Peter Huber · Danuše Nerudová
Petr Rozmahel *Editors*

Competitiveness, Social Inclusion and Sustainability in a Diverse European Union

Perspectives from Old and New Member States

Springer

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Introduction

Peter Huber, Danuše Nerudová, and Petr Rozmahel

1 Motivation and Background to This Collective Volume

The concept of diversity and heterogeneity may be considered one of the central features of the European Union (EU) and applies both to the economic and the political dimensions of the project of European integration. Economically, the four rounds of enlargements by 16 countries and the introduction of the common market program, in addition to the European Monetary Union (EMU), noticeably increased the heterogeneity of the EU. In just two decades, the addition of these countries moved the European Union from a free trade association of 12 countries with a population of approximately 380 million to a common market area of 28 countries (most of which have also joined the EMU) with a population of almost 600 million. Thus, among the 12 EU countries that were EU members in the late 1980s, the second wealthiest country (ignoring Luxembourg, which is the wealthiest of these 12 countries but is an outlier) in terms of GDP per capita at purchasing power parities (the Netherlands) was approximately 1.8 times wealthier than the poorest country under the same metric (Greece); however, among the 28 countries that are currently members of the EU (two decades later), the same ratio was 2.9.

Politically—putting aside the obvious differences in interests between countries of such vastly differing economic development levels—this diversity is

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documented by the increasingly complex institutional set-up and the growing concerns about the adequacy of governance within both the EU and the EMU resulting from the differing speeds of integration followed by different member countries. Thus although the concept of a multi-speed European Union is and always was a highly controversial topic in theoretical debates on European integration, the integration process in practice has repeatedly allowed individual countries to decide whether and when individual integration steps are adopted. Although this autonomy has significantly contributed to the progress of integration, it has also increased the complexity of governance issues and—as evidenced by the recent economic crisis—has led to significant economic vulnerabilities.

This heterogeneity—which is likely to increase, given that the EU in 2014 was negotiating membership with six countries, which all differ widely in terms of economic development and level of integration—also poses a number of questions with respect to the viability of a number of the EU's joint common economic and political development initiatives, such as the EU 2020 strategy and its long-term goal of creating smart, sustainable and inclusive growth in Europe. Although the prolonged impact of the economic and financial crisis has clearly shifted the priorities of European economic policy to more short term crisis management, the underlying diversity in the EU also raises issues as to what type of policies, instruments and strategies can deliver such smart, sustainable and inclusive growth and how this growth can be achieved in different parts of Europe.

However, the same diversity may also be an asset for the EU because it has the potential to trigger substantial learning effects among governments. These could ultimately be used to substantially improve policy deliverance and efficiency in the EU.

Against this background, this book brings together a series of papers that were produced in a project at Mendel University in Brno and funded by the European Social Fund (ESF) of the EU and the Czech Ministry of Education, Youth and Sport. These papers analyse competitiveness, social exclusion and sustainability in the EU with a strong emphasis on the perspective of those member states that joined the EU after 2004. The aspirations of this book is to document the diversity in the current EU and analyse the challenges diversity poses to EU policies in attempting to establish such a growth path in an economic area as heterogeneous as the EU, using the example of a selected number of policy fields and initiatives.

To fulfil these aspirations the team working on this book decided to organize the analysis focused upon three headline topics:

- The first topic aimed to document and provide tools for the analysis and assessment of the heterogeneity in economic and social development, in addition to sustainable development, among current EU countries. The aim of this part of the analysis was to determine the main division lines defining the current heterogeneity of the EU and to determine to what extent the noticeable shift of the public debate from East–west to North–south differentials in economic development since the 2010 crisis is also reflected in data.

- The second topic aimed to consider how this heterogeneity in the EU affects the design and efficacy of selected EU policies. Considering both the comparative advantages of the researchers involved and the identification of neglected topics in previous research, the decision was to focus on policies related to corporate social responsibility, SMEs and environmental taxation, as these policies are featured high on the EU's policy agenda but have also been slightly neglected in the academic debate thus far.
- The third topic aimed to highlight the potential to generate learning effects about efficient policies in the EU. Faced with a plethora of potentially rewarding research topics, the research team decided to focus on two commonly recognized central strategic issues for the future development of the EU: the development of peripheral countries and welfare state reform and the development of data collection and processing infrastructure, which is a topic that is frequently neglected in current debates but holds substantial potential for the generation of smart, inclusive and sustainable growth in the EU.

2 The Individual Contributions

2.1 Patterns of Heterogeneity

As a consequence of this work plan, the first part of this book takes stock of the diversity of the EU and its development since the financial and economic crisis. In the first chapter of this part of the book (chapter "The Competitiveness of the EU countries: A Multi-dimensional Cluster Analysis Approach"), *Rozmahel, Issever Grochová, and Litzman* analyse the diversity of EU countries in light of some new approaches to understanding, measuring and assessing competitiveness. Using cluster analysis, they analyse the results of comparing traditional cost-based measures of competitiveness to alternative approaches by focusing on institutional features (such as the business environment), human capital and infrastructure endowments, in addition to innovative capacity. They find that, although traditional cost-based measures of competitiveness suggest a clear division between the core EU countries and the periphery, in addition to the new member states, measures based on infrastructure, human capital and the institutional environment do not confirm the existence of these three country groups; in particular, the new member state group shows substantial diversity. However, when innovation potential is included as a measure of competiveness, a stable division of two country groups consisting of core countries, on one hand, and the periphery plus the new member states, on the other, emerges.

Repeating the analysis for different points in time, Rozmahel, Issever Grochová, and Litzman also reveal a remarkable convergence of the new member states towards the core EU countries in terms of institutional features, a more modest convergence in terms of cost-based measures, and a lack of convergence in terms of

innovation potential. They interpret this finding as a positive sign of the new member states' capacity to attract businesses, but suggest that the persistent deficits in innovation potential and the absence of support for innovation activities from both government as well as private actors in the new member states may hinder their competitiveness in the long run. Research, development and innovation support should thus be considered as priority issues in both periphery and new member countries.

Whereas the contribution of Rozmahel, Issever Grochová, and Litzman thus focuses on input indicators for economic growth, the contribution by *Kapounek* (in chapter "Long-Run Heterogeneity Across the EU Countries") focuses directly on previous growth experiences in the EU. He is interested in the impact of the EMU on growth and convergence among the EU countries. In particular, Kapounek tests the hypothesis that the introduction of a single currency has provided an institutional advantage that can be directly analysed on the steady-state GDP levels. His results indicate that in the EU there are currently three groups of countries in terms of steady-state income. The first of these is a high GDP per capita group consisting of the EU-core countries that are not Eurozone members (i.e., Denmark, Sweden and the United Kingdom). The second is a low-income group consisting of Portugal, Slovenia, Greece and Cyprus. The third, by contrast, consists of the remaining EU member countries. Notably, these three groups reflect the recent shift in debates on economic differences in the EU from a discussion of East–west differentials to North–south differentials during the financial and economic crisis, in addition to differentiating between EMU and non-EMU countries.

The results also have positive implications for the long-run potential of the new member states and periphery countries to catch up with the core Eurozone countries and corroborate the original hypothesis that the single currency provides an institutional advantage that increases total factor productivity and output over the long term. This analysis, however, suggests that the benefits of a single currency are utilized differently by different European countries and that the policy debates related to differences in economic development among Northern and Southern European EU countries are likely to fuel EU policy discussions for some time to come. From a policy perspective, resolving these disparities, according to Kapounek, may require adaptations in the policy framework with the key issue being that heterogeneity implies that regulation at the international (EU) level may have to be restricted to a few countries and not implemented across the entire currency area.

By contrast, the contribution by *Hampel, Issever Grochová, Janová, Kabát and Střelec* (in chapter "Sustainable Development in the EU"), shifts the focus onto social and sustainability issues. The starting point for their analysis is that half a decade after the financial and economic crisis, EU economic policy remains focused on the impact of the crisis, and the main challenge of the future will be the necessity of ensuring the efficient use of natural resources and guaranteeing sustainable development. These authors present and discuss a set of tools and indicators that allow to measure and evaluate not only the results of economic growth but also its complex social and environmental effects. In particular, their

focus is on indicators that extend beyond the measurement of GDP. Thus, basing their analysis on the concept of sustainable development, they review different indicators used to measure sustainable development and explore the potential of data envelopment analysis (DEA) methods to measure the progress of individual EU countries towards sustainable development. These authors conclude that DEA analysis has a high potential in the fields of environmental management and ecological control because it provides an objective tool to measure the relative efficiency of achieving environmental and societal goals that are difficult to monetize and have hitherto proven to be to analyse with the more standard tools of economic analysis.

Furthermore, on a more substantial basis, their application to sustainable development indices shows substantial differences in sustainable economic performance among the EU member states. Compared with the CEE and periphery countries, the EU's core countries generally have higher values for all studied indices. Conversely, the CEE countries have larger ecological footprints than the other countries, primarily due to the high proportion of heavy industry in their economies. When the DEA is applied, the CEE countries throughout have low efficiency levels ecologically and they lag behind both core and periphery countries with little tendency to catch up, which implies that the new EU member states have substantial room to improve in terms of the efficiency of environmental policy.

2.2 *Policies for Competitiveness, Social Inclusion and Sustainability in the EU*

Reflecting the set of objectives, the second part of the book focuses on selected policies for achieving competitiveness, social inclusion and sustainability in the EU. In particular, this part of the book focuses on policies directed at corporate social responsibility (CSR) and SME policies, as well as on environmental taxation, all of which have featured prominently on the European Commission's policy agenda. Thus (in chapter "Current Developments in Corporate Social Responsibility in the EU") *Abramuszkinová-Pavlíková and Basovníková* analyse and discuss current developments in CSR in the EU. They summarize the current state of CSR and CSR policies in the EU, including descriptions of certification processes such as ISO 26000 and SA8000. They also suggest that companies can be motivated to be socially responsible not only by market forces but also by the combination of political forces and public opinion because trust levels are important not only for other stakeholders but also for employees and their well-being, which is true for both large companies as well as SMEs.

However, the main thrust of Abramuszkinová Pavlíková's and Basovníková's analysis is centred on determining which firms are particularly prone to obtain SA8000 certifications and what the impacts are of such a certification on firm profitability and turnover using the example of Italian manufacturing companies.

Their results suggest that SA8000 certification is primarily used by larger, more profitable companies and that it has a positive impact on firm growth but not on firm profitability. This finding is consistent with results that suggest that SA8000 certification is particularly important for companies expanding into new markets because such a certification is frequently required by state institutions for tendering for public contracts and is also important for supply-chain management of large multi-national firms in international value added chains. It is thus of particular value for firms who are expanding their markets. From a policy perspective, these results indicate that public procurement regulations could be a powerful tool to motivate all firms to implements such strategies, although severe challenges remain in motivating SMEs to commit to CSR strategies.

Kubíčková, Tuzová and Toulová (chapter "The Internationalisation of Small and Medium-Sized Enterprises as a Path to Competitiveness"), by contrast, is the first of two contributions in the book that focus on the role of SMEs and SME policies in implementing the Europe 2020 strategy. These authors synthesize an impressive number of studies that they conducted, which focus on SMEs operating in different sectors in the Czech Republic, with the aim to explore the specifics of and communalities in the motives for, barriers to and the perceived success factors of internationalization of SMEs in different sectors and in different EU countries.

Their results suggest some common features but also a number of differences among both countries and sectors. Whereas SMEs in various sectors of the Czech economy have similar motives for entering foreign markets, their priorities differ across sectors. Similarly, comparing the most frequently reported motives for the internationalization of Czech SMEs with the motives for internationalization of SMEs presented in the literature covering the entire world shows that reactive motives prevail (slightly) for Czech SMEs. The most significant barriers to entry into foreign markets for Czech SMEs are those involving finding international opportunities, difficulties in establishing contacts with foreign customers, and the lack of employees who possess the necessary knowledge and experience in foreign trade operations. In comparison with international studies, Czech companies thus perceive almost the same barriers as foreign SMEs, but the order of their importance again differs from that found in international studies. Finally, there are certain differences in the motives for and the perceived barriers to internationalization as well as in the perception of success factors in internationalization among not only SMEs from different European countries but also among SMEs from different sectors within the same country.

Based on these results, the authors therefore argue against "one-size-fits-all" policies to support SME internationalization efforts. Rather, the specifics of the internationalization process in particular countries and sectors should be considered when designing such policies.

Beranová, Tabas and Vavřîna (chapter "Key Aspects of Competitiveness: Focus on European Small and Medium-sized Enterprises") is the other contribution focusing on SMEs in the book. The emphasis of this article, however, is on the role of innovation in shaping competitiveness. Their research aims to identify differences in the capital structure and financial performance of innovative and

non-innovative industries by focusing on the two most innovative branches in the EU (i.e., ICT and manufacturing) and on the two branches that have experienced the greatest changes in innovativeness: the real-estate business, which has the highest growth in innovation; and the accommodation and food services industry, which has the deepest decrease. These authors find only minimal differences in the capital structures and financial performance of innovative branches and the accommodations and food services industries according to evidence based on the corporate financial statements of businesses. Conversely, there are large differences between innovative branches and the real-estate business. Both the unchanged capital and property structures in the context of increased profitability measured by EBITDA primarily resulted in the preservation of profits in enterprises and innovations that are financed mostly from internal financial resources. In other words, enterprises only accept debt levels that do not change their capital structures. Based on these results, the authors discuss the rationale for policies designed to provide financial support for innovation.

