/or wholesalers, and individuals who neither hold a pharmacy degree nor conduct activity in the aforementioned sector. In reference to entities operating a pharmacy and which hold a qualification in pharmacy, it should be emphasized that similarly to others, they are engaged in efforts to generate profits. However, it should also be acknowledged that a professional pharmacist operates a pharmacy not only to generate profits, but also to carry out their professional responsibilities. Such an individual's private interest in profits is thereby limited by her education, professional experience, and the responsibility she bears. Indeed, any potential violation of legal regulations or principles of professional ethics not only reduces the value of her investment, but also threatens her very presence in the profession. In contrast to

pharmacists, non-pharmacists by definition possess neither education nor experience equivalent to that of pharmacists, and also do not bear the same professional responsibility. In these circumstances, the Court holds that they do not offer the same guarantee that pharmacists do. As a consequence, in the Court's opinion, Member States may take advantage of their discretion to arrive at the conclusion that, in contrast to pharmacies operated by a pharmacist, the operation of a pharmacy by a non-pharmacist may constitute a danger to public health. In particular, it may threaten the certainty and quality of retail distribution of medicinal products, as the generation of profits from the operation of a pharmacy is not subject to the aforementioned restrictions resulting from factors unique to the activity of pharmacists. A Member State may thus invoke its discretion to determine *inter alia* whether such a threat is constituted by producers and wholesalers of medicinal products due to the fact that they may violate the independence of employed pharmacists, inclining them to promote pharmaceuticals they themselves manufacture and/or sell. Similarly, Member States can also make a determination whether entities operating a pharmacy and not possessing a qualification as a pharmacist may infringe on the independence of pharmacists in their employ by inducing them to sell medicinal products whose retention is no longer profitable, or whether there is a danger that operator of a pharmacy will lower operating costs to an extent influencing the principles of distribution of medicinal products. The Court has also clearly held that the exclusion of non-pharmacists from the group of entities that can operate a pharmacy is necessary for protection of health, and cannot be substituted by less burdensome means, e.g. the obligation of presence of a pharmacist in a pharmacy, the obligation to conclude a contract for insurance encompassing third-party liability, or the introduction of an appropriate system of controls and effective sanctions. The Court's view is that these measures are not as effective as the requirement that a pharmacy be operated by a pharmacist (Case C-531/06).

Similar statements and an identical assessment were then repeated by the Court in its judgement in *Apothekerkammer des Saarlandes and others* (Joined Cases C-171/07 and C-172/07), in which it held that the regulations of the TFEU do not impose limitations on Member States and their capacity to disallow individuals who do not possess a qualification as a pharmacist from owning and/or operating pharmacies. The Court again acknowledged that limiting the operation of pharmacies exclusively to pharmacists is justified by an overarching general interest, in whose framework the highest consideration is protection of public health that facilitates the certainty and quality of provision of medicinal products to society at large. Thus, if there exists any uncertainty as to the presence or dimension of threats to human health, Member States may employ protective measures without waiting for the full materialization of those threats; these measures can include reservation of the right to retail sale of pharmaceuticals for pharmacists, the imposition of strict requirements as to the manner of their sale, and on the achieving of profits (Case C-369/88; Case C-170/04; Case C-70/95).

In turn, in its judgement in the *José Manuel Blanco Pérez* case, the CJEU declared that art. 49 TFEU should be interpreted in such a manner that it does not impede national regulations, such as those constituting the subject matter of the dispute

before the Spanish national court, imposing limits on the issuing of permits for establishing new pharmacies which state that: (a) in each pharmaceutical region, as a rule one pharmacy per 2800 residents can be opened; (b) additional pharmacies can only be opened when this ratio is greater, for a population of above 2000 residents; and (c) pharmacies must keep a minimum distance from established (existing) pharmacies, measuring as a rule 250 m. However, art. 49 TFEU is an impediment to the aforementioned national regulations insofar as the basic rule of 2800 residents and/or 250 m make it impossible in any region of special demographic characteristics to open a number of pharmacies sufficient to ensure proper pharmaceutical care. This should be determined by a national court. In support of its position the Court argued that protection of public health may justify limitations on the primary freedoms guaranteed under the Treaty, such as freedom of commercial activity. Limitations on the freedom of commercial activity can, therefore, be justified by the objective of ensuring full and appropriate quality provision of medicinal products to the general public. The CJEU also mentioned that, in accordance with its previous case-law, facilities and elements of the health care infrastructure may be subject to planning, which can in turn encompass prior permission to establish enterprises by new entities providing health care services. This applies to situations where this permission is essential in order to fill any gaps in access to health care services, and to prevent the multiplication of structures to ensure health care that would be adapted to the needs of the general public, encompass the entire territory, and take into account geographical regions which are isolated or otherwise in a worse situation (Case C-157/99; Case C-372/04; Case C-169/07). In the Court's opinion, an analogical conclusion can be applied in its entirety to health care services in the sphere of pharmacy. The CJEU observed that there are locations which many pharmacists may consider as very lucrative, for example in heavily urbanized regions, and which are therefore more attractive. However, in other parts of the country, such as in rural areas, geographically isolated regions, or others of a less beneficial location, their attractiveness is significantly smaller. This may in turn mean that in the absence of any regulations, pharmacists would concentrate in those locations felt to be attractive, which would lead to other locations suffering from an insufficient number of pharmacists capable of providing guaranteed pharmaceutical care of appropriate quality. The Court also held that it is precisely when there is an absence of certainty as to the presence or dimensions of threats to public health that Member States can undertake protective measures without delay, and without waiting to see whether a real threat has entirely materialized. Therefore, a Member State can determine that there is a risk of insufficient supply of pharmacies in some parts of its territory, thus leading to the danger of an interruption in the certain and appropriate quality provision of medicinal products. Particularly considering the aforementioned risk, this is a serious argument for Member States to adopt regulations declaring that only one pharmacy may be established for a given number of residents. This condition can, in the future, lead to the formation of a tendency to establish pharmacies in those parts of a country's territory where there are gaps in access to pharmaceutical services, as the prevention of pharmacists conducting their activities in regions with a sufficient number of pharmacies will encourage them to undertake business

in regions where there are not enough of them. From this it results that the described condition can lead to the even distribution of pharmacies around a country's territory, and by the same token the guarantee of access to pharmaceutical care for the entire population along with increased certainty and quality of provision of medicinal products. The Court did, however, emphasize that the mere criterion concerning population density is accompanied by the risk that it will not prevent the concentration of pharmacies in a geographical region established under that condition in selected attractive cities belonging to that region. This type of aggregation could then lead to the emergence of duplicate structures, whereas in other parts of the same region there may be insufficient numbers of pharmacies. In these circumstances, the Member State may establish additional conditions designed to prevent such a concentration, such as by enacting a requirement to maintain a minimum distance between pharmacies. This condition can in a natural manner facilitate the avoidance of concentrations of pharmacies, and by the same token can lead to their being more evenly distributed across a given geographical region. The condition associated with minimum distance also supports certainty among patients that they will have a pharmacy sufficiently close as to ensure easy and quick access to proper pharmaceutical care. This type of condition of access can be held as essential, as the distribution of medicinal products would seem to be an urgent matter, and the group of clients using pharmacies encompasses individuals with limited capacity for movement, such as the elderly or people with serious illnesses. The condition of minimum distance thus constitutes a complement to the condition concerning population density, and thereby contributes to achievement of the objective of even distribution of pharmacies around the country so as to ensure for the general public appropriate access to pharmaceutical care. In consequence, that leads to improving the certainty and quality of provision of medicinal products to the general public (Joined Cases C-570/07 and C-571/07).

## 4 Summary

The above analyses show that that the case-law of the CJEU and the provisions of the Treaty do not forbid the enactment of regulations limiting concentration in the pharmacies sector. Indeed, the CJEU emphasizes that the regulations in place in many Member States, such as the requirement that only pharmacists operate pharmacies, are in the service of public health and ensure independence of pharmacists from other entities, particularly those involved in wholesaling and/or intermediary services in the sale of medicinal products. In turn, norms restricting the concentration of pharmacies in particular markets serve to ensure a more even distribution of pharmacies across the terrain of an entire country, and allow those pharmacies to conduct their operations under economically acceptable conditions. Regulations limiting the concentration of pharmacies in particular markets and allowing only pharmacists and companies founded by pharmacists to operate pharmacies force those pharmacists—if they desire to operate a pharmacy and practice their profession

with a view to making a profit—to establish pharmacies distributed evenly across particular regions of Member States. In this way, they are encouraged to enter into activity in those regions where there are not enough pharmacies.

Anti-concentration regulations in the pharmacies sector thus have a positive effect on protection of competition, and are an effective instrument in the realization of many ultimate objectives, as: reducing the prices of medicinal products; increasing access to them and diversity in the form of alternative and substitute products; forcing greater care for the good of consumers using pharmacies; encouraging activities leading to improvements in quality and innovation; and reducing the market strength of large enterprises operating within consortia.

It, therefore, seems that all of these restrictive anti-concentration regulations comprise a cohesive whole, and as such they are justified on grounds of protection of health in their limitations on freedom of establishment and provision of services as enshrined in the TFEU, insofar as they do so in a proportional manner. Indeed, they guarantee the achievement of the aim of ensuring certain and appropriate quality provision of medicinal products to the general public, as well as protection of public health, but do not exceed the scope of what is necessary to achieve that aim. Other measures which impose fewer restrictions on the aforementioned freedoms would not provide equally effective means of guaranteeing the same level of certainty and quality in the provision of medicinal products to the general public. In consequence, it would seem that the adopted national anti-concentration regulations are appropriate to secure the achievement of the purpose for which they were enacted, and they do not exceed that which is necessary for doing so.

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## References

- Berringer, C. (2004). *Regulierung als Erscheinungsform der Wirtschaftsaufsicht [Regulation as manifestation of economic supervision]*. München: C.H. Beck.
- Blair, R., & Sokol, D. (2012). The rule of reason and the goals of antitrust: An economic approach. *Antitrust Law Journal*, 78, 471–504.
- Case C-141/07. (2008). *Commission v. Germany*. ECR I-6935.
- Case C-157/99. (2001). *B.S.M. Geraets-Smits v Stichting Ziekenfonds VGZ and H.T.M. Peerbooms v Stichting CZ Groep Zorgverzekeringen*. ECR I-5473.
- Case C-169/07. (2009) *Hartlauer Handelsgesellschaft mbH v Wiener Landesregierung and Oberösterreichische Landesregierung*. ECR I-1721.
- Case C-170/04. (2007). *Klas Rosengren and others v Riksåklagaren*. ECR I-4071.
- Case C-322/01. (2003). *Deutscher Apothekerverband v DocMorris*. ECR 2003 I-14887.
- Case C-369/88. (1991). *Criminal proceedings against Jean-Marie Delattre*. ECR I-1487.
- Case C-372/04. (2006). *Watts v Bedford Primary Care Trust*. ECR I-4325.
- Case C-531/06. (2009). *Commission v Italy*. ECR I-4103.
- Case C-70/95. (1997). *Sodemare SA, Anni Azzurri Holding SpA and Anni Azzurri Rezzato Srl v Regione Lombardia*. ECR I-3395.

- Directive 2005/36/EC of 7 September 2005 of the European Parliament and the Council on recognition of professional qualifications (2005). OJ L 255/22.
- Joined Cases C-171/07 and C-172/07. (2009). *Apothekerkammer des Saarlandes and Others (C-171/07) and Helga Neumann-Seiwert (C-172/07) v Saarland and Ministerium für Justiz, Gesundheit und Soziales*. ECR I-04171.
- Joined Cases C-570/07 and C-571/07. (2010). *José Manuel Blanco Pérez, María del Pilar Chao Gómez v Consejería de Salud y Servicios Sanitarios (C-570/07), Principado de Asturias (C-571/07)*. ECR I-4629.
- Justification for the draft bill amending the Pharmaceutical Law, Sejm circular, No. 1126, 2016 [online]. Accessed April 30, 2017, from <http://www.sejm.gov.pl/Sejm8.nsf/PrzebiegProc.xsp?nr=1126>
- Kohutek, K. (2012). *Praktyki wykluczające przedsiębiorstw dominujących. Prawidłowość i stosowalność reguł prawa konkurencji [Excluding practices of dominant undertakings. Correctness and applicability of competition law rules]*. Warszawa: Wolters Kluwer.
- Kühling, J. (2004). *Sektorspezifische Regulierung in den Netzwirtschaften. Typologie. Wirtschaftsverwaltungsrecht. Wirtschaftsverfassungsrecht [Sector-specific regulation in the network economies. Typology. Administrative law. Economic Constitutional Law]*. München: C.H. Beck.
- Motta, M. (2004). *Competition policy. Theory and practice*. Cambridge: Cambridge University Press.
- Nazzini, R. (2011). *The foundations of European Union Competition Law: The objective and principles of article 102*. Oxford: Oxford University Press.
- Pharmaceutical Law of 6 September 2001. (2017). *Journal of Laws of the Republic of Poland*. No. 2211.
- Schmidt, I. (2005). *Wettbewerbspolitik und Kartellrecht [Competition policy and antitrust law]*. Stuttgart: Uni-Taschenbücher.
- Skoczny, T. (Ed.). (2009). *Ustawa o ochronie konkurencji i konsumentów. Komentarz [The act on the protection of competition and consumers. The commentary]*. Warszawa: C.H. Beck.
- Szydło, M. (2006). *Swobody rynku wewnętrznego a reguły konkurencji. Między konwergencją a dywergencją [The freedoms of the internal market and the rules of competition. Between convergence and divergence]*. Toruń: Towarzystwo Naukowe Organizacji i Kierownictwa "Dom Organizatora".
- Szydło, M. (2010a). *Nadużycie pozycji dominującej w prawie konkurencji [Abuse of a dominant position in competition law]*. Warszawa: Wolters Kluwer.
- Szydło, M. (2010b). *Prawo konkurencji a regulacja sektorowa [Competition law and sectoral regulation]*. Warszawa: Wolters Kluwer.
- Szydło, M. (2017). *Legal opinion on draft law amending the Pharmaceuticals Act, Sejm circular, No. 1126 [online]*. Accessed May 7, 2017, from <http://www.sejm.gov.pl/Sejm8.nsf/opinieBAS.xsp?nr=1126>

**Part III**  
**Empirical Studies on Emerging Markets**

# Determinants of Enterprises' Capital Structure in Poland: Evidence from Warsaw Stock Exchange



Leszek Czerwonka and Jacek Jaworski

**Abstract** The aim of the paper is to identify factors that affect the financing structure of Polish companies listed on the Warsaw Stock Exchange in the period 1998–2012. In the first part of the paper the modern theories of capital structure are reviewed and main determinants of this structure are identified. The second part provides empirical verification of the relationship between debt and found factors using panel models. The capital structure of studied enterprises measured by the total debt ratio is most adequately explained by the pecking order theory. The increase in the share of fixed assets in total assets, profitability, liquidity and company size influences the reduction of its debt. The non-debt tax shield affected the debt level differently from the pecking order theory. The positive relationship between non-debt tax shield and debt corresponds to the agency theory. While a large number of studies conducted in other countries confirm the significance of the impact regarding the above factors on the long-term debt ratio, in Poland a similar relationship is not noticeable. Long-term debt is determined only by the share of fixed assets in total assets. It indicates the importance of short-term debt in the financing of Polish enterprises.

**Keywords** Capital structure · Cost of capital · Financing · Determinants of capital structure · Capital structure theories · Warsaw Stock Exchange

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## 1 Introduction

One of the key financial decisions in any organisation is seeking financing sources. These decisions depend on many internal and external factors. The impact of these factors on the relationship of equity and debt has been the research subject for decades. Until now, many theories called capital structure theories have been formulated. The most notable theories include: The Modigliani-Miller model, the signalling theory, the agency theory, the pecking order theory and the static trade-off theory. Most of these theories were empirically tested. The studies have not brought unambiguous confirmation or falsification of any of these theories so far. Therefore, the studies are further conducted on various capital markets and for different sectoral conditions, using very different research methods. The current study is part of this research trend. Its aim is to identify the factors that may affect the capital structure of enterprises in Poland.

In the first part of the paper the modern theories were reviewed, and on that base the determinants of capital structure were identified. The second part of the study provides empirical verification of the significance of the factors affecting corporate debt using panel models. The objects of the research are companies listed on the Warsaw Stock Exchange in the period 1998–2012.

## 2 Contemporary Theories of Capital Structure

One of the oldest major theories of capital structure is the MM model (Modigliani and Miller 1958). Assuming a perfect capital market, the authors showed that the cost of capital and thus the market value of a company are independent from the capital structure. With the increase in the share of cheaper debt capital in financing the risk increases, and consequently the shareholders' required rate of return (cost of equity) increases too. These values are mutually offset and that is why weighted average cost of capital does not change. The original MM model was modified by introducing into the model different factors, making the functioning of a company closer to reality (corporate tax, shareholders' income taxes, etc.). The insertion an income tax into the MM model resulted in the emergence of benefits from having debt (interest tax shield), and the optimum capital structure was based on the only share of debt in the capital of the company.

Jensen and Meckling (1976) published a concept of financial decisions based on an agency theory. It takes into account conflicts of interest between shareholders, creditors and the company management. The result of using contracts for assuring interests of the parties is agency costs. Capital structure should then be determined, taking into account the costs of issuing equity and costs of issuing and service of debt. It is assumed that the debt is a way of reducing conflicts. It causes the need for ongoing maintenance of obligations, thus reducing the amount of cash left to the managers (Jensen and Meckling 1976). Jensen (1986) also pointed out that the

payment of increased dividends reduces the cash available to managers. Summing it up, the tendency of managers to implement unprofitable projects can be limited by increasing the amount of dividends and/or use of debt.

Ross (1977) is considered to be the author of the signaling theory. It assumes that only the management has accurate information about future profits and investment opportunities of the company. It means that share prices which are determined by the market do not reflect all relevant information. The management can transfer its knowledge to the company environment by choosing a relationship of equity and debt. A larger share of debt in the capital structure gives the signal of large future cash flow enabling repayment of obligations. In turn, it causes an increase in investor confidence leading to the rise in share prices.

The observed low financial leverage of highly profitable businesses gave the premise to formulate the pecking order theory (Myers 1984; Myers and Majluf 1984). According to this theory, the company prefers the specific, based on negative selection, order of financing sources. The management knows the exact value of the company assets and possibilities of its development, so they readily spend generated profit on further financing for the company. External investors have less knowledge about the company. Thus, from their point of view, participation in equity is more risky than borrowing money. Therefore the risk premium expected by investors is higher in the case of the purchase of shares than granting the loan. In summary, managers firstly choose the internal financing, then debt. The issue of shares is chosen as the last option.

On the basis of discussions on the MM model, the static trade-off theory has been formulated. It claims that the optimal capital structure results from the comparison of the tax benefits, costs of financial distress and potential agency costs of equity and debt. The risk of bankruptcy is adopted as a cost of debt, which counterbalances benefits from the interest tax shield (Hirshleifer 1966). The first model based on these assumptions has been proposed by Kraus and Litzenger (1973). The model enhanced by Myers (1984) stipulates that a company sets a target debt-to-value ratio, and then gradually moves towards the target determined by balancing the benefits of tax shield and costs of financial distress (bankruptcy).

### **3 Factors Affecting the Capital Structure of Enterprises**

The wide analysis of the capital structure theories was conducted by Harris and Raviv (1991). Under these theories, they indicated factors that may influence decisions on financing. Based on Polish experience, a similar list was developed by Cwynar et al. (2015). These factors include: the share of fixed assets in total assets, the company size and growth rate, profitability, liquidity and non-debt tax shield.

Fixed assets are good collateral of obligations and they are to a lesser extent than current assets exposed to lose a value in the case of financial distress. From the static trade-off theory point of view, high share of fixed assets in total assets may cause the

increase in the share of debt in financing sources. Better debt collateral also reduces the cost of its issuing. Thus, from the point of view of the agency theory the relationship between increase in fixed assets and debt ratio is positive. This relationship is negative according to the pecking order theory. The higher level of assets, the less information asymmetry, and it decreases the cost of equity.

The static trade-off theory and the agency theory justified next factor of the capital structure: the company size. For the first of the above theories, it is important that large companies are more diversified and their bankruptcy risk is lower. Large companies also operate longer than smaller companies. They are more known and according to the second theory, debt issuance costs are lower because of their reputation. It means that the larger the enterprise, the higher the share of debt in its financing.

The size of the company also helps to reduce the cost of shares issuing. For a large enterprise it is easier to issue and sell their shares than for a small company. On the other hand, large companies have more assets in absolute terms, what means that the phenomenon of adverse selection of purchasers of these shares is for them more important. It means that from the point of view of the pecking order theory the relationship between the company size and the level of debt may be important, but the impact can be both: positive or negative.

The factor which is associated with the size is the rate of company growth. The dynamic growth requires a corresponding increase in financing. In this case, according to the pecking order theory, the debt is more preferred than the issue of shares. According to the signalling theory, faster growth of a company is a positive signal to investors and raises the share price. Higher valuation gives the company the opportunity to take advantage of the debt at a lower price, at a relatively low risk of bankruptcy. It means that for both above theories there is a positive relationship between the growth of the company and debt.

In turn, the static trade-off theory and the agency theory indicate the opposite relation. According to the first of these theories, the costs of bankruptcy are higher for companies with rapid growth—such companies loose relatively more value. The agency theory points out that fast-growing enterprises finance riskier projects, and that is why the cost of debt for them is higher. Conclusion: the higher rate of the company growth, the lower the share of debt in its financing.

One of the key determinants of the company growth is profitability. According to the pecking order theory, the profitability should promote self-financing, and thus limit the share of debt in the capital structure. Profitable businesses generate large cash surpluses and it is possible to a greater extent to use internal financing sources than in the case of companies with losses. The other discussed theories claim that the relationship between profitability and the share of debt in financing is opposite. According to the trade-off theory profitable businesses have lower costs associated with the risk of bankruptcy and more appreciate the benefits of the interest tax shield. According to the signaling theory, a profitable company sends positive signals to the creditors, which enables a further increase in debt. The agency theory also recognizes a higher level of debt to be more beneficial for profitable businesses, because it can make the problem of free cash flow less troublesome.

**Table 1** Selected empirical studies verifying determinants of capital structure

| Factor/direction of impact   | Positive   | Negative  |
|------------------------------|--|---|
| Fixed assets                 | Rajan and Zingales (1995)<br>Pandey et al. (2000)<br>Frank and Goyal (2003)<br>Buferna et al. (2005) | Chittenden et al. (1996)<br>Huang and Song (2006)                     |
| Size and growth of a company | Chaplinsky and Niehaus (1990)<br>Frank and Goyal (2003)<br>Huang and Song (2006)                     | Rajan and Zingales (1995)<br>Barclay and Smith (1996)<br>Bauer (2004) |
| Profitability                | Um (2001)  | Rajan and Zingales (1995)<br>Huang and Song (2006)                    |
| Liquidity                    | Chaplinsky and Niehaus (1990)<br>Nejad and Wasuuzzaman (2013)  | –   |
| Non-debt tax shield          | Chaplinsky and Niehaus (1990)<br>Campbell and Jerzemowska (2001)                                     | Upneja and Dalbor (2001)<br>Qian et al. (2007)                        |

Source: Own elaboration

The pecking order theory shows that liquidity is the next variable affecting the share of debt in company financing. Enterprises, which are able to generate a significant amount of cash, use internal sources of financing to avoid the use of debt. Thus, high liquidity causes a lower level of debt. However, according to the static trade-off theory the relationship is positive. With the increase in liquid assets the cost of selling them decreases. It means lower risk of bankruptcy, which allows companies to increase debt and the use of the interest tax shield.

The trade-off theory shows another determinant of capital structure—non-debt tax shield. It is based on the share of depreciation in the costs. The increase of that ratio is a substitute for the interest tax shield and reduces the demand for borrowing money. A similar relationship can be formulated for the pecking order theory. High depreciation causes larger financial surplus which translates into increased opportunities for self-financing. Contrary, positive correlation between non-debt tax shield and debt can be derived from the agency theory. The increasing depreciation means wider free cash flow available to managers. The natural way to reduce the unreasonable use of cash by managers is to increase debt. Table 1 summarizes selected empirical research, the results of which confirmed the above-mentioned relationships.

There are many other variables mentioned in the literature that may affect the capital structure of a company. These are: probability of bankruptcy, advertising expenditures, expenditures and the quality of research and development, innovation, etc. (Barowicz 2014). However, these factors are usually justified by one theory. There is also not enough confirmation for them in empirical research. Based on the literature and empirical research, the following research hypothesis can be formulated: capital structure of companies in Poland depends on the share of fixed assets in total assets, the size and growth of a company, its profitability, liquidity and size of non-debt tax shield.

## 4 Research Method

From a methodological point of view, an important issue is to define the dependent and independent variables and to specify their measures. There are in the literature four alternative approaches to define the capital structure (dependent variable) (Błach 2009):

1. The equity and interest-bearing liabilities—it assumes that the use of trade credit without interest has a technical and not financial nature.
2. The relationship of debt and ownership securities issued—it is specific for the Anglo-Saxon system of corporate financing based mainly on the capital markets.
3. The equity and long-term liabilities—this approach assumes the dominant role of the fixed capital in corporate financing.
4. The equity and total liabilities—it includes all financial sources of the company.

Rajan and Zingales (1995) analysed the above approaches and the usefulness of the results from measures of the capital structure and found, that the appropriate choice should be based on the characteristics of the studied economy. The first three definitions do not include accounts payable in the capital structure. For the economies (including the Polish economy), where trade credit is an important source of financing, it becomes reasonable to take into account the last definition. Measures of capital structure based on this definition can have various forms. One of the most relevant is the debt ratio understood as “the relationship of total liabilities to total assets” (the sum of equity and liabilities). This ratio was applied among others by Mazur (2007), Cortez and Susanto (2012), Abeywardana and Banda (2015), Imtiaz et al. (2016). It is also the primary dependent variable in this study. The additional variable is the long-term debt ratio understood as the relationship of long-term liabilities and total assets. A similar control measurement was applied among others such as Cekrezi (2013).

The first of the independent variables is defined in the literature clearly as a share of fix assets in total assets (Campbell and Jerzemowska 2001; Mazur 2007; Rauh and Sufi 2010; Cortez and Susanto 2012; Imtiaz et al. 2016). For the company size several measures can be distinguished. The most frequently used in the empirical studies are: sales revenue (Cortez and Susanto 2012; Nejad and Wasiuzzaman 2013) and the value of total assets (Mazur 2007; Rauh and Sufi 2010). To eliminate the impact of abrupt differences in the balance sheet amounts of individual companies on the calculation, thus the use of linear scale. Some authors as a measure of the company size use the natural logarithm of total assets (Campbell and Jerzemowska 2001; Abeywardana and Banda 2015; Imtiaz et al. 2016).

Even more varied in the literature are measures of another explanatory variable related to the company growth. It is measured e.g. as the total value of the investment expenditure (Huang and Ritter 2009), the relationship of these expenditures to total assets (Campbell and Jerzemowska 2001), as well as using the dynamics of the return on operating assets (Kędzior 2012) or the percent increase in assets (Cortez and Susanto 2012; Imtiaz et al. 2016). The last dimension is the most

appropriate for the application previously discussed measure of the company size: the value of total assets. This dimension is applicable also to measure the company profitability where the relationship of the operating profit and total assets (ROA) is most often used (Campbell and Jerzemowska 2001; Kędzior 2012; Cortez and Susanto 2012; Abeywardana and Banda 2015; Imtiaz et al. 2016). The other measures of profitability e.g. the return on sales (ROS) are less frequently used in empirical studies (Mazur 2007).

The common measures of liquidity are the static ratios. They show the coverage of current liabilities by the respective components of asset. The most capacious static ratio is the current ratio. It's the relation of the total current assets and the current liabilities. It was used in studies concerning capital structure among others by Campbell and Jerzemowska (2001), Mazur (2007), Abeywardana and Banda (2015). Quick liquidity ratio, being the relationship of the most liquid assets (receivables and cash) and current liabilities was used in the studies of Imtiaz et al. (2016). Liquid assets related to the sales revenues were the measure of liquidity in the research of Nejad and Wasiuzzaman (2013).

The last of the capital structure factor mentioned in the research hypothesis is a non-debt tax shield. It is a substitute for the interest tax shield and it results from fixed assets depreciation. The non-debt tax shield is most often measured by the relationship of the annual amount of depreciation and total assets (Mazur 2007; Cortez and Susanto 2012; Nejad and Wasiuzzaman 2013; Abeywardana and Banda 2015). As an exception to the adopted rule, the study of Campbell and Jerzemowska (2001) can be pointed out. These authors measured the non-debt tax shield by the share of the depreciation reduced by tax liabilities in total sales revenue.

Taking into account the above analysis, Authors decided to use in this study the measures of the dependent and explanatory variables listed in Table 2.