The aim of the final chapter of the second part of this book (chapter "Pigouvian Carbon Tax Rate: Can It Help the European Union Achieve Sustainability?") by *Nerudová and Dobranschi* is to argue the applicability of a Pigouvian tax on negative externalities such as carbon emissions. The authors suggest that in a second best framework, carbon taxation should use an adjusted Pigouvian principle, which levies a lower carbon tax than originally advocated by Pigou, because this tax is levied in an already distortionary fiscal system, and because a portion of the external costs of pollution are borne by the polluter. This theoretical argument is complemented by an empirical analysis, which suggests that current carbon taxes have had a limited impact on environmental innovation in the past. Additional instruments, such as subsidies, may therefore be required to ensure full effectiveness of environmental taxation.

Accordingly, the authors argue that an efficient abatement policy that will curb carbon emissions strongly depends on additional instruments that must be implemented to enhance its effectiveness. In particular if carbon taxes are implemented, the revenues from these taxes should be used to support abatement capital formation and to provide incentives for green technology development. Moreover, revenue recycling through capital or payroll tax cuts should seek to boost the production and consumption of less carbon-intensive goods.

2.3 Strategies and Instruments: The Potential for Policy Learning

The third part of the book addresses key elements of potential development strategies for the EU. In particular, the aim in this section was to focus on the potential for learning effects that could be triggered by the diversity of EU countries. In the first chapter of this part (chapter "A Lesson for the Contemporary

European Periphery from the Transition Process of the CEE Countries"), *Kouba* asks what the distinguishing factors are between successful and less successful CEE countries in the transition period and what can be learnt from the transition process in the CEE countries for the development strategies of the Southern European periphery countries. Focusing on the first question, Kouba identifies the level of (non-elite) political stability, quality of the institutional framework, maturity and compatibility of informal institutions and the initial economic development level as the key determinants of the success of the transition and integration process of the CEE countries. The countries that have reached positive features within these categories were predestined to become members of the EU. Moreover, the prospect of accession to the EU in itself was a factor involved in the success of the transition process. However, the ex-ante strategies of economic transition and individual economic policies in different stages of transition were not essential for the success of the integration process from a long-term perspective.

Kouba's findings therefore suggest that to create a competitive and sustainable economic model for Southern European periphery countries, the policy of enforcing budgetary savings is inevitable but that a positive vision of the future is also needed. However, according to his findings, whether the way to competitiveness should be based on certain sectors, such as the knowledge economy, cheap exports or tourism, is of lesser importance because there could be many ways to achieve prosperity. Rather than the particular forms of economic policies, the existence of a positive vision and the broad-based support of this vision across the political spectrum are decisive for successful transforming peripheral countries.

Procházka, Landa, Procházková and Klimánek (chapter "Geospatial Infrastructure for European Union Sustainable Development"), by contrast, focus on the role of information systems and data collection in designing smart, sustainable and inclusive strategies in the EU, as an often overlooked aspect of the economic discussions on growth strategies. In particular, their case study of projects developing the joint geospatial data infrastructure of the EU notes that there is a general understanding that spatial data are essential for analyses that evaluate and monitor sustainable development. In particular, all developed countries have created national agencies that are focused on spatial data collection and maintenance. Nonetheless, the debate about a unified geospatial infrastructure allowing spatial data to be shared from different countries seamlessly within the EU is now decades-old. Based on these observations, the authors discuss the possibility of developing this strategy on the basis of the current INSPIRE directive of the European Commission.

Aside from the concrete suggestions for the further development of a European geospatial data infrastructure, Procházka, Landa, Procházková and Klimánek's contribution presents a case study illustrating how technological progress, national regulations and data collection interact to enable (or constrain) the development of infrastructure that, on the one hand, is necessary to steer, measure and evaluate the success of sustainable development and that, on the other hand, is also often instrumental for innovation and the development of new products and is thus pivotal for future economic growth.

Finally, in the last contribution to this book, *Huber, Leoni and Pitlik* (chapter "Reforming Welfare States") present a literature survey on the current challenges faced by European welfare states and discuss potential strategies to address these challenges from both economic and political-economic perspectives. These authors argue that policies directed at removing social inequalities based on inequality of opportunity and a social investment approach are more likely to be conducive to growth than not. Therefore, the frequently postulated trade-off between efficiency and equality does not generally apply. Countries looking for growth-friendly social policies should thus primarily focus on policies to provide equal opportunities and avoid exclusion or discrimination on the basis of gender, ethnicity or other characteristics.

However, these authors are also aware that a policy based on removing inequalities in opportunities alone is unlikely to meet the changing demands faced by the welfare state. Some form of "traditional" redistribution and social insurance against the risks of unexpected income losses will also have to be a feature of any European welfare state of the future. In this respect, the authors argue that an analysis of the redistribution over the life cycle and the impact of life cycle events as well as a more detailed analysis of unpaid work is required to design effective polices in a world in which globalization, migration, ageing, technological change, evolving work patterns, shifting family structures and other forms of social modernization and changes in life style are confronting governments with increased political demands to address old and new social risks.

Furthermore, Huber, Leoni and Pitlik suggest that welfare state reforms entail not only economic questions regarding the design of optimal policies but also the problem of how the general public and third-party actors as well as vested interests can be motivated to support reforms. Theories of welfare state reform resistance are, however, severely flawed if they do not account for the role of core beliefs in the process of attitude formation, and in procedural fairness considerations, in particular. Voters must have a minimum level of confidence in their democratic institutions to accept the uncertainties involved in far-reaching institutional changes. Notably, trust in European institutions can act as a substitute, to an extent, for trust in national institutions.

3 Summary

In sum, the results of this collective volume address a number of central issues in the advancement and development of a "smart", "sustainable" and "inclusive" growth strategy for the EU. These results highlight such central questions as whether the trade-offs between growth and sustainability as well as social inclusion can be solved but also relate to how both national and European institutions can be developed to internalize both social and ecological externalities. Whereas these issues are clearly too complex to be completely settled in a volume such as the present book, the contributions relating to documenting the diversity of the current

EU countries suggest that, although the public debate has noticeably shifted from an East–west centred discussion to a focus on North–south disparities in the last decade, this shift is only partially reflected in actual data.

In particular, in assessing the major division lines in the current EU, the results of these analyses suggest that, as a general matter, much depends on the indicators used and that the stronger the focus of researchers extends beyond GDP indicators and indicators of advanced comparative advantages (such as research and innovation), the stronger is the re-emergence of the traditional East–west (rather than the North–south) divide in the EU. Rather than being characterized by a single (East–west or North–south) divide, the EU is therefore split in a multitude of directions and fashions, in which East–west and North–south divides superimpose themselves or alleviate one another. Depending on the concrete indicator considered, this division will lead to very different results. Heterogeneity in the EU is thus a fundamentally multi-dimensional phenomenon, with results depending strongly on the concrete indicator considered.

Therefore, the results with respect to individual policies followed in the second part of this book warn that overly simplistic "one-size-fits-all" growth strategies and associated benchmarking exercises may not be conducive to achieving their goals. Instead, we would argue that resolving the current economic problems of the EU requires strategies that take due account of the vast heterogeneity of its member states in economic, institutional and political terms and embeds differentiated strategies in a sound framework of multi-level governance. Different member states of the EU have largely different experiences with reforms and policies and are also characterized by rather different needs, some of which must be addressed by national policy makers, whereas others can be addressed by EU wide policies.

The results of this part of the volume, however, also indicate that the analytical basis for the design of such overarching but country-specific strategies remains missing. Developing such a basis would require a much more detailed analysis of national systems than is currently available and therefore will remain as a highly active area of policy-oriented research in the future. In particular, we expect that detailed research into the sources and consequences of the heterogeneity of the EU and on the implications of these sources and consequences for the effectiveness of policy in particular fields will be a productive field of research in the future.

The results of the final part of this book focusing on the strategic aspects of heterogeneity, by contrast, suggest that the heterogeneity of the EU could—if used productively—also become one of the main sources of its comparative advantages. If countries and regions use their diverse experiences to learn from one another, there may be substantial improvements in policy making as a result. The results of this part, however, also suggest that reaping these potential benefits of diversity, requires investments into the joint data and analytical infrastructure to inform such learning as well as taking into account the political constraints affecting the decisions of policy actors.

Part I
Patterns of Heterogeneity

The Competitiveness of the EU Countries: A Multi-dimensional Cluster Analysis Approach

Petr Rozmahel, Ladislava Issever Grochová, and Marek Litzman

1 Introduction

Since the economic downturn in Europe and the rest of the world because of the global economic crisis in 2007/2008, Europe remains caught in lingering stagnation. Consequently, Europe is striving to identify a new strategy for reviving growth. Today's Europe seeks sustainable, smart and inclusive growth that is environmentally friendly. The narrow definition in terms of the percentage change in the GDP is not currently the most important issue in European society. Long-term sustainability and support of knowledge-based economic activity must be considered when designing the strategy for a new growth path in Europe. The new growth strategy should also prevent the exclusion of particular groups in society, ensuring social cohesion and seriously considering the ecological aspects of the strategy. According to the current understanding of economic growth in today's European society, the manner of understanding and measuring economic competitiveness has changed recently. In addition to the changing definition of growth, there is a shift in understanding the terms of national and regional competitiveness and their measurement. As stated in The Europe 2020 Competitiveness Report, Europe should support smart, environmentally sustainable and socially inclusive competitive strategies, an obvious shift from a traditional cost-based approach of measuring competitiveness by productivity and cost indicators. The traditional approach is limited because it excludes measures of a knowledge-based economy or innovation potential and does not allow for an evaluation of countries' competitiveness from a firm-level perspective. Instead, different indices of a country's competitiveness potential are considered by firms when choosing a business location.

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New definitions and new approaches to defining and assessing the competitiveness of EU countries have also been discussed in recent economic literature. Aiginger et al. (2013) redefined the term *competitiveness* to render it more useful for the evaluation of a country's performance and for policy conclusions. These authors sought to establish a definition that is "*adequate if economic policy strives for a new growth path that is more dynamic, socially inclusive and ecologically sustainable*". Accordingly, they defined *competitiveness* as the "*ability of a country (region, location) to deliver the beyond-GDP goals for its citizens*". Following the beyond-GDP literature, the authors then suggested a composite indicator of outcome competitiveness comprising income as well as social and ecological pillars.

A new competitiveness index that captures the dimensions in which politics can influence competitiveness beyond factor price adjustment was proposed by Huemer et al. (2013). These authors criticised the traditional concepts of measuring competitiveness, stating that competitiveness can change not only because of market processes but also because of political decision-making. Because this perspective is not compatible with traditional concepts of competitiveness measuring, the authors constructed a competitiveness measure that is more institutional in nature. Various approaches to defining and measuring national and regional competitiveness are followed by multinational organisations and their institutions such as the World Bank, the Organization for Economic Co-operation and Development (OECD), the European Union and the Asia Pacific Economic Cooperation (APEC). Various types of scoreboards evaluating the knowledge-based economy and innovative activity indicators are applied by those organisations when assessing countries' competitiveness.[1]

Considering the changing concepts of competitiveness in current economic literature, our paper evaluates competitiveness using various approaches to definition and measurement across the EU countries. In particular, three dimensions of competitiveness evaluation were identified and used in the analysis. In the first dimension, the traditional cost-based measures were applied to assess and compare competitiveness and its development over time in the EU countries. The second dimension captures the potential of a country to attract firms to establish and sustain high-skilled enterprises in a country. In this second dimension, two sub-dimensions are used separately to evaluate the potential of a country to attract firms to establish high-skilled businesses and to provide the conditions that will induce such firms to stay. Finally, the third dimension evaluates the innovation potential of a country.

In summary, three research questions were asked for each dimension of the competitiveness evaluation: (1) What are the levels of competitiveness and its development over time in the EU countries from the perspective of traditional cost-based measures? (2) How attractive are the EU countries for firms to establish and sustain high-skilled enterprises? (What non-cost conditions do the EU countries offer to firms to establish and retain competitive high-skilled enterprises?) (3) How

[1] For a summary of competitiveness-measuring methods by selected multi-national organisations, see, e.g., Karahan (2012).

attractive are the EU countries to firms in terms of innovation development potential? (What is the innovation and development potential of the EU countries?)

After the individual countries were analysed and compared in the first cost-based dimension, the individual countries and country-groups with similar competitiveness evaluations from the second and third dimension perspectives were identified. The purpose was to examine whether the evaluation of countries' competitiveness differs according to various perspectives of its definition and measurement. Hence, hypothesising the traditional division among the aforementioned three groups of countries to result from the traditional cost-based competitiveness approach, our paper asks whether such a division differs using the perspectives of doing business and innovation potential indices.

The chapter is structured as follows: The motivation, goals and research questions are explained in the introductory section. The second section describes the empirical strategy and methodology of the analysis. The cost-based competitiveness measures utilised to evaluate the EU countries are applied in the third section. The fourth and fifth sections examine the competitiveness of the EU countries from the firm-level perspective. In those sections, competitiveness is evaluated in terms of the conditions necessary to establish a sustainable high-skilled enterprise and the innovation potential in the EU countries. The sixth section concludes.