The study was based on the financial statements of 335 companies listed on the Warsaw Stock Exchange between the years of 1998–2012. The financial data was taken from the Notoria database. In total, the study included 3134–5025 observations. The primary reason that the number of observations is less than the maximum

**Table 2** Measures of variables used in study

| Variable                               | Short | Measure   |
|--|-------|---|
| Capital structure (primary measure)    | DR    | $\frac{\text{total liabilities}}{\text{total assets}}$                |
| Capital structure (additional measure) | LDR   | $\frac{\text{long-term liabilities}}{\text{total assets}}$            |
| Share of fixed assets in total assets  | TANG  | $\frac{\text{fixed assets}}{\text{total assets}}$                     |
| Company size                           | SIZE  | $\ln(\text{total assets})$  |
| Company growth                         | GROW  | $\frac{\Delta \text{total assets}}{\text{total assets}} \times 100\%$ |
| Profitability                          | PROF  | $\frac{\text{EBIT}}{\text{total assets}}$                             |
| Liquidity                              | LIQ   | $\frac{\text{current assets}}{\text{current liabilities}}$            |
| Non-debt tax shield                    | NDTS  | $\frac{\text{depreciation}}{\text{total assets}}$                     |

Source: Own elaboration

**Table 3** Descriptive statistics of research sample

| Variable | Mean     | Median  | Standard deviation | Minimum   | Maximum   |
|----------|----------|---------|--------------------|-----------|-----------|
| LDR      | 0.0864   | 0.0416  | 0.1202             | 0.0000    | 1.5836    |
| DR       | 0.4818   | 0.4365  | 0.4823             | 0.0000    | 11.8650   |
| TANG     | 0.5121   | 0.5105  | 0.2271             | 0.0000    | 0.9986    |
| SIZE     | 11.7670  | 11.6440 | 1.7371             | 3.4340    | 20.1050   |
| GROW     | 291.6600 | 8.3986  | 10.547             | -100.0000 | 546,840   |
| PROF     | 0.0338   | 0.0471  | 0.2539             | -7.5676   | 0.7770    |
| LIQ      | 3.9665   | 1.4680  | 35.6340            | 0.0145    | 1668.0000 |
| NDTS     | 0.0362   | 0.0290  | 0.0348             | 0.0000    | 0.6606    |

Source: Own elaboration

is the fact that not all companies were listed during the whole period of the analysis. The number of observations for variable GROW is 3134 (this variable is the index and for calculations the data from two successive periods were needed). The number of observations of variable LIQ is 3458. For the other remaining variables the number of observations is 3461.

For the assessment of the correctness of the data and isolate outliers the descriptive statistics of the research sample were verified (Table 3). The questionable cases were explained or eliminated from the study.

The arithmetic mean of the debt ratio (DR) is 48%, and median 44%. For 300 companies this variable ranges from 0 to 1. Only in 35 companies, debt ratio exceeds one, because they generate losses and negative equity value—a special case of this value is 11.87, representing a maximum for DR. The share of long-term debt in the financing of Polish enterprises is significantly lower. The arithmetic mean of LDR in the research sample is 8.4% while the median is 4.1%.

The TANG variable defining the share of fixed assets in total assets has values between zero and one. Both, the arithmetic mean and the median are 0.51. The SIZE specifying the size of the company, measured as the natural logarithm of the total assets range from 3.43 to 20.1. The arithmetic mean is 11.76 and does not much differ from the median.

Variables GROW and PROF, meaning the rate of asset growth and profitability are also negative. Due to the huge outliers for these variables the median should be considered as a better measure than the average mean as well as for variables LIQ and NDTS. The standard deviation also indicates great variability for these variables. For variables GROW, PROF and LIQ it repeatedly exceeds the arithmetic mean what indicates a much greater variation than in the case of other variables. Therefore using the median to determine the average, it may be noted that half of the companies in the research sample increased its assets at a rate to 8.4%, while the rest is growing at a faster rate. Similarly, half of the studied companies achieved a profitability of 4.7%, the next half is even more profitable. The median of the liquidity ratio is up to 1.47, and of the NDTS is 0.029.

The adequacy of the model describing the dependent variable is preserved only when the independent variables are uncorrelated or weakly correlated (independent)

**Table 4** Correlation coefficients of variables studied

| TANG   | SIZE   | GROW   | PROF    | LIQ     | NDTS    |      |
|--------|--------|--------|---------|---------|---------|------|
| 1.0000 | 0.3342 | 0.0052 | -0.0635 | 0.0010  | 0.1134  | TANG |
|        | 1.0000 | 0.0025 | 0.0874  | -0.0147 | -0.2022 | SIZE |
|        |        | 1.0000 | -0.0249 | -0.0025 | -0.0209 | GROW |
|        |        |        | 1.0000  | -0.0028 | -0.1900 | PROF |
|        |        |        |         | 1.0000  | -0.0571 | LIQ  |
|        |        |        |         |         | 1.0000  | NDTS |

Note: critical value = 0.0277,  $p = 0.05$

(Kufel 2007). The Pearson correlation coefficients were calculated in order to determine the relationship of the variables (Table 4).

The correlation between the independent variables in most cases does not occur (for the level of significance  $p = 0.05$  most of the correlation coefficients do not exceed the critical value). In seven cases, the correlation exists, but its strength is small reaching a maximum of 0.33 for the variables SIZE and TANG.

In order to identify and measure the relevance and impact of the independent variables on the dependent variables the econometric, linear panel models were applied. They are based on:

1) regression model (Ordinary Least Squares Method):

$$DV_{it} = \beta_0 + \beta_1 TANG_{it} + \beta_2 SIZE_{it} + \beta_3 GROW_{it} + \beta_4 PROF_{it} + \beta_5 LIQ_{it} + \beta_6 NDTS_{it} + \varepsilon_{it} \quad (1)$$

2) model with fixed effects:

$$DV_{it} = \beta_0 + \beta_1 TANG_{it} + \beta_2 SIZE_{it} + \beta_3 GROW_{it} + \beta_4 PROF_{it} + \beta_5 LIQ_{it} + \beta_6 NDTS_{it} + \mu_{it} \quad (2)$$

3) model with random effects:

$$DV_{it} = \beta_0 + \beta_1 TANG_{it} + \beta_2 SIZE_{it} + \beta_3 GROW_{it} + \beta_4 PROF_{it} + \beta_5 LIQ_{it} + \beta_6 NDTS_{it} + \mu_{it} + \varepsilon_{it} \quad (3)$$

where  $DV_{it}$  are dependent variables, respectively  $DR_{it}$  and  $LDR_{it}$ .

Analogous or similar methods are used in the studies among others: Mazur (2007), Nejad and Wasiuzzaman (2013), Cortez and Susanto (2012), Uddin (2015), Cekrezi (2013) and Intiaz et al. (2016). The simplest method of panel data analysis is to treat them as cross-sectional data. Then the model of the Ordinary Least Squares Method (OLS) can be applied for the estimation. However the use of such an estimator very often leads to inefficient or even biased estimations, due to the heterogeneity of the population. Therefore, if it is accepted that the individuals are varied, it would be more appropriate to use a model with fixed effects which takes into account the presence of unknown but constant in time differences between



individuals. When the individual effects are not the same in subsequent periods, the model with random effects should be used (Greene 2003).

To determine whether the model can be estimated using OLS, the hypothesis of the existence of the individuals effects must be verified. For this purpose the Breusch-Pagan test was used. Failure to reject the null hypothesis according to which the variance of the individual effects is zero, meaning that these effects do not occur, and model OLS can be used. The rejection of the above hypothesis means that it is entitled to enter the individual effects and the OLS estimation cannot be applied (Kufel 2007; Maddala 2006).

For selecting individual effects between fixed and random the Hausman test is helpful. The null hypothesis of this test assumes no correlation between the independent variables and random effects, while an alternate hypothesis claims that the correlation exists. Failure to reject the null hypothesis indicate compliance of both estimators. But the estimator for the random effects is more effective. The rejection of the null hypothesis suggests a choice of model with fixed effects (Kufel 2007).

## 5 Findings

Table 5 contains the estimated parameters of the models adopted in the study and the results of tests verifying their adequacy.

The results of the Breusch-Pagan test for both dependent variables (value does not exceed the level of significance 0.05) indicate that the null hypothesis must be rejected—it is not possible to use the OLS estimation. Similarly, the results of the Hausman test (in both cases, the value is lower than the level of significance 0.05) indicate rejection of the null hypothesis, which means choosing the model with fixed effects as best describing both response variables.

Parameters of the model with fixed effects for the DR indicates that the GROW variable is statistically insignificant. It means that the company growth measured by the dynamics of assets does not play a statistically significant role in shaping of the total debt in the companies studied.

The TANG, SIZE, PROF, LIQ, NDTs variables were proved significant. The first four variables have a negative impact on total debt of the company (DR). In the case of TANG variable the capital structure of Polish enterprises is similarly affected like in the case of enterprises from United Kingdom and China (Chittenden et al. 1996; Huang and Song 2006). For the SIZE and PROF variables we have found the same dependence like Rajan and Zingales (1995), Barclay and Smith (1996) and Bauer (2004) (USA and Czech Republic).

For the last variable (NDTS) the positive relationship was observed. It means that when the share of fixed assets in total assets, company size, profitability and liquidity were higher, the average total debt ratio is lower. Determinant increasing total debt ratio is a non-debt tax shield. It confirms findings of Campbell and Jerzemowska

**Table 5** Result of models' estimations

| Variable/Model     | OLS                         |                              | Random effects                           |  | Fixed effects          |                       |
|--------------------|-----------------------------|------------------------------|--|--|------------------------|-----------------------|
|                    | DR                          | LDR                          | DR                                       | LDR                                      | DR                     | LDR                   |
| Constant           | 0.6867***<br>(0.0583)       | -0.0927***<br>(0.0150)       | 0.8734***<br>(0.0756)                    | -0.03578<br>(0.0238)                     | 1.9656***<br>(0.1419)  | 0.0232<br>(0.0339)    |
| TANG               | -0.5027***<br>(0.0369)      | 0.1487***<br>(0.0095)        | -0.5010***<br>(0.0423)                   | 0.12749***<br>(0.0115)                   | -0.4147***<br>(0.0564) | 0.1165***<br>(0.0134) |
| SIZE               | 0.0027<br>(0.0050)          | 0.0080***<br>(0.0013)        | -0.0140**<br>(0.0065)                    | 0.00460**<br>(0.0020)                    | -0.1086***<br>(0.0123) | 4.71e-5<br>(0.0029)   |
| GROW               | -1.98e-7<br>(7.22e-7)       | 6.26e-8<br>(1.86e-7)         | -4.9e-7<br>(6.84e-7)                     | -4.49e-8<br>(1.62e-7)                    | -1.13e-6<br>(6.92e-7)  | -1.42e-7<br>(1.64e-7) |
| PROF               | -0.8859***<br>(0.0307)      | 0.0043<br>(0.0079)           | -0.8266***<br>(0.0301)                   | 0.00796<br>(0.0073)                      | -0.7841***<br>(0.0313) | 0.0070<br>(0.0075)    |
| LIQ                | -0.0015***<br>(0.0003)      | 4.52e-5<br>(8.79e-5)         | -0.0013***<br>(0.0003)                   | 7.91e-5<br>(7.80e-5)                     | -0.0010***<br>(0.0003) | 8.15e-5<br>(7.95e-5)  |
| NDTS               | 1.4486***<br>(0.238)        | 0.2122***<br>(0.0614)        | 1.6634***<br>(0.2597)                    | 0.12392*<br>(0.0675)                     | 1.2119***<br>(0.3132)  | 0.05504<br>(0.0747)   |
| No. of obs.        | 3118                        | 3118                         | 3118                                     | 3118                                     | 3118                   | 3118                  |
| Adj. R squared     | 0.2600                      | 0.1170                       |  |  |                        |                       |
| Breusch-Pagan test | LM = 643.61<br>p = 5.5e-142 | LM = 1281.55<br>p = 1.6e-280 | Chi-squared(1) = 643.61<br>p = 5.5e-142  | Chi-squared(1) = 1281.55<br>p = 1.2e-280 |                        |                       |
| Hausman test       | H = 123.795<br>p = 2.6e-024 | H = 21.847<br>p = 0.00129    | Chi-squared (6) = 123.80<br>p = 2.6e-024 | Chi-squared (6) = 21.85<br>p = 0.00129   |                        |                       |

Standard errors are in parentheses

Source: Own elaboration

\*Variable significant at the level p = 0.1

\*\*Variable significant at the level p = 0.05

\*\*\*Variable significant at the level p = 0.01

(2001) for Polish enterprises. It is the same dependence as diagnosed by Chaplinsky and Niehaus (1990) in the USA.

There is only one statistically significant variable affecting the level of the LDR. It's the TANG variable with a positive sign. It means that the higher the share of fixed assets in total assets, higher will be the long-term debt ratio.

## 6 Conclusions

Table 6 summarizes the research results in the background of the factors resulting from modern capital structure theories. The comparative analysis of the data leads to the conclusion that the formation of capital structure (measured by total debt ratio) of companies listed on the Warsaw Stock Exchange is most adequately explained by the pecking order theory. According to this theory increasing the share of fixed assets in total assets, profitability and liquidity in a company causes a reduction in total debt. And it is happened in the enterprises studied. The pecking order theory does not indicate precisely the direction of the relationship of the company size and capital structure. In the case of the studied companies it is negative. For the GROW variable, which according to the pecking order theory has a positive impact on the total debt, the dependence was not observed. The last variable (NDTS) affected total debt ratio differently than according to the pecking order theory. The positive relationship between NDTS and debt corresponds to the agency theory.

These results confronted with the analysis for the long-term debt ratio indicate an important issue concerning the specifics of Polish companies. While a large number of studies conducted in the world confirm the significance of the impact of the factors considered in this study on both general and long-term ratios, in Polish enterprises the dependence is noticeable only for the total debt. Long-term debt is determined only by the share of fixed assets in total assets. The assignment on this basis adequate capital structure theory for long-term debt ratio seems doubtful. It indicates the importance of short-term debt for financing Polish enterprises, including, and perhaps to a great degree, trade credit.

**Table 6** Influence of selected factors on share of debt in financing sources

| Factor/<br>share of<br>debt | Agency<br>theory | Signaling<br>theory | Pecking<br>order theory | Static trade-<br>off theory | Research<br>results DR | Research<br>results LDR |
|-----------------------------|------------------|---------------------|-------------------------|-----------------------------|------------------------|-------------------------|
| TANG                        | +                | n/a                 | –                       | +                           | –                      | +                       |
| SIZE                        | +                | n/a                 | ±                       | +                           | –                      | n/a                     |
| GROW                        | –                | +                   | +                       | –                           | n/a                    | n/a                     |
| PROF                        | +                | +                   | –                       | +                           | –                      | n/a                     |
| LIQ                         | n/a              | n/a                 | –                       | +                           | –                      | n/a                     |
| NDTS                        | +                | n/a                 | –                       | –                           | +                      | n/a                     |

+ positive dependence; – negative dependence; ± unspecified dependence; n/a no grounds to identify the dependence

Taking into account the total debt ratio as a measure of the capital structure of Polish enterprises, the identified dependences can confirm the research hypothesis. The capital structure depends on the share of fixed assets in total assets, company size, its profitability, liquidity and on the non-debt tax shield. An exception to the rule is the company, growth for which there was no impact on the total debt.

## References

- Abeywardana, N. L. E., & Banda, Y. K. W. (2015). Impact of observable determinants and unobservable effect on capital structure: Evidence from quoted public manufacturing companies in Sri Lanka. *The International Journal of Business & Management*, 3(6), 150–158.
- Barclay, M. J., & Smith, C. W. (1996). On financial architecture: Leverage, maturity and priority. *Journal of Applied Corporate Finance*, 8(4), 4–17.
- Barowicz, M. (2014). *Determinanty struktury kapitałowej przedsiębiorstwa. Podejście empiryczne (Determinants of Capital Structure of Company. Empirical Approach)*. Kraków: Wyd. edu-Libri [in Polish].
- Bauer, P. (2004). Determinants of capital structure: Empirical evidence from the Czech Republic. *Czech Journal of Economics and Finance*, 54, 2–21.
- Błach, J. (2009). Ewolucja teorii struktury kapitału (Evolution of capital structure theory). *Finanse (Finance)*, 1, 87–106 [in Polish].
- Buferna, F., Bangassa, K., & Hodgkinson, L. (2005). *Determinants of capital structure: Evidence from Libya*. Research Paper Series Management School, University of Liverpool.
- Campbell, K., & Jerzemowska, M. (2001). Capital structure decisions made by companies in a transitional economy. In D. Zarzecki (Ed.), *Financial management objectives – organisation – tools* (pp. 51–76). Warszawa: Fundacja Rozwoju Rachunkowości w Polsce.
- Cekrezi, A. (2013). Impact of firm specific factors on capital structure decision: An empirical study of Albanian firms. *European Journal of Sustainable Development*, 2(4), 135–148.
- Chaplinsky, S., & Niehaus, G. (1990). *The determinants of inside ownership and leverage*. University of Michigan Working Paper, Ann Arbor.
- Chittenden, F., Hall, H., & Hutchinson, P. (1996). Small firm growth, access to capital markets and financial structure: Review of issues and empirical investigation. *Small Business Economics*, 8 (1), 59–67.
- Cortez, M. A., & Susanto, S. (2012). The determinants of corporate capital structure: Evidence from Japanese manufacturing companies. *Journal of International Business Research*, 11(3), 121–133.
- Cwynar, A., Cwynar, W., & Dankiewicz, R. (2015). Studies of firm capital structure determinants in Poland: An integrative review. *e-Finase*, 11(4), 1–22.
- Frank, M. Z., & Goyal, V. K. (2003). Testing the pecking order theory of capital structure. *Journal of Financial Economics*, 67, 217–248.
- Greene, W. H. (2003). *Econometric analysis*. Upper Saddle River, NJ: Prentice Hall.
- Harris, M., & Raviv, A. (1991). The theory of capital structure. *The Journal of Finance*, 46(1), 297–355.
- Hirshleifer, J. (1966). Investment decision under uncertainty: Applications of the state preference approach. *Quarterly Journal of Economy*, 80, 252–277.
- Huang, R., & Ritter, J. R. (2009). Testing theories of capital structure and estimating the speed of adjustment. *Journal of Financial and Quantitative Analysis*, 44(2), 237–271.
- Huang, S. G., & Song, F. M. (2006). The determinants of capital structure: Evidence from China. *China Economic Review*, 17(1), 14–36.
- Imtiaz, F., Mahmud, K., & Mallik, A. (2016). Determinants of capital structure and testing of applicable theories: Evidence from pharmaceutical firms of Bangladesh. *International Journal of Economics and Finance*, 8(3), 23–32.

- Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, 76(2), 323–329.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305–360.
- Kędzior, M. (2012). Capital structure in EU selected countries – micro and macro determinants. *Argumenta Oeconomica*, 1(28), 69–117.
- Kraus, A., & Litzenberger, R. H. (1973). A state-preference model of optimal financial leverage. *The Journal of Finance*, 28(4), 911–922.
- Kufel, T. (2007). *Ekonometria. Rozwiązywanie problemów z wykorzystaniem programu GRETL (Econometrics. Solving Problems Using GRETL)*. Warszawa: Wydawnictwo Naukowe PWN [in Polish].
- Maddala, G. S. (2006). *Ekonometria (Econometrics)*. Warszawa: Wydawnictwo Naukowe PWN [in Polish].
- Mazur, K. (2007). The determinants of capital structure choice: Evidence from Polish companies. *International Advances in Economic Research*, 13(4), 495–514.
- Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and theory of investment. *The American Economic Review*, 48(3), 261–297.
- Myers, S. C. (1984). The capital structure puzzle. *The Journal of Finance*, 39(3), 575–592.
- Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13, 187–221.
- Nejad, N. R., & Wasizzaman, S. (2013). The empirical analysis of capital structure determinants – Evidence from Malaysia. *Engineering and Technology*, 74, 466–474.
- Pandey, I. M., Ranjit, M. K., & Chotigeat, T. (2000). Capital structure choices in an emerging capital market: Case of Thailand. *Management and Change*, 4, 1–32.
- Qian, Y., Tian, Y., & Wirjanto, T. S. (2007). *An empirical investigation into the capital structure determinants of publicly listed Chinese companies: A static analysis*. University of Zhejiang, Hangzhou China and Waterloo, Canada.
- Rajan, R. G., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *Journal of Finance*, 50, 1421–1460.
- Rauh, J. D., & Sufi, A. (2010). Capital structure and debt structure. *The Review of Financial Studies*, 23(12), 4242–4280.
- Ross, S. A. (1977). The determination of financial structure: The incentive-signalling approach. *The Bell Journal of Economics*, 8(1), 23–40.
- Uddin, N. (2015). Determinants of corporate capital structure: A theoretical integration and some empirical evidences. *International Journal of Economics and Finance*, 7(7), 254–277.
- Um, T. (2001). *Determination of capital structure and prediction of Bankruptcy in Korea*. Nonpublished doctor's thesis, Cornell University, Ithaca, NY.
- Upneja, A., & Dalbor, M. (2001). The choice of long-term debt in the US lodging industry. *UNVL Journal of Hospitality, Tourism and Leisure Science* [online]. Accessed October 20, 2016, from <http://hotel.unlv>

# Branch Group Purchasing Organizations vs. Sales Profitability of Commercial Companies



Grzegorz Zimon

**Abstract** When analyzing the financial situation of an enterprise, it is worth looking at the sales profitability ratios. When managers know their result, they receive information whether the sales is profitable, and to what extent the realized margin covers fixed and variable costs. The company managers looking for solutions that will help increase sales, sales revenues, and reduce costs. One of the popular methods to achieve such results is a joint action within a group purchasing organization. The aim of this article was to present an impact of branch group purchasing organizations on the financial results and the profitability of sales of enterprises operating in them. In the study the functioning of the groups, and the benefits that units operating in them in the area of cost and revenue management gain, were discussed.

The article analyzes the profitability of sales on the example of 31 commercial enterprises operating in branch group purchasing organizations and 19 operating independently in the market. The research period covered the years 2013–2015. The selected ratios of the ratio analysis and information from the preliminary analysis were used for the research. The analysis showed that functioning within branch group purchasing organizations allows enterprises to obtain a positive financial result. In the case of enterprises operating independently in the market, a large part of them suffered losses. Sales profitability in the studied groups is affected by the size of the enterprise, its location and the share of fixed costs. When analyzing the results, it can be stated that enterprises operating in the groups obtained higher results than independent entities. The best results are obtained by small units operating in groups, whose annual turnover reaches PLN 15–20 mln (USD 3.6–4.8 mln).

**Keywords** Group purchasing organizations · Commercial companies · Profitability

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## 1 Introduction

The business management process is a constantly making decisions process related to the safety of the company's operation. Managers need to decide in which direction to run the unit: whether to act aggressively, but to achieve high profits, or focus on the financial security of the enterprise at the expense of reducing profits. If the owners want the company to bring expected profits, sales should be suspended, and the cost level should be optimized. Simply striving to reduce costs in the long run can reduce the company's production potential, which will bring a reduction in revenues. Many authors believe that small and medium-sized enterprises will have particular advantages if they organize more effective purchases (Dollinger and Kolchin 1986). Therefore, one of the popular solutions used in small and medium-sized enterprises that improves the efficiency of purchases, and which positively affects the growth of labor force, is functioning in group purchasing organizations (GPOs). Purchasing in relatively small and intensive groups is becoming increasingly popular in both private and public sector (Essig 2000). Joint operation of small and medium-sized enterprises within multi-entity organizations such as GPOs allows to increase operational safety and profitability. This is mainly achieved by using economies of scale. When analyzing the financial situation of an enterprise, a very important measure the attention should be paid to is the return on sales. When managers know the result of the sales profitability index, they can receive information whether and to what extent the realized sales margin will cover costs and what profit the company managers can expect. If one wants this ratio to reach a high level, revenues should increase faster than costs. When analyzing revenues in commercial enterprises, the greatest attention should be focused on net revenues from sales of goods and materials. They usually have the largest share in total revenues. In the case of cost analysis, the most important group of costs in commercial enterprises is the value of goods and materials sold at the purchase price, i.e. the price of purchased goods. Reducing this cost item, and then imposing a high margin, and increasing sales revenues is the key to rise profitability, and in particular sales profitability. One of the very popular methods to achieve such effects is the organization of trade enterprises in the branch group purchasing organizations. It is very important for enterprises to function in branch GPOs, as in such groups the economies of scale are used to a greater extent. In the branch GPOs companies cooperate, mutual trust emerges, which is the key to the success of such organizations (Schotanus et al. 2010). The article presents how companies operating in branch groups can reduce costs, increase revenues, which has a positive impact on the profitability of sales. Until now, research in the field of purchasing groups in the healthcare sector has been the most common in the literature (Nollet et al. 2017). In the US, hospitals organize about 70% of purchases through GPOs (Safaei et al. 2017). The authors in their research focus on the main benefits of functioning in GPOs, i.e. lowering the prices of purchased goods (Tella and Virolainen 2005), and reducing administration costs (Nollet and Beaulieu 2005).

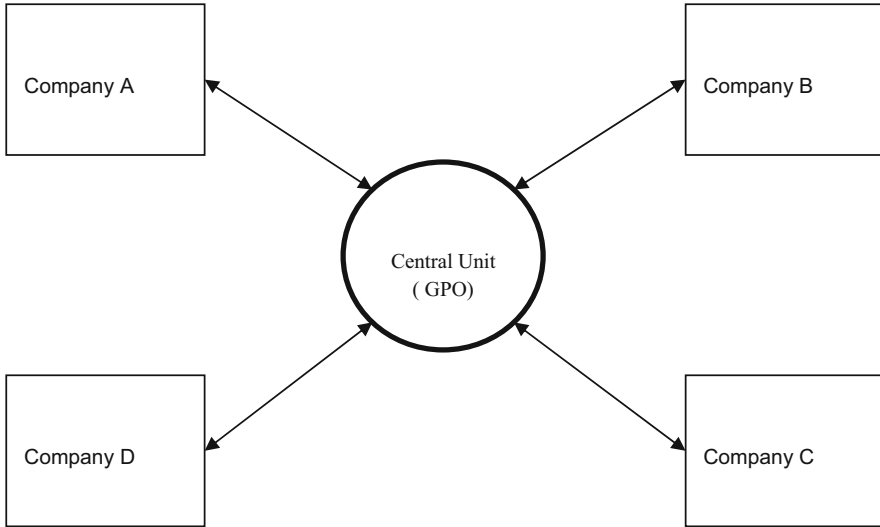
The article presents the results of profitability of sales of units operating in branch GPOs against the background of enterprises operating in multi-sector purchasing groups. The analysis was carried out on the basis of financial data for the years 2013–2015. The units surveyed operate in the oldest and largest Polish purchasing groups such as Instal Konsorcjum and ABG. These companies operate in the heating and sanitation industry.

## 2 Group Purchasing Organizations

One of the simplest methods for companies to get the lowest prices of purchased goods and an increase their turnover is functioning within the branch purchasing groups. The first Group Purchasing Organizations—GPOs appeared in the US in 1950. Their maximum development was in the 80s and 90s (Weinstein 2006). In Poland, the strong growth of purchasing groups in the retail sector can be observed in the 90s. The main aim of their creation was to oppose the strong foreign competitors. Also, the group should facilitate cooperation on the recipient's supplier line (Adobor and McMullen 2014). Thus, despite the fact that cooperative purchasing is as old as ancient Egypt and Babylon (Wooten 2003), the terminology is broad and not yet fully stabilized. There are several terms that define GPOs. However, to define them properly, it is necessary to distinguish two concepts, namely group purchasing and a purchasing group. Very often one encounters a situation when several companies are working together and make a one-time or several-times common purchase. This type of action should be defined as group purchasing, i.e. a common action in order to purchase goods, products, semi-finished products, materials or services without creating a special supervising unit and without additional restrictions imposed on individual participants for the transaction. It is a popular activity to get lower prices. However, a purchasing group should be understood differently. A purchasing group should be defined as a group of companies of the same or different branch which combine to make joint purchases (Zimon 2015). Another simple definition defines a purchasing group as a group of cooperating companies managed by a specially created central unit (this is a company which is defined as a group purchasing organization). Its primary objective is the realization of tasks commissioned by the companies making up the purchasing group, which are to ensure better financial performance and safety for companies creating a purchasing group (Zimon 2013).

A purchasing group consists of dependent or independent organizations that share and/or bundle together in order to achieve mutually compatible goals that they could not achieve easily alone (Lambe et al. 2002). There are also central units of purchasing groups that do not make purchases and only negotiate with suppliers (Yang et al. 2017). Another expanded definition defines a purchasing group as co-operating companies that collectively control and improve the property, information and cash flows in the producer—central unit—company relationship. The organizational chart of the branch purchasing group is shown in Fig. 1.

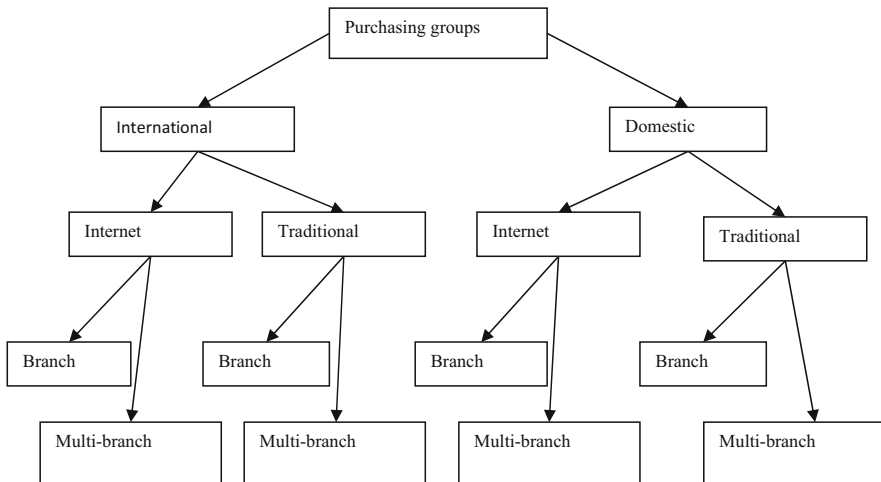




**Fig. 1** Organization scheme of a group purchasing organization. Source: Author's own study

The purpose of purchasing groups is to protect the individual companies against strong competition and increase the bargaining power (Praksth 2009). A purchasing group can be described as powerful buyers. They meet the important criteria characteristic for powerful buyers (Porter 2001): they buy large quantities of products, products purchased in the sector are standardized, products purchased in a given sector by a group of buyers are an important part of its costs. The group will operate on the principles of developing databases of suppliers. It will accept a definite attitude towards suppliers in order to force them to meet all the necessary requirements (Leenders et al. 2006). In the literature this type of purchasing group is referred to as third-party groups. Third-party groups mostly involve long term piggy backing made by public or private external parties or central authorities with devoted resources. A third party is a profit or a non-profit organization and may be owned by the members of the group (Schotanus and Telgen 2007).

Recently, a lot of purchasing groups are organized by the Internet. One can find a number of advertisements where the organizer (integrator) invites to cooperation. This type of group is, e.g. a pharmacy or an automotive wholesaler. Therefore, it is worth dividing the purchasing groups due to the integrating unit into traditional and Internet ones (Zimon 2013). The Internet purchasing groups are appointed to perform several operations, and then, as soon as they arise, they are resolved. Another important division in terms of efficiency analysis of purchasing groups is a division due to the selection of participants into the branch and multi-branch groups. This division is important because of the intensity of the most important features for the assumed purchasing groups, i.e. the economies of scale. Purchasing groups, due to participants, can also be divided into national and international ones. Figure 2 shows the details.



**Fig. 2** Classification of purchasing groups. Source: Author’s own study

In the branch purchasing groups there are companies operating within only a single branch. This is of positive significance to increase “power buy” economies of scale. Companies operating in this type of group order the same type of goods. This limits the range of suppliers to the minimum. The limitation of suppliers makes that the scale of the order is large. The central unit negotiating conditions of the purchase for a branch purchasing group has a strong advantage in the form of a size order. However, there are groups that allow their members to make purchases from other suppliers, e.g. if they want to buy products of better quality (Sandberg and Mena 2014). Company integration within the supply chain is essential to fight the competition, for joint actions, and the lack of rivalry helps avoid self-destruction (Christopher 2011). A supplier (producer) must be reckoned with. In the case of multi-branch purchasing groups this scale effect is smaller as there are many divisions due to the choice of suppliers. The most serious drawback of functioning within the groups is a difficulty to make a decision. Diversity of customers within one purchasing group may prevent joint purchases from being made (Yan et al. 2017). If this situation appears more often, the functioning of such groups will lose their significance. Representatives of individual companies have a different vision of development and a purchasing group needs to follow a commonly determined course of action.

### **3 An Impact of Branch Group Purchasing Organizations on the Costs and Revenues of Enterprises**

Operation in a purchasing group brings a number of advantages. They can be divided into three groups: low price of the goods purchased, beneficial terms of trade credit, and other benefits. The greatest benefit, which is achieved by companies operating within purchasing groups, is a low price. This is possible thanks to economies of scale. Often, in order to get a good price, group members must meet the appropriate purchase limits (Doucette 1997). Purchasing power in the branch purchasing groups is an operation in the same area—the branch. The number of suppliers is limited, which intensifies the effect of scale, thus the benefits are large. The central unit of the GPO negotiating conditions on behalf of all units has a great strength in negotiations. It meets the conditions to become a powerful buyer. Thanks to this it achieves low prices. If the manufacturer offers a discount for an early payment, companies can benefit from an additional discount to buy goods. In addition, the central unit negotiates a long period for the payment of liabilities. This is often a very important weapon in the fight against competition. A long term for the payment of liabilities enables companies to extend payment periods, which allows maintaining the existing customers, and gives an opportunity to attract new customers. Low price and long-term debt repayment allows to increase sales revenues. Other benefits include, primarily low price of services, an exchange of experience, an ability of benchmarking and financial assistance. Mutual transactions are the simplest way to help. Enterprises within the branch purchasing groups can sell their products. The buying unit receives a long period for repayment of the liability, it is credited by another unit operating in the purchasing group. There may also be cash sales as immediate cash inflow improves the financial position of the unit. Mutual transactions in a situation where an enterprise has problems with financial liquidity avoid the costs related to additional lending activity.

Unfortunately, in practice, other benefits are hard to achieve. This is due to the fact that companies are gradually moving away from further co-operation. The only thing they are interested in is a joint purchase. Collaboration and cooperation of companies in many organizations do not completely eliminate the factor of competition, often this type of action is referred to as “partnership-like relationship” (Goffin et al. 2006). In companies operating in purchasing groups there is also competition, but it makes that the group develops and its power increases. Unfortunately, sometimes unhealthy competition may appear, as well as every company, in spite of the joint actions, takes care of their businesses and future.

## 4 Methodology and Subject of Research

The research was carried out on a group of 31 Polish small and medium-sized commercial enterprises operating in the construction industry. The companies analyzed annually receive turnovers from PLN 10 mln to PLN 100 mln (USD 2.3–23.8 mln). These companies sell only products related to heating and sanitary technology. The first GPOs in Poland were created in this industry. The companies analyzed belong to the two oldest purchasing groups in Poland, namely Consortium Instal Groups and the ABG group. The analysis was based on the financial data from 2013 to 2015. Functioning within purchasing groups has the greatest impact on the level of costs and sales volume. Therefore, two ratios regarding the profitability of sales were used for the research. The first stage of the analysis was the calculation of profitability ratios, then the dynamics of sales revenues and operating costs were compared. Then, the results were compared with those obtained by enterprises operating independently in the market. For the comparative analysis 19 enterprises operating independently in the market were used, these companies do not operate in multi-entity organizations. They also operate in the industry dealing with the trade of goods from the construction industry. The annual turnover of the analyzed units ranges from PLN 10 mln to PLN 100 mln (USD 2.3–23.8 mln).

## 5 Profitability of Sales Results in the Analyzed Enterprises

The research was conducted on a group of 31 commercial companies operating in the construction industry. The companies deal with the sales of only materials and products related to heating and sanitary technology. In Poland, there are two of this type of branch purchasing groups. The analysis was conducted based on the financial data from the years 2013–2015. The analysis showed that in 27 companies in the researched period sales revenue grew faster than operating costs. Functioning within purchasing groups means the use of economies of scale. Low prices of the goods purchased reduce the biggest groups of costs—the value of goods sold in the purchase price. Attractive prices allow increasing a turnover and gaining new customers. Additionally, the central unit organizes trainings for businesses, purchases vehicles, services, e.g. legal ones, debt collection, insurance, information technology, telecommunications, etc. All this reduces the costs in the column: external services position. When analyzing the costs by type, remunerations account for the largest share in this group. In this area a purchasing group has no possibility for their reduction. External services are the second group of costs in a few companies which constitute even higher share of remunerations. In four companies costs increased more quickly, and in one of them it is a consequence of changes among owners. Almost all companies in the periods surveyed recorded profits, and in only two periods a loss was recorded. Table 1 shows the results for a general rate profitability of net sales.

**Table 1** Profitability of net sales (%) in branch GPOs

| Company  | 2015 | 2014 | 2013 | Mean |
|----------|------|------|------|------|
| 1        | 2.0  | 2.1  | 2.0  | 2.0  |
| 2        | 7.2  | 4.9  | 4.0  | 5.3  |
| 3        | 7.0  | 4.8  | 6.1  | 6.0  |
| 4        | 3.0  | 6.0  | 3.0  | 4.0  |
| 5        | 4.1  | 5.0  | 3.2  | 4.1  |
| 6        | 2.0  | 3.1  | 4.0  | 3.0  |
| 7        | 4.0  | 5.1  | 6.2  | 5.1  |
| 8        | 2.3  | 3.0  | 3.0  | 3.0  |
| 9        | 4.1  | 3.0  | 3.2  | 3.4  |
| 10       | 6.8  | 5.7  | 3.0  | 5.2  |
| 11       | 3.4  | 2.1  | 5.4  | 3.6  |
| 12       | 2.0  | 1.0  | 1.0  | 1.3  |
| 13       | 3.3  | 1.0  | 1.0  | 1.8  |
| 14       | 3.2  | 6.0  | 6.0  | 5.0  |
| 15       | 4.3  | 7.3  | 6.1  | 5.9  |
| 16       | 1.0  | 1.1  | 1.3  | 1.1  |
| 17       | 7.2  | 8.4  | 8.1  | 7.9  |
| 18       | 2.4  | 2.3  | 2.2  | 2.3  |
| 19       | 11.2 | 11.5 | 10.2 | 11.0 |
| 20       | 9.3  | 9.1  | 9.4  | 9.3  |
| 21       | 5.1  | 5.3  | 4.1  | 4.8  |
| 22       | 3.2  | 5.0  | 3.4  | 3.9  |
| 23       | 3.3  | 2.0  | 2.0  | 2.4  |
| 24       | 1.0  | 0.6  | -0.1 | 0.5  |
| 25       | 1.2  | 1.0  | 1.1  | 1.1  |
| 26       | 1.1  | 6.5  | 1.3  | 3.0  |
| 27       | 2.1  | -0.1 | 1.4  | 1.5  |
| 28       | 4.6  | 4.8  | 2.4  | 3.9  |
| 29       | 1.1  | 0.9  | 1.7  | 1.3  |
| 30       | 2.0  | 2.0  | 2.0  | 2.0  |
| 31       | 4.1  | 6.1  | 4.8  | 5.0  |
| The mean | 4.2  | 4.1  | 3.6  | 3.9  |

Source: Author's own study

Profitability of net sales ratio informs about the share of net profit in the value of sales. This is the ratio of the net result to total revenues. A more detailed picture of the profitability of sales is presented in Table 2, which uses a rate of return on sales.

Sales profitability (profitability ratio of products, goods and materials sold) is the ratio of profit on sales to revenues from sales of products, goods and materials. It informs about the level of profitability achieved directly from the core business.

When analyzing the results from Table 2, one can notice that the best results are received by small companies where the turnover is of PLN 15–20 mln (USD 3.6–4.8 mln). The companies 2, 17, 19, 20, are the organizations that have only a few

**Table 2** Sales profitability (%) in branch GPOs

| Company  | 2015 | 2014 | 2013 | Mean |
|----------|------|------|------|------|
| 1        | 4.7  | 5.1  | 3.2  | 4.3  |
| 2        | 8.2  | 7.4  | 5.1  | 6.9  |
| 3        | 9.2  | 7.3  | 7.1  | 7.9  |
| 4        | 3.2  | 7.3  | 3.1  | 4.5  |
| 5        | 5.2  | 7.1  | 6.2  | 6.1  |
| 6        | 4.3  | 4.0  | 3.9  | 4.1  |
| 7        | 7.2  | 8.1  | 8.1  | 7.8  |
| 8        | 4.1  | 4.1  | 4.0  | 4.0  |
| 9        | 4.9  | 3.1  | 4.0  | 4.0  |
| 10       | 8.2  | 5.9  | 2.7  | 5.6  |
| 11       | 2.9  | 3.8  | 7.0  | 4.6  |
| 12       | 3.9  | 4.0  | 1.0  | 3.0  |
| 13       | 3.1  | 1.0  | 1.0  | 1.7  |
| 14       | 4.2  | 7.1  | 6.9  | 6.1  |
| 15       | 2.0  | 1.0  | 1.0  | 1.3  |
| 16       | 3.9  | 4.9  | 1.1  | 3.3  |
| 17       | 7.5  | 8.2  | 8.2  | 8.0  |
| 18       | 5.0  | 5.3  | 4.0  | 5.1  |
| 19       | 11.5 | 10.3 | 9.8  | 10.5 |
| 20       | 9.9  | 9.0  | 8.0  | 8.9  |
| 21       | 7.1  | 6.1  | 2.9  | 5.4  |
| 22       | 3.1  | 5.1  | 4.3  | 4.2  |
| 23       | 4.3  | 4.2  | 3.1  | 3.9  |
| 24       | 2.0  | 0.8  | 0.1  | 0.9  |
| 25       | 1.8  | 1.9  | 2.2  | 2.0  |
| 26       | 7.1  | 7.4  | 6.0  | 6.8  |
| 27       | 2.1  | -0.1 | 1.0  | 1.0  |
| 28       | 4.4  | 5.1  | 3.2  | 4.2  |
| 29       | 1.3  | 2.4  | -0.1 | 1.2  |
| 30       | 4.4  | 4.2  | 4.1  | 4.2  |
| 31       | 4.5  | 6.3  | 7.3  | 6.0  |
| The mean | 5.0  | 5.0  | 4.2  | 4.7  |

Source: Author's own study

subsidiaries. And when analyzing profitability, it is worth dividing the costs into variable and fixed ones. For small businesses the fixed costs are not high. These companies have not several dozen, but a few branches, and thanks to this the fixed costs of maintaining these branches fall off. Not always all branches are profitable. Some are formed in places where there is a strong competition to select only the presence of the company. Companies where the share of fixed costs increases, are more exposed to risk reduction in turnover compared to the companies with low share of these costs (Higgins 2012). Companies operating in marketing and purchasing groups can organize a delivery in several ways. This depends on having the

central warehouse that can serve as a point of separation. The supply chain expands and companies should pay attention to it (Nollet and Beaulieu 2005). The extended supply chain by the branch network is another increase in costs. Unfortunately, in large companies too extensive branch network means also high cost of logistics. They can be classified into variable costs. In companies that obtained the highest rates of sales profitability, the low costs of external services can be seen. Transport and delivery of goods is mostly supported by their own transportation. In biggest companies the costs of external services for transport are very high. In large organizations remuneration costs are also at a higher level compared to smaller companies. Remunerations, rents, outsourcing everything decreases profitability ratio. Companies that obtained the highest ratios, operate in cities with populations of 30–180 thous. Residents. They are not the biggest cities and functioning within the branch purchasing group puts them in the position of leaders of local markets. Companies operating in major Polish cities obtain low sales profitability ratios. It is caused by high competition that makes companies lower prices in order to acquire contractors. The low profitability of these enterprises is influenced by high costs of remuneration and fixed costs concerning, for example, rent, local taxes, which in large cities are high.

In the case of 19 enterprises operating independently in the market, in 9 enterprises in the years analyzed there was a loss, the remaining units obtained profits. In the case of dynamics analysis, only eight enterprises recorded a higher dynamics of revenues over costs. The detailed results of ten enterprises, where profits were recorded, are presented in Tables 3 and 4.

Profitability of net sales is the ratio of the net result to total revenues.

Sales profitability is the ratio of profit on sales to revenues from sales of products, goods and materials. When analyzing Tables 1, 2, 3 and 4, it can be seen that the higher profitability of sales is obtained by enterprises operating together in branch purchasing groups.

**Table 3** Profitability of net sales (%) in enterprises operating independently in the market in 2013–2015

| Enterprise | 2015 | 2014 | 2013 | Mean |
|------------|------|------|------|------|
| 1          | 2.1  | 1.2  | 2.3  | 1.9  |
| 2          | 1.3  | 2.3  | 2.1  | 1.9  |
| 3          | 1.1  | 1.0  | 1.0  | 1.0  |
| 4          | 2.0  | 3.1  | 2.8  | 2.6  |
| 5          | 4.1  | 5.4  | 4.3  | 4.5  |
| 6          | 1.1  | 1.1  | 3.1  | 1.8  |
| 7          | 1.0  | 1.0  | 1.0  | 1.0  |
| 8          | 1.0  | 2.8  | 4.7  | 2.8  |
| 9          | 2.1  | 2.1  | 4.3  | 2.8  |
| 10         | 2.0  | 3.0  | 2.7  | 2.6  |

Source: Author's own study

**Table 4** Sales profitability (%) in enterprises operating independently in the market in 2013–2015

| Enterprise | 2015 | 2014 | 2013 | Mean |
|------------|------|------|------|------|
| 1          | 4.3  | 5.2  | 4.1  | 4.5  |
| 2          | 2.8  | 2.0  | 4.1  | 3.0  |
| 3          | 2.1  | 1.9  | 2.9  | 2.3  |
| 4          | 4.1  | 4.2  | 5.2  | 4.5  |
| 5          | 6.2  | 6.8  | 6.6  | 6.5  |
| 6          | 1.8  | 2.0  | 3.7  | 2.5  |
| 7          | 2.1  | 1.9  | 3.0  | 2.3  |
| 8          | 2.0  | 4.0  | 5.7  | 3.9  |
| 9          | 2.9  | 2.9  | 4.7  | 3.5  |
| 10         | 2.6  | 4.2  | 3.4  | 3.4  |

Source: Author's own study

## 6 Conclusions

The functioning of companies together, mutual cooperation, creation of purchasing groups is an opportunity for small and medium-sized enterprises to increase their competitive strength.

The analysis of the results from Tables 1, 2, 3 and 4 showed that enterprises operating in branch group purchasing organizations obtained higher profitability rates than enterprises operating independently in the market. Joint operation allows them to increase turnover, reduce costs and make profits. In the 27 companies surveyed, a greater increase in sales revenue over the costs of operating activity was reported over a 3-year period. In the case of enterprises operating independently in the market only eight entities recorded an increase in the dynamics of revenues over the growth rate of costs in the years 2013–2015. In addition, almost half of the units analyzed recorded a loss. Operating independently in the market is becoming more and more risky for small and medium-sized enterprises. They do not have a chance to compare with enterprises operating in various types of multi-entity organizations, unless they are powerful companies, whose turnover exceeds the total turnover of the purchasing group. However, profitability ratios of sales in the enterprises operating in the branch purchasing groups achieve different results. Profitability depends largely on the level of fixed costs. The highest results were achieved by companies with medium turnover. These companies had a few subsidiaries and their headquarters were located in small towns. In the area where they operate, there is not much competition. The largest companies with turnover of PLN 60–100 mln (USD 14.2–23.8 mln) received the weakest results. They work in the biggest cities in Poland, where the competition is strong. Remuneration costs, fixed costs to maintain branches, logistics costs are a serious group of costs which significantly reduce the profitability of sales, but the scale of trading allows them to make a profit. Comparing the results of profitability ratios in both groups of enterprises, better results are visible in units operating in branch purchasing groups. The average result of net sales profitability for branch groups is 3.9%, in non-resident units it is 2.3%. The average result of the sales profitability index in



branch groups is 4.7%, whereas in stand-alone units it is 3.5%. However, it should be noted that these results cover only those enterprises acting independently in the market that have gained profits.

To sum up, in purchasing groups set up by enterprises dealing with trade in construction products, including heating and sanitary technology, better results can be observed in the area of sales profitability in comparison to entities operating independently in the market. This is due to the benefits gained by entities operating in branch purchasing groups. Joint operation and the use of economies of scale reduce costs in enterprises, and the obtained advantageous trade credit is an excellent tool to fight against competition. Attractive loans, low prices allow to acquire new business partners and, what is important, keep existing ones. In this way, functioning of purchasing groups allow to reduce significantly costs and increase revenues, which is confirmed by the profitability results of sales of units operating in industry purchasing groups.

## References

- Adobor, H., & McMullen, R. S. (2014). Strategic purchasing and supplier partnership – The role of a third party organization. *Journal of Purchasing & Supply Management*, 20, 263–272.
- Christopher, M. (2011). *Logistics & supply chain management*. London: Prentice Hall.
- Dollinger, M. J., & Kolchin, M. G. (1986). Purchasing and the small firm. *American Journal of Small Business*, 10(3), 33–45.
- Doucette, W. R. (1997). Influences on member commitment to group purchasing organizations. *Journal of Business Research*, 40, 183–189.
- Essig, M. (2000). Purchasing consortia as symbiotic relationships: Developing the concept of consortium sourcing. *European Journal of Purchasing & Supply Management*, 6(1), 13–22.
- Goffin, K., Lemie, F., & Szejczewski, M. (2006). An exploratory study of close supplier-manufacture relationship. *Journal of Operations Management*, 24, 189–209.
- Higgins, R. C. (2012). *Analysis for financial management*. New York: McGraw-Hill Irwin.
- Lambe, C. J., Spekman, R. E., & Hunt, S. D. (2002). Alliance competence, resources, and alliance success: Conceptualization, measurement, and initial test. *Journal of the Academy of Marketing Science*, 30(2), 141–158.
- Leenders, M., Johnson, P. F., Flynn, A., & Fearon, H. E. (2006). *Purchasing and supply management*. New York: MacGrow-Hill/Irwin.
- Nollet, J., Beaulieu, M., & Fobbe-Costes, N. (2017). The impact to performance measurement on purchasing group dynamics: The Canadian experience. *Journal of Purchasing & Supply Management*, 23, 17–27.
- Nollet, J., & Beaulieu, M. (2005). Should an organization join a purchasing group? *Supply Chain Management: An International Journal*, 10(1), 11–17 [online]. Accessed February 2005, from [https://www.researchgate.net/publication/242337545\\_Should\\_an\\_Organisation\\_Join\\_a\\_Purchasing\\_Group](https://www.researchgate.net/publication/242337545_Should_an_Organisation_Join_a_Purchasing_Group)
- Porter, M. (2001). *Porter about competition*. Warszawa: PWE.
- Praksth, S. (2009). *Group purchasing organization – Undisclosed scandal in the U.S healthcare industry*. New York: Palgrave Macmillian.
- Safaei, A. S., Heidarpoor, F., & Paydar, M. M. (2017). A novel mathematical model for group purchasing in healthcare. *Operations Research for Health Care*, 15(2017), 82–90.

- Sandberg, E., & Mena, C. (2014). Exploring strategic strengths and weakness of retail purchasing groups. *The International Review of Retail Distribution and Consumer Research*, 25, 276–297 [online]. Accessed November 19, 2014, from <https://doi.org/10.1080/09593969.2014.982679>
- Schotanus, F., & Telgen, J. (2007). Developing a typology of organisational forms of cooperative purchasing. *Journal of Purchasing & Supply Management*, 13(1), 53–68.
- Schotanus, F., Telgen, J., & de Boer, L. (2010). Critical success factors for managing purchasing groups. *Journal of Purchasing & Supply Management*, 16(1), 51–60.
- Tella, E., & Virolainen, V. M. (2005). Motives behind purchasing consortia. *International Journal of Production Economics*, 93–94, 161–168.
- Weinstein, B. L. (2006). The role of group purchasing organizations (GPO) in the U.S. medical industry supply chain. *Estudios De Economia Aplicada*, 24(3), 790–810.
- Wooten, B. (2003). Cooperative purchasing in the 21st century. *Inside Supply Management*, 14(2), 4–7.
- Yan, Y., Zhao, R., & Lan, Y. (2017). Asymmetric retailers with different moving sequences: Group buying vs. individual purchasing. *European Journal of Operational Research*, 261(3), 903–917.
- Yang, Y. H., Cheng, H. K., Ding, C., & Li, S. (2017). To join or not to join group purchasing organization: A vendor's decision. *European Journal of Operational Research*, 258(2), 581–589.
- Zimon, G. (2013). Financial liquidity in enterprises forming purchasing groups. In A. Kopinski & P. Kowalik (Eds.), *Financial management – Theory and practice* (pp. 213–223). Research papers of Wrocław University of Economics 321. Wrocław: Wydawnictwo UE we Wrocławiu.
- Zimon, G. (2015). The influence of the marketing and purchasing group on the situation and financial results of enterprises. In Z. Luty & M. Chmielowiec-Lewczuk (Eds.), *Accounting, macroeconomic policy, globalization* (pp. 284–290). Research papers of Wrocław University of Economics 390. Wrocław: Wydawnictwo UE we Wrocławiu.

# The Interdependence of Housing Market and Banking Sector in Croatia



Tamara Slišković, Martina Nakić, and Tomislav Sekur

**Abstract** The two-way causality between housing market and banking sector has been widely documented in housing economics literature. On the one hand, the volume of housing loans, interest rates and other terms of lending are often highlighted as significant determinants of demand for housing and therefore housing prices. On the other hand, variations in housing prices change the value of assets in banks' balance sheets. This might influence their loan potential. The aim of the paper is to investigate the mentioned bidirectional relationship in the case of Croatia. The interdependence between housing market and banking sector is examined within Vector Autoregressive (VAR) model. Housing market is represented by housing prices and construction variables and banking sector by volume of housing loans and corresponding interest rates. The empirical analysis shows that the causal relationship in Croatia mainly goes from the banking sector to housing market. On the other hand, there is a weak evidence of reverse causality which largely depends on chosen housing price index. These results suggest that housing market in Croatia does not follow typical patterns implied by widely accepted theoretical models.

**Keywords** Housing market · Housing prices · Banking sector · Housing loans · VAR model

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## 1 Introduction

Housing market fluctuations can have strong impact on economic activity and vice versa. This is described both in theoretical models and empirical research. The housing economics literature also confirms that there is a strong two-way causality between the housing market and banking sector.

The main aim of this paper is to examine the interdependence between the housing market and banking sector variables in the case of Croatia. The analysis of this relationship is done within Vector Autoregression framework.

The analysis showed that Croatian housing market doesn't follow typical behavior implied by economic theory. Namely, we found evidence of banking sector impact on housing market, since in both estimated VAR models housing prices and new construction respond positively to change in housing loans in accordance to economic theory. But, we haven't found conclusive answer on the effects that housing market variables have on banking sector (especially interest rate) since they depend on index used as a measure of housing prices.

The paper is structured as follows. After introduction, in the second chapter theoretical framework and review of previous research on the interconnectedness between housing market and banking sector is given. Data and methodology description and results of the empirical analysis are given in the third chapter. Finally, the last chapter sums up the conclusions.

## 2 Theoretical Background and Literature Review

The interaction between housing market and overall macroeconomic activity has been in the center of economic discussions since the beginning of this century. Goodhart and Hofmann (2007) state that strong declines in stock prices at the beginning of 2000s resulted in redirecting of funds from stocks to other asset forms, such as housing real estate. This led to the creation of housing market bubble, and housing wealth became an important component of total wealth.

Some studies such as Otrok and Terrones (2005) point out that housing real estate is the main component of total households' assets in industrialized countries, while their main liabilities are mortgage loans. This emphasizes the importance of the housing market as a specific segment of the entire real estate market, as well as the need to observe the implications of housing prices fluctuations. Namely, strong price changes in the housing market may have significant effects on macroeconomic activity, primarily through changes in households' net wealth and therefore changes in demand on housing and credit markets.

The household market, as well as any market, can be explained in terms of supply and demand. McQuinn and O'Reilly (2008) point out that a list of factors that have an impact on the supply and demand in the housing market is inexhaustible and any change in any of these factors leads to a shift in demand or supply curve which will

affect housing prices. Housing prices (current and expected), household income, mortgage interest rates, demographic factors and the availability of loans are among the factors that shape housing demand. Factors affecting housing supply include the cost of housing, the amount of available building land, zoning and planning restrictions and construction costs (McQuinn and O'Reilly 2008). Other studies identify even broader list of determinants of housing supply and demand (for example, Hlaváček and Komárek 2009).

Interest rate is the key variable in explaining the dynamics of housing prices. There is a strong evidence in empirical literature that shows significant impact of interest rates on the housing prices (Kalra et al. 2000; Sutton 2002; Tsatsaronis and Zhu 2004; Abelson et al. 2005; Égert and Mihaljek 2007; Lovrinčević and Vizek 2008; McQuinn and O'Reilly 2008; Posedel and Vizek 2009; Adams and Füss 2010; Vizek 2010; Ojetunde 2012; Nikolić 2015). Sutton (2002) explains this with the long lifetime of residential real estate which through all that period generates services related to its utilization. Furthermore, residential real estate implicit value is the discounted value of the expected flows of these services. Therefore, the value of residential real estate depends on the current but also on the expected future interest rates used for discounting.