2 Empirical Strategy

This chapter applies three dimensions to examine different approaches to evaluating and comparing the competitiveness of the EU countries. The dimensions follow the major research questions examined in the analysis. First, the traditional cost-based approach to measure competitiveness is represented by a composition of the first dimension. The remaining two dimensions focus more on individual firms, evaluating the potential of countries to establish a high-skilled and competitive business. The second dimension includes the competitiveness indicators related to quality of infrastructure and human capital. In addition, this dimension includes various indicators evaluating the environment for doing business in the country—doing-business indicators (sourced from the World Bank Doing Business Database). The third dimension comprises indicators of the innovation potential of the country. The innovation potential is evaluated using the measures of research and development support and outputs, educational attainment, measures of students' and pupils' skills, etc. All indicators used in the analysis are described in Table 1. The final list of indicators described in the table represents the final reduced form of the set because some of the selected competitiveness and innovation indicators were excluded because of multicolinearity problems.

Descriptive comparative analysis is used to evaluate the EU countries using the traditional cost-based competitiveness measures approach. The list of cost-based competitiveness measures comprises indices of labour productivity, nominal unit labour costs and the real effective exchange rate (REER), as reported in Table 1.

Table 1 Indicators in analysed competitiveness dimensions

Variable	Dimension/unit	Source
1. Traditional cost-based competitiveness		
REER	Index 1996 = 100	Eurostat
Labour productivity	Euro/hour	Eurostat
Unit labour cost (modified)	Euro	Eurostat
2a. Infrastructure, human capital		
Students of science and computing	% of tertiary students	Eurostat
Engineering students	% of tertiary students	Eurostat
Internet penetration	%	Eurostat
Airport coverage	Per 1,000 km^2	Eurostat
Railway coverage	Km per 1,000 km^2	Eurostat
Motorway coverage	Km per 1,000 km^2	Eurostat
Learning English at ISCED level 3	% of students	Eurostat
2b. Doing business		
Strength of investor protection	Composite index	Doing business
Paying taxes administration (time)	Hours per year	Doing business
Time to enforce a contract	Hours	Doing business
Costs of enforcing a contract	% of claim	Doing business
3. Innovation potential		
GERD	% of GDP	Eurostat
Citations per document in Scopus	Units	SCImago
Patents per inhabitant	Units	Eurostat
Students 15–19	% of population 15–19	Eurostat
Students 20–24	% of population 20–24	Eurostat
Reading skills	Points	OECD PISA
Persons with upper secondary education	% of population 25+	Eurostat
R&D personnel	% of employees	Eurostat
Government expenditures on education	% of GDP	Eurostat

This portion of the analysis seeks to verify whether a clear division among the core and periphery countries remains. In addition, the relative position of the CEE countries is examined in this dimension.

The firm-level perspective of countries' competitiveness in establishing and maintaining high-skilled and competitive business is examined by the second and third dimensions. Our approach does not primarily focus on analysing the development of each particular indicator over time. Such a comparative analysis is simply a complementary tool to evaluate the countries. The analysis of the second and third dimensions concentrates more on evaluating the similarity of countries in terms of the entire sets of competitive indicators examined in each dimension. The purpose is to identify the internally homogeneous clusters of EU countries providing similar conditions for firms to start up and sustain competitive and innovative enterprises. We believe that selected indicators in the firm-level dimensions are more indices of long-term success and can say more about a country's future from

the perspective of the current European direction of smart knowledge-based growth. Hence, the multi-dimensional cluster analysis is applied for clusters' identification. The changing clustering structure is compared in the years 2000, 2004, 2008 and 2012. Comparing the identified clustering structures in particular selected years, one may observe changes associated with the integration processes, namely in CEE countries in 2000–2004 and then the early influence of EU membership in 2004–2008. The crisis influence may also be observed in the structure of clusters in 2012.

Considering the application of cluster analysis, similar to Sorensen and Gutierrez (2006) and Rozmahel et al. (2013), we applied the agglomerative Ward method with Euclidean distance to emphasise internal homogeneity and emphasise outliers[2] in the dataset.

Variables were then transformed into an index I representing countries' position relative to the rest of the sample of countries:

$$I_{i,t} = \frac{v_{i,t}}{WAVG(v_t)}, \; if \; values\,(v_{i,t}) > 0 \tag{1}$$

where v represents a respective variable, i stands for a country in the time period t, and $WAVG$ is a weighted average of the particular variable comprising the rest of the EU countries—excluding the *ith* country, weights being *ith* country's GDP. Index I, representing a country's position relative to the rest of the EU when compared to other countries' indices, can be used to describe a contribution of a country to the level of heterogeneity within the EU and thus provide information on the integration process in the EU.

All indices were normalised:

$$N_{i,t} = \frac{I_{i,t} - MIN(I_T)}{MAX(I_T) - MIN(I_T)}, \tag{2}$$

where I is a value of the index in time period t. MAX(I_T) / MIN(I_T) represents a maximal/minimal value of the index during the entire time period T.

The two approaches to examining the dynamics of clustering in the EU from the perspective of both dimensions were applied in the analysis. The first approach compares the structures of internally homogeneous country-clusters in the years of 2000, 2004, 2008 and 2012 as mentioned above. In that approach, the clusters were identified as results of the analysis. Comparing the structures, one may question whether there is also a clear division between the core, periphery and CEE countries using the firm-level perspective of countries' attractiveness to establishing and retaining competitive business there.

[2] For example, Artis and Zhang (2001), Boreiko (2003), Camacho et al. (2006, 2008), Song and Wang (2009) or Quah and Crowley (2010) applied the cluster analysis to identify the clusters of countries using various dimensions capturing measures of economic and institutional performance.

The second approach of dynamics measurement allows presenting some evidence of convergence between the core, periphery and CEE countries considering both firm-level dimensions. This method is based on analysing the average distance within clusters over time. Contrary to the previous method, the clusters of countries are established before (ex-ante) the analysis. The clusters of core countries, the core enlarged by periphery countries (core + periphery), the core enlarged by the CEE countries (core + CEEC) and finally the cluster of the entire EU are set to examine the effect of the cluster's enlargement. Assuming the core as a benchmark for a semi-ideal competitiveness cluster from both dimensions' perspectives, the analysis shows whether the internal homogeneity increases in the cluster after its enlargement or whether the opposite occurs. The decreasing measures of inner average distance within clusters refer to increasing homogeneity, implying the convergence of countries within clusters. Increasing average distance within clusters denotes divergence. Using this analysis, one may also identify and compare the potential contribution of the periphery or CEE countries (or both) to the changing heterogeneity when joining the core cluster.

Concerning the ex-ante proposed clusters, the core involves Austria, Belgium, Germany, Finland, France, Netherlands, Sweden and United Kingdom; periphery countries include Portugal, Italy, Greece, Spain and Ireland. Finally, CEECs are the Czech Republic, Hungary, Poland, Slovenia, Slovakia, the Baltic countries Estonia, Latvia and Lithuania, and Bulgaria and Romania as new member countries.

3 Data

The three-dimensional approach represents three different views of competitiveness in the analysis. The list of indicators in all dimensions is described in Table 1. The set of indicators in each area corresponds to the character of each dimension, which can also be justified by a particular research question.

First, the analysis asks how the EU countries are competitive from a traditional, cost-based perspective. This represents a rather macroeconomic view. In the analysis, the real effective exchange rate deflated by the consumer price index (as a measure of inflation) was applied. The increasing value of the index over time denotes the loss of a country's price competitiveness relative to other trading partners. However, such a simple interpretation of the index may be a bit spurious because the increase in the index may also be a result of the price convergence. If this occurs because of positive growth differential, implying real appreciation of assets in the converging country, the rising REER may be considered a natural effect of the convergence. This may be the case of the CEE countries catching up to the rest of the EU after 2004. The real labour productivity (Euro per hour worked) and nominal unit labour cost index (ULC) are two other measures of the first dimension. The ULC index was modified by multiplying by employee compensation to identify the labour cost indicator expressed in the Euro per unit. Such a

measure allows better comparability with the real productivity measure. The Eurostat was the source of data for this dimension.

The selection of competitiveness indicators in the second and third dimensions is designed to reflect the firm-level view when assessing countries' attractiveness for establishing and retaining competitive business. Considering competitive businesses, the analysis focuses on enterprises demanding high-skilled and well-educated labour. In addition, the conditions for using the results of research and development and exploiting the innovation potential of countries are examined by those dimensions. Finally, the infrastructure quality in a country is also considered an important factor for firms when choosing a business location. The second dimension thus examines indicators describing the attractiveness of a country for establishing and sustaining high-skilled business. The third dimension focuses on evaluating the innovation potential of countries. The indicators of the second dimension should provide some evidence of the quality of the infrastructure and human capital in the country, indicating how friendly the environment is to business. Hence, the second dimension focuses on production of high-skilled products and services. The third dimension focuses on innovation and further development of innovative products and services. Thus, some measures of educational attainment, student skills, research results, and research and development support are included in the third dimension's indicator list. The analysis focuses primarily on identification of clusters of countries showing similar levels of indicators in each dimension. This chapter simply asks the following questions: Which are the attractive country-clusters in the EU for highly innovative firms? What do these countries have in common from the firm-level competitiveness perspective? Are these clusters identical to the clusters resulting from the traditional cost-based macroeconomics approach? A brief analytical comparison of particular selected indicators of chosen EU countries from each dimension complements the cluster analysis in the chapter.

The content of the second dimension is internally divided into two subgroups of indicators. The first subgroup concentrates on assessing the quality of human capital and infrastructure in a country. The second dimension includes indicators evaluating how convenient the business environment is for doing business from a long-term perspective. In other words, the second dimension evaluates the institutional aspects of the business environment of the country. Both subgroups are associated with common research. In the first subgroup of indicators, the quality of human capital is approximated by the indices of educational attainment in terms of the study focus on a tertiary level. In particular, percentages of tertiary students (ISCED 5–6) by field of education (science, mathematics and computing) and tertiary students (ISCED 5–6) by field of education (engineering, manufacturing, and construction) and finally a share of students learning English at ISCED level 3 (upper secondary education) as a percentage of total students at this level were applied in this dimension. The measure of Internet penetration as a percentage of households with Internet access and the measure of transport infrastructure capturing airport, railway and motorway coverage were used to check the infrastructure quality in the country. The data in this subgroup of indicators were provided by

Eurostat. The second subgroup includes the indicators evaluating the institutional environment in the country, sourced from the World Bank Doing Business Database. Our indicator list of this sub-dimension begins with a composite indicator measuring the strength of minority shareholder protection against directors' misuse of corporate assets for personal gain. This indicator is estimated as a simple average of three institutional indices capturing the extent of disclosure (of related-party transaction), director liability and ease of shareholder suits (access to internal corporate documents, access to documents, information during trial, etc.). The tax paying administration indicator, representing the second measure in this sub-dimension, measures the time in hours per year spent addressing the administrative agenda to comply with the three major taxes in a country: profit taxes, consumption taxes and labour taxes, with mandatory contributions. In particular, this indicator counts hours spent collecting information and computing the tax payable, completing the tax return forms, filing with the proper agencies, arranging payment or withholding and preparing separate mandatory tax accounting books. The time spent enforcing a contract represents a measure evaluating the efficiency of the judicial system in a country. This indicator is measured as the number of days required to resolve a commercial sales dispute in the courts. This indicator covers the time required to file and serve the case, the time for the trial and obtaining judgement and the time required to enforce the judgement. Finally, the costs of enforcing the contracts measured as a percentage of claim covers the average attorney fees, court costs and enforcement costs.

The third dimension evaluates the innovation potential of a country that may be applicable in business. This dimension covers the results of research and development represented by measures of citations per document in the Scopus database and patents per inhabitant in a country. The Eurostat and SCImago databases were the sources of these data. Similarly, the indicator of reading skills among students provided by PISA OECD (Programme for the International Student Assessment) was evaluated in the analysis. According to the Programme, students with good reading skills are more likely to continue and complete higher education. These students are also less likely to receive long-term social benefits. The students-to-population ratios (%) in three age groups above 19 are also covered in the third dimension. Regarding the meaning of the education attainment indicators in the third dimension, we hypothesise that a high proportion of students, namely at the tertiary level, combined with high measurements of research and development results (patents, citations) and reading skills implies a high innovation potential in the country. From this point of view, the innovation potential dimension naturally includes the indices of government support of education and research and development measured as expenses-to-GDP ratio. Finally, the percentage of employees in research and development sectors is used in the final dimension.

The second and third dimensions include various measures of educational attainment for several reasons. The second dimension focuses more on a description of actual potential to employ university students in the areas of engineering, science and computing. These students are promptly accessible for newly as well as previously established firms focusing on high-skilled labour production and

services. For the same reason, the second dimension includes the percentage of students learning English to satisfy the needs of small international start-ups and firms as well as supranational companies. The third dimension concentrates more on future innovation and the research potential of countries in terms of educational attainment. Hence, this dimension captures indices of what shares of society in particular age groups (15–19, 20–24, 25+) are actively studying. The analysis assumes that higher proportions of university and post-university students imply greater potential for quality research, development and innovation in a country.

4 The Competitiveness of the EU Countries: Traditional Cost-Based Approach

Using traditional cost-based productivity measures clarifies the gap between the core of the Euro area and the CEE or periphery countries. Figure 1 (left) compares the actual real labour productivity of selected CEE countries measured in EUR per hour with the average of the EU 27 and EU 15 in 2012. The measure of nominal unit labour costs (ULC) presented in Fig. 1 (right) was modified. The ULC index was multiplied by the measure of compensation of employees sourced from Eurostat to determine the labour cost indicator expressed in Euro per unit.