Housing prices are linked to the other developments in the financial and, especially banking sector. Existing empirical research confirms the existence of a strong two-way connection between housing prices and banking sector (for example, Collyns and Senhadji 2002; Goodhart and Hofmann 2007; Oikarinen 2009).

In practice, most of the research focuses on interrelationship between housing prices and bank loans. A strong correlation and mutual causation between these variables is proven both in developed and developing countries (Gerlach and Peng 2005). According to Goodhart and Hofmann (2007), housing wealth approximated by housing prices can affect households' demand for loans through three channels. The effects are primarily reflected in the change of the borrowing capacity, which is the function of the collateral net value. Furthermore, housing prices changes may have significant effects on the households' perception of wealth, which can affect their spending and savings plans and finally their demand for loans. The third channel implies the so-called balance effects, i.e., the direct and indirect effects that the housing prices movements have on the bank's capital position and their loan potential.

Housing prices can affect banking system in two ways (Pirounakis 2013): (a) directly, through the impact on the value of assets in banks' balance sheets. When housing prices rise, these institutions will more easily meet the capital adequacy requirements; and (b) indirectly, affecting the solvency of private and corporate borrowers. With rising housing prices, there is also a rise in borrowers' solvency which consequently reduces the volume of bad loans. Thus, the banks' capital position improves.

The reverse relationship, i.e., the impact of bank loans on housing prices, is described by liquidity effects. Residential real estate are, on one hand, viewed as long-term assets whose supply is fixed in short run. Greater loan availability in the short run can increase housing demand, which, combined with a fixed supply, results

in higher housing prices. On the other hand, residential real estates can also be perceived as a form of asset whose price is equal to the present value of its future returns. The increase in loan availability reduces interest rates (which are used as discount factors), but also stimulates current and future economic activity, so the positive effects on housing prices is achieved through both channels (Goodhart and Hofmann 2007). The statistical significance of the bank loans as a determinant of housing prices has been confirmed on several occasions (for example, Apergis 2003; Tsatsaronis and Zhu 2004; Égert and Mihaljek 2007; Lovrinčević and Vizek 2008; Hlaváček and Komárek 2009; Vizek 2010).

In empirical research, the interdependence of housing prices and bank loans has often been proven, but when it comes to causality, more research is done investigating the effects of real estate prices on loan dynamics. The results presented in Goodhart (1995) show that real estate prices have a significant impact on bank loans growth in the UK, but this is not the case with the USA. Zhu (2005) shows that the rise in the housing prices leads to the expansion of the bank loans. Gerlach and Peng (2005) demonstrate a high correlation between bank loans and the residential property prices in Hong Kong. Their results confirm the influence of asset prices on bank loans, while there is no evidence of reverse causality. Goodhart and Hofmann (2007) test the relationship between real estate prices and bank loans in 16 industrialized countries and show that real estate prices are an important determinant of bank loans. Precisely, the real estate price shocks in the 14 out of 16 observed countries have significant and persistent dynamic effects on bank lending. Collyns and Senhadji (2002) find empirical evidence of reverse causality, i.e., loan growth strongly influences housing prices inflation in the Eastern Asia countries.

It is generally considered that negative housing prices developments are associated with the emergence of banking crises. While it is certain that high fluctuations in housing prices in the 1970s contributed significantly to banking crises in many industrialized and developing countries (Zhu 2005), many authors believe that such fluctuations do not necessarily cause banking sector instability and other factors should be taken into account.

For example, Goodhart and Hofmann (2007) emphasize that the interactive relationship between real estate prices and bank loans in theory may lead to mutually reinforcing cycles in housing and credit markets. Namely, the rise in the housing prices, through greater collateral value, encourages further lending. If a portion of additional loans goes for buying real estate, surplus of demand over fixed supply will result in an additional increase in housing prices. The price increase then stimulates additional lending, and so on. Such price-loan spiral may have negative effects on the financial system, which is argued also by Borio and Lowe (2002). According to them, neither rapid loan growth neither the strong growth in property prices (including real estate) by themselves can undermine the stability of the financial system. What may be dangerous, in terms of increasing likelihood of financial instability, is a combination of continuous growth of both variables. Koetter and Poghosyan (2010) consider that the dynamics of nominal prices on the housing market itself is not so significant. According to them, what contributes to instability in the banking system

are the deviations of current housing prices from their fundamental values, which are determined by fundamental macroeconomic variables.

Oikarinen (2009) provides empirical evidence of a strong two-way relationship between real estate prices and mortgage lending in Finland, and stresses that precisely this interdependence encourages cyclical deviations of prices from their fundamental values, thus increasing the financial sector's sensitivity. This interaction gained significance after the financial liberalization that was carried out in Finland in the late 1980s. Collyns and Senhadji (2002) provide evidence that market liberalization is accompanied by cycles in economic activity, bank loans and real estate prices in the Eastern Asia countries. Goodhart and Hofmann (2007) show that the link between liberalization and asset prices movements is a common phenomenon both in Western and Asian countries, as well as in developed and developing countries, and that liberalization has strengthened the financial accelerator mechanism through greater sensitivity of bank lending to fluctuations in real estate prices.

Given all the above, an indisputable fact is that housing prices have significant implications on banking and financial sector and overall economic activity and *vice versa*. Although there is a lot of research of this relationship, they do not give an unambiguous answer of strength and direction of causality. In the case of Croatia, there are several studies of macroeconomic implications of housing prices (Tica 2002; Dumičić et al. 2012; Égert and Mihaljek 2007; Lovrinčević and Vizek 2008; Vizek 2010), but housing prices—banking sector relationship is poorly investigated.

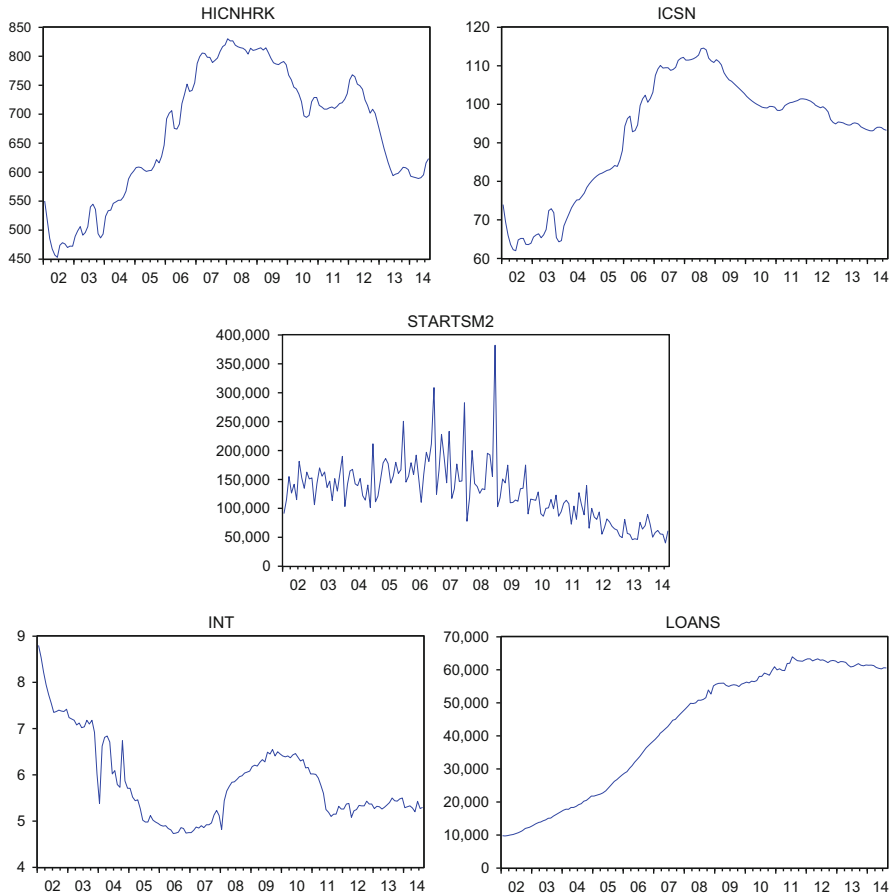
### 3 Empirical Analysis

#### 3.1 Data and Methodology

From the beginning of this century, the housing market in Croatia followed the same trends as the developed countries' market. Housing prices had been growing strongly until the onset of the global financial crisis which was followed by a sharp decline in housing prices. The same trend in housing market is visible when new construction is observed. The same period is characterized by strong growth of housing loans, which is significantly slowed down by the outbreak of the crisis. Since the beginning of 2000 interest rates on housing loans have been continuously falling, with exception of several short periods of strong rise including the beginning of the financial crisis (see Fig. 1).

The analysis of interdependence between housing market and banking sector covers the period from January 2002 to August 2014. Banking sector is represented with two variables: loans and interest rate. Loans represent total bank housing loans in million HRK, while interest rate is interest rate on long-term housing loans in HRK with currency clause. Data on housing loans and interest rate are collected from Croatian National Bank (CNB) and are published on a monthly basis.

Housing market is represented with housing prices and new construction. To check the robustness of results, two different indices representing housing prices are



**Fig. 1** Housing prices (HICNHRK, ICSN), new construction (STARTSM2, m2), interest rate (INT, %) and housing loans (LOANS, million HRK) in Croatia, 2002–2014, monthly. Source: Croatian Bureau of Statistics (2016) and Croatian National Bank Statistics (2016)

used: (a) HICNHRK—Hedonic Real Estate Price Index which is calculated by CNB on quarterly basis based on real estate prices in euros; the index is then translated in HRK using average quarterly exchange rate EUR/HRK; and (b) ICSN—House Price Index which is calculated by Croatian Bureau of Statistics (CBS) on quarterly basis based on real estate prices in HRK. New construction is approximated with the useful area (in m2) of the apartments for which the building permits were issued. The data are published by the CBS on a monthly basis.

All data originally published at the quarterly level were translated into monthly using the quadratic interpolation method in EViews. Monthly data are used for the analysis as to provide greater number of observations. The House Price Index for the



period 2002–2008 (since there is no official data) is approximated by corrected movement of the Hedonic Real Estate Price Index. The justification for the above approximation arises from the high correlation between the indices at those periods in which data is available for both. Loans and new construction are translated in logarithmic form.

The interdependence between housing market and banking sector is examined within Vector Autoregressive (VAR) model. VAR( $k$ ) model with  $n$  endogenous variables and number of lags  $k$  has the following form:

$$Z_t = \mu + A_1 Z_{t-1} + \dots + A_k Z_{t-k} + \epsilon_t \quad (1)$$

where  $Z_t$  is the  $n$ -dimensional vector of endogenous variables,  $A_1, \dots, A_k$  ( $n \times n$ ) coefficient matrices,  $\mu$  vector of constants and  $\epsilon_t$  vector of innovations, ie error terms.

### 3.2 Results

In order to be included in VAR model, all variables have to be of the same order of integration. To examine the order of integration Augmented Dickey-Fuller (ADF) unit root tests were carried out and results are shown in Table 1.

The ADF unit root tests indicate that housing prices indices and loans are integrated of order 1, i.e., non-stationary, while interest rate and new construction are stationary time series, i.e.,  $I(0)$ . Since the VAR model includes  $I(0)$  and  $I(1)$  variables, in order to proceed with analysis, first the  $I(1)$  variables have to be differenced.

After testing order of integration, number of lags  $k$  has to be chosen. The selection procedures used here include multivariate information criteria (Akaike, Schwartz-Bayes, Hannan-Quinn), sequenced modified LR test (LR) and final predictive error test (FPE). Based on these tests as well as tests of appropriateness of the model with different number of lags (autocorrelation and heteroscedasticity tests of the whole system and every equation in the system),  $k = 5$  (VAR with HICNHRK) and  $k = 7$

**Table 1** Results of ADF unit root tests

| Variable  | Level    |                           |        | First difference |                           |        | Decision          |
|-----------|----------|---------------------------|--------|------------------|---------------------------|--------|-------------------|
|           | Constant | Constant and linear trend | None   | Constant         | Constant and linear trend | None   |                   |
| HICNHRK   | 0.2245   | 0.9313                    | 0.8233 | 0.0000           | 0.0000                    | 0.0000 | I(1)              |
| ICSN      | 0.0545   | 0.6730                    | 0.7911 | 0.2442           | 0.1229                    | 0.0483 | I(1) <sup>a</sup> |
| LLOANS    | 0.0000   | 0.9996                    | 0.9795 | 0.0561           | 0.0000                    | 0.0399 | I(1) <sup>a</sup> |
| INT       | 0.0115   | 0.1309                    | 0.0700 | 0.0000           | 0.0000                    | 0.0000 | I(0) <sup>a</sup> |
| LSTARTSM2 | 0.9978   | 0.8901                    | 0.0527 | 0.0000           | 0.0000                    | 0.0000 | I(0) <sup>a</sup> |

Note: The values in table are MacKinnon (1996) one-sided p-values

<sup>a</sup>In case of contradictory results the decision is made on the basis of an additional tests (Phillips-Perron's unit root test and/or graphical analysis of the observed time series)

(VAR with ICSN) are selected as a compromise between improving model diagnostics and ensuring a sufficient number of degrees of freedom.

In order for the innovation analysis to be carried out, it is necessary to orthogonalize the innovations. Cholesky factorization which requires a choice of order of variables is chosen. Setting the interest rate in the first place is in line with Posedel and Vizek (2009), who assume that interest rate can affect housing loans, prices and new construction very rapid. Variable housing loans is put in the second place. Putting loans in front of the housing prices is proposed by Zhu (2005) since bank lending conditions may affect asset prices over the same period, while price changes have effects on loans with a time lag. Posedel and Vizek (2009), Sutton (2002) and Tsatsaronis and Zhu (2004) assumed that housing prices are positioned at the last place. In contrast, housing prices here are positioned in front of new construction. The theoretical basis for this comes from DiPasquale and Wheaton's (1992, 1996) model of long-run equilibrium in the aggregate real estate market according to which the real estate price is the main determinant of the new construction. Although the theory also foresees the effects of new construction on the real estate prices, it is considered that these effects will not be realized in the same period.

Finally, vector of endogenous variables is defined as:

$$\text{VAR1} : Z_t = (\text{INT}_t, \text{DLLOANS}_t, \text{DHICNHRK}_t, \text{LSTARTSM2}_t) \quad (2)$$

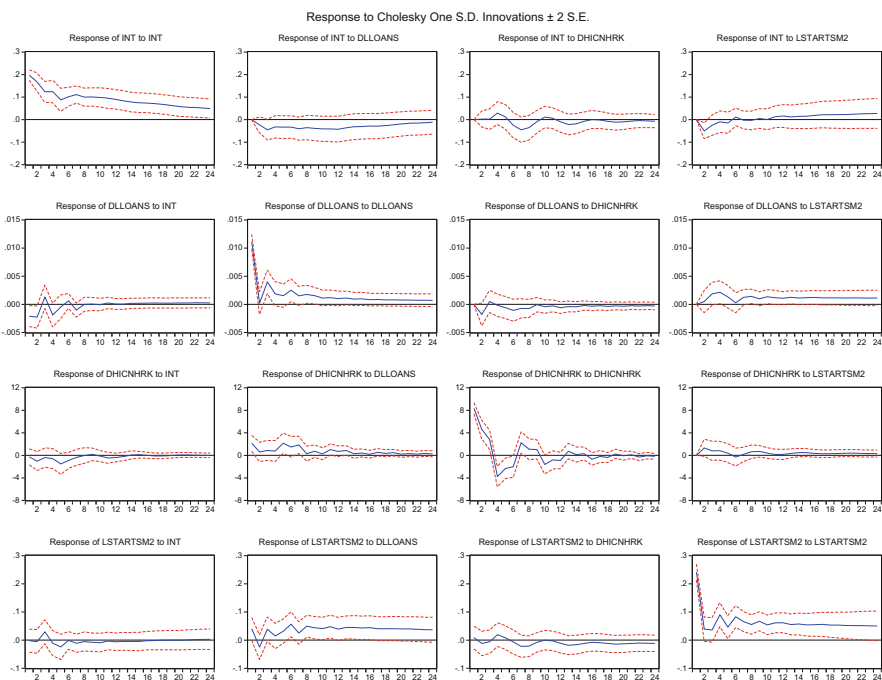
or

$$\text{VAR2} : Z_t = (\text{INT}_t, \text{DLLOANS}_t, \text{DICSN}_t, \text{LSTARTSM2}_t) \quad (3)$$

The stability of both VARs is examined by analyzing the roots of AR characteristic polynomial. Since all the parameters of characteristic polynomial per module are smaller than 1, both VARs are stable.

According to theory, positive change in housing loans should have positive effects on housing prices and new construction. On the other hand, rise in interest rates should result in a decline in housing prices and, indirectly, new construction. Regarding the opposite direction of relationship, i.e., effects of housing market on banking sector, positive change in housing prices (and new construction) should result in a rise of bank loans and a decline in interest rates.

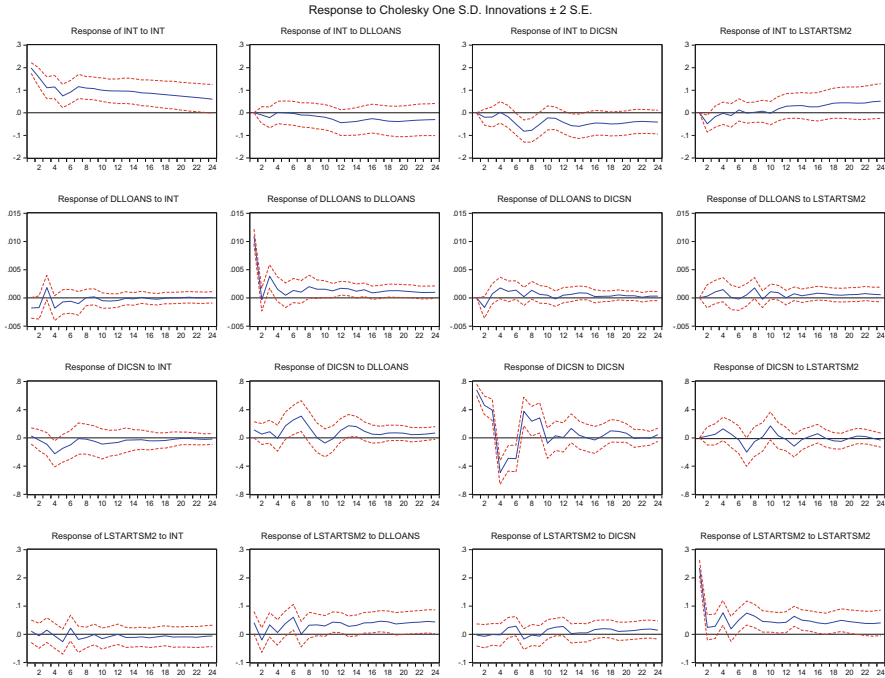
Figure 2 shows impulse response functions to one standard deviation shocks in variables of estimated VAR1 model with HICNHRK as measure of housing prices. There is a positive and statistically significant response of change in housing prices in the first month after the shock in change in housing loans, while the positive and statistically significant response of new construction occurs in sixth month after the shock. There are no statistically significant responses of housing market variables to the shock in interest rate. Shock in new construction variable results with positive response of change in housing loans in the fourth month and a negative response of interest rate in the second month after the shock which is expected and in accordance with economic theory. On the other hand, there are no statistically significant responses of banking sector variables to the shock in change in housing prices.



**Fig. 2** Impulse response functions in VAR1 with HICNHRK

To test for robustness of results, VAR2 model is estimated with ICSN as measure of housing prices. Figure 3 shows impulse response functions to one standard deviation shocks in variables of estimated VAR2 model. Looking to the responses of housing market to the shock in change in housing loans, the results are similar as in VAR1. There is a positive and statistically significant response of change in housing prices in the fifth month and new construction in the sixth month after the shock. But, opposite to the VAR1, there is also statistically significant response of change in housing prices in the fourth month after the shock in interest rate. Same as in VAR1, shock in new construction results with a negative response of interest rate in the second month after the shock, but opposite to the impulse response in VAR1, there is no statistically significant response of change in housing loans. Finally, negative and statistically significant response of interest rate occurs in sixth month after the shock in change in housing prices which was not the case in VAR1.

Looking at the impulse response functions of both VARs, the effects which occur in both of them and are in accordance to theory are the responses of housing market variables to the shock in the change of housing loans. According to theory, interest rate should be one of the key determinants of housing prices, but our results show that the statistically significant response of change in housing prices to interest rate shock exist only in case when ICSN is used. As it is present only in the fourth month after the shock, it can be assessed as a weak evidence of importance of interest rate as a determinant of housing prices in Croatia. Moreover, it can be interpreted as an atypical behavior to the one implied by widely accepted theoretical models.



**Fig. 3** Impulse response functions in VAR2 with ICSN

Regarding causality which goes from housing market towards banking sector, there is statistically significant response of interest rate to the shock in new construction in both estimated models but it occurs in very short period after the shock and it is not persistent. Furthermore, statistical significance of responses of interest rates and loans to the shocks in the changes of housing prices differs between two estimated VARs.

Summing up the results, we can conclude that the causal relationship mainly goes from banking sector to housing market in Croatia. There is no strong evidence of reverse causality, i.e., from housing market to banking sector, as it largely depends on chosen housing price index.

## 4 Conclusion

Since housing wealth has become very important part of the total wealth, housing market fluctuations can have strong implications to overall economic activity. Furthermore, since housing real estate are mostly financed through bank loans, changes in housing market are strongly associated with movements in banking sector. The main goal of the this paper was to investigate the relationship between housing market and banking sector in Croatia.

The analysis showed positive responses in housing market variables, i.e., housing prices and new construction, as a result of positive shock in housing loans. This effect is common to both estimated VARs and is evidence of causal relationship from banking sector to housing market. The reverse causality has not been proven since estimated VARs do not give an unambiguous answer on the effects of housing market variables on banking sector.

These results should be taken with the caution since the analysis of housing market variables often have the problem of missing (or unavailable) long series of data needed for quality analysis, which is also the case in this analysis. For that reason, time series are interpolated and translated with different econometric techniques that potentially result with the loss of the information contained in the original data. Also, the results of ADF unit root test on short time series data are questionable. Furthermore, there are certainly more macroeconomic variables which should be included in VAR, like GDP, employment, income etc., which are not included here in order to provide a sufficient degrees of freedom.

Regardless of all that, we can conclude that the causal relationship in Croatia mainly goes from banking sector to housing market, while the evidence of reverse causality is weak and dependent on housing price index included in analysis.

**Acknowledgement** This work has been fully supported by Croatian Science Foundation under the project 7031.

## References

- Abelson, P., Joyeux, R., Milunovich, G., & Chung, D. (2005). Explaining house prices in Australia: 1970–2003. *Economic Record*, 81(8), 96–103.
- Adams, Z., & Füss, R. (2010). Macroeconomic determinants of international housing markets. *Journal of Housing Economics*, 19(1), 38–50.
- Apergis, N. (2003). Housing prices and macroeconomic factors: Prospects within the European Monetary Union. *International Real Estate Review*, 6(1), 63–74.
- Borio, C., & Lowe, P. (2002). *Asset prices, financial and monetary stability: Exploring the nexus*. BIS Working Papers No. 114.
- Collins, C., & Senhadji, A. (2002). *Lending booms, real estate bubbles and the Asian crisis*. IMF Working Paper, No. WP/02/20.
- Croatian Bureau of Statistics. (2016). Accessed from <http://www.dzs.hr/>
- Croatian National Bank Statistics. (2016). Accessed from <https://www.hnb.hr/statistika>
- DiPasquale, D., & Wheaton, W. (1992). The markets for real estate assets and space: A conceptual framework. *Journal of the American Real Estate and Urban Economics Association*, 20(1), 181–197.
- DiPasquale, D., & Wheaton, W. (1996). *Urban economics and real estate markets*. Englewood Cliffs, NJ: Prentice Hall.
- Dumičić, K., Čeh Časni, A., & Šprajac, P. (2012). The linkage between real estate prices and the macro-economy in Croatia: VAR approach. *Croatian Operational Research Review (CRORR)*, 3, 289–299.
- Égert, B., & Mihaljek, D. (2007). *Determinants of house prices in central and eastern Europe*. BIS Working Papers, No. 236.

- Gerlach, S., & Peng, W. (2005). Bank lending and property prices in Hong Kong. *Journal of Banking and Finance*, 29, 461–481.
- Goodhart, C. (1995). Price stability and financial fragility. In K. Sawamoto, Z. Nakajima, & H. Taguchi (Eds.), 1995. *Financial stability in a changing environment*. London: St. Martin's Press.
- Goodhart, C., & Hofmann, B. (2007). *House prices and the macroeconomy: Implications for banking and price stability*. New York: Oxford University Press.
- Hlaváček, M., & Komárek, L. (2009). *Property price determinants in the Czech regions. Financial stability report 2008/2009* (pp. 82–91). Czech National Bank.
- Kalra, S., Mihaljek, D., & Duenwald, C. (2000). *Property price and speculative bubbles: Evidence from Hong Kong SAR*. IMP Working Paper, No. WP/00/2.
- Koetter, M., & Poghosyan, T. (2010). Real estate prices and bank stability. *Journal of Banking and Finance*, 34(6), 1129–1138.
- Lovrinčević, Ž., & Vizek, M. (2008). Determinante cijena nekretnina u Republici Hrvatskoj i potencijalni učinci liberalizacije tržišta nekretnina [House Price Determinants in the Republic of Croatia and Potential Effects of Housing Market Liberalization]. *Ekonomski prehled*, 59, 723–740.
- MacKinnon, J. G. (1996). Numerical distribution functions for unit root and cointegration tests. *Journal of Applied Econometrics*, 11, 601–618.
- McQuinn, K., & O'Reilly, G. (2008). Assessing the role of income and interest rates in determining house prices. *Economic Modelling*, 25(3), 377–390.
- Nikolić, I. (2015). Price determinants of newly built dwellings in Serbia. *Industrija*, 43(2), 105–116.
- Oikarinen, E. (2009). Interaction between housing prices and household borrowing: The Finnish case. *Journal of Banking and Finance*, 33, 747–756.
- Ojetunde, I. (2012). On the interaction between the Nigerian residential property market and the macroeconomy. *Journal of Geography, Environment and Planning (JOGEP)*, 7(2). Ado-Ekiti, Nigeria: University of Ado-Ekiti. Available at SSRN. Accessed May 15, 2017, from <https://ssrn.com/abstract=2105998>
- Otrok, C., & Terrones, M. E. (2005). *House prices, interest rates and macroeconomic fluctuations: International evidence*. 2005 Conference: Housing, Mortgage Finance, and the Macroeconomy, Atlanta, USA, May 19–20, 2005. Federal Reserve Bank of Atlanta. Accessed May 5, 2016, from [https://www.frbatlanta.org/news/conferen/housing2005/otrok\\_terrones.pdf](https://www.frbatlanta.org/news/conferen/housing2005/otrok_terrones.pdf)
- Pirounakis, N. G. (2013). *Real estate economics: A point-to-point handbook*. Oxon: Routledge.
- Posedel, P., & Vizek, M. (2009). House price determinants in transition and EU-15 countries. *Post-Communist Economies*, 21(3), 327–343.
- Sutton, G. (2002). Explaining changes in house prices. *BIS Quarterly Review*, September, 46–55.
- Tica, J. (2002). *Tranzicija hrvatskog stambenog tržišta* [Transition of the Croatian Housing market]. Zagreb: Politička kultura.
- Tsatsaronis, K., & Zhu, H. (2004). What drives housing price dynamics: Cross country evidence. *BIS Quarterly Review*, March, 65–78.
- Vizek, M. (2010). Short-run and long-run determinants of house prices in Eastern and Western European countries. *Privredna kretanja i ekonomska politika*, 125, 27–60.
- Zhu, H. (2005). The importance of property markets for monetary policy and financial stability. In *Bank for International settlements: Real estate indicators and financial stability* (Vol. 21, pp. 9–29).

# Ecosystems Services Economic Valuation Model: Case Study in Latvia



Irina Arhipova, Elina Konstantinova, Nameda Belmane, and Gatis Kristaps

**Abstract** The aim of the paper is to present and discuss the model for ecosystem economic (monetary) valuation for the territory socio-economic development planning in two Latvian administrative areas: Baltic Sea coastal Saulkrasti and Jaunkemeri pilot areas. Using ecosystem services economic valuation model three scenarios have been modelled: current situation, planned development and uncontrolled development, when in two pilot areas about 50% increase in construction and 50% decrease of the forest area is foreseen. After analyzing the ecosystem services' monetary values, it is concluded that the greatest monetary value in both areas are provided by regulating services, so the maintenance and protection of ecosystems ensuring regulating services can be considered as a priority in both pilot areas. The second priority is cultural services, assuming, that the use of cultural services will not generate additional anthropogenic load. The lowest priority is given to provisioning services, taking into account the fact that the real possibilities to obtain the market values are limited, because tree felling is prohibited.

**Keywords** Monetary valuation · Land-use planning · Sustainable management

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## 1 Introduction

Ecosystem services (ES) assessment can be implemented by applying bio-physical, social and economic methods. Bio-physical assessment of ES characterizes ecosystem structure and functions by using precise measurements, regular monitoring data and ecosystem services modelling. Social assessment of ES evaluates significance of ES for existing and potential recipients, different stakeholders and interest groups. The Millennium Ecosystem Assessment presents the conceptual and methodological approach for evaluation of ecosystems contribution to human well-being (Alcamo et al. 2003).

Economic assessment of ES evaluates the willingness to pay for ecosystem services in monetary or relative terms. Decision on the most appropriate ecosystem services management scenario mainly depends on indicator selected for ecosystem services assessment. There is developed a common Ecosystem Services Partnership Visualization Tool which is an open-access interactive platform that hosts a catalogue of ecosystem services maps including information on indicators, data and models useful for ES assessment (Drakou et al. 2015). There are several researches on ES assessment in coastal areas, for instance the research study in Australia examines the willingness-to-pay for marine environmental improvements, based on policy-determined scenario (Ostberg et al. 2015). The conclusion is that economic valuation of coastal and marine ecosystem services is applied in decision-making process in Australia, but its impact on policy is weak (Marre et al. 2015).

It should be considered that economic assessment of ES is extensive work with considerable time and human resources consumption. ES economic assessment mainly is implemented on basis of secondary data analysis and using TEEB (The Economics of Ecosystems and Biodiversity) Ecosystem Service Validation Database (ESVD) (Ploeg et al. 2010). TEEB ESVD presents the monetary values of the ecosystems services for the main biomes/ecosystems, and it is possible to use these monetary values for analysis of different scenario (Groot et al. 2011). In research an overview of the value of ecosystem services of 10 main biomes expressed in monetary units is given (Groot et al. 2012). Following the global TEEB initiative, the TEEB Nordic carries out development of recommendations for policy actions on ecosystem services in the Nordic countries (Kettunen et al. 2012).

The estimated monetary value is the tool for the comparing different policies, where not absolute values are important, but the amount and direction of the monetary values changing (Notte et al. 2012). Wolff et al. (2015) found that for applying ecosystems services approach in planning, decision-making and management it important to evaluate impacts on potential land use changes. There was also discussed the necessity of the ecosystems services and landscape ecology concepts and their integration into assessment procedures and landscape planning practice (Pelorosso et al. 2016). Ecosystem assessments should be set within the context of contrasting scenarios, as a function of changes between alternative options (Groot et al. 2011). To model different economic scenarios it is necessary to integrate the



ecosystems services monetary values into decision support systems for the scenario development in public applications (Klein et al. 2015).

There are wide variety of methods for the ecosystems services evaluation. One of the methods is ecosystem services assessment implemented by experts, using matrix modeling techniques (Jacobs et al. 2015). Ecosystems Service Partnership working groups have provided the guidance in ecosystems services mapping and assessment practices (Willemens et al. 2015). For example, a value transfer analysis was used for ecosystem services evaluation in the coastal zone of Catalonia, Spain (Brenner et al. 2010) and in northwest Mexico wetlands (Camacho-Valdez et al. 2013). For applying the combination of market-based and value transfer methods the authors (Sharma et al. 2015) recommend recognizing the ecosystems services as an integral part of the policy of local community. Benefit transfer can be a practical and cheap method to estimate the ecosystems services values (Pascual et al. 2011). The biotope value assessment method was development in Poland wetlands area, using Czech methodology for estimating the monetary value of biotopes (Trzaski and Mana 2008).

This study is based on the data of Baltic Sea coastal pilot territories in Latvia—Saulkrasti and Jaunkemeri. The necessary ecosystem services categories and assessment indicators are indicated and assessed in the framework of European Commission LIFE project “LIFE Ecosystem Services—Assessment of ecosystems and their services for nature biodiversity conservation and management (LIFE13 ENV/LV/000839)”. There is carried out collection of primary data, aggregation and comparative assessment of secondary data by using approbated scientific research methods and ES assessment indicators. The obtained data is adapted to Latvian social-economic situation by using correction factors. Depending on ES category there were used following assessment methods (Pascual et al. 2011):

- for assessment of provisioning services—direct market pricing method;
- for assessment of regulating services—benefit transfer method and direct market pricing method;
- for assessment of cultural services—benefit transfer method and travel cost method.

The aim of the paper is to present and discuss the model for ecosystem economic (monetary) valuation for the socio-economic development planning in Latvian coastal areas.

## **2 ES Assessment Methodology Based on Secondary and Primary Data Analysis**

For ES and assessment indicators, it is necessary to standardize received data in unite spatial, time and currency units, for example EUR/ha/year. In addition, standardized data monetary values must be corrected taking into account inflation and other factors to compare over time. ES economic impact mainly determines the value

of ES in annual terms; it is necessary to perform seasonal corrections. ES usually are assessed in certain place for certain services. Total economic value (TEV) and received economical values of services can be converted to Latvian situation by using Gross domestic product (GDP) deflator and GDP purchasing power parity (PPP) conversion factors:

- by applying GDP deflator, the economic value of services (USD/ha/year) in fixed year is converted in (USD/ha/year) in prices of current year;
- by applying GDP purchasing power parity (PPP) conversion factors, the economic value of services in other currency (for example, USD) is converted in EUR.

Purchasing parity method is theoretical price comparison, calculated on the basis of certain basket of consumer goods price in certain currency in its basic country. It is often significantly different from market currency exchange rate as well as in one currency the prices can differ in different countries due to geographical situation, differences in production and market situation. In the result there is received economical value of services EUR/ha/year in current year prices.

ES value is relative contribution to sustainable human well-being. ES monetary assessments is not the same to privatization and exactly value how much the service costs in terms of money in the market, because it depends on the assumptions and limitations of the study during of assessment of ES (Costanza et al. 2014). Although, if we have ES monetary values, it is possible to develop and implement different management scenarios and determine trade-off mechanisms. ES monetary assessment is standardized assessment as it is necessary to transform different ES indicator units in one monetary unit, for example EUR/ha/year. It gives possibility to compare different ES and determine which service is valuable. The absolute value of the ecosystem services are uncertain and for practical use, it is necessary to compare the relative values of changes in the provision of ecosystems services (Price 2007).

ES economical assessment methodology consists of following stages:

- provisioning, regulating and cultural service monetary evaluation;
- assessment of ES in larger areas in longer time period which includes data aggregation by geographical units and by ecosystem services and determines ES economic impact range/area;
- ES economical assessment meta-analysis based on ES assessment model;
- ES economical model for modelling development scenarios.

Provisioning, regulating and cultural service monetary evaluation includes at the first step the process of secondary and primary data standardization in spatial, time and currency units, for example EUR/ha/year, and at the second step includes secondary and primary data corrections, taking into account inflation and other factors for comparison over the certain time period.

## 2.1 Economic Impact Area of Ecosystem Services in Pilot Territories

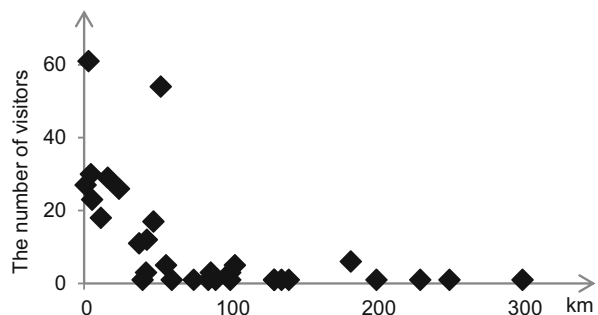
The two pilot areas in the coastal zone—Jaunkemeri and Saulkrasti—have been selected to test the approach of assessment the ES for the Latvian coastal conditions. Pilot area “Jaunkemeri” is located within the city and is part of Kemeru national park. It includes sandy beach and biologically valuable habitat of EU importance—wooden dunes. The area is not much transformed and relatively poorly visited (90.85 ha). Pilot area Saulkrasti is located in Saulkrasti municipality. It includes sandy beach and biologically valuable habitat of EU importance—wooden dunes and remarkable cultural and nature monument—White Dune. The well-maintained nature object is frequently visited and subjected to excessive anthropogenic pressure and erosion (132.86 ha).

To evaluate economic impact area of ES in pilot territories, it is necessary to identify the relation or link of pilot territories within larger area considering distance, number of visitors and total monetary value of ecosystem services depending on place of residence. The determination of economic impact area of ES allows to determine average number of visitors in pilot territories per year per 1000 inhabitants depending on place of residence, to assess the average monetary value (EUR) per year, depending on place of residence, to calculate the proportion of ecosystem services in pilot territory and all other area and to assess number of visitors of pilot territory depending on distance from visiting place.

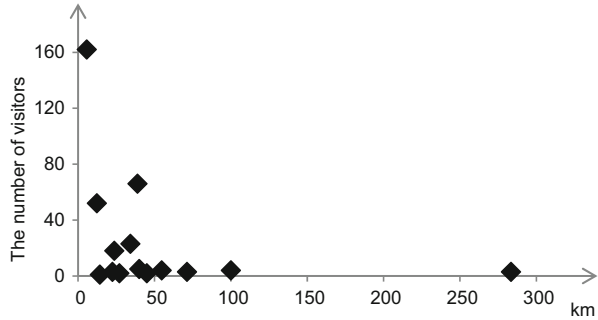
There was implemented the social survey with aim to obtain primary data for economic assessment of following ecosystem services in pilot territories about provisioning ecosystem services of medical plants (herbs), as well cultural and recreational ecosystem services of bird watching, active/passive recreation, environmental education and cultural heritage, landscape.

The surveys were implemented in August and September of 2016 and in total 750 respondents (375 in each pilot territory) were interviewed. Analyzing the number of active/passive recreation visitors depending on distance travelled the economic impact area of Jaunkemeri pilot territory was estimated at 50 km (Fig. 1).

**Fig. 1** The number of Jaunkemeri pilot territory active/passive recreation visitors depending on distance (km). Source: Authors own study



**Fig. 2** The number of Saulkrasti pilot territory active/passive recreation visitors depending on distance (km). Source: Authors own study



Analyzing the number of active/passive recreation visitors in Saulkrasti depending on distance travelled it is possible to estimate that economic impact area of Saulkrasti pilot territory is also 50 km (Fig. 2).

### 2.2 Ecosystem Services Assessment Meta-analysis

Meta-analysis of ecosystem services economic assessment is based on multiple regression analysis (Eq. 1):

$$\ln(Y_i) = \beta_0 + \beta_1 X_{1i} + \dots + \beta_k X_{ki} + \varepsilon_i \tag{1}$$

$Y_i$ —economical (monetary) value of ecosystem and  $X_i$  are factors characterizing geographical location, social-economic situation and other factors of selected territory. Considering the small number of total visitors, ES assessment meta-analysis was applied for data obtained in survey only about active/passive recreation. It was used such quantitative factors as average monthly net income, age, costs, duration of visit, willingness-to-pay for conservation of place and qualitative factors as gender and educational level. Correlation analysis shows that in case of active/passive recreation there is linear relationship between economic (monetary) value of ecosystems (EUR/ha) and quantitative factors (Table 1).

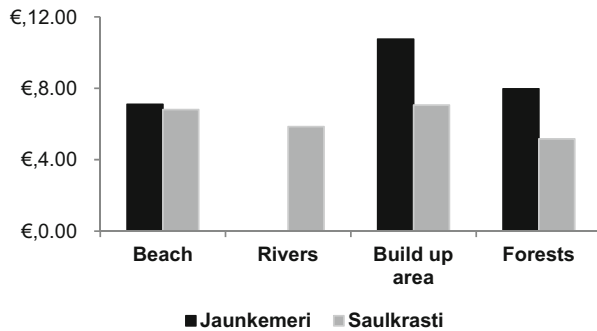
It can be concluded, that there are higher costs (EUR/person) related to active/passive recreation in Jaunkemeri than in Saulkrasti. Analyzing costs, we can conclude that higher costs are in build-up areas and lower costs are in forest area in Saulkrasti and in beach area in Jaunkemeri (Fig. 3).

There is lower duration of visit related to active/passive recreation (h) in Jaunkemeri than in Saulkrasti. Analyzing the duration of visits depending on recreation place it can be concluded that longer duration of visits is in build-up areas and in river areas, conversely the shorter duration is in forest area in Saulkrasti and in beach area in Jaunkemeri (Fig. 4).

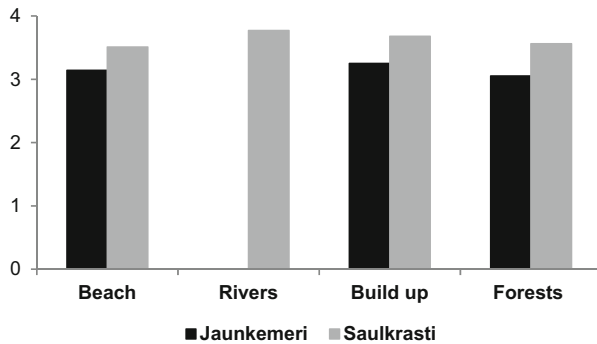
**Table 1** Correlation coefficients between ecosystems monetary value and quantitative factors in Jaunkemeri un Saulkrasti pilot territories

| Quantitative factors  | Correlation coefficients ( <i>r</i> )        |  |
|---|--|--|
|   | Jaunkemeri ecosystem monetary value (EUR/ha) | Saulkrasti ecosystem monetary value (EUR/ha) |
| $X_1$ : average monthly net income (EUR)                                      | 0.99   | 0.09   |
| $X_2$ : age (years)   | 0.63   | -0.82  |
| $X_3$ : costs of visiting the place (EUR/person)                              | 0.79   | 0.41   |
| $X_4$ : duration of visit (h)   | 0.81   | 0.67   |
| $X_5$ : willingness-to-pay once a year for conservation of place (EUR/person) | 0.68   | 0.17   |

**Fig. 3** Average costs (EUR/person) related to active/passive recreation in the pilot territories

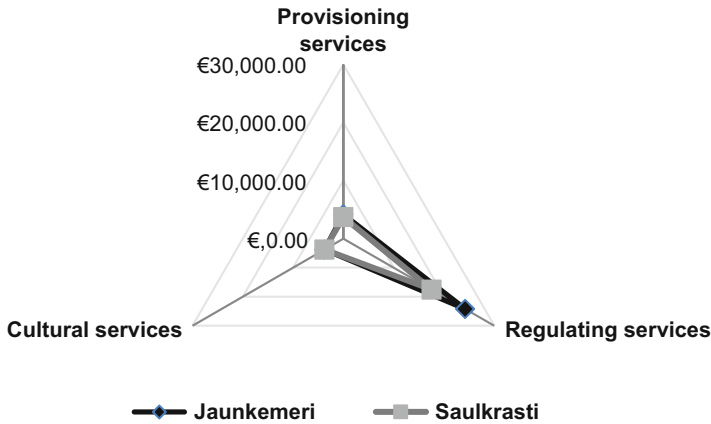


**Fig. 4** Average duration (h) of visit related to active/passive recreation in pilot territories



### 3 Economic Model of Ecosystem Services for Modelling Development and Land-Use Scenarios

In the framework of the study, there is developed model for determining economic values of ecosystem services. The model is based on developed and approved methodology and intended to use for monetary assessment of ES in coastal areas. In



**Fig. 5** Economic assessment of ecosystem services (EUR/ha/year) in Saulkrasti and Jaunkemeri pilot territories in current situation

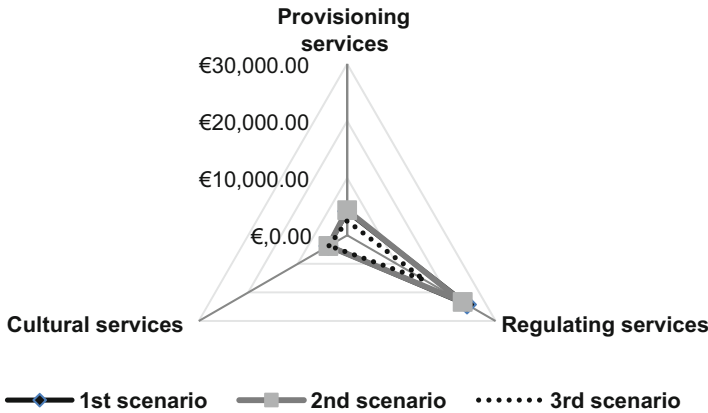
a case of the study the scenarios are developed against the current status of the land use in the pilot territories. Saulkrasti and Jurmala are popular recreation and tourism destinations, therefore the main controversial interests are nature conservation versus tourism development.

To provide leisure opportunities including sport activities and other activities outside the summer season, Jurmala city has designated a part of Jaunkemeri pilot area as a resort park. Saulkrasti municipality anticipate the establishing a nature design park in a part of the pilot area. There are data provided and analyzed for modelling of three following scenarios for pilot territories:

- first scenario reflects the existing situation—current monetary values of ecosystem services in Saulkrasti and Jaunkemeri pilot territories;
- second scenario is related to tourism and recreation development in Jaunkemeri and Saulkrasti pilot territories—nature territories for active/passive recreation and sport activities, environmentally educational activities covering all seasons;
- third scenario is modelling a hypothetical situation where in both pilot territories about 50% increases build-up area instead of forests displaying changes of ES monetary values in a case of uncontrolled development in pilot territories.

The results of economic assessment of ES in Saulkrasti and Jaunkemeri in current situation (EUR/ha/year) distributed by provisioning, regulating and cultural services are shown in Fig. 5. The monetary value of ES in Jaunkemeri is higher than ES monetary value in Saulkrasti. The second development scenario doesn't have large impact of ES monetary values. There are increasing of monetary value of provisioning services in Jaunkemeri territory (about 4%) and decreasing of monetary value of regulating services (about 4%).

The regulation services gave the largest monetary value in both pilot territories both at the existing situation and at the implementation of second scenario. At the



**Fig. 6** Economic assessment of ecosystem services (EUR/ha/year) in Jaunkemeri pilot territory in a case of implementation of first, second and third scenario

same time, comparing changes of implementation of third scenario, there is significant decreasing of monetary values of regulating and provisioning services. The lower decreasing has cultural services.

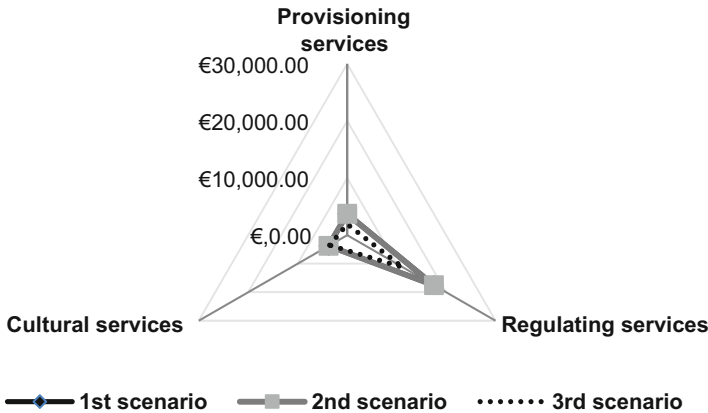
The comparison of all three development scenarios in Jaunkemeri pilot territory based on secondary data and distributed by provisioning, regulating and cultural services are shown in Fig. 6.

The third scenario provides visible losses of ES monetary value comparing with first and second scenario. The most significant are losses in values of regulating and provisioning services. The regulating services have the largest monetary value in a case of implementation of all scenarios.

The comparison of all three development scenarios in Saulkrasti pilot territory based on secondary data and distributed by provisioning, regulating and cultural services is shown in Fig. 7. The same as in Jaunkemeri, the implementation of third scenario provide visible losses of ES monetary value comparing to other scenarios, particular for regulating and provisioning services. There are no significant changes in ES values by implementation of first and second scenario. The regulating services have the largest monetary value in a case of implementation of all scenarios also in Saulkrasti pilot territory.

As it was explained above, the regulating services have the largest monetary value in both territories and it is mainly provided by forest areas. Forest areas have the largest common rate of ES monetary value comparing to other areas—beach, build-up, rivers. Thus, the largest monetary value of ES in Jaunkemeri territory can be explained with larger forest covering comparing with Saulkrasti (in Jaunkemeri forests covers 78% of all territory, in Saulkrasti—48%). By implementing third scenario which means decrease of 50% of forest area Jaunkemeri territory still remain more valuable than Saulkrasti territory.

There are no changes of ES monetary values in Saulkrasti by implementing second scenario, which means that this scenario is gentle to existing ecosystems in



**Fig. 7** Economic assessment of ecosystem services (EUR/ha/year) in Saulkrasti pilot territory in a case of implementation of first, second and third scenario

territory and don't change the ES provision. A similar conclusion can be done also for Jaunkemeri territory, although there is a small decrease of regulating services about (4%) and a small increase of provisioning services (about 4%). The implementation of third scenario is not recommended for both pilot territories because it can cause significant monetary and ecological losses of all ES categories.

## 4 Conclusions

It can be concluded that implementation of second scenario is a well-considered decision—there are no losses of common ES values and no negative impact on ecological status of ecosystems in both pilot territories. At the same time, it has a positive impact on tourism and recreation development by implementing different leisure and sport activities and establishing environmentally friendly visitor infrastructure.

Implementation of third scenario is hypothetical scenario and there are limitations to make reasonable conclusions of changes of ES values by changing only land use of areas without detail description of planned infrastructure (resort, museum etc.) and evaluations of its impacts environment and socio-economic situation. As the result of ES monetary assessment, the following priorities and recommendations can be outlined:

- the largest monetary value has regulating services provided by forest areas. The forest areas are the most valuable areas from ES monetary assessment perspective. Therefore, the priority should be given to management scenarios and measures which are toward to maintain and protect the forest ecosystem;



- the second priority from ES monetary assessment perspective is given to cultural services assuming that development of tourism and recreation activities would not create additional anthropogenic load on ecosystems, but will be directed toward nature education and decreasing of negative impacts on ecosystems;
- the lowest priority is for provisioning services considering that both territories are located in coastal areas and there are legal and physical restrictions to obtain these services (for example restriction of tree felling and fishing).

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## References

- Alcamo, J., Ash, N. J., Butler, C. D., Callicot, J. B., Capistrano, D., & Carpenter, S. R. (2003). *Ecosystems and human well-being: A framework for assessment*. Washington, DC: World Resource Institute.
- Brenner, J., Jimenez, J. A., Sarda, R., & Garola, A. (2010). An assessment of the non-market value of the ecosystem services provided by the Catalan coastal zone, Spain. *Ocean and Coastal Management*, 53, 27–38.
- Camacho-Valdez, V., Ruiz-Luna, A., Ghermandi, A., & Nunes, P. (2013). Valuation of ecosystem services provided by coastal wetlands in Northwest Mexico. *Ocean and Coastal Management*, 78, 1–11.
- Costanza, R., De Groot, R., Sutton, P., Der Ploeg, S. V., Anderson, S. J., Kubiszewski, I., Farber, S., & Turner, R. K. (2014). Changes in the global value of ecosystem services. *Global Environment Change*, 26, 152–158.
- De Groot, R., Brander, L., Der Ploeg, S. V., Costanza, R., Bernard, F., Braat, L., Christie, M., Crossman, N., Ghermandi, A., Hein, L., Hussain, S., Kumar, P., Mcvittie, A., Portela, R., Rodriguez, L. C., & Van Beukering, P. (2012). Global estimates of the value of ecosystems and their services in monetary units. *Ecosystem Services*, 1(1), 50–61.
- De Groot, R., Kumar, P., Der Ploeg, S. V., & Sukhdev, P. (2011). Estimates of monetary values of ecosystem services. In *The Economics of Ecosystems and Biodiversity. Ecological and economic foundations* (pp. 1–35). Liverpool: The Economics of Ecosystems and Biodiversity (TEEB).
- Drakou, E. G., Crossman, N. D., Willemsen, L., Burkhard, B., Palomo, I., & Maes, J. (2015). A visualization and data-sharing tool for ecosystem service maps: Lessons learnt, challenges and the way forward. *Ecosystem Services*, 13, 134–140.
- Jacobs, S., Burkhard, B., Daele, T. V., Staes, J., & Schneiders, A. (2015). “The Matrix Reloaded”: A review of expert knowledge use for mapping ecosystem services. *Ecological Modelling*, 295, 21–30.
- Kettunen, M., Vihervaara, P., Kinnunen, S., D’Amato, D., Badura, T., Argimon, M., & Ten Brink, P. (2012). Socio-economic importance of ecosystem services in the Nordic countries. In *Synthesis in the context of the economics of ecosystems and biodiversity (TEEB)*. Copenhagen: Nordic Council of Ministers.
- Klein, T. M., Celio, E., & Gret-Regamey, A. (2015). Ecosystem services visualization and communication: A demand analysis approach for designing information and conceptualizing decision support systems. *Ecosystem Services*, 13, 173–183.
- Marre, J. B., Thebaud, O., Pascoe, S., Jennings, S., Boncoeur, J., & Coglán, L. (2015). The use of ecosystem services valuation in Australian coastal zone management. *Marine Policy*, 56, 117–124.

- Notte, A. L., Maes, J., Bouraoui, F., & Masi, F. (2012). *Biophysical assessment and monetary valuation of ecosystem services. Scenario analysis for the case of water purification in Europe*. Luxembourg: European Commission, Joint Research Centre, Institute for Environment and Sustainability.
- Ostberg, K., Hasselstrom, L., & Hakansson, C. (2015). Non-market valuation of the coastal environment – Uniting political aims, ecological and economic knowledge. *Journal of Environmental Management*, *110*(2012), 166–178.
- Pascual, U., Muradian, R., Brander, L., Gomez-Baggethun, E., Martin-Lopez, B., Verma, M., Armsworth, P., Christie, M., Cornelissen, H., Eppink, F., Farley, J., Pearson, L., Perrings, C., Polasky, S., Mcneely, J., Norgaard, R., Siddiqui, R., Simpson, R. D., Turner, R. K., & Simpson, R. D. (2011). The economics of valuing ecosystem services and biodiversity. In *The Economics of Ecosystems and Biodiversity. Ecological and economic foundations* (p. 133). Liverpool: The Economics of Ecosystems and Biodiversity (TEEB).
- Pelorusso, R., Gobattoni, F., Geri, F., & Leone, A. (2016). Evaluation of ecosystem services related to bio-energy landscape connectivity (BELC) for land use decision making across different planning scales. *Ecological Indicators*, *61*, 114–129.
- Price, R. (Ed.). (2007). *An introductory guide to valuing ecosystem services*. London: Department for Environment, Food and Rural Affairs.
- Sharma, B., Rasul, G., & Chettri, N. (2015). The economic value of wetland ecosystem services: Evidence from the Koshi Tappu Wildlife Reserve, Nepal. *Ecosystem Services*, *12*, 84–93.
- Trzaski, L., & Mana, V. (2008). Monetary value assessment of biotopes in the Bobrek river valley, Sosnowiec – A methodology proposal for Poland. *Research Reports Mining and Environment*, *3*, 79–90.
- Van Der Ploeg, S., De Groot, D., & Wang, Y. (2010). *The TEEB valuation database: Overview of structure, data and results*. Wageningen: Foundation for Sustainable Development.
- Willemen, L., Crossman, N. D., Drakou, E., & Palomo, I. (2015). Editorial: Best practices for mapping ecosystem services. *Ecosystem Services*, *13*, 1–5.
- Wolff, S., Schulp, C. J. E., & Verburg, P. H. (2015). Mapping ecosystem services demand: A review of current research and future perspectives. *Ecological Indicators*, *55*, 159–171.

# Salaries to Revenue Ratio Efficiency in Football Clubs in Europe



Igor Perechuda

**Abstract** Coefficient of Salary to Revenue is one of the key performance indicators in football clubs. It contains information about money invested in the main resource of football club, i.e. in football player. Thus, the most important element of a football club is the football squad. The sports club could not participate in competitions without a suitable team. Consequently, the question arises about an effective level of salary in comparison to sports and business performances. A sports club is a specific enterprise. A significant number of football clubs have financial difficulties. Therefore, knowledge of the optimal allocation of financial resources is important. The main objective of the study is to identify an optimal level of salaries in relation to revenue coefficient so that effective sport results could be achieved. Depending on the chosen sample in the conducted research, results show different levels of the chosen coefficient. Yet, it is observed that clubs are characterised by some extreme results and tendencies. The paper presents a part of a wider research study about the key indicators of measuring sports clubs efficiency in Europe.

**Keywords** Corporate finance · Football clubs · Efficiency · European football · Salary

## 1 Introduction

Many professional football clubs in Europe face financial difficulties, and they are seeking new and wide opportunities to attract money. In England, take-over by investors of professional football clubs has increased over the last years and the English Premier League (EPL) became the most successful football league in the world, at least from a revenue perspective (Peeters and Szymanski 2013; Markham 2013). It is fundamental for many owners to continuously optimise their investment decisions. A sports club is a specific enterprise. A significant number of football clubs have financial difficulties (Szymanski 2012). Some of the mentioned clubs are

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gradually more unsuccessful on the pitch over the last years too. Therefore, knowledge of the optimal allocation of financial resources is important. A gap can be noticed in the literature concerning the efficiency level particularly in the football sector. Therefore, a study on this subject is valuable.