Ireland and Italy overreach the nominal EU average labour costs. This creates relative disadvantages in cost-based competitiveness for these countries compared with the rest of the sample. Conversely, higher labour costs should force these countries to focus on improving the quality of their production. The Visegrad countries comprising the Czech Republic, Hungary, Poland and Slovakia show comparable levels of unit labour costs, placing them in a relatively homogeneous cluster from this perspective within the entire country sample. Slovenia shows the highest level of convergence among CEECs towards the old EU countries. Apart

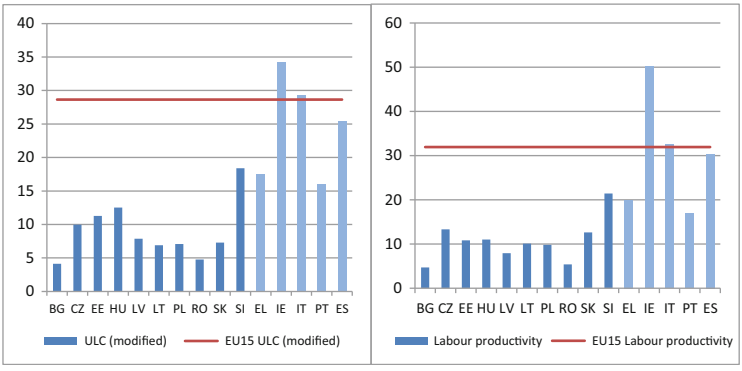

Fig. 1 Labour productivity in the CEECs compared with the EU and EUR averages; Nominal unit labour costs modified by the compensation of employees (EUR per unit), 2012 (Eurostat)

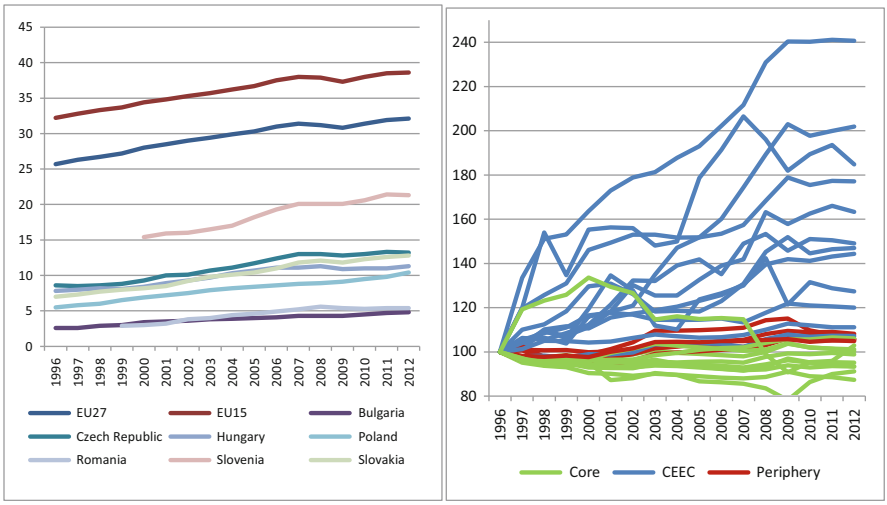

Fig. 2 Labour productivity in CEE countries and the EU and EUR averages (EUR/hour, left part), Real effective exchange rate in the EU core, periphery and CEE countries (deflated with CPI, 1996 = 100) (Eurostat)

from Slovenia, all CEE countries reached lower labour productivity than the EU periphery countries in 2012. In addition, a significant gap remains between the labour productivity in CEECs and the EU average. Similar to the measure of unit labour costs, Bulgaria and Romania show the lowest levels of labour productivity among the CEE countries. Portugal is lagging behind the rest of the old EU countries and shows nearly comparable results to the leading countries of the Visegrad group.

Figure 2 reveals the apparent division among the core, periphery and CEE countries. The development of labour productivity measured in EUR per working hour in the left section of Fig. 2 shows no remarkable signs of convergence among the three sub-groups of countries mentioned above. In addition, there is an obvious trend in the real effective exchange rate (REER) appreciation in the CEE countries in general as shown in the right portion of the figure. A rationale for the appreciation tendency, particularly over 1996–2008/2009 in the CEEC, may be the growth differentials and maintaining price stability in those countries. The real convergence of the CEE countries in terms of GDP per capita towards the rest of the EU over the analysed period pushes up prices in the catching-up economies, which implies nominal convergence. Regarding the efforts of CEE countries to keep the price stability in accordance with the Maastricht criteria, the exchange rate appreciation is the only remaining channel of the convergence. Hence the countries appreciated mostly during the period of positive growth differentials up to the point of the global crisis in 2008. Since then, the appreciation tendency diminishes as shown by the REER development after 2008.

5 The New Competitiveness Evaluation Concept: Do the EU Countries Have the Potential to Be Competitive from the Perspective of the New Growth Path Strategy for Europe? Do They Differ?

Having observed relatively clear divisions among core, periphery and CEEC countries using the cost-based macroeconomic indicators in the first dimension, one might ask whether this rather narrow approach represents a complex evaluation of competitiveness. Answering such a question can include the effects of on-going real and price convergence processes among the catching-up countries towards the EU and Euro area average that may play a role in explaining the rising values of the REER for the CEE countries. The remaining gaps among price levels, cost-of-living standards, different life expectations and other various aspects across the EU countries should also be considered. In addition, the diminishing role of the cost-based output indicators in the beyond-GDP literature should be mentioned. Recalling the current discussions regarding the changing perceptions of growth among European academics and policy-makers and stressing the role of a knowledge-based economy and societal and environmental issues, one should ask about the future perspective of such an approach on competitiveness evaluation.

The role of medium and small enterprises focusing on high-tech, high-skilled and highly competitive businesses with high innovation potential is stressed in the EU strategic documents on the new growth path in Europe, leading to the question of whether the EU countries provide interesting conditions for such businesses. In today's globalised world, there is nothing easier than to move even high-skilled production to low-cost countries such as India, Brazil or China. Are the EU countries competitive in providing appropriate conditions for establishing and running highly competitive businesses? Do the EU countries and their populations have a high enough innovation and development potential to attract firms and start-ups for highly competitive businesses? These questions should be answered to evaluate the competitiveness and the potential to be competitive from the perspective of the current new growth path strategy in Europe. These approaches to competitiveness evaluation may focus more on the input indices whereas the traditional cost-based method includes the output measures (such as various forms of labour productivity indices); however, the effect of globalisation renders Europe basically uncompetitive in a low-cost manner compared with large, emerging economies such as China or India. Another argument for the suggested change in measuring competitiveness is that in addition to current competitiveness evaluation, the new method also captures indices of the future potential of a country to be competitive from a long-term perspective. This is because of the inclusion of human capital quality indices involving the educational attainment and skills of

the people, the infrastructure of the economy and research and development support and results.

5.1 *How Attractive Are the EU Countries to Firms to Establish and Retain Highly Competitive Businesses?*

5.1.1 Infrastructure and Human Capital Quality

Assessing human capital quality from an internationally competitive firm-level perspective, the ability of prospective employees to communicate in English and possess competitive knowledge and skills in competitive branches in selected periphery and CEE countries is compared with the EU15 average. The results of the comparison in 2012 depicted in Fig. 3 provide evidence of a high proportion of English-learning students at the upper secondary level in the majority of CEE and periphery countries. The majority reach or even surpass the EU15 average. Hungary, Bulgaria, and Cyprus from the CEE country-group and Greece and Portugal from the periphery countries do not reach the EU15 average. Portugal and Hungary especially fall behind. Malta can be considered a special case in this evaluation because the majority of its citizens speak English for historical reasons.[3] Unlike learning English, the majority of the CEE countries have a smaller proportion of students studying the sciences and computing than the EU15 average of 11 %. Only the Czech Republic and Estonia reach this level. Other CEE countries vary around the level of 5–6 % of students in this area and do not approach the EU15 average

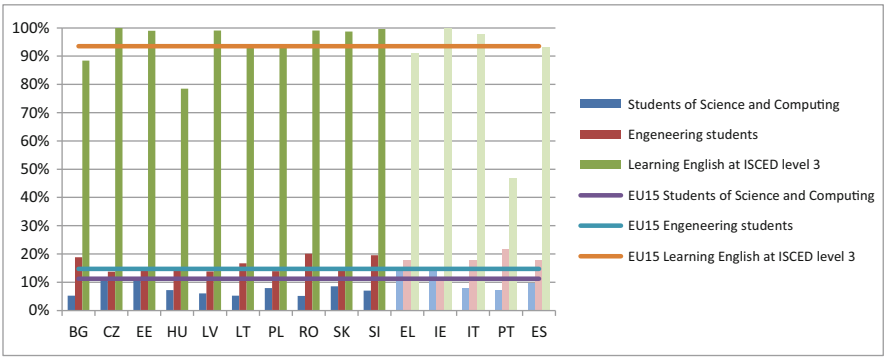

Fig. 3 Percentage of students studying science, computing, engineering (% of tertiary students) and English (% of students at ISCED level 3—upper secondary education) compared with EU 15 averages, 2012 (Eurostat)

[3] Malta was a British Colony until its independence in 1964 and became an independent republic in 1974. Malta remains a member of the Commonwealth of Nations.

level. In engineering, the situation is much more balanced because nearly all countries of the CEE and periphery groups reach or approach the EU15 average of 15 % of the total student population at ISCED levels 5 and 6 (tertiary students up to a bachelor's level). The high percentage of engineering students in CEE countries may be attributed to the fact that engineering branches were strongly favoured and supported by the ruling communist establishment in the past era of centrally planned economies in CEECs whereas the social sciences were neglected during those times. There are a surprisingly low number of engineering students in Ireland (Fig. 3).

Situated in the heart of Europe, the Czech Republic is considered a transportation hub for passengers as well as cargo, having the highest railway density among the analysed countries. Other CEE countries also significantly surpass the EU15 average. As opposed to railway transportation, the CEE countries suffer from low coverage by motorways. Slovenia is the exception, showing high coverage by railways, motorways, and airports. Apart from Italy, the periphery countries also show minimal values of coverage by railways. The airport coverage indicator should be interpreted carefully. The extremely small countries with a small total area (measured, e.g., by km^2) generally have at least an airport in their capital. Thus, they show high values of airport coverage. This occurred with Malta and Cyprus, causing these two countries to significantly exceed the EU15 average.[4] Greece shows notably high values of airport coverage mostly because of newly built airports financed by ESF funds. Omitting any exceptional cases, the simplified comparison indicates generally lower coverage by airports in the CEE countries than in the periphery countries. These results are alarming, especially for large countries such as Poland, Bulgaria and Romania. These countries jointly report low coverage by motorways and airports, which indicates disadvantages, especially for passenger traffic. In addition, some regions in smaller countries such as the Czech Republic, Slovakia or Hungary may be served by nearby airports in other countries (such as Vienna for those CEECs mentioned above), which is not a solution for large internal regions in larger countries (Fig. 4).

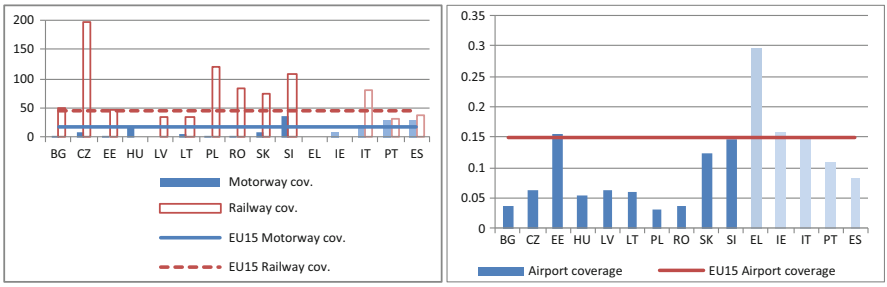

Fig. 4 Motorway, railway (km per 1,000 km^2) and airport (with more than 15,000 passengers per year) coverage (per 1,000 km^2) compared with EU 15 averages, 2012 (Eurostat)

[4] Being an extreme outlier, Malta was excluded from the picture of airport average.

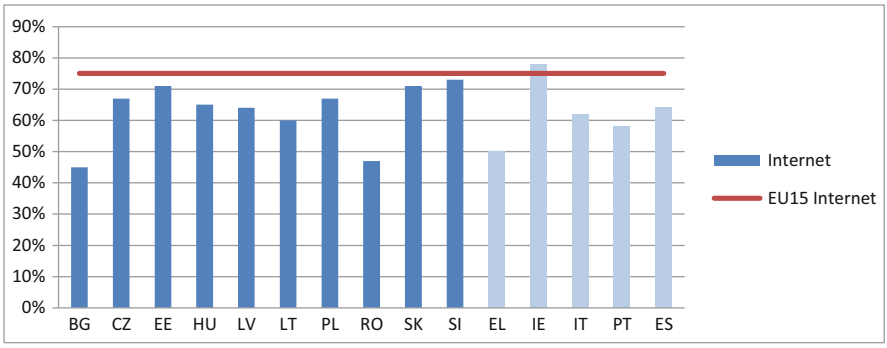

Fig. 5 Households with Internet access (% of households in 2012) (Eurostat)

Considering the levels of educational attainment and infrastructure quality indicators, including also the share of internet penetration (Fig. 5), is it important to note that the indices cannot indicate everything regarding actual competitiveness or the economic performance of analysed countries. The human capital indices are used as a measure of potential for firms when assessing the quality of human resources to be employed in their businesses. Of course, high potential does not guarantee immediate effects on the macroeconomic performance of the countries because there are more factors involved in utilising such potential by internal as well as external firms. Portugal and Spain, with high percentages of unemployed tertiary students (approximately 50 %), may be examples. Although the infrastructure quality indices imply the business potential of a country, the country's usage depends on other factors that are difficult to include in the analysis. For example, institutional support by policy-makers at the national and regional levels comprises subsidies, taxation, employment protection, legislation, etc. These factors also determine the business risk, which firms seriously consider when deciding on an investment location. Nevertheless, the indices used in our analysis represent a potential, which every country has a chance to exploit. In addition, one should not assess the indices separately because they generally relate to one another. Many well-educated engineers with poor communication skills in English are not attractive to investors. Hence, we use the multi-dimensional cluster analysis, which identifies clusters considering a set of related indicators in each dimension.

Figure 6 depicts the changing structures of clusters of EU countries with similar indices of human capital and infrastructure quality in the years 2000, 2004, 2008 and 2012. No stable division is apparent among country clusters similar to those identified as core, periphery and CEE countries with the traditional cost-based competitiveness measures in the analysed years. The formation of two dissected clusters and the two outlying states of Malta and Portugal are observable in the final analysed year. The catching-up CEE countries, including the Czech Republic, Poland and

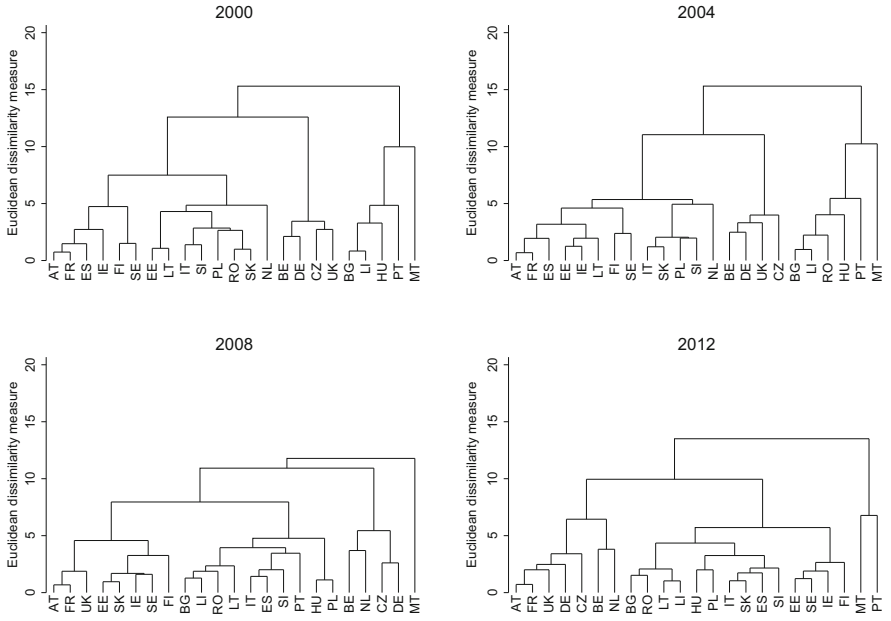

Fig. 6 Clusters of similar EU countries from the perspective of infrastructure and human capital quality (Authors' calculations, Eurostat)

Hungary, complement the EU core countries, Austria, Belgium, France, Germany, Netherlands and United Kingdom, and compose the internally opposite cluster. The opposite cluster comprises Bulgaria, Estonia, Latvia, Lithuania, Romania, Slovenia, and Slovakia, representing the CEECs with Finland, Sweden and the EU periphery countries including Ireland, Italy and Spain. Although one might report these results as a sign of profiling clusters close to the traditional division of the EU countries between the core and the periphery, we must refrain from such an interpretation. The cluster analysis does not seek to assess quality in terms of which cluster is better or more competitive. The analysis is descriptive in nature and enables identification of internally homogenous clusters of countries with similar measures of human capital and infrastructure quality. The analysis did not confirm the dissection of the stable country-group division among core, periphery and new EU countries composing the CEE countries. Regarding the division between the two dissected clusters, which are relatively similar to those of the core and periphery identified by the traditional approach, we do not consider one time period to be sufficient evidence of a country-cluster dominance from the perspective of countries' potential to attract investors to establish and sustain highly competitive business. In the next section, we apply the dynamics analysis to examine the convergence or divergence tendencies among the pre-determined groups of the EU core, periphery and new EU countries.

The distances identified in the cluster analysis are used to examine the convergence among the pre-determined clusters (EU core, periphery and CEE countries). First, the average inner distance for each group is computed and is regarded as a measure of homogeneity. The evolution of average distances of the core, the core

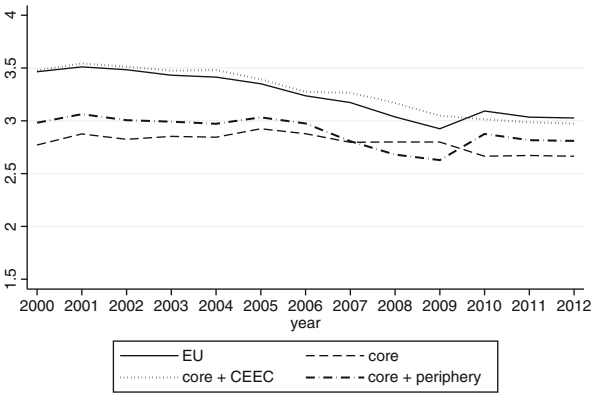

Fig. 7 Competitiveness convergence analysis: development of average distances within selected EU country-clusters from the perspective of infrastructure and human quality from 2000 to 2012 (Authors' calculations, Eurostat)

enlarged by the CEE countries (core + CEEC), the core enlarged by the periphery countries (core + periphery) and the entire EU[5] is then studied. The results of the dynamic analysis are reported in Fig. 7. The average distance among core countries is the lowest and is stable during the entire period, which indicates that this cluster is the most homogeneous, as foreseen. Although the average distance increases when including the periphery in the core cluster, which can be interpreted as a contribution of the periphery countries to heterogeneity, the evolution shows a gradual convergence until 2009, followed by a return to nearly initial values. Despite the greatest contribution to EU heterogeneity, the CEE countries converge steadily towards the core countries over the entire time period analysed and reduce the gap to the periphery contribution to the EU heterogeneity. In addition, internal average distances decrease within the entire EU cluster, implying decreasing heterogeneity in terms of infrastructure and human capital quality measures.

5.1.2 Institutional Environment

Figure 8 shows four indicators from the Doing Business database (see Sect. 2.3 for more information). The first indicator—costs of enforcing a contract—shows that in the majority of CEE countries, enforcing a contract is associated with relatively higher costs than in the EU15 on average. The worst performing country from this perspective is the Czech Republic, followed by Slovakia and Romania. Similar costs to these worst-performing CEE countries can be observed in Italy. Conversely, costs of enforcing a contract are far lower than the EU15 average in Slovenia and Hungary. Similarly, Greece and Portugal showed satisfactory results in this category.

The second indicator, strength of investor protection, is much more balanced than the first indicator, most likely because of the EU legal harmony that partially protects investors. In particular, Slovenia, when compared to the other CEE

[5] Excluding Luxembourg, Cyprus, Croatia, Greece and Denmark because of low data availability.

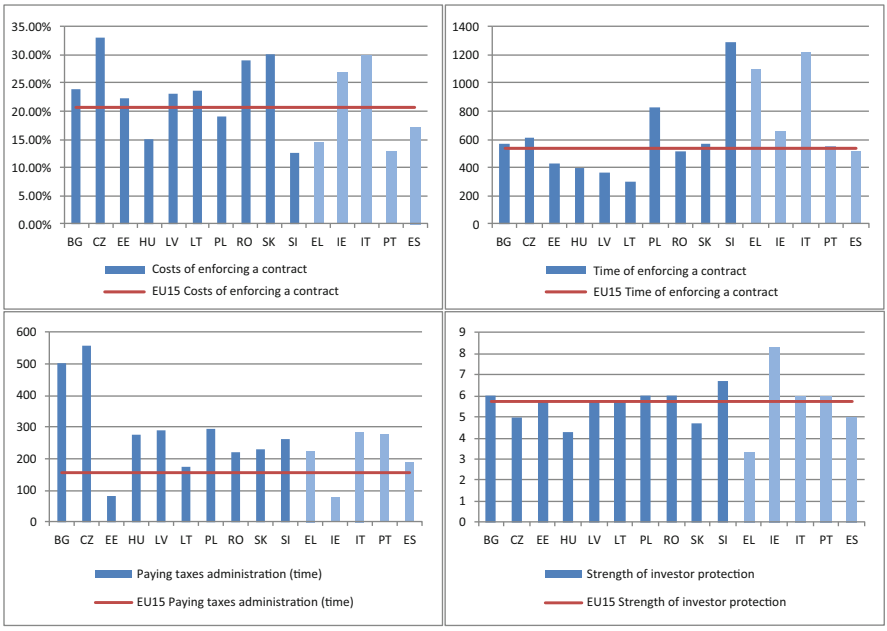

Fig. 8 Institutional environment indicators: cost of enforcing contracts (% of claim), strength of investor protection (composite index), time of enforcing contract (calendar days), paying taxes administration (hours), 2012 (World Bank Doing Business Database)

countries, performed significantly better than the EU15 average. Ireland, a member of periphery group, achieved an even better ranking—high above the "old EU" average. Conversely, Greece, with the worst evaluation in this comparison, is far below the average. The worst performing CEE country, Hungary, was still better than Greece.

The third indicator calculates the time necessary to enforce a reference contract. The fastest in resolving described disputes are the Baltic countries—Latvia and Lithuania, whereas Estonia remains below the EU15 average. The worst situation is in periphery countries, especially in Greece and Italy, in which enforcing a contract may take twice as long as in the EU15 on average and nearly four times longer than in Lithuania.

The fourth indicator describes how long it takes to fulfil all the requirements to pay taxes. Large differences appeared among countries in this category. In Estonia, paying taxes requires only 81 h a year, whereas in the Czech Republic, the same activity requires 556 h. Interesting differences can be observed within some sub-groups of countries. In the Baltic countries, Estonia, as mentioned before, is one of the top countries, Latvia is high above and Lithuania is identical to the EU average. Similarly, the Czech Republic and Slovakia, which shared a common legal system 20 years ago, differ markedly. Paying taxes in Slovakia takes half the time that the same activity takes in the Czech Republic (Fig. 8).

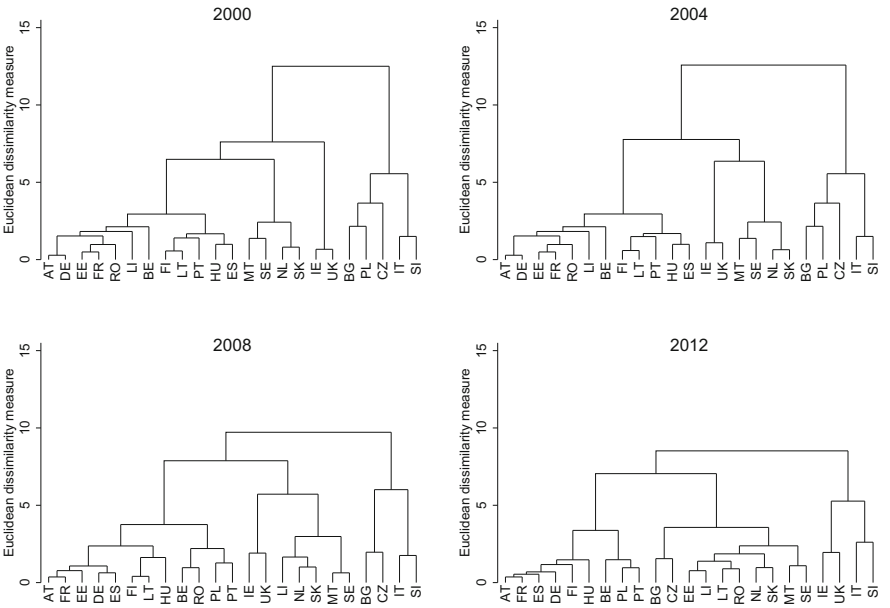

Fig. 9 Clusters of similar EU countries from the perspective of institutional doing-business indicators (Authors' calculations, Eurostat, World Bank's Doing Business Database)

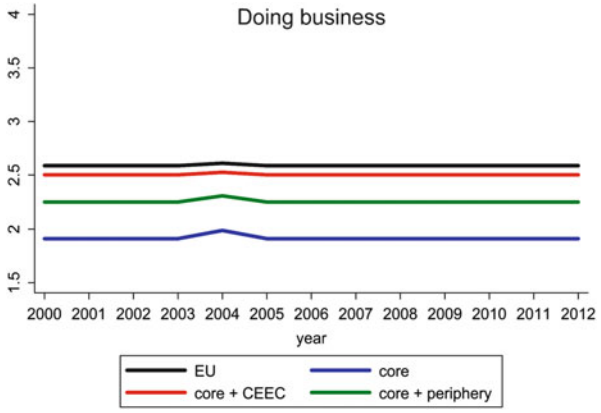

Fig. 10 Competitiveness convergence analysis: development of average distances within selected EU country-clusters from the perspective of institutional doing-business indicators in 2000–2012 (Authors' calculations, Eurostat, World Bank's Doing Business Database)

Institutional indicators examined in cluster analysis remained nearly unchanged during the entire time period. Ireland and the United Kingdom compose a stable group even when moving among clusters. Bulgaria, Poland and the Czech Republic managed to move from the outer cluster that included Italy and Slovenia to the group of the CEE countries. From the institutional perspective, core coutries do not create stable, homogeneous clusters. Core countries tend to form small groups (especially Austria, Germany and France) shared with some periphery and CEE countries (Fig. 9).