The sports club could not participate in competitions without a suitable team. Consequently, football players generate the assumptions of potential economic benefits for the club (Oprean and Oprisor 2014). Currently, there are certain problems concerning football players. They include difficulties with valuation and market capitalization (Demir and Danis 2011; Amir and Livne 2005; Markham 2013), accounting standards (Shareef and Davey 2005; Lozano and Gallego 2011), human resources studies and intellectual capital (Morrow 1996, 1997; Perechuda 2016), law and tax conditions (Morris et al. 1996). Every year, football clubs make significant investments by buying optimal football players, aiming at improving the quality of sport competitions, which promotes the growth of investment attractiveness of a club as a business unit. Scales of investment into professional football players are comparable to the amounts of direct investments in the industrial sector (Kulikova and Goshunova 2014). The evolution of the transfer market observed for the five major European leagues since 2009/10 reflects a strong increase in the spent sums. The big-5 league (English, French, German, Spanish and Italian) spent 6.9 billion € to hire football players in their squad in 2009/10 (70.4 million € per club). This amount increased to 8.6 billion € in 2014/15 (87.7 million € per club). During these six seasons, the average “value” of a squad as a transfer expenditure increased by 24.5% (Poli et al. 2015). It implicates the next issue. If clubs spend more on buying new players, then they spend more on salaries of these players too (Markham 2013). Thus, the question arises about the efficiency of football players as resources.

In order to measure efficiency, a choice of way of using resources and achieving performances are important. This paper presents a research about the chosen key indicators to measure football club efficiency. First of all, it is important to describe how efficiency can be understood in case of football clubs. Secondly, this paper presents the chosen key indicators to measure football clubs efficiency. The objective of the paper is to verify if there is such a level of the chosen indicators that allows to assume the scope of their values as a condition to achieve reasonably level of efficiency by football clubs. Additionally, the research tries to verify if there is an optimal efficiency curve in football clubs. The chosen indicator is the coefficient of Salaries to Revenue. Thus, the main objective is to identify an optimal level of coefficient of Salaries to Revenue in order to achieve effective sport results. This paper presents a part of a wider research study about key indicators for measuring sports clubs efficiency in Europe. The first stage of research concerns efficiency and its understanding in case of football clubs. The second and the main part of the research consist of the comparison of the coefficient of Salary to Revenue (S/R) with the chosen key performance indicator in total sample of data. The third part of research was carried out in order to complete the main part of the research in the divided sample.

The research was based on the clubs from the main European leagues, i.e. mainly from Italy and England. The research also includes football clubs listed on the stock

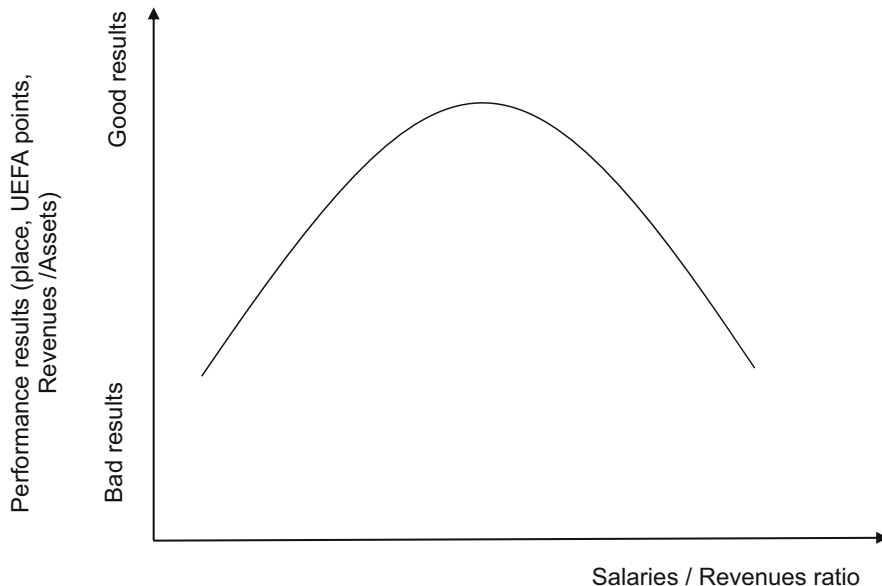
exchange in Europe and the ones which are from other countries. In all cases, all clubs were from the highest football league. This paper presents results mainly on the basis of financial data and data of sport performance of the chosen football clubs. The gathered data concerns the years from 2010 to 2015. It includes a 5 year-period because the UEFA ranking is based on points granted during 5 years. The sample included 19 football clubs without the English Premier League (EPL). The research on the EPL was conducted only for one season, i.e. as a complementary sample in the third part of research. Moreover, the literature review and business reports was conducted in order to choose some suitable data and to adequately interpret the obtained result.

## 2 Understanding of Efficiency

Economic efficiency indicates an economic entity in which all resources are allocated to serve in the best way possible, minimising waste and inefficiency. In such situation, any newly implemented changes would make it worse. In other words, it is a situation understood as maximization of production using all available resources which are limited. The concept of efficiency has to employ some measure of value. The monetary measure used by economics proves to be both broad and useful. It enables to take account of and compare the evaluations made in many different cases and to respond appropriately (Heyne 2008; Samuelson and Nordhaus 2001). In this study, the expected curve of efficiency is assumed. The curve presents effects which depend on the chosen variable in the Fig. 1. The variable in this paper is the level of coefficient of Salaries/Revenues.

Evaluation and measurement of efficiency in economics are fundamental problems for organization, regardless of whether it is a profit organization, a nonprofit organization such as a foundation or a sports club. In order to deal with efficiency, we can distinguish sports clubs which are divided into non-profit and for-profit sports club (Cieslinski and Perechuda 2015). This paper elaborates on the problem in professional football clubs and it focuses on the group of profit sports clubs. Professionalization and commercialization in sport raised a questions regarding the benefits of investment in football clubs and the method of measuring efficiency of resources in football clubs. The importance of the issue of efficiency and financial performance of football clubs is proven by the Financial Fair Play initiative undertaken in 2009 by the Union of European Football Associations (UEFA).

Many studies (Wyszynski 2016; Wang et al. 2014; Wilson et al. 2013; Szymanski and Kuypers 1999; Fort 2003) observed that in business practice, sports club managers have a higher impact on input reduction, mainly regarding the costs of staff (players and coaches), that is on their salaries rather than on an increase in the output obtained, for instance the number of points awarded for winning or drawing in a football match. Many authors pointed that the business performance of the football clubs depends on their football players. Thus, the coefficient of Salaries to Revenue is one of the most important Key Performance Indicator (KPI) in football



**Fig. 1** Expected optimal efficiency salaries/revenues coefficient curve. *Source:* Author own study

business. It is used to compare the investment in players to the achieved results (Barros and Garcia del Barrio 2008; Carmichael et al. 2010; Halkos and Tzeremes 2010).

Plumley et al. (2017) prepared the research of KPI for the EPL. They pointed out that the economic aspects of sporting effectiveness are often considered in isolation and there is little reference as to how these can be linked together with financial performance factors to contribute to an overall measure of performance. Yet, they still they chose the KPI divided in two groups, that is the financial one and the sports one. As far as financial indicators are concerned, they analysed revenues, profit, ROCE, current ratio, debt, gearing and the last but not the least Salaries/Revenue (S/R) ratio (it was regarded as the most important). Additionally, it is worth mentioning that due to the UEFA's recommendation within Financial Fair Play, clubs are advised to make sure that salaries do not exceed 70% of revenues and debt levels do not exceed 100% (Plumley et al. 2017). Both of these factors are assigned with the greatest weight as far as the financial performance is concerned.

The classification of sports and financial indicators is fundamental to understand the processes and relations between financial results such as profits and sport results such as championship. Some authors stated that indicators based on profit or net profit approach are hard to apply in football clubs (Markham 2013; Szymanski and Kuypers 1999). Small part of football clubs that generate profit are exception to situation that most clubs' outgoings continue to race ahead of revenues (Kennedy and Kennedy 2016). Szymanski and Kuypers (1999) considered three areas of the relationship between sport success and financial success. Firstly, higher profits might automatically lead to better team performance and greater sports success might lead

to greater profit, so that there would be no conflict between satisfaction of stakeholders such as football fans and owners of sports club. Secondly, sports success might be unrelated to profitability or even could be generating loss due to high level of salaries which is the last area investigated by Szymanski and Kuypers (1999). The collected data and the conducted research by these authors show that there is no simple formula that could explain the relation between sport success and financial success. Studies on value creation by football clubs correspond with this problem. Studies on sports clubs valuation pay more attention to the utility approach of value creation by football clubs than to the transactional approach (Andreff 2011; Markham 2013; Perechuda 2016). In conclusion, it is hard to evaluate effectiveness of sports clubs only by profit orientated approach. Professional sports clubs need to balance the requirements of producing a successful team on the pitch (utility maximisation) with the requirements of being a commercial organisation (profit maximisation).

### 3 Research Results

Review of literature showed that the coefficient of Salary to Revenue ( $S/R$ ) is the most important performance indicator in the football industry. Moreover, it reflects level of investment in football team. Thus, this paper attempts to answer how it correlates with direct results of sport performance such as:

- Place in national league
- UEFA ranking points (including general good sport performance in Europe)

Additionally, this paper presents elaboration on how coefficient of Salary to Revenue ( $S/R$ ) refers to the one chosen financial result: Revenue/Assets ( $R/A$ ). This indicator was chosen in order to show some effectiveness in financial perspective and to avoid profit approach which is not recommended in sports clubs, where range of business success is measured better by changes in revenues (Kennedy and Kennedy 2016).

The main research question in the study is: what is the optimal level of coefficient of Salary to Revenue ( $S/R$ ) in order to achieve effective sport results? In order to answer this question, the data of sports clubs were collected. The obtained results are presented on the scatter plot in order to compare them with assumed efficiency curve in the Fig. 1. The quantity verification is an additional part of the research and it includes only basic statistical means and Pearson correlation. However, the main conclusions are drawn on the basis of the presented scatter plots (Table 1).

In order to validate the research, financial data is gathered from financial statements of the chosen clubs. All chosen clubs during the period of the data collection were in the upper divisions and some of them competed in international competitions. These kinds of clubs were chosen because they are the ones that attract a great number of investors and sponsors and as a result they are the most professional organizations in this industry. The samples were collected mostly on the basis of the

**Table 1** Chosen football clubs

| Name                    | Country    |
|-------------------------|------------|
| 1. Juventus             | Italy      |
| 2. Roma                 | Italy      |
| 3. Lazio                | Italy      |
| 4. Cagliari             | Italy      |
| 5. Udinese              | Italy      |
| 6. Fiorentina           | Italy      |
| 7. Genoa                | Italy      |
| 8. Inter                | Italy      |
| 9. Milan                | Italy      |
| 10. Napoli              | Italy      |
| 11. Parma               | Italy      |
| 12. Verona              | Italy      |
| 13. Torino              | Italy      |
| 14. Borussia Dortmund   | Germany    |
| 15. Sporting Lisbon     | Portugal   |
| 16. Benfica Lisbon      | Portugal   |
| 17. Porto               | Portugal   |
| 18. Olympique Lyonnaise | France     |
| 19. Ajax Amsterdam      | Netherland |

*Source:* Author own study

top 5 best football leagues in Europe. All of the clubs were limited companies. At the initial stage of the study, only the clubs listed on the stock exchange were chosen. The data collected at the initial stage were not sufficient to compare the relation between the Salary and Revenue (S/R) with efficiency understood as the place in league. As a result, in the main stage of the study 10 clubs from one league (Italian league) were added to the sample.

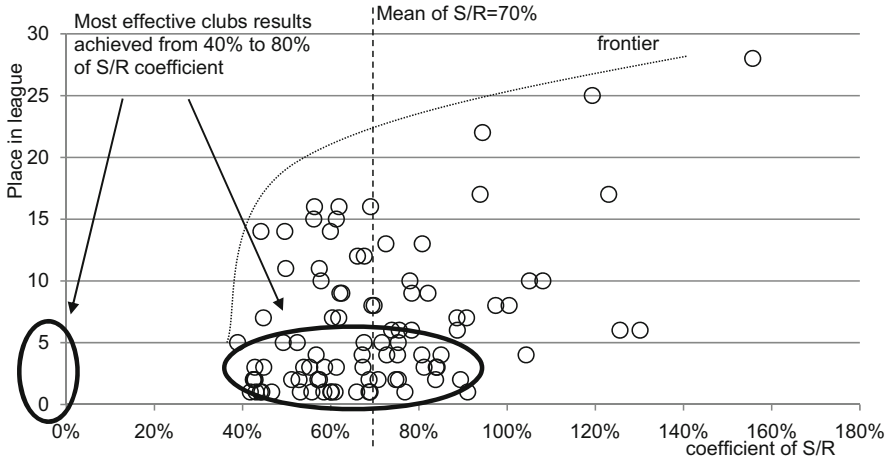
The first verification concerns comparing place in the league<sup>1</sup> with coefficient of Salaries to Revenues. Results of this comparison is presented in the Fig. 2.

The best clubs which achieved from the first to fifth place in the league were characterised by a wide range of coefficient of Salary to Revenue (S/R) from 40% to above 80%. Thus, it is hard to clearly indicate the optimal level of S/R in order to achieve good sport performance. Additionally, the Fig. 2 allows to observe a border of S/R ratio at 40%. There are hardly any clubs whose value is lower than that. The mean of S/R in this comparison achieved 70%. Furthermore, the scatter plot presents the comparison of the UEFA points<sup>2</sup> with coefficient of Salary to Revenue (S/R) in the Fig. 3.

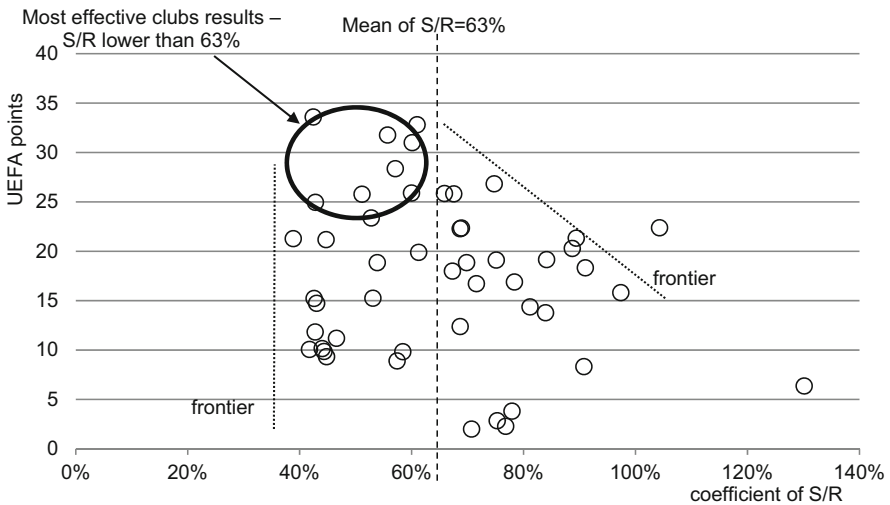
<sup>1</sup>The higher place in league (the lower number) the better the sports performance.

<sup>2</sup>UEFA points are based on the results of clubs competing in the five previous seasons of the UEFA Champions League and the UEFA Europa League. The rankings determine the seeding of each club in all UEFA competition draws. The more points the better the club performance.



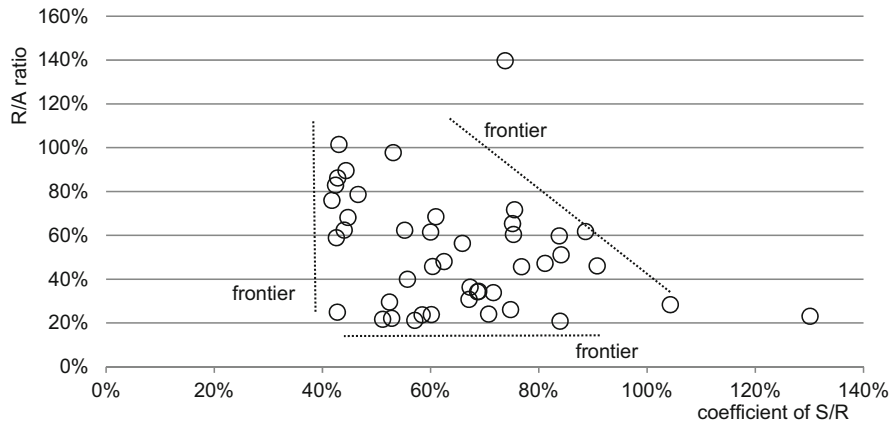


**Fig. 2** Scatter plot of place in league vs coefficient of S/R. *Source:* Author own study



**Fig. 3** Scatter plot of UEFA points vs S/R coefficient. *Source:* Author own study

In the Fig. 3 it may be noticed that that the best clubs with regards to the sports performance mostly have the S/R ratio between 40% and 63%. Thus, the good performance taking into account the UEFA points are below mean of S/R in this sample. The sample in this comparison is lower than in the Fig. 2 because not all the clubs performed during 5 years in the UEFA competition. The third comparison



**Fig. 4** Scatter plot of Revenues/Assets vs coefficient of S/R. *Source:* Author own study

**Table 2** Chosen statistics data (w/o EPL)

|   | Mean of S/R | St. dev. |
|---|-------------|----------|
| All football clubs (%)  | 70          | 23       |
| Means for clubs from the first to fifth place in the league (%) | 62          | 18       |
| Means for clubs with the UEFA points (%)                        | 63          | 21       |
| Pearson correlation   |             |          |
| S/R vs place in the league                                      | 0.43        |          |
| S/R vs UEFA points  | -0.18       |          |
| S/R vs R/A  | -0.18       |          |

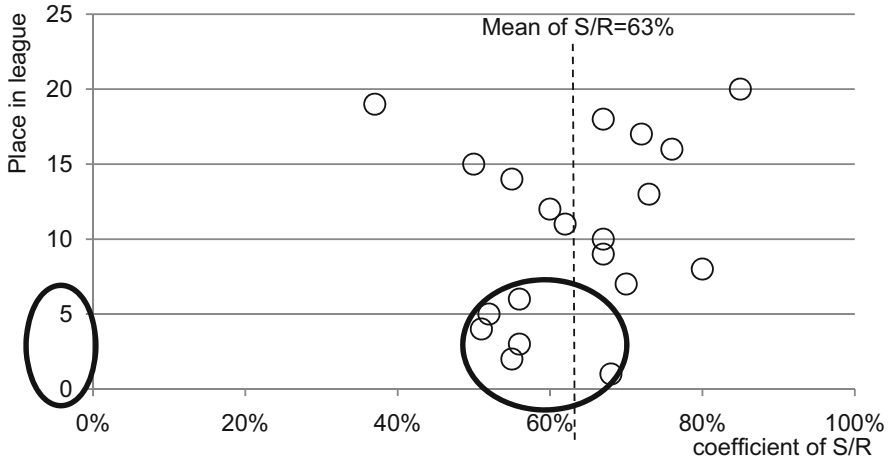
*Source:* Author own study

concerns the ratio of business efficiency: Revenues/Assets<sup>3</sup> (R/A) versus coefficient of Salaries to Revenue (S/R).

The scatter plot in the Fig. 4 presents a relationship between these two values, mainly when the S/R ratio increases, the R/A may become lower. It can occur in this way particularly if the change is determined by the value of revenues. On the other hand, if a change is determined by salaries there can be a positive relation between higher salaries and higher value of assets because football players are treated as intangible assets in assets of a given club.. Finally, in this comparison, as it is presented in the Table 2, there is a weak regression correlation between these two ratios (R/A and S/R).

In the chosen statistics data if only sample of clubs achieving from the first to the fifth place in the league are observed, one may see that they have the lowest level of mean S/R and the lowest standard deviation. It implicates that the clubs with better sport performance are characterised with more stable level of S/R and in most cases

<sup>3</sup>The higher the R/A ratio, the better the company performs, since higher ratios imply that the company is generating more revenue.

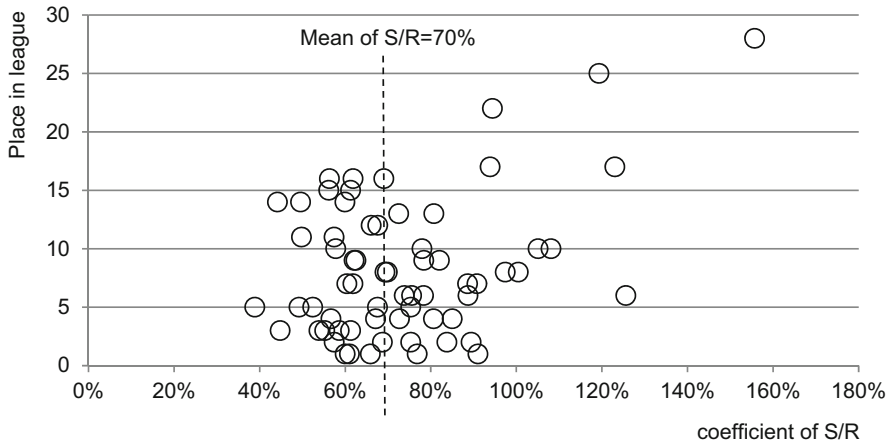


**Fig. 5** Scatter plot of places in EPL vs coefficient of S/R. *Source:* Author own study

S/R is lower than S/R mean of total sample. In these three comparisons, there is not a good Pearson correlation. The main stage of the research has not shown clearly how the curve of optimal efficiency level of S/R should look like. As a result, the complementary research was implemented in the last stage of the research. In addition to comparing of S/R with sport performance, were presented a basis only of one national league. Two samples were chosen in the additional stage: one season (from 2014 to 2015) of the English Premiere League (EPL) and all five seasons for clubs only of the Italian league.

In the additional sample of the EPL, the most effective clubs (5 of 6) with the best results achieved from 50 to 60% of coefficient of Salary to Revenue (S/R) and they were below mean which is at similar level as it is in the comparison with the UEFA points: 63%. The comparison presented in the Fig. 5 is similar to the one presented in the Fig. 3 (UEFA points). Clubs placed further in league are characterised by a wider discrepancies of S/R ratio.

The data presented only for the Italian league is not quite different from the one presented in the Fig. 1. However, there are differences between the EPL and the Italian league so that it can be assumed that it is a good research direction to investigate and optimal level of S/R inside the whole one league and clubs from different leagues should not be mixed. Yet, they can be mixed if the research sample is not based only on the clubs that participated in the UEFA competitions which is another form of a group competition and clubs with players from different countries but at one common level of competition.

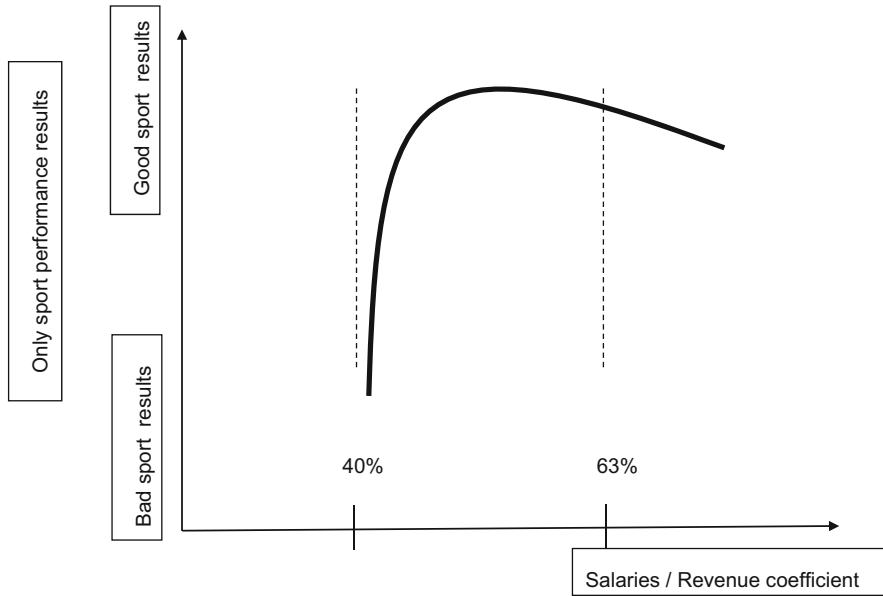


**Fig. 6** Scatter plot of places only in Italian league vs coefficient of S/R. *Source:* Author own study

## 4 Conclusions

In the conducted research, the results are dependent on the selection of the sample. The collected data in the total sample (w/o EPL) do not allow to confirm or reject the initial assumption. However, it is possible to observe the trend where increase of coefficient of Salary to Revenue (S/R) over a certain level leads to a decline of efficiency measured by sport results or by R/A ratio. The results can be explained by the analysis of the sample. In the total sample (the Fig. 2), there is no equal representation of each place in the league. Moreover, the sample contains clubs from different national leagues. Thus, at the additional stage of research the results for clubs only in one national league (the Fig. 5 and the Fig. 6) are presented. In case of the EPL sample, it contains an equal representation of each place in league because it is prepared for one season with all the clubs. After having prepared a comparison and an additional analysis of the chosen statistics data (Table 2), it is possible to observe that clubs which achieve good sports results are characterised by a lower value of coefficient of Salary to Revenue (S/R). Yet, there are some limitations of S/R value when none of the teams are below that value. Moreover, the cases of achieving worse performance results (sport performance) are characterised by a higher standard deviation of S/R and are more varied. The observed minimum level of S/R ration is close to 40% but it is hard to indicate the maximum level of this ratio. On the basis of conducted research, it is possible to prepare, preliminary shape of the curve of the optimal efficiency of S/R (the Fig. 7) only in comparison to sports performance. The curve is limited by the minimum level of S/R (40%) and is declining when S/R ratio is above mean (63%) as it was observed in the conducted research.

The study is not sufficient to fully confirm the previous assumptions, yet it allows to spot a problem that should be explored in details in a wider historically sample of



**Fig. 7** Preliminary optimal efficiency Salaries/Revenues coefficient curve depending on sport performance. *Source:* Author own study

the selected cases of clubs with an analysis of the process of relations between hiring expensive players and obtaining specific sport results as consequences. Nevertheless, coefficient of Salary to Revenue (S/R) is one of the key performance indicators in football clubs as it is presented by other authors and it is a derivate of sport performance. In order to obtain better results, clubs are expected to achieve lower levels of this indicator. On the other hand, at the time the club is at the top of the sport competition, it has huge funding and is able to hire expensive players but when the players do not achieve adequate results, there is a risk that annual revenues will fall drastically and the club will be paying high wages to players who draws club to the bankruptcy. Distribution of salaries between players in each club is another problem to investigate in further research. S/R could be overestimated due to one or couple very expensive football players in comparison to other players in the same team.

## References

- Amir, E., & Livne, G. (2005). Accounting, valuation and duration of football player contracts. *Journal of Business Finance and Accounting*, 32(3–4), 549–586.
- Andreff, W. (2011). Some comparative economics of the organisation of sports: Competition and regulation in North American vs. Europe professional team sports leagues. *The European Journal of Comparative Economics*, 8, 3–27.