A high level of stability is typical for institutional variables. As Fig. 10 shows, average distances among clusters scarcely change. Thus, no measurable convergence or divergence appears. Core countries are more coherent in the analysis and show more homogeneous institutional environments. Including periphery countries, the level of heterogeneity increases. The greatest distances, however, can be observed within the core + CEEC cluster.

5.2 *What Is the Innovation Potential of the EU Countries?*

Figure 11 shows the levels of scientific achivements in the CEE and periphery countries. Regarding average citations per document published in the Scopus database, all the CEE coutries lie below the EU15 average with one exception—Estonia. This indicates that papers produced in the CEE countries are less likely to be cited than those from the "old EU" countries, suggesting a lower level of research quality in those countries. The quality of papers published by the authors from periphery countries, however, is nearly the EU15 average.

Poorer results for the CEE countries can be observed in patents. All the CEE countries patent their ideas sigificantly less often than the EU15 average. Countries such as Bulgaria, Romania or Lithuania patent several ideas per year, much less than Finland or Sweden, with over 200 patents per inhabitant. Most patent applications were successfull in Slovenia, followed by Estonia. In periphery countries, Ireland and Italy do not perform as well as the EU15 on average; however, the number of succesful patents is higher than in the CEE coutries (Fig. 11).

The proportion of students of the total population between 15 and 19 years shows that nearly all children of this age attend school in the CEECs, exceeding 90 % school attandence with the exception of Bulgaria, Romania and Slovakia. Poorer results were obtained in periphery countries, among which only Ireland was above the 90 % ratio. Portugal and Spain have the same attendance rates as the EU15 average; Italy and Greece fall below the average.

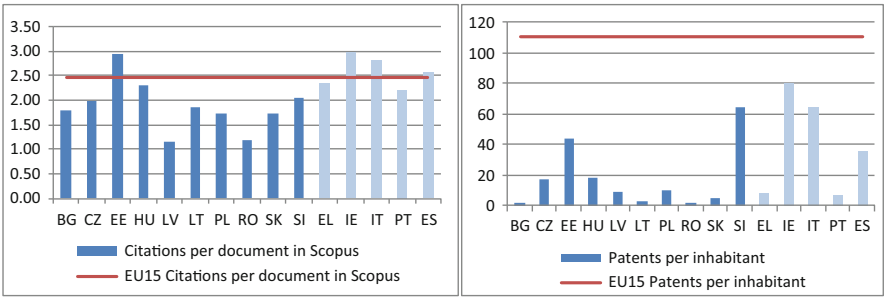

Fig. 11 Citations per document in Scopus database, patents per inhabitant (2012) (SCImago, OECD, Eurostat)

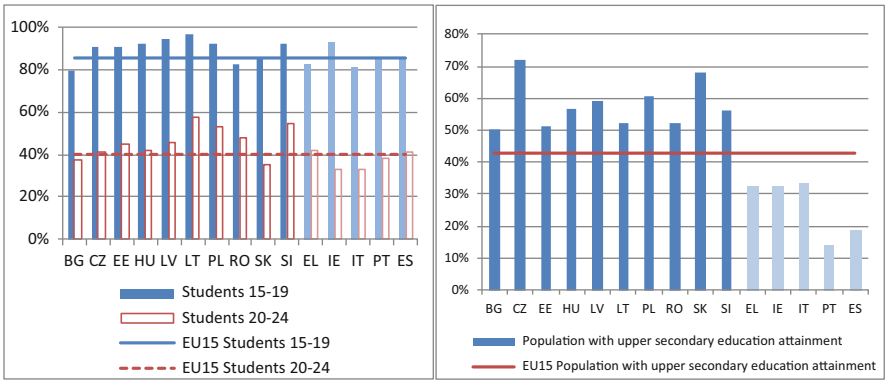

Fig. 12 Percentage of students in the population in the age groups of 15–19, 20–24; Percentage of persons with upper secondary education in the population of 25+, 2012 (Eurostat)

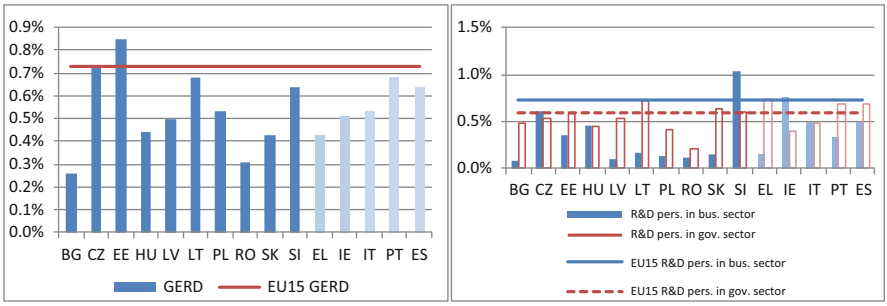

Fig. 13 Total intramural R&D expenditures (GERD)—Government sector + higher education sector, share of R&D personnel in government and higher education sectors in total employment, 2012 (Eurostat)

Results in the older age category, 20–24 years, are similar. A high proportion of chlidren who are in school at this age in CEECs indicates efforts to catch up to the "old EU" countries in the percentage of persons who have achieved a tertiary education in the population. Conversely, periphery countries fall below the EU15 average.

Comparing the percentages of persons attaining upper secondary education shows huge differences among the CEE countries, the EU15 average and periphery countries. The majority of the CEECs are 10 or more percentage points higher in this area. In contrast, all periphery countries are proportionally 10 or more percentage points lower. The Czech Republic and Slovakia show the best ratios in this indicator (Fig. 12).

Resources for research activities are depicted in Fig. 13. Research and development expenditures are measured as a proportion of the GDP. Although the CEECs are generally not able to compete with the EU15, Estonia and the Czech Republic

finance science similarly to the EU15 on average. The lowest percentages of research and development expenditures are in Bulgaria and Romania.

The second chart reveals the weaknesses of the CEE countries in research—the lack of researchers in the business sector. In the EU15, more researchers are employed in the business sector than in the government sector. In the CEECs, the proportion is reversed. Generally, the share of government researchers in the CEECs is quite similar to the EU15 average. Only Slovenia has an above-average share of business researchers. Slovenia, the Czech Republic and Hungary are the only CEE countries in which the ratio of business researchers to government researchers is similar to the EU15 average. Regarding periphery countries, only Ireland has a significantly higher number of research personnel in business than in government sectors. In Greece, the percentage of business researchers is rather low, similar to the poorest performing CEE countries (Fig. 13).

Clustering with respect to innovation potential splits the EU countries into two segments and later into three main clusters. Selected variables divide the EU into periphery, CEECs and core nearly perfectly, especially in 2012. In previous years the clusters differ less. The only persistent cluster is that of the core countries. In the earlier years, periphery countries created one or more smaller clusters with the CEECs but never with the core countries (Fig. 14).

The average distance within clusters tends to decline over time, as observed in Fig. 15. The decline is slower in the core countries group. The extended cluster that includes the CEECs, the convergence of core and CEECs, is a result of the

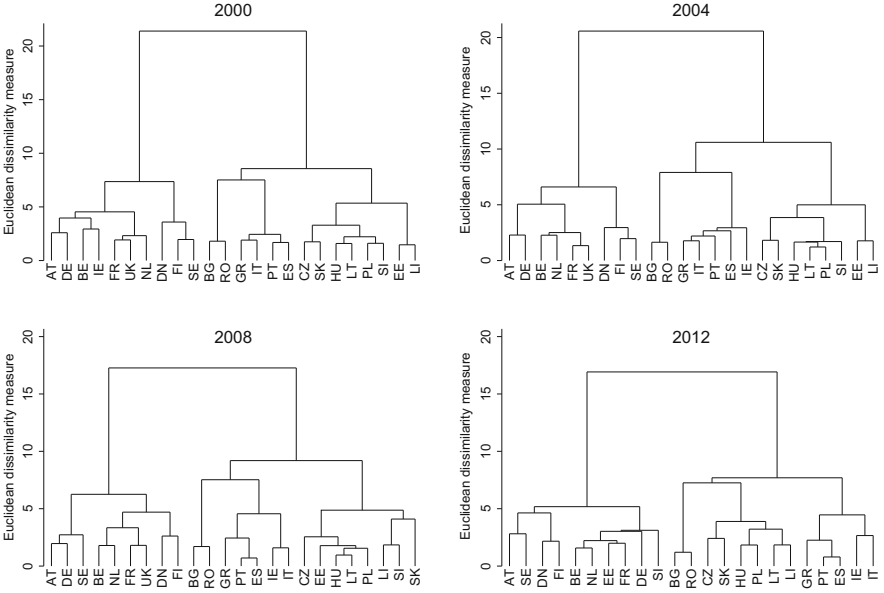

Fig. 14 Clusters of similar EU countries from the perspective of innovation and development potential (Authors' calculations, Eurostat, SCImago, OECD PISA)

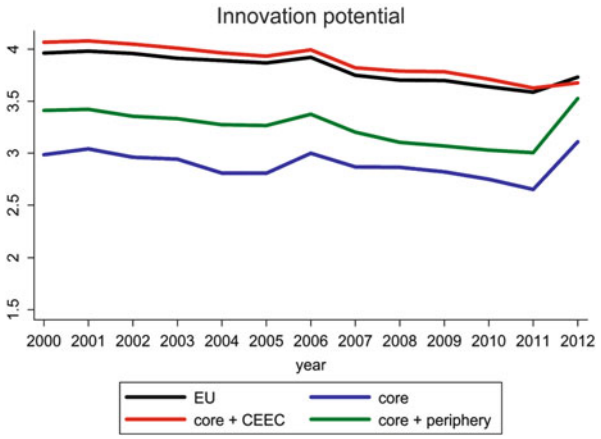

Fig. 15 Competitiveness convergence analysis: development of average distances within selected EU country-clusters from the perspective of innovation and development potential in 2000–2012 (Authors' calculations, Eurostat, World Bank's Doing Business Database)

innovation potential indicators. Heterogeneity in the core and periphery countries is much lower than in the group of core + CEEC, which may be caused by the longer membership of periphery countries in the European Union and "western block". We believe that the increase of divergence observed in 2012 is a temporary phenomenon, partially caused by incomplete data used for this analysis.

6 Conclusions

This chapter attempted to offer some insights into new approaches to understanding, measuring and assessing the competitiveness of the EU countries. The traditional cost-based concept of competitiveness measuring indicated a clear division among the core, periphery and new EU states, mostly the Central and Eastern European countries representing the former centrally planned economies. The alternative approaches, embodied in two alternative dimensions, focused on examining the competitiveness of the EU countries in providing conditions to attract enterprises to establish and maintain high-skilled business. In addition, the innovation potential of countries was assessed to provide some evidence of the prospective competitiveness of countries from the perspective of knowledge-based economy assumptions.

Apart from descriptive statistics assessing selected competitiveness indices, the comparative analysis was the core of research. Using sets of indices, the chapter identified clusters of internally homogeneous country-clusters within the EU and their development over time. In addition, the dynamics analysis was applied to provide some evidence of convergence or divergence tendencies among pre-determined country-clusters of the EU core, periphery and CEE countries from the perspectives of both alternative approaches.

The competitiveness dimension, focused on assessing the infrastructure, human quality and institutional environment, did not confirm the hypothesis of profiling country groups comprising highly competitive and innovative core, the periphery lagging behind and CEE countries composing the rest. The dynamics analysis showed a remarkable convergence trend, especially in CEE countries towards the core of the EU. This may be a positive sign of reducing the gap in the level of attractiveness of the EU countries for enterprises choosing a location for their high-skilled and knowledge-based business. Thus, the EU countries provide relatively comparable conditions for establishing and sustaining high-skilled business.

However, the situation is different for the EU countries' innovation potential. The EU countries differ in terms of institutional as well as private support of research and development. In addition, the effects of research results such as patents and publications differ across the EU. The stable division of two country-groups comprising the EU core countries as the first internally homogeneous cluster and the periphery and the CEE countries as the second group is clearly observable in the dendrograms. The dynamics analysis shows rather slow convergence among the pre-determined countries of core, periphery and CEE countries.

Regarding the policy conclusions, the analysis provided evidence of current EU governments' efforts to attract firms to engage in competitive business in their countries at comparable levels. There are no significant disparities or dissimilarities indicating increasing gaps among countries or stable country-clusters across the EU. This finding is based on infrastructure, human capital and institutional quality indices. However, these conditions may be considered insufficient because the competitiveness advantage is expected to increase with increasing potential to invent and innovate in the future. The current state of innovation potential and innovation's support from both government and private spheres differs across the EU. The gaps among countries and country-clusters appear to be consistent over the analysed period. Thus, the research, development and innovation support should be considered a priority by policy-makers at regional as well as national levels, especially among the EU periphery and CEE countries to take the competitive advantage of specialisation of high-skilled and knowledge-based production and services generating high gross value added.

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Long-Run Heterogeneity Across the EU Countries

Svatopluk Kapounek

From a theoretical perspective, a currency union can be expected to increase trade and financial integration primarily due decreased transaction costs and exchange rate risks. Both of these factors should sustain long-term productivity and economic growth. The first authors to empirically verify this hypothesis are Rose and Engels (2002). They examine the criteria for Mundell's concept of an optimum currency area and find that members of currency unions are more integrated than countries with their own currencies. They apply the two-state approach and data for more than 200 countries and quantify the impact of a single currency for trade and output. They concluded that the use of a single currency significantly boosts international trade. More specifically, their estimations suggest that a one percent increase in trade raises income per capita by approximately 1/3 of 1 % over a 20-year period. For example, Poland's decision to join the euro zone will result in an income increased as high as 20 % over 20 years. Many other empirical studies have reacted to these controversial results (Rose and van Wincoop 2001 or Glick and Rose 2002). In 2005, Rose and Stanley conducted a meta-analysis of the effect of common currencies on international trade (Rose and Stanley 2005). Based on 34 empirical studies, they rejected the hypothesis that a currency union has no effect on trade and concluded that a single currency (i.e., a currency union) increases bilateral trade by between 30 and 90 %.

Conversely, many recent studies discuss the fact that European productivity growth has decelerated since the 1990s, whereas American productivity growth has accelerated. Aiginger (2013) notes that the main reasons for the different development of the European countries and the U.S. relate to energy costs (the U.S.'s energy prices are 2/3 lower) and labour costs (the U.S. has a 1/3 advantage in labour costs). Timmer et al. (2011) argues that the primary cause of the European slowdown is the productivity slowdown in traditional manufacturing and other goods

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production combined with the concomitant failure to invest in and reap the benefits from information and communications technology and market services. The U.S.'s productivity growth from market services is also confirmed by both Jorgenson and Vu (2005) and Triplett and Bosworth (2006). Working hours per capita are very low in the European Union compared to the U.S. (Eichengreen 2007). Blanchard (2004) argues that the difference between the working hours is caused by a trade-off between preferences for leisure and work. Prescott (2004) shows that income taxes correlate to Europe and the U.S.'s different labour participation rates.

Clearly, slowdown in the total factor of productivity, high labour costs and energetic dependency plays a fundamental role in the economic growth of Europe as a whole. Furthermore, there are large asymmetries among the regions and countries within the Eurozone. Timmer et al. (2011) argues that the primary difference in labour productivity growth among the individual European economies is to be found in multi-factor productivity, not in differences in the use of capital per hour worked. Timmer and van Ark (2005) also show that the differences in productivity are larger than differences in factor inputs. They generally note that Europe's productivity slowdown is primarily driven by the indebted countries (e.g., Spain, Italy and Greece), whereas the Nordic economies are prospering in terms of productivity. The differences between the Nordic and Southern countries with respect to the amount of capital contributed to information and communication technologies are also shown in Timmer et al. (2011). However, the primary difference amongst the European countries lies in their residents' consumption behaviour.

Compared to the above asymmetric causes on the supply side of the economy, there are much more significant determinants of asymmetric behaviour on the demand side. The key point on the demand side relates to differences in the economic fundamentals that determine money demand (Bosker 2003 or Setzer and Wolff 2009). Following endogenous theories of money, asymmetric investment and economic activity implies credit money creation and heterogeneous distribution of money supply across the Eurozone despite its common monetary policy and common money market (Poměnková and Kapounek 2013). Finally, asymmetric money demand and investment activity implies asymmetries in individuals' behaviour and causes asymmetries in their consumption expenditures. Moreover, fiscal policies (which could theoretically reduce asymmetries) in practice have been pro-cyclical and have increased asymmetries (Darvas et al. 2005).

What is the effect of the single currency and the European integration process? Traditionally, the theoretical answer to this question cites endogeneity and the specialisation hypothesis (Frankel and Rose 1997). Frankel and Rose (1997) argue that increased trade in a common currency area leads to industrial specialisation among regions in the goods for which they have a comparative advantage. The authors who contribute to this discussion include both Krugman (1993) and Bayoumi and Eichengreen (1992, 1996). The wide-ranging discussions on this issue are summarised in Krugman's specialisation effect, which is said to lead to economies' divergence. Subsequently, Horváth and Komárek (2002, pp. 16) argue that *'the problem with Krugman's view is that it implicitly assumes that regional*

concentration of industry will not cross the borders of the countries that formed the union, while borders will be less relevant in influencing the shape of these concentration effects.' If that is true, then autonomous monetary policy is an inefficient method of stabilising asymmetric shocks within a currency union, which could be relatively closed to the outside world. The empirical perspective on this issue is provided by Landesmann (2003), who identifies significant differentiation across regions and countries in both Central and East Europe related to both industrial 'upgrading' and remaining 'locked into' low-skill production areas. Finally, Landesmann (2003) proposes that regional differentiation constitutes a substantial challenge for cohesion policies. However, according to recent empirical evidence, the effects of single currency and structural reforms are not entirely clear because political resistance to reforms and adjustment can both expand and limit the relevant instruments (Matthes 2009).

We adopt the assumption that a single currency provides an institutional advantage that has a direct impact on potential output. We follow the empirical foundations of growth econometrics provided by Durlauf et al. (2005), especially his assumption of the capital thresholds that divide two groups of countries. In our theoretical model, we substitute the capital thresholds by the institutional factor (single currency adoption).

Duval and Elmeskov (2006), pp. 31 note that *'European countries have widely different starting points as regards structural policy settings and therefore different needs in terms of reform. As well, even similar structural reforms may well have different supply and demand-side effects across countries—in part because reform will interact with pre-existing institutions and structural policy settings—which would make the overall effect on area-wide inflation and demand-pressure hard to predict and to factor into monetary policy.'* We assume that two groups of countries obey separate growth regimes (Durlauf et al. 2005). Simultaneously, their thresholds are provided by currency union membership and all other related institutional determinants. Finally, we focus on the specific monetary issues that arose during the European integration process and their impact on asymmetries. Two groups of countries desire a specific monetary policy and financial regulation. We argue that the common character of monetary policy framework and regulation has a negative impact not only on long-term economic performance but also on potential output.

1 Brief Review on Optimum Currency Area Theory

The European integration process is theoretically supported by optimum currency area (OCA) theory, which originates from debates about fixed versus flexible exchange rates, treating a common currency as the extreme case of a fixed exchange rate. A system of fixed exchange rate, applied through the gold standard mechanism, was blamed by many economists for the post-1929 world-wide depression. Mundell (1961) begins with the simple idea that flexible exchange rates are based on regional currencies, not national currencies, if macroeconomic shocks affect

regions differently. However, an economy with a fixed exchange-rate regime does not have monetary policy independence because the disparity of interest rates among reasons will lead to unsustainable balance of payment imbalances. Within the fixed exchange-rate region, market-based adjustment mechanisms must be applied to cope with asymmetric shocks/factor mobility. Inspired by Keynes and his price and wage rigidities assumptions, Mundell argues that if there is a high degree of labour mobility within a region, then its member states should employ a fixed exchange rate amongst themselves and a flexible exchange rate against the rest of the world.

The key issue in OCA theory is that of macroeconomic policy efficiency in an open economy. McKinnon (1963) supports OCA theory assumptions and argues that currency devaluation is ineffective in very open economies because prices and wages immediately increase. A large currency area is less open than its member countries and therefore, the efficiency of its exchange rate policy increases. In contrast to Mundell, McKinnon not only distinguishes labour mobility among regions but also focuses on inter-industrial immobility. Labour mobility among industries reduces factor movement between regions. Consequently, the effects of adjustment mechanisms to prevent drops in income vanish. Kenen (1969) further develops this effect and argues that regions are defined not by their geography or by their politics, but by their activities. He assumes that perfect inter-regional labour mobility requires perfect occupational mobility, which can only come about when labour is homogenous. Based on the same assumption, OCA member states should display very similar skill requirements. In this context, structural synchronisation is an important condition of OCA, thus affecting the efficiency of a market-based adjustment mechanism.

Kenen (1969) assumes that diversified economies with inter-industrial mobility are good candidates to join OCA because diversification helps them to adjust rapidly to negative external shocks. A diversified economy with a diversified export sector is more stable if those shocks are uncorrelated. Krugman (1993) notes that economic integration leads to regionally concentrated industries (e.g., automobile plants in Michigan). Subsequently, regionally concentrated industries could lead to asymmetric shocks within a currency region.

The traditional version of OCA theory is supplemented by Corden (1972), who argues that joining a currency area is related to a loss of control over monetary policy and exchange rates. These arguments followed by new theoretical development of OCA that focuses more on the benefits and costs of adopting a common currency. On the basis of the theoretical principles, the costs are minimised and benefits maximised with high degrees of cyclical and structural synchronisation.

In summary, we suppose that the benefits of joining a currency union provide an institutional advantage that increases total-factor productivity and long-term output. According to the endogeneity hypothesis (Frankel and Rose 1998), the benefits will be maximised ex post.

However, Imbs et al. (2011) show that the European integration process was accompanied by dynamic evolution of structural changes in sectoral production, which led to geographically dispersed activity. In the peripheral countries (mostly

in Southern and Eastern Europe) sectoral diversification led to agglomeration, heterogeneous regions and integration processes that had different impacts at the national and regional levels. Conversely, in the core member states (mostly in Western Europe), sectoral specialisation led to diversification because the regions integrated with each other based on each region's comparative advantages.

2 Multiple-Steady-State Growth Model

The theoretical multiple-steady-state model assumes that there are heterogeneous sets of countries that obey separate growth regimes. The model is a variant of the Solow model of economic growth with threshold non-convexities in institutional factors provided by the single currency. The key question is whether multiple steady states exist. If so, the system has two steady states (two equilibria) to which economies tend. In the original assumption provided by Durlauf et al. (2005), the threshold k^T is given by different capital stocks. According to his assumption, the solid curve represents multiple steady states and dashed curve nonlinearities (Fig. 1).

Our multiple-steady-state approach explains the long-term economic growth between euro member states and non-member states (solid curve). In that case, we can expect a single-currency regime to result in continuously increasing heterogeneity over the long term. Conversely, if the economies do not tend to the different steady states, there is nonlinearity in the growth process (dashed line) and over the long term, countries will converge to a single steady state.

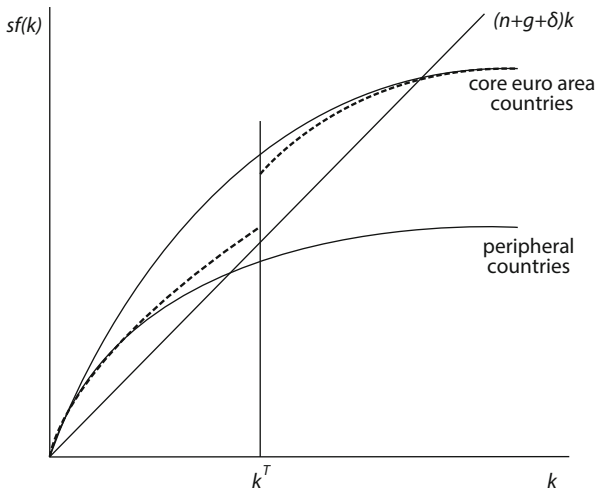

Fig. 1 Non-linearity vs. multiple steady states

3 Empirical Evidence

The identification problem is conditioned by insufficient observations that would allow one to distinguish the differences in the long-run behaviour of the countries that start with capital stocks at k^T. Figure 2 describes the evolution of the European integration process divided into the three sub-sample periods. The crosses represent the core euro area member countries (Belgium, Germany, Spain, France, Italy, Netherlands, Austria, Portugal and Finland). The rest of the countries are the current EU Member States that had not adopted single currency by the year 1999: Bulgaria, Czech Republic, Denmark, Estonia, Greece, Croatia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Romania, Slovenia, Slovakia, Sweden and United Kingdom. Ireland, Luxembourg and Malta were excluded due to outliers and structural breaks. Data series (GDP and gross fixed capital formation) are averages of EUR per capita in 2005 prices.

The first period represents the period between the common market and currency union stages (1990–1999). GDP per capital exceeds 10,000 euros in all of the euro-area countries, including Cyprus, United Kingdom, Sweden and Denmark. However, there are no substantial non-linearities and multiple-steady states in the figure.

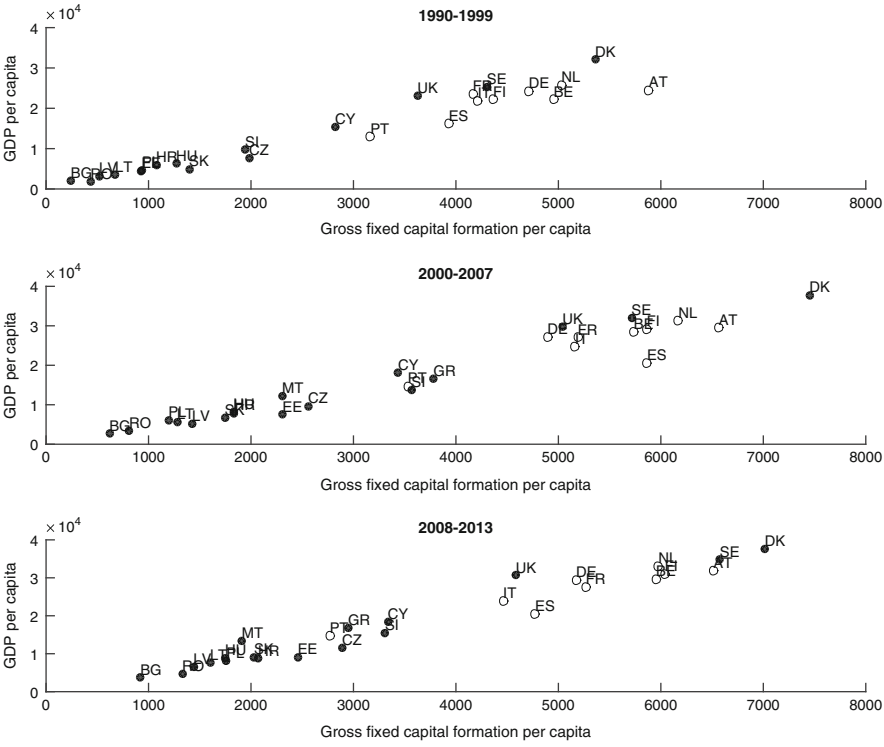

Fig. 2 Evolution of the European integration process (Eurostat)

Conversely, in the second period we can distinguish among three groups of countries. The first group is represented by GDP per capita of more than 20,000 euros and gross capital formation per capita that exceeds 3.5,000. The group is composed of all of the core euro area member countries (except Portugal), Denmark, Sweden and United Kingdom. The second cluster is composed of Portugal, Slovenia, Greece and Cyprus. The third cluster is composed of the rest of the EU member countries.