- Barros, C. P., & Garcia del Barrio, P. (2008). Efficiency measurement of the English football Premier League with a random frontier model. *Economic Modelling*, 25(5), 994–1002.
- Carmichael, F., McHale, I., & Thomas, D. (2010). Maintaining market position: Team performance, revenue and wage expenditure in the English Premier League. *Bulletin of Economic Research*, 63(4), 464–497.
- Cieslinski, W. B., & Perechuda, I. (2015). Profit and nonprofit sports clubs: Financial and organizational comparison in Poland. *International Journal of Social, Behavioural, Educational, Economic and Management Engineering*, 9(6), 2110–2114.
- Demir, E., & Danis, H. (2011). The effect of performance of soccer clubs on their stock prices: Evidence from Turkey. *Emerging Markets Finance and Trade*, 47, 58–70.
- Fort, R. D. (2003). *Sports economics*. Upper Saddle River, NJ: Prentice Hall.
- Halkos, G. E., & Tzeremes, N. G. (2010). The effect of foreign ownership on SMEs performance: An efficiency analysis perspective. *Journal of Productivity Analysis*, 34(2), 167–180.
- Heyne, P. (2008). *The concise encyclopedia of economics*. 2008. Library of Economics and Liberty [online]. Accessed July 13, 2017, from <http://www.econlib.org/library/Enc/Efficiency.html>
- Kennedy, P., & Kennedy, D. (2016). *Football in neo-Liberal times: A Marxist perspective on the European football industry*. New York: Routledge.
- Kulikova, L. I., & Goshunova, A. V. (2014). Human capital accounting in professional sport: Evidence from youth professional football. *Mediterranean Journal of Social Sciences*, 5(24), 45.
- Lozano, F. J. M., & Gallego, A. C. (2011). Deficits of accounting in the valuation of rights to exploit the performance of professional players in football clubs. A case study. *Journal of Management Control*, 22(3), 335–357.
- Markham, T. (2013). *What is the optimal method to value a football club?* ICMA Centre. [online]. Accessed June 10, 2016, from <http://ssrn.com/abstract=2238265>
- Morris, P. E., Morrow, S., & Spink, P. M. (1996). EC law and professional football: Bosman and its implications. *The Modern Law Review*, 59(6), 893–902.
- Morrow, S. (1996). Football players as human assets. Measurement as the critical factor in asset recognition: A case study investigation. *Journal of Human Resource Costing and Accounting*, 1(1), 75–97.
- Morrow, S. (1997). Accounting for football players. Financial and accounting implications of ‘Royal Club Liégeois and others V Bosman’ for football in the United Kingdom. *Journal of Human Resource Costing and Accounting*, 2(1), 55–71.
- Oprean, V. B., & Oprisor, T. (2014). Accounting for soccer players: Capitalization paradigm vs. expenditure. *Procedia Economics and Finance*, 15, 1647–1654.
- Peeters, T., & Szymanski, S. (2013). Financial fair play in European Football. *Economic Policy*. [online]. Accessed June 10, 2016, from <http://www.economic-policy.org/wp-content/uploads/2013/10/peeters-szymanski.pdf>
- Perechuda, I. (2016). Market value, book value and intellectual capital value in case of football clubs listed on stock exchange. In *Proceedings 8th International Scientific Conference Managing and Modelling of Financial Risks* (Vol. 3, pp. 798–806). VŠB-TU of Ostrava, Faculty of Economics, Department of Finance.
- Plumley, D., Wilson, R., & Ramchandani, G. M. (2017). Towards a model for measuring holistic performance of professional football clubs. *Soccer and Society*, 18(1), 16–29.
- Poli, R., Ravenel, L., & Besson, R. (2015). Transfer expenditure and results. *CIES Football Observatory Monthly Report* 3—March 2015.
- Samuelson, P. A., & Nordhaus, W. D. (2001). *Economics* (17th ed.). New York: McGraw-Hill Higher Education.
- Shareef, F., & Davey, H. (2005). Accounting for intellectual capital: Evidence from listed English football clubs. *Journal of Applied Accounting Research*, 7(3), 78–116.
- Szymanski, S. (2012). *Insolvency in English professional football: Irrational exuberance or negative shocks?* (Working Paper No. 12–02). North American Association of Sport Economics.

- Szymanski, S., & Kuypers, T. (1999). *Winners and losers: The business strategy of football*. London: Viking Books.
- Wang, J. S., Cheng, C. F., & Jane, W. J. (2014). Buying success or redistributing payment: Bidirectional causality in Korean Professional Baseball League. *Eurasian Business Review*, 4, 247–260.
- Wilson, R., Plumley, D., & Ramchandani, G. M. (2013). The relationship between ownership structure and club performance in the English Premier League. *Sport, Business and Management: An International Journal*, 3(1), 19–36.
- Wyszynski, A. (2016). Efficiency of football clubs in Poland. *Olsztyn Economic Journal*, 11(1), 59–72.

# Evaluating Realized Volatility Models with Higher Order Cumulants: HAR-RV Versus ARIMA-RV



Sanja Dudukovic

**Abstract** The objective of this paper is to introduce a new Realized Volatility (RV) Model. The model solves the problems of capturing long memory and heavy tails, which persist in current Heterogeneous Auto Regressive Realized Volatility Models (HAR-RV). First, an extensive empirical analysis of the classical RV model is provided by coupling Digital Signal Processing (DSP), Non Gaussian Time Series Analyses (NG-TSA) and volatility forecasting concepts. All models are built and tested on 30 min quotations of closing spot prices: USD/JPY, CHF/USD, JPY/EUR USD/GBP and GBP/EUR for the period from May 14, 2013 to July 31, 2015, taken from Bloomberg. The independence of the model's innovations is tested by using the second, third and fourth cumulants, known as Higher Order Cumulants (HOC). Two tests are used, the Box-Ljung (B-Lj) test and Hinich test. The model is compared with the more natural Autoregressive Moving Average model (ARMA-RV). The empirical analysis shows that neither classic HAR-RV nor ARMA-RV models produce independent residuals. In addition, DSP recent findings are used to build a new HOC-ARMA-RV model. It was shown that only HOC-ARMA model fully captures fat tails and the long memory of FX returns.

**Keywords** Realized volatility · HAR-RV model · HOC-ARMA model · Extended Box-Jenkins method · Model testing · Volatility forecasting

## 1 Introduction

Volatility is fundamental for financial theory and investment decisions. Accurate volatility forecasts are essential inputs for pricing derivatives as well as trading and hedging strategies. Ever since the stylized facts of exchange rate time series were defined, the GARCH model (Bollerslev 1986) and its many variants, came to dominate the field of volatility forecasting. A huge amount of literature investigated

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many of the aspects of GARCH models including their ability to capture volatility clustering, fat tails and long memory.

In the last decade, it has been demonstrated that the realised volatility, defined as the sum of high frequency squared returns, provides a more accurate estimate of the latent volatility than the GARCH volatility, which is non-observable volatility proxy. It was mathematically proved that the sum of intraday squared returns converges (as the length of sampling interval goes to zero) to the integrated volatility of the returns making it possible to construct an error-free estimate of the actual volatility. This non-parametric volatility estimator is known as realized volatility (RV).

Unfortunately RV, which is constructed directly from real ultra-high frequency returns, appears to be biased. This biasness is due to the market microstructure frictions which deform the measurement of returns at the very high frequencies. It was empirically found that RV is regularly measured with noise. Müller et al. (1997) agreed on a tradeoff sampling interval of 30 min for the most highly liquid exchange rates, leading to only 48 observations per day. Ultimately, the realised volatility, defined as the sum of intraday, 30-min squared returns, provides a more correct estimate of the latent volatility. That finding is used in this research.

Theoretical and empirical properties of realized volatility are well-defined for foreign exchange market (Andersen et al. 2000). They found that the realised volatility distribution is nearly Gaussian. However, there is an unnoticed problem regarding the calling upon the Central Limit Theorem to justify the use of the Gaussian distribution from intraday data. The summation involves only a finite number of terms which does not go to infinity (Andreou et al. 2001). In addition, it is also concluded that averaging is inappropriate because it creates a spurious autocorrelation. Therefore, the obtained coefficient of determination of the RV model must be taken with caution.

Corsi (2009) proposed an additive cascade model of three volatility components each of which is generated by the actions of different types of market participants. The resulting model incorporates daily, weekly and monthly realized volatilities and is called the Heterogeneous Autoregressive model of Realized Volatility (HAR-RV). It is expected that the HAR-RV model can capture the memory persistence, as well as many of the other main stylized facts of financial data volatility. In literature, the HAR-RV model is very positively evaluated by using the classic forecasting accuracy measures to include the Mean Forecast Error (MSE), Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Absolute Percentage Error (MAPE). The results show that the HAR-RV model outperforms the GARCH model both in standard and logarithmic forms.

Notwithstanding the positive HAR-RV evaluations based on the MSE, it is also found that HAR models for realized volatility exhibit strong Non-Gaussianity and volatility clustering (Corsi et al. 2008). It was proposed to add a GARCH component to the classic HAR model to solve the problem of volatility clustering. For example, Sedá (2012) showed that the most appropriate and accurate model for prediction of future realized volatility is the HAR-RV-GARCH model estimated in logarithmic

form. He also found that a monthly market component is insignificant within the HAR model structure.

The bipower variation (BV), is proposed as the volatility proxy with the aim to capture the long memory (Barndorff-Nielsen and Shephard 2004). They replaced the HF squared returns  $r_{t,1}^2$  by the product of two consecutive absolute returns  $|r_{t,i}| * |r_{t,i+1}|$ , in the formula for RV. Furthermore, in order to eliminate volatility jumps, Andersen et al. (2010) proposed the minimum and median RV bipower variations as the volatility proxy. Recently, Cheong (2016) included the Bipower variation (BV), minRV and medRV models as the jump-robust volatility proxies. He tested and compared the HAR-GARCH and HAR-RV models with the new volatility proxies. The BV and min RV showed better performance in robust estimation of jumps than the classic HAR-RV model. However, he also found that all tested models failed to reject the Box-Ljung test for serial correlations for standardized and squared standardized residuals.

Audrino and Knaus (2016) reviewed the structure of the HAR-RV model and proposed a flexible AR-RV model structure. They demonstrated that the HAR model can be expressed as a pure autoregressive model AR(22), with some constraints. They also advocated for a flexible AR model where the AR order has to be identify beforehand. They used an adaptive LASSO estimation method and showed that there is no robust evidence that the lag structure (1, 5, and 22) can be accurately recovered by flexible models. Indeed, they found almost no evidence that the monthly component should be included.

In the meantime, in the area of Digital Signal Processing (DSP), Non Gaussian Time Series Analysis has attracted a considerable attention. It is theoretically proved that higher order cumulants (HOC) of the signals are blind to any kind of additive Gaussian noise, including the measurement noise. A number of algorithms for the ARMA parameter estimation based on HOC were made (Giannakis and Mendel 1989). Some of them are available in the HOSA toolbox (Swami et al. 1995) as an open source set of scripts to be used within MATLAB. Paradoxically, HOC based AR or ARMA models have not attracted attention in financial economics.

This article builds upon integration of the novice time series results and achievements in digital signal processing area to recommend the HOC-ARMA volatility forecasting model for NG FX volatilities. Additional objective is to use HOC statistics to challenge the hypothesis that the classic HAR-RV and ARMA RV models produce independent innovations which are nearly Gaussian (Andersen et al. 2000).

The paper is organised as follows. Introduction and literature review are given in the first section. Two models, HAR-RV and ARIMA-RV, are described in the second section. The first part of the third section contains an empirical data analysis, model building and the parameter estimation results, which are obtained by using second order statistics. The second part of the same section shows residual tests based on the third and fourth cumulants, for all currencies. The fourth section suggests the HOC-ARMA-RV model, introduces the extended Box-Jenkins model building method and tests a new model by using Hinich's test. The last section contains the summary of the findings and the conclusion.

## 2 Realized Volatility Models

### 2.1 Heterogeneous Autoregressive Model: HAR-RV

The heterogeneous market hypothesis (HMH) is introduced with the aim to interpret long memory in realized volatility observations. It is based on the assumption that non-homogeneous market participants/investors interpret the same information in different ways according to their investment preferences and trading frequencies. Corsi (2009) chose three principal components of the RV (realized volatility): daily, weekly and monthly and created the Heterogeneous Autoregressive model (HAR RV). His model is tested by using sample forecasting errors and found by many authors to be good in approximating the dynamics of a long-memory. However, there is a theoretical problem regarding “calling upon the Central Limit Theorem to justify the use of Normal distribution from intraday data because averaging is inappropriate and creates a spurious autocorrelation” (Andreou et al. 2001). Therefore, the obtained coefficient of determination must be taken with caution. Incredible as it may seem, this problem is underestimated in Andersen et al. (2000).

A daily realised volatility is calculated by using intraday spot prices  $p_t$ .

$$\begin{aligned} RV_t^d &= \sum_1^{48} r_{t,i}^2, \quad \text{where } r_{t,i}^2 \text{ are squared of returns } r_{t,i} \\ &= \log \frac{p_{t,i}}{p_{t,i-1}} \quad i = 1, 2 \dots 48 \end{aligned} \quad (1)$$

Weekly and monthly average volatilities are defined by Corsi (2009) as:

$$RV_t^w = \sum_0^4 \frac{RV_{t-j}^d}{5}, \quad RV_t^m = \sum_0^{21} \frac{RV_{t-j}^d}{22} \quad (2)$$

Corsi assumed that each of those volatilities can be described by the AR (1) model:

$$RV_t^d = a_d RV_{t-1}^d + w_t^d, \quad RV_t^w = a_w RV_{t-1}^w + w_t^w, \quad RV_t^m = a_m RV_{t-1}^m + w_t^m, \quad (3)$$

where  $w_t^d$  and  $w_t^m$  are different white noises introduced by corresponding market agents.

After some manipulation, Corsi (2009) proved that the general HAR (1, 5, and 22) model takes the form:

$$RV_t^d = b_d RV_{t-1}^d + b_w RV_{t-1}^w + b_m RV_{t-1}^m + v_t \quad (4a)$$

Audrino and Knaus (2016) demonstrated that the HAR model can be expressed as a pure autoregressive model AR (22) with some constraints:

$$RV_{t+1}^d = \sum_1^{22} f_i RV_{t-i+1}^d + v_{t+1}, \quad i = 1, \dots, 22 \tag{4b}$$

### 2.2 ARMA-RV Model

The rationale for introduction of the ARIMA (p, d, q) model for RV time series, in this research, is based on the following research results:

- (a) A true heterogeneous RV can be described by the very long AR (22) (Audrino and Knaus 2016);
- (b) High frequency measurement and heterogeneous market structure introduce noise to the FX prices;
- (c) Sampling/measuring of a continuous AR signal produces an ARMA (p,p) digital signal (Pagano 1974);
- (d) The time aggregation produces an ARMA process (Amemiya and Wu 1972). More specifically, the sum of three autoregressive processes for daily, weekly and monthly realized volatilities, generates an ARMA model (Engel 1984);
- (e) If NG assumption does not hold empirically, higher order cumulants must be used to estimate parameters and test the models, Hinich (1996);
- (f) The microstructure effects make the empirical returns not independent (Corsi et al. 2001). The heterogeneous structure of the FX spot market creates an incoherent component in the observed price, which induces a strong negative first-order autocorrelation of returns in tick time.

Consequently, if the HAR model is defined as a sum of three independent autoregressive processes, for daily, weekly and monthly realized volatilities in the presence of additive measuring noise, it must be identified as an ARMA model.

The best known NG ARMA model building methodology is known to be the Box-Jenkins methodology (Box and Jenkins 1970). It includes three steps: model identification; model order determination, parameter estimation and model testing. That methodology assumes that each stationary time series can be treated as an output from the ARMA (p, q) filter, which has as an input uncorrelated noise  $\{v_\tau\}$ .

The general ARMA model has the following form:

$$y_t = \alpha_0 + \sum_1^p \alpha_i y_{t-i} + v_t + \sum_1^q \beta_j v_{t-j} \tag{5}$$

It's close form is:

$A(Z)y_t = B(Z)v_t$ , where Z is a backward shift operator  $y_{t-1} = Z^{-1}y_t$ ,  $y_{t-k} = Z^{-k}y_t$  and where A(Z) and B(Z) are characteristic transfer functions of orders p and q respectively:

$$\begin{aligned}
 A(Z) &= 1 - \alpha_1 Z^{-1} - \alpha_2 Z^{-2} - \dots - \alpha_p Z^{-p}; & B(Z) \\
 &= 1 - \beta Z^{-1} - \beta Z^{-2} - \dots - \beta Z^{-q}
 \end{aligned}
 \tag{6}$$

The roots of the characteristic functions of the ARMA model must be within the unit cycle to guarantee stationarity and invertibility of the model.

Model identification is accomplished by using autocorrelation and partial autocorrelation functions. Model order is determined by using FPE, Akaike's or Schwarz Information criterion. Sufficient statistics for ARMA parameter estimation, which is the second step of the B-J methodology, in the case of the Gaussian driving noise, is autocovariance function. The most popular AR parameter estimation method is based on the Yule-Walker system of equations (Box and Jenkins 1970).

$$\sum_1^p \alpha_i C^2(k-i) = -C^2(k) \quad i = 1, 2, \dots, p \quad k = 1, 2, \dots, p \tag{7}$$

$C^2(k)$ ,  $k = 1, 2, \dots, L$ , is a covariance function calculated for  $L + 1$  lags. The covariance function is known as an estimate of the second order cumulant.

The Box-Ljung Q test shows how successfully the model performs "digital whitening" and has the form:

$$Q = n \sum_1^L C^2(k) \tag{8}$$

Q has  $\chi^2$  distribution with d.f. of  $L-p-q$ , where  $L$  is max lag.

There are many CANEF estimation methods based on second order statistics which are used to produce ARMA parameter estimates. They are built in the MATLAB, R, Eviews and other programs.

### 2.3 Model Testing Methods

The common criteria for comparing volatility models are the Mean Forecast Error (MSE), Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Absolute Percentage Error (MAPE). All those criteria are based on the variance of innovations and assume that innovations are not correlated.

Most recently, the methods which test whether the popular volatility models have been parameterized in such a way that they can accommodate and explain the most common FX stylized facts, such as volatility clustering, fat tail phenomena, the leverage effect (Taylor effect) or long memory. Models for which the answer is positive may be viewed as suitable for practical use. For example, Teräsvirta and Zhao (2011) investigated the ability of the GARCH model to reproduce series with high kurtosis and, at the same time, positive but low and slowly decreasing autocorrelations (AC) of squared returns. Bai et al. (2003) also compared the GARCH and ARSV models in terms of kurtosis and autocorrelation relationship in squared returns.

Recently, Zhang et al. (2011) proved that the empirical distribution of realized daily volatility (RV) can be approximated by using the Edgeworth expansion and developed a general device for the computation of the cumulants.

In the case of the NG-TSA, as well as in the case of the G-TSA, a good volatility model must produce independent and identically distributed innovations (Lim et al. 2005). Consequently, in addition to the autocorrelation function, the higher order cumulants must be used to build a model, as they provide additional information about true signal parameters. Accordingly, NG ARMA models must be tested by using Hihich test (Hinich 1996).

Giannakis and Swami (1992) showed that AR parameters of non-Gaussian ARMA signals can be estimated by using the third and the fourth-order cumulant functions of the output time series  $r(t)$ . Parameters can be calculated as follows:

$$C_r^2(m) = \frac{1}{n} \sum r(t)r(t+m) \quad m = 1,2 \dots L$$

$$C_r^3(m,s) = \frac{1}{n} \sum r(t)r(t+m)r(t+s) \quad m = 1,2 \dots L, \quad s = 1,2 \dots L, \quad (9)$$

$$C_r^4(m,s,v) = \frac{1}{n} \sum r(t)r(t+m)r(t+s)r(t+v) - C_r^2(m) C_r^2(s-v) - C_r^2(s) C_r^2(v-m) - C_r^2(v) C_r^2(m-s), \quad m = 1,2 \dots L, \quad s = 1,2 \dots L, \quad v = 1, \dots L \quad (10)$$

where  $n$  is a number of observations and where the second-order cumulant  $C^2(m)$  is just the autocovariance function of the time series  $r(t)$ ,  $t = 1,2, \dots n$ .

The test statistics suggested by Hinich (1996) is aimed to discover serial dependence in NG time series by using auto correlation, bicorrelations and tricorrelations. According to Wild et al. (2010) “if the null hypothesis of pure noise is rejected by the H3 or H4 tests, this then signifies the presence of structure in the data that cannot be modeled by ARCH or ARMA or stochastic volatility models that assume a pure noise input”.

Tests H3 and H4 are designed to test the existence of a higher order serial dependence (Wild et al. 2010, p. 9). They are defined as following:

$$H^3 = \frac{1}{n-s} \sum_{s=2}^L \sum_{r=1}^{s-1} \{C^3(m,s)\}^2 \approx \chi^2 \text{ with } L(L-1)/2 \text{ d.f.}, \quad (11)$$

$$H^4 = \frac{1}{(n-v)^{1.5}} \sum_{v=2}^L \sum_{s=2}^{v-1} \left\{ \sum_{r=1}^{s-1} \{C^3(r,s,v)\}^3 \right\} \approx \chi^2$$

with d.f. of  $L(L-1)(L-2)/3$ , (12)

where  $L$  is the number of lags. The number of lags  $L$  is defined as  $L = n^b$ , with  $0 < b < .5$ , for H3 and  $0 < b < .33$  for the test based on the fourth order cumulants.

### 3 Empirical Analysis

#### 3.1 HAR and ARMA Volatility Models

The empirical analysis is based on 30-min quotations of closing exchange rates for the period from May 14, 2013 to July 31, 2015, taken from Bloomberg. All RV time series are tested first for unit roots by using Augmented Dickey-Fuller test statistic with 5% level of significance and t critical is  $-2.866$ . The results are presented in Table 1.

Table 1 shows that all realized volatilities are nonstationary. Moving ahead, stationarity is achieved by applying the first order difference. The transformed RV is marked with the suffix DRV. Common simple statistics, relevant for this paper's analysis are given in Table 2. Table 2 shows a strong departure from the Gaussian distribution with high kurtosis.

##### 3.1.1 HAR Model Estimation and Residuals

The model parameterization is given in Table 3. The results show a relatively high coefficient of determination for all currencies. Surprisingly, the results show evidence that the monthly RV is statistically insignificant. Going on to testing the innovations, their autocorrelation are calculated. The common sample statistics of HAR\_RV residuals is given in Table 4. Large excess kurtosis of realized volatility is evident across all currencies. Therefore, the Non-Gaussian TSA must come into play.

Going on, residual autocovariances are calculated. For easiness of visual comparison, Fig. 1 shows autocovariance dynamics and huge autocovariances for the first 10 lags as well as in some cases for lag 25 according to the control limits ( $\pm 1/\sqrt{n}$ ,  $n = 556$ ).

Moving ahead, the Box-Ljung test, as defined by Eq. (8), was applied to all HAR residuals. The results are presented in Table 5.

Table 5 shows that the hypothesis of independent innovations must be rejected with 5% level of significance for all five time series. This finding creates a problem to the reliability of the HAR model, since the consistent and efficient properties of the OLS method assume that regressors are independent and that innovations are also independent. In addition, the correlation between the daily and weekly realized volatility is found to be 80%. This is the case of a spurious regression with an artificially very high coefficient of determination.

**Table 1** Unit root test results

| Null hypothesis:<br>TS has unit root | RVCHFUSD | RVGBPEUR | RVJPYEUR | RVUSDGBP | RVUSDJPY |
|--------------------------------------|----------|----------|----------|----------|----------|
| t-Statistic                          | -3.694   | -6.376   | -3.806   | -4.109   | -4.214   |

Source: Authors own study

**Table 2** First difference of realized volatilities and their descriptions

|           | DRVCHFUSD | DRVGBPEUR | DRVJPYEUR | DRVUSDGBP | DRVUSDJPY |
|-----------|-----------|-----------|-----------|-----------|-----------|
| Mean      | 0.00      | 0.00      | 0.00      | 0.00      | -0.01     |
| Std. dev. | 0.64      | 0.28      | 0.75      | 0.41      | 0.61      |
| Skewness  | 0.08      | 0.11      | -0.29     | -0.42     | -0.36     |
| Kurtosis  | 50.44     | 21.18     | 10.62     | 14.85     | 12.76     |

Source: Authors own study



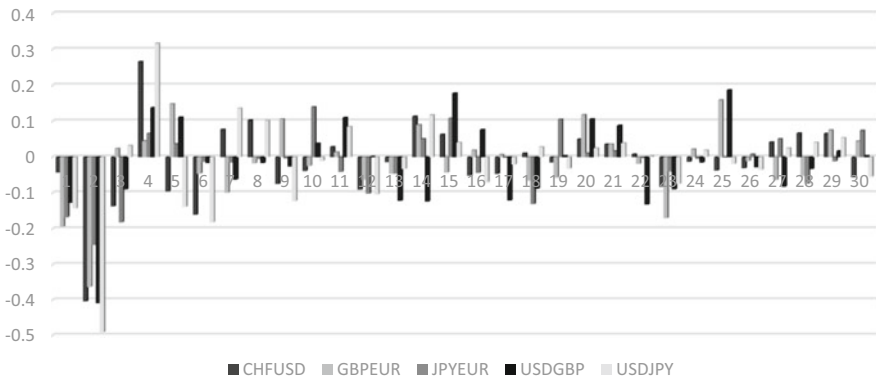
**Table 3** HAR parameter estimates

|             | Variable       | RV1        | RV5        | RV22       | R <sup>2</sup> |
|-------------|----------------|------------|------------|------------|----------------|
| D(RVCHFUSD) |                | CHFUSD(-1) | CHFUSD(-1) | CHFUSD(-1) |                |
|             | Coefficient    | -1.218     | 1.210      | 0.017      | 0.611          |
|             | Standard error | 0.041      | 0.108      | 0.112      |                |
|             | t-stat         | -29.456    | 11.218     | 0.152      |                |
| D(RVGBPEUR) |                | GBPEUR(-1) | GBPEUR(-1) | GBPEUR(-1) |                |
|             | Coefficient    | -1.281     | 1.305      | -0.024     | 0.638          |
|             | Standard error | 0.041      | 0.095      | 0.096      |                |
|             | t-stat         | -31.208    | 13.701     | -0.251     |                |
| D(RVJPYEUR) |                | JPYEUR(-1) | JPYEUR(-1) | JPYEUR(-1) |                |
|             | Coefficient    | -1.112     | 1.133      |            | 0.568          |
|             | Standard error | 0.042      | 0.108      | 0.115      |                |
|             | t-stat         | -26.395    | 10.470     | -0.089     |                |
| D(RVUSDGBP) |                | USDGBP(-1) | USDGBP(-1) | USDGBP(-1) |                |
|             | Coefficient    | -1.092     | 1.123      | -0.029     | 0.555          |
|             | Standard error | 0.042      | 0.097      | 0.099      |                |
|             | t-stat         | -26.245    | 11.571     | -0.289     |                |
| D(RVUSDJPY) |                | USDJPY(-1) | USDJPY(-1) | USDJPY(-1) |                |
|             | Coefficient    | -1.134     | 1.191      | -0.065     | 0.559          |
|             | Standard error | 0.043      | 0.085      | 0.077      |                |
|             | t-stat         | -26.411    | 14.063     | -0.844     |                |

Source: Authors own study

**Table 4** HAR-DRV residuals and their description

|           | CHFUSD | GBPEUR | JPYEUR | USDJPY | USDGBP |
|-----------|--------|--------|--------|--------|--------|
| Std. dev. | 0.41   | 0.17   | 0.51   | 0.41   | 0.28   |
| Skewness  | 4.57   | 2.05   | 2.01   | 1.53   | 1.89   |
| Kurtosis  | 55.20  | 16.72  | 11.35  | 10.89  | 15.71  |



**Fig. 1** HAR-RV residual autocorrelations. Source: Authors own study

**Table 5** Box-Ljung test results for the HAR model

| Box-Ljung test            | CHFUSD  | GBPEUR | JPYEUR  | USDJPY  | USDGBP  |
|---------------------------|---------|--------|---------|---------|---------|
| Residuals HAR-DRV         |         |        |         |         |         |
| QSTAT                     | 167.404 | 142.27 | 236.324 | 230.005 | 200.827 |
| $\chi^2$ critical, L = 30 | 32.671  |        |         |         |         |
| Significance = .05        | 1       | 1      | 1       | 1       | 1       |

Source: Authors own study

### 3.1.2 ARMA-RV Model and Its Residuals

As opposed to the HAR-RV model, where the equation of the model is predetermined, the ARMA model order needs to be determined first, since it cannot be known in advance how much noise is introduced by measuring and by market agents. The order selection is based on AIC, Schwartz or similar criterion. In this research, preliminary parameter estimation is performed by using EViews 9.5. The best resulting ARIMA model coefficients for the first differences of the RV variables are given in Table 6. Using the parameter estimates, proceeding with the creation of standard 1-day-ahead forecasts or innovations, their autocorrelation functions (AC) (l),  $l = 1, 2, 3, \dots, 30$ , are calculated for all currencies in Eviews. Figure 2 shows that a long memory feature of the RV is not perfectly captured by the ARIMA model, given that autocorrelations for lags 15, 20 and above are outside control limits ( $\pm 1/\sqrt{n}$ ,  $n = 556$ ).

Going on, the Box-Ljung test, given in Eq. (8), was applied to all ARIMA residuals. The results are presented in Table 8. They show that for max lag of 30, the hypothesis of independent innovations could be rejected with 5% level of significance in three out of five cases. It means that ARIMA models capture a slightly better correlation between innovations.

The common descriptive statistics for all ARMA-RV residuals is given in Table 7. A huge discrepancy from the Guassian distribution is obvious.

The Box-Ljung test rejected the hypothesis of independent ARMA model innovation produced for three currencies, as shown in Table 8.

To conclude, autocorrelations cannot be treated as sufficient statistics for the RV parameter estimation and modeling. Or more generally: as long as the sufficient statistics for the ARMA parameter estimation is considered to be the autocorrelation function, the existing parameter estimation methods will not produce independent innovations.

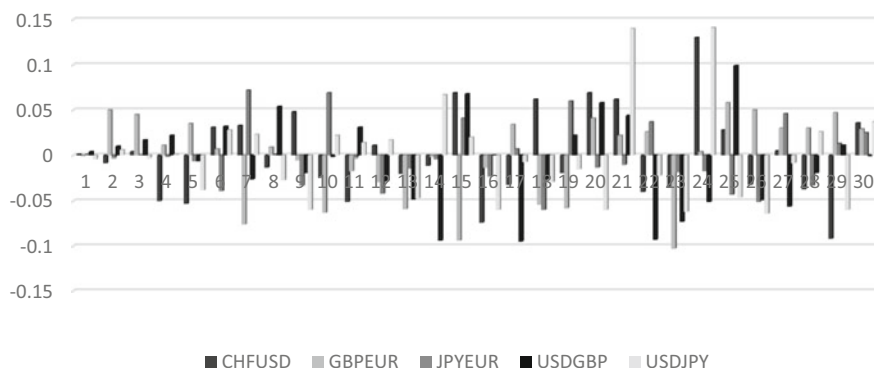
### 3.1.3 Model Testing with Higher Order Cumulants

The third order residual cumulants of the models HAR-RV and ARMA RV are calculated with MATLAB, the HOSA toolbox and the MATLAB scripts, made for this research. Since the third order cumulants are two dimensional, to make visualization easier, diagonal cumulants are extracted and presented in Figs. 3, 4, 5 and 6.

Table 6 ARIMA-DRV parameter estimates

| RV ARMA parameters | AR1   | AR2   | AR3   | AR4   | AR5   | MA1   | MA2   | MA3   | MA4   | MA5   | R <sup>2</sup> |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------------|
| DRVGBPEUR          |       |       |       |       |       |       |       |       |       |       |                |
| Coefficient        | -1.22 | -0.75 | -1.22 | -0.89 |       | 0.29  | -0.46 | 0.55  | -0.23 | -0.83 | 0.50           |
| Standard error     | 0.05  | 0.06  | 0.07  | 0.05  |       | 0.07  | 0.07  | 0.07  | 0.06  | 0.06  |                |
| DRVCHFUSD          |       |       |       |       |       |       |       |       |       |       |                |
| Coefficient        | -1.21 | -0.90 | -1.23 | -0.94 | -0.08 | 0.28  | -0.33 | 0.36  | -0.16 | -0.83 | 0.51           |
| Standard error     | 0.06  | 0.09  | 0.07  | 0.06  | 0.04  | 0.06  | 0.06  | 0.06  | 0.06  | 0.05  |                |
| DRVJPYEUR          |       |       |       |       |       |       |       |       |       |       |                |
| Coefficient        | -1.04 | -0.56 | -1.23 | -0.99 | -0.15 | 0.20  | -0.56 | 0.57  | -0.07 | -0.91 | 0.47           |
| Standard error     | 0.06  | 0.09  | 0.10  | 0.10  | 0.10  | 0.05  | 0.05  | 0.06  | 0.05  | 0.05  |                |
| DRVUSDGBP          |       |       |       |       |       |       |       |       |       |       |                |
| Coefficient        | -0.23 | 0.49  | -0.14 | 0.15  | 0.12  | -0.56 | -0.95 | 0.55  |       |       | 0.43           |
| Standard error     | 0.19  | 0.17  | 0.03  | 0.04  | 0.02  | 0.19  | 0.04  | 0.18  |       |       |                |
| DRVUSDJPY          |       |       |       |       |       |       |       |       |       |       |                |
| Coefficient        | 0.46  | -1.37 | 0.63  | -0.77 | 0.29  | -1.12 | 1.38  | -1.30 | 0.99  | -0.83 | 0.44           |
| Standard error     | 0.06  | 0.08  | 0.09  | 0.10  | 0.08  | 0.05  | 0.08  | 0.09  | 0.09  | 0.06  |                |

Source: Authors own study



**Fig. 2** ARIMA-DRV residual autocorrelations

**Table 7** ARMA-DRV residuals and their description

|           | CHFUSD | GBPEUR | JPYEUR | USDJPY | USDGBP |
|-----------|--------|--------|--------|--------|--------|
| Std. dev. | 0.447  | 0.198  | 0.538  | 0.432  | 0.302  |
| Skewness  | 5.628  | 3.871  | 2.668  | 1.763  | 3.011  |
| Kurtosis  | 63.151 | 30.638 | 14.330 | 11.507 | 18.225 |

Source: Authors own study

**Table 8** Box-Ljung test for ARIMA-DRV models

| Box-Ljung test             | CHFUSD | GBPEUR | JPYEUR | USDJPY | USDGBP |
|----------------------------|--------|--------|--------|--------|--------|
| Residuals ARMA-DRV         |        |        |        |        |        |
| QSTAT                      | 41.662 | 35.725 | 27.42  | 46.425 | 42.879 |
| Critical $\chi^2$ , L = 30 | 38.885 |        |        |        |        |
| Significance = .05         | 1      | 0      | 0      | 1      | 1      |

Source: Authors own study

The black lines show diagonal residual HAR-ARMA-RV third cumulants while the gray lines show third cumulants of the ARMA-RV model.

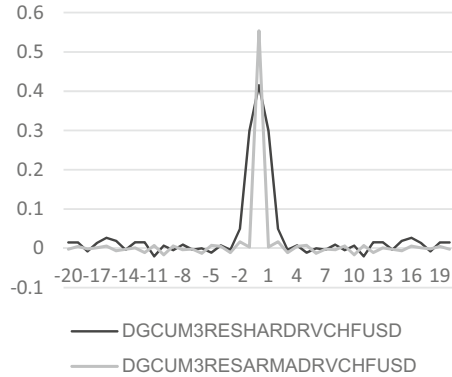
The diagonal cumulants of ARMA residuals are closer to zero than cumulants of HAR residuals in all cases. These findings suggest that the ARMA structure captures somewhat better FX stylized facts.

Going ahead, H3 test was calculated for both models. The results are presented in Table 9.

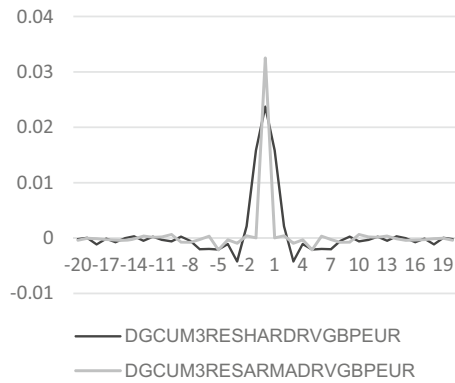
Table 9 demonstrates that null hypothesis about innovations' independence based on third order cumulants is rejected for the HAR-model for all but two currencies (CHFUSD and GBPEUR). The ARMA-RV innovations look independent, the test was passed in all cases, but innovations still include higher cumulant values for lags 20 and above.

Going on, Figs. 7, 8, 9 and 10 show the fourth order diagonal cumulants both for HAR-RV and ARMA-RV innovations. As it can be seen, the ARMA-RV model

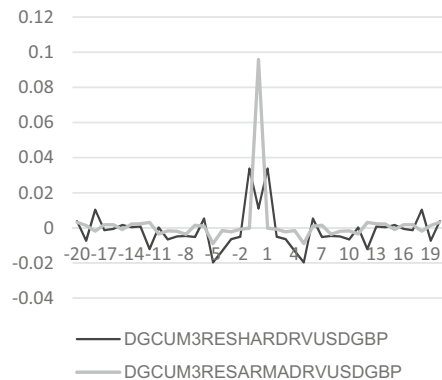
**Fig. 3** Third order cumulants for HAR-RV and ARMA-RV residuals for CHFUSD. Source: Authors own study



**Fig. 4** Third order cumulants for HAR-RV and ARMA-RV residuals for GBPEUR. Source: Authors own study

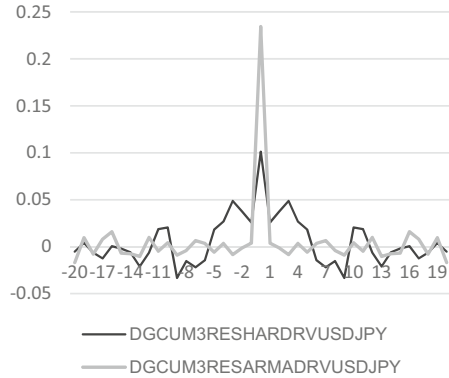


**Fig. 5** Third order cumulants for HAR-RV and ARMA-RV residuals for USDGBP. Source: Authors own study



performs better digital whitening than the HAR-RV model in terms of the fourth order cumulants in all cases. It is to be noted that the digital whitening capacity varies across exchange rates and, most probably, depends on noise introduced by different announcements which are perhaps country specific.

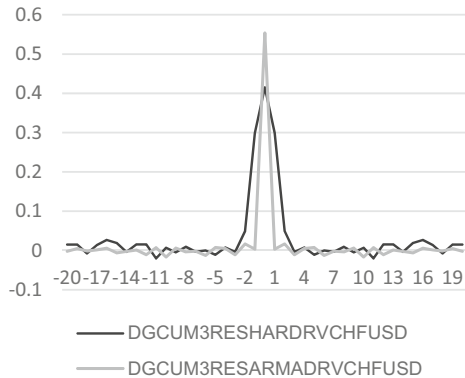
**Fig. 6** Third order cumulants for HAR-RV and ARMA-RV residuals for USDJPY. Source: Authors own study



**Table 9** Hinich test for HAR and ARMA-RV models

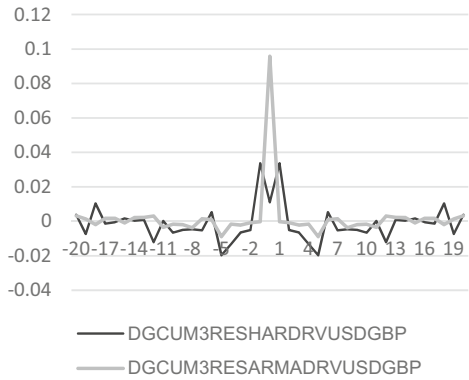
| Hinich test H3                 | CHFUSD | GBPEUR | JPYEUR  | USDJPY | USDGBP  |
|--------------------------------|--------|--------|---------|--------|---------|
| ARMA-RV innovations            | 5.315  | 61.548 | 5.314   | 150.89 | 127.038 |
| HAR-RV innovations             | 88.994 | 90.296 | 243.725 | 564.1  | 546.119 |
| $\chi^2$ -critical, for L = 20 | 223.16 |        |         |        |         |
| Significance = .05             |        |        |         |        |         |

**Fig. 7** Fourth order cumulants for HAR-RV and ARMA-RV residuals for CHFUSD. Source: Authors own study

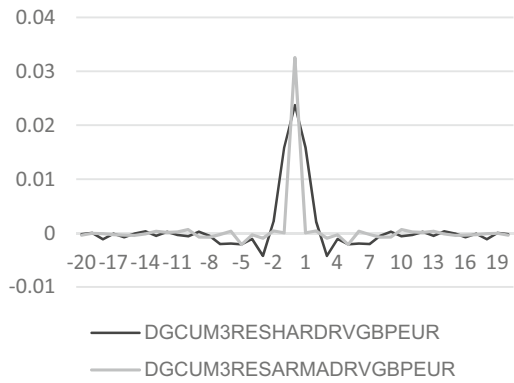


Nonetheless residuals still contain information in the form of the fourth order cumulants, which has not been captured by either model, since they both depend on the OLS parameter estimation. OLS is based on the second order cumulants and assumes independent innovations. It was revealed that HAR and ARMA-RV models really do not produce independent innovations. It means that those models have not captured all information from the FX intraday data. The idea that emerges naturally is to extract that information from the third and fourth cumulants, i.e. HOC statistics.

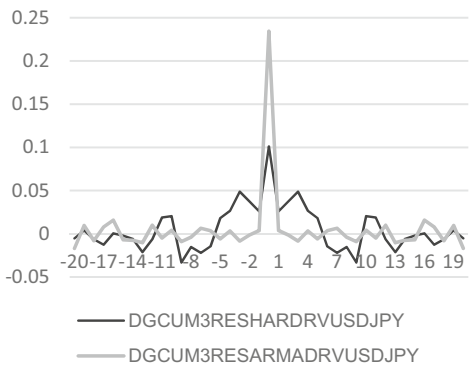
**Fig. 8** Fourth order cumulants for HAR-RV and ARMA-RV residuals for GBPEUR. Source: Authors own study



**Fig. 9** Fourth order cumulants for HAR-RV and ARMA-RV residuals for USDGBP. Source: Authors own study



**Fig. 10** Fourth order cumulants for HAR-RV and ARMA-RV residuals for USDJPY. Source: Authors own study



### 4 Suggested HOC-ARMA-RV Model Building Method

The failure of the asymptotic normality of RV was proved theoretically. It was also demonstrated that the distribution of Realized Volatility, as a proxy for integrated volatility, can be approximated by Edgeworth distribution (Zhang et al. 2011), which is expressed in terms of the central higher order cumulants (skewness, kurtosis, fifth and sixth cumulants).

The well-known Yule-Walker system of equations for AR parameters, which is used for Gaussian ARMA models, is extended to the case of Non Gaussian ARMA models, in terms of higher order cumulants. A three-step parameter estimation method, for both AR and MA coefficients, is developed by Giannakis and Mendel (1989). In the first step, AR parameters of a mixed ARMA model are estimated by using the expanded Yule-Walker system of equations, where second order cumulants are replaced by third or fourth order cumulants (Giannakis and Swami 1992):

$$\sum_1^p \alpha_i C^3(k - i, k - l) = -C^3(k, k - i) \quad i = 1, 2 \dots p; \quad k \geq l \geq q + 1 \quad (13)$$

$$\begin{aligned} \sum_1^p \alpha_i C^4(k - i, k - l)(k - m) = -C^4(k, k - l, k - m) \quad i = 1, 2 \dots p; \quad k \\ \geq l \geq m \geq q + 1 \end{aligned} \quad (14)$$

The expanded form of Eq. (14) is given in Eq. (15) to underline the absolute analogy between the Yule-Walker system with the second, third and fourth order cumulants.

$$\begin{aligned} & \left| \begin{array}{cccc} C^3(q + 1 - p, k) & C^3(q + 2 - p, k) & \dots & C^3(q, k) \\ C^3(q + 2 - p, k) & C^3(q + 3 - p, k) & \dots & C^3(q + 1, k) \\ \vdots & \vdots & \dots & \vdots \\ C^3(q, k) & C^3(q + 1, k) & \dots & C^3(q + p - 1, k) \end{array} \right| * \left| \begin{array}{c} \alpha(p) \\ \alpha(p - 1) \\ \vdots \\ \alpha(1) \end{array} \right| \\ & = \left| \begin{array}{c} -C^3(q + 1, k) \\ -C^3(q + 2, k) \\ \vdots \\ -C^3(q + p, k) \end{array} \right| \end{aligned} \quad (15)$$

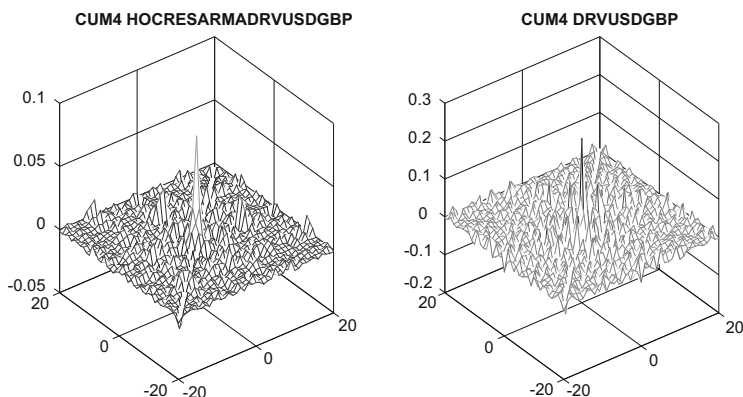
In the second step, pure AR residuals are calculated. In the third step, they are used to estimate pure MA model parameters (Swami and Mendel 1989). Going ahead, the HOC ARMA residuals are calculated for all currencies. They are marked as HOCRESARMA-FX in figures that follow. The algorithm is coded and included in the HOSA toolbox (Swami et al. 1995). It is used in this research in addition to many MATLAB scripts created by the author.



**Table 10** Descriptive statistics for HOC-ARMA RV residuals

|                    | USDGBP | JPYEUR | GBPEUR | CHFUSD | USDJPY |
|--------------------|--------|--------|--------|--------|--------|
| HOC ARMA residuals |        |        |        |        |        |
| Std. dev.          | 0.322  | 0.524  | 0.200  | 0.470  | 0.474  |
| Skewness           | 1.954  | 2.956  | 3.989  | 6.002  | 0.913  |
| Kurtosis           | 13.018 | 16.130 | 31.812 | 39.823 | 7.738  |

Source: Authors own study



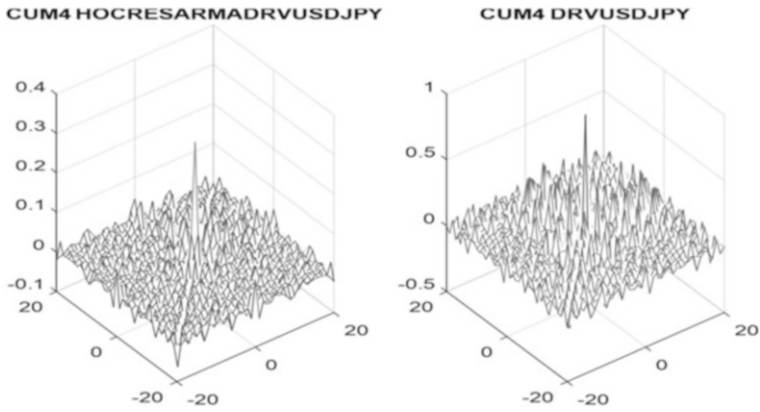
**Fig. 11** USDGBP fourth order cumulants for HOC-ARMA residuals and observed daily RV. Source: Authors own study

The descriptive common sample statistics of all HOC-ARMA residuals is given in Table 10. Comparing Table 7 with Table 10, one can notice, at a glance, a huge decrease in kurtosis for all currencies, comparing with the common sample description in the case of original realized volatilities DRV and RESARMADRV.

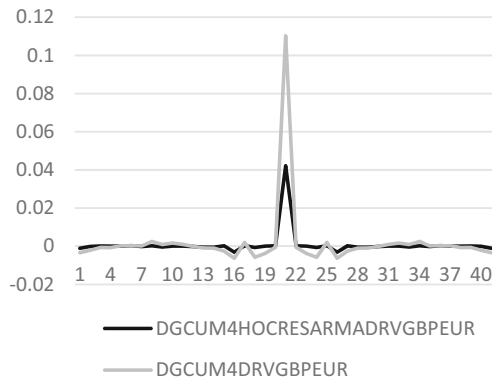
A closer look requires a calculation of the fourth order cumulants for all HOC-ARMA residuals. It was necessary to check if cumulants of HOC-ARMA residuals are reduced for all lags, not only for lag 0 (kurtosis). Due to lack of space, fourth order residual cumulants for all lags are graphed only for two currencies: USDGBP and USDJPY in Figs. 11 and 12. Diagonal cumulants are extracted and presented in Figs. 13 and 14.

Figures 11 and 12 show that all HOC-ARMA-DRV residual fourth cumulants are significantly smaller than input DRV fourth order cumulants.

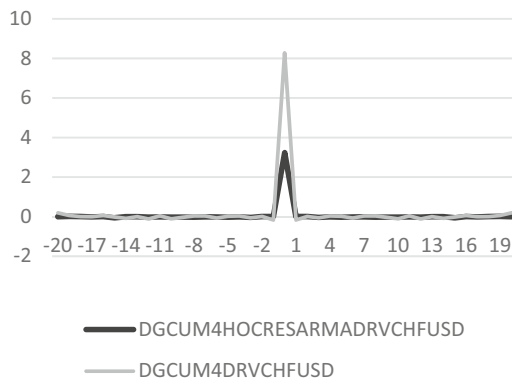
Figures 13, 14, 15 and 16, show more visibly the fourth order cumulants reduction. The black lines show diagonal residual HOC-ARMA-RV fourth cumulants while the gray lines show fourth cumulants of the original DRV. Since HOC-ARMA fourth residual cumulants are very close to the horizontal line around zero, undoubtedly the HOC-ARMA-RV model produces independent residuals or captures almost all information which is embedded in the HF FX spot prices.



**Fig. 12** USDJPY fourth order cumulants for HOC-ARMA residuals and observed daily RV. Source: Authors own study

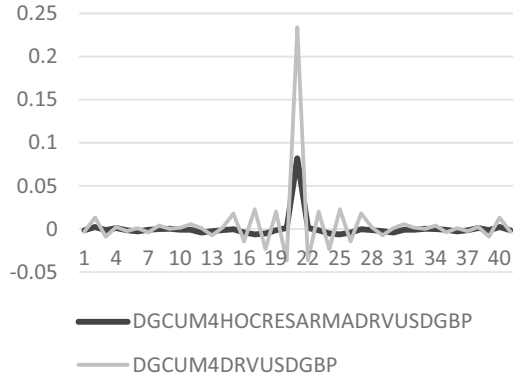


**Fig. 13** GBPEUR fourth order cumulants for HOC-ARMA residuals and for RV. Source: Authors own study

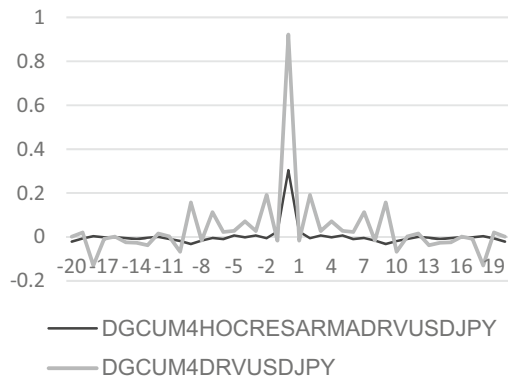


**Fig. 14** CHFUSD fourth order cumulants for HOC-ARMA residuals and for RV. Source: Authors own study

**Fig. 15** USDGBP fourth order cumulants for HOC-ARMA residuals and for RV. Source: Authors own study



**Fig. 16** USDJPY fourth order cumulants for HOC-ARMA residuals and for daily RV. Source: Authors own study



## 5 Conclusion

This paper introduces the new HOC-ARMA Realized Volatility model, which can capture long memory, fat tails and volatility clustering of FX volatility. Currently the most popular HAR-RV model is extensively analyzed and tested, not only in terms of autocovariances, but also in terms of the third and fourth order residual cumulants. The structure of the HAR-RV model is challenged, given the fact that a sum of three autoregressive processes, for daily, weekly and monthly realized volatilities must generate an ARMA model. The HAR-RV and ARIMA-RV models are estimated and tested on five intraday FX spot prices: USD/JPY, CHF/USD, JPY/EUR USD/GBP and GBP/EUR for the period from May 14, 2013 to July 31, 2015. All data are from Bloomberg.

First, this research reveals that the classic HAR-RV model produces spurious regressions with the high correlation between daily and weekly components, resulting in the artificially high values of the coefficient of determination. Second, given the fact that RV data are not Gaussian, the hypothesis stating that the HAR-RV model produces independent innovations, is tested by using Hinich’s tests based on

the third and fourth order cumulants. It demonstrates empirically that neither the HAR nor the ARMA-RV model performs digital whitening adequately, as long as their parameters are estimated by using only the autocovariance function or daily realised volatility. Indeed, the innovation structure violates both normality and independence assumptions.

The paper recommends the new HOC-ARMA RV model and the extended Box-Jenkins method for the estimation of its parameters and the model test based on the third and fourth order cumulants. It demonstrates that the new model can capture long memory and volatility clustering more effectively and make innovations independent. At the same time, it also compels for further research to address the problem of the HOC based ARMA parameter estimation method and its statistical efficiency in the case of non-Gaussian FX market volatility.

## References

- Amemiya, T., & Wu, R. Y. (1972). The effect of aggregation on prediction in the autoregressive models. *Journal of American Statistical Association*, 67(9), 628–632.
- Andersen, T., Bollerslev, T., Diebold, F., & Labys, P. (2000). Exchange rate returns standardized by realized volatility are nearly Gaussian. *Multinational Financial Journal*, 4(3&4), 159–179.
- Andersen, T. G., Bollerslev, T., Frederiksen, P., & Nielsen, M. O. (2010). Continuous-time models, realized volatilities, and testable distributional implications for daily stock returns. *Journal of Applied Econometrics*, 25(2), 233–261.
- Andreou, E., Pittis, N., & Spanos, A. (2001). On modelling speculative prices: The empirical literature. *Journal of Economic Surveys*, 15(2), 187–220.
- Audrino, F., & Knaus, S. (2016). Lassoing the HAR model: A model selection perspective on realized volatility dynamics. *Econometric Reviews*, 35(8–10), 1485–1521.
- Bai, N., Russell, J. R., & Tiao, G. C. (2003). Kurtosis of GARCH and stochastic volatility models with non-normality. *Journal of Econometrics*, 114(2), 349–360.
- Barndorff-Nielsen, O., & Shephard, N. (2004). Power and bpower variation with stochastic volatility and jumps. *Journal of Financial Econometrics*, 2(1), 1–37. <https://doi.org/10.1093/jjfinec/nbh001>.
- Bollerslev, T. (1986). Generalized autoregressive conditional heteroscedasticity. In R. Engle (Ed.), *ARCH selected readings* (pp. 42–60). Oxford: Oxford University Press.
- Box, G., & Jenkins, G. (1970). *Time series analysis, forecasting and control*. San Francisco: Holden-Day.
- Cheong, C. W. (2016). Heterogeneous market hypothesis evaluations using various jump-robust realized volatility. *Romanian Journal of Economic Forecasting*, 19(4), 51–64.
- Corsi, F. (2009). A simple approximate long-memory model of realized volatility. *Journal of Financial Econometrics*, 7(2), 174–196. <https://doi.org/10.1093/jjfinec/nbp001>.
- Corsi, F., Dacorogna, M., Müller, U., & Zumbach, G. (2001). Consistent high-precision volatility from high-frequency data. *Economic Notes*, 30(2), 183–204.
- Corsi, F., Kretschmer, U., Mittnik, S., & Pigorsch, C. (2008). The volatility of realized volatility. *Economic Review*, 27(1–3), 1–33.
- Engel, E. (1984). A unified approach to the study of sums, products, time-aggregation and other functions of ARMA processes. *Journal of Time Series Analysis*, 5(3), 159–171.
- Giannakis, G., & Mendel, J. (1989). Identification of non-minimum phase systems using higher-order statistics. *IEEE Transactions on Acoustics, Speech and Signal Processing*, 37(3), 360–377.

- Giannakis, G., & Swami, A. (1992). Identifiability of general ARMA processes using linear cumulant-based estimators. *Automatica*, 28(4), 771–779. [https://doi.org/10.1016/0005-1098\(92\)90036-F](https://doi.org/10.1016/0005-1098(92)90036-F).
- Hinich, M. (1996). Testing for dependence in the input to a linear time series model. *Journal of Nonparametric Statistics*, 6(2–3), 205–221. <https://doi.org/10.1080/10485259608832672>.
- Lim, K. P., Hinich, M. J., & Liew, V. K. S. (2005). Statistical Inadequacy of GARCH models for Asian stock markets: Evidence and implications. *Journal of Emerging Market Finance*, 4(3), 263–279. <https://doi.org/10.1177/097265270500400303>.
- Müller, U., Dacorogna, M., Davé, R., Olsen, R., Pietet, O., & Veizsack, V. (1997). Volatilities of different time resolutions—analyzing the dynamics of market components. *Journal of Empirical Finance*, 4(2–3), 213–239.
- Pagano, M. (1974). Estimation of models of autoregressive signal plus white noise. *The Annals of Statistics*, 2(1), 99–108.
- Seda, P. (2012). Performance of heterogeneous autoregressive models of realized volatility: Evidence from U.S. stock market. *International Journal of Economics and Management Engineering*, 6(12), 3421–3424.
- Swami, A., & Mendel, J. (1989). Closed form estimation of MA coefficients using autocorrelations and third-order cumulants. *IEEE Transactions on Acoustics, Speech and Signal Processing*, 37(11), 1794–1797.
- Swami, A., Mendel, J., & Nikias, C. (1995). *Higher-order spectral analysis toolbox: For use with Matlab*. E-book math works. Accessed May 20, 2016, from [https://books.google.ch/books/about/Higher\\_order\\_Spectral\\_Analysis\\_Toolbox.html?id=2SEIPwAACAAJ&redir\\_esc=y](https://books.google.ch/books/about/Higher_order_Spectral_Analysis_Toolbox.html?id=2SEIPwAACAAJ&redir_esc=y)
- Teräsvirta, T., & Zhao, Z. (2011). Stylized facts of return series, robust estimates, and three popular models of volatility. *Applied Financial Economics*, 21(1&2), 67–94.
- Wild, P., Foster, J., & Hinich, M. (2010). Identifying nonlinear serial dependence in volatile, high-frequency time series and its implications for volatility modeling. *Macroeconomic Dynamics*, 14(1), 88–110.
- Zhang, L., Mykland, P. A., & Ait-Sahalia, Y. (2011). Edgeworth expansions for realized volatility and related estimators. *Journal of Econometrics*, 160(1), 190–203.