Thus, following single-currency adoption (between 2000 and 2007) we can distinguish three groups of countries that tend towards three steady states. This period was typical of the credit-boom bust cycle in the most of the new EU Member States. Rapid credit growth and a high level of liquidity in the global markets were followed by the particular attractiveness of "new Europe" for capital flows. The lending boom was associated with the excessive consumption growth that resulted in vulnerabilities during the financial crisis, especially in the CEECs. After 2007, growth forecasts for CEECs (especially for private consumption) were significantly revised downward. Consequently, several CEECs allowed their currencies to depreciate massively so that they could improve competitiveness and cope with both capital flight and sudden stops of capital inflows. The vulnerabilities that accumulated during the pre-crisis period were further increased by adverse income shocks, leading to reforms in the European supervisory architecture.

Liquidity and solvency shocks during the crisis contributed to changes in output across Europe. The European recession affected growth through three different channels: capital accumulation, labour input and total factor productivity (Halmai and Vásáry 2012). The same results are presented in Fig. 2. Although the gross fixed capital formation and GDP per capital increased in Sweden, Finland, Germany and Belgium, most other countries experienced decline.

Finally, following the financial crisis (2008–2013) we can identify two steady states.[1] The first group is composed of the core euro-area countries (Belgium, Germany, Spain, France, Italy, Netherlands, Austria, Finland), United Kingdom, Sweden and Denmark. The second group is composed of Bulgaria, Czech Republic, Estonia, Greece, Cyprus, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia, Slovakia, Portugal, Greece and Cyprus. In relation to our theoretical background, we can note that three countries that grouped during 2000–2007 (Portugal, Slovenia, Greece and Cyprus) changed their steady states to approach those of the other peripheral countries.

[1] Following our theoretical background and detailed analysis of growth components, there is a potential for a third steady state, which distinguish core euro-area countries into two groups.

4 Policy Implications

The traditional debates about the heterogeneous transmission mechanisms for both real and monetary shocks began immediately after the introduction of a common currency in the euro area (Eijffinger and de Haan 2000 or Mihov 2001). A wide range of literature focuses on institutional, financial, consumption and housing heterogeneity and its impact on the efficiency of monetary policy in the currency area. However, recent theoretical and empirical papers seek to identify the optimal EU-level governance structure and especially whether and which macro-prudential regulatory framework is efficient in the heterogeneous currency union. The theoretical framework for internationally co-ordinated regulation supplies arguments for the need not only to maintain the field for competition but also to avoid regulatory races to the bottom (Jeanne 2014). However, the key issue is that the assumed heterogeneity implies that regulation at the international (EU) level may have to be restricted to a few countries and not implemented across the entire currency area. Moreover, the limited efficiency of monetary stabilisation tools at the EU level is emphasised by national budgets' fiscal capacities and their pro-cyclical effects.

According to the theoretical discussion and empirical results, we can conclude that Europe's heterogeneity will increase due to the existence of multiple steady states. If so, the single regulatory framework will cause heterogeneous levels of restriction in different countries. Excessive restrictions will negatively affect long-run economic growth, especially in countries with lower productivity and capital formation. Conversely, these negative effects will not be sufficiently balanced by weak regulation in the countries with a higher level of potential growth. In summary, over the long term, economic growth is much more sensitive to restrictions. Thus, the centralisation of monetary policy, especially with respect to the regulatory framework, could undermine potential economic growth across Europe.

The assumption of Europe's heterogeneity is adopted by many empirical and theoretical models. Schoenmaker (2013) differentiates between a centralised model, in which the ECB controls policy instruments and national monetary and regulatory authorities provide recommendations according to local conditions, and a de-centralised model, in which the ECB provide the overall policy framework and national monetary authorities control instruments. Rubio (2014) proposes a Taylor-type rule for loan-to-value ratios and distinguishes among four types of asymmetries: (1) non-synchronised business cycles; (2) financial accelerator effects; (3) differences in borrowers' labour income shares; and (4) asymmetries in the variable and fixed rates of mortgages.

In summary, key issues and questions addressed in the conceptual frameworks include which instruments follow the heterogeneous currency union appropriately and how to implement these instruments at the national and EU levels in accordance with their efficiency and efficacy.

5 Summary

The chapter provides theoretical evidence of the growing heterogeneity of economic growth among the EU Member States over the long term and discusses the appropriateness of the single monetary policy framework with respect to recent changes in the EU's regulatory architecture. The traditional theoretical background is represented by the OCA theory. Our contribution is to substitute the institutional factor (i.e., single-currency adoption) for capital thresholds in the theoretical multiple steady-state model.

The effects of the single currency and the European integration process were discussed in the context of traditional endogeneity and the specialisation hypothesis. We discussed sectoral diversification and agglomeration to show that the core euro-area member countries tend to different steady states than do peripheral countries.

Finally, we showed that the single currency provides the institutional advantage that increases total-factor productivity and output over the long term. However, the benefits of a single currency are utilised differently by different European countries. In the future, therefore, the policy framework should adapt its instruments to the heterogeneous currency union and combine monetary and other authorities at the national and EU levels.

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Sustainable Development in the EU

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1 Introduction

Having been hit by an economic crisis that revealed weaknesses in its economic and social progress, Europe is confronted by serious problems. Moreover, Europe is part of a fast-changing world managing long-run challenges such as globalisation and limited resources. These issues are reflected in the EU Treaty, Article 3 of which states that the European Union's overarching long-term target is sustainable development. More specifically, the European Union's goal is a "balanced economic growth and price stability, a highly competitive social market economy [. . .], and a high level of protection and improvement of the quality of the environment". Priorities such as improved resource efficiency, greening and increased competitiveness are highlighted in the Europe 2020 Strategy. The resulting call of the United Nations Rio+20 conference for the "development of internationally recognised indicators to measure the green economy" affirms the relevance of this topic.

The close interconnection and complexity of economic, social and environmental aspects requires a new methodology both for performing economic analyses and for measuring economic activities. We face the challenge of how to improve our economic accounting systems to better reflect both economic and ecological issues. Incremental increases in popular GDP are often made at the expense of ecological capital and therefore, GDP provides us with misleading information about where we are and where we should go. Consequently, it is necessary to identify relevant indicators that measure the economic performance of national economies while considering environmental issues.

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This chapter reflects those needs and focuses on the sustainability of economic growth, linking economic issues with environmental quality. Primary attention is paid right to the measurability of the EU countries' economic-environmental performance, which in reality is closely related to the European priorities mentioned above. In particular, various alternatives for measuring sustainable economic performance—together with the evolution of those alternatives—are introduced.

The chapter is structured as follows: First, the concept of well-being is introduced in Sect. 2 and is accompanied by a discussion of the misuse of GDP in that context. Well-being is realised through sustainable development, as explained in Sect. 3. Possible sustainable-development measures are discussed in the remaining part of this chapter (beginning with Sect. 4), which includes a discussion of the widely used indices approach (Sect. 5) and suggests possible alternatives (Sects. 6–8). Section 9 concludes the chapter.

2 From GDP to Well-Being Concept

To explain why the sustainable economic performance indicators were developed, it would be opportune to present a historical overview of economic performance measures, which originated in the post-war period of reconstruction. Many people lived in conditions of misery caused by the destruction of war, and greater production was seen as the key to prosperity. Consequently, gross domestic product was regarded as the main indicator for measuring production and consequently, its growth. In the early 1930s, S. Kuznets implemented this indicator in economic practice at the direct request of the American government. The indicator's primary purpose was to measure the gross output of the American economy, especially its production capacities in strategic industries. Later, this indicator (and particularly its derived version, GDP per capita) became popular for interpreting the successes of economic growth (for GDP per capita progress in the EU countries,[1] see Table 1). Despite continued warnings from the GDP's authors about its unsuitability to measure societal well-being and social progress (Kuznets 1934), frequently this indicator has been interpreted inappropriately.

Standard quantities such as gross national product (GNP) and gross domestic product (GDP) are commonly used to measure a country's level of economic activity. However, experience shows that the broad applications and categorical interpretation of this indicator are not appropriate and do not give a comprehensive picture of societal development, either for the population's social status or for the state of the environment. Simultaneously, many economists have noted that GNP

[1] Countries: **V4:** Czech Republic, Hungary, Poland, Slovakia; **CEEC:** Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia; **Periphery:** Greece, Ireland, Italy, Portugal, Spain; **Core:** Austria, Belgium, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Sweden, United Kingdom.

Table 1 GDP in PPS per capita for the EU countries (Eurostat)

Country	2004	2008	2012	Country	2004	2008	2012
Austria	27,600	31,100	33,100	Italy	23,100	26,000	25,600
Belgium	26,200	28,900	30,700	Latvia	10,100	14,600	16,400
Bulgaria	7,500	10,900	12,100	Lithuania	11,100	16,100	18,300
Croatia	12,500	16,200	15,700	Luxembourg	54,500	65,800	67,100
Cyprus	19,600	24,800	23,400	Malta	17,200	20,300	22,000
Czech Republic	16,900	20,200	20,700	Netherlands	27,900	33,500	32,600
Denmark	27,100	31,100	32,100	Poland	10,900	14,100	17,100
Estonia	12,400	17,200	18,200	Portugal	16,700	19,500	19,400
Finland	25,100	29,700	29,400	Romania	7,500	12,200	13,500
France	23,700	26,700	27,700	Slovakia	12,300	18,100	19,400
Germany	25,000	29,000	31,500	Slovenia	18,700	22,700	21,400
Greece	20,300	23,200	19,500	Spain	21,900	25,900	24,400
Hungary	13,600	15,900	17,000	Sweden	27,300	30,900	32,200
Ireland	30,800	32,900	32,900	United Kingdom	26,900	28,600	26,800
EU	20,514	24,504	25,007	Periphery	22,560	25,500	24,360
V4	13,425	17,075	18,550	Core	26,311	29,944	30,678
CEEC	12,136	16,200	17,255				

and GDP can give a highly misleading impression of both economic and human development (Bell and Morse 2008). It is also important to say that GDP is not bad—rather, it is being misused as an indicator of something that it does not measure.

In light of increasing requirements to capture economic growth in all its complexity, namely, the impact of economic growth on security, health, social, environmental, educational, politics, etc., demand for a new concept referring to an overall condition also increased. Consequently, the concept of well-being was developed. Well-being is composed of the satisfaction of human needs in terms of physiological needs (such as housing, food, etc.) and material standard of living, both of which depend on the ability to provide oneself with the financial and material wealth that enables the purchase of goods and services that satisfy those needs. One important prerequisite to finding a relevant job is access to education. Other crucial aspects of well-being include family, social participation and leisure opportunities. Contentment also depends not only on health and health care but also on a sound living environment. Moreover, without either security or accountable governance and political voice, individual liberties are endangered. Because of its multidimensionality, it is difficult to carefully analyse well-being, and measuring it is even more difficult. Stiglitz et al. (2009) identify key dimensions for economic development and social progress that should be reflected in well-being measures (see Fig. 1).

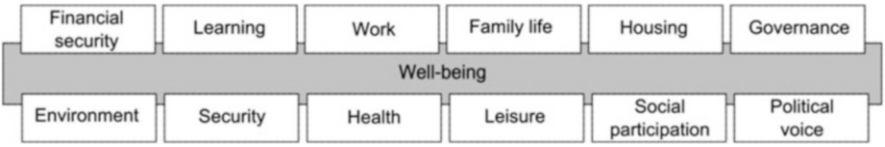

Fig. 1 Well-being dimensions

3 Sustainable Development

Realising, conserving and developing well-being are goals guided by sustainable development, i.e., "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations 1987). Sustainable development ensures an individual's well-being by integrating social development, economic development, and environmental conservation and protection (see Fig. 2).

The social dimension is an essential aspects of sustainable development and refers to the fact that human needs such as access to education, health services, food, housing, employment, and fairly distributed income are met by emphasising the necessity of enabling poor, disabled, and minority people to have those needs satisfied. Satisfaction of these needs can be facilitated if human rights are both implemented and enforceable: that is the role of institutions.

The institutional framework creates an environment for all of the mentioned dimensions because it embodies both formal and informal institutions that determine individuals' behaviour and particular markets' functioning. Economic development both preserves and creates work for individuals, assuring an income for their families. The economic dimension incorporates domestic economies within the global economy. Social and economic dimensions are interconnected and reinforce one another. Well-being is definitely influenced by environmental quality. Accordingly, the protection of both the earth and natural resources are important aspects of sustainable development.

Sustainable development can be regarded as "a normative concept involving trade-offs among social, ecological and economic objectives," which is determined by the institutional framework and "is required to sustain the integrity of the overall system" (Hediger 2000). Another insight can be presented by the so-called 'sustainability barometer', see Fig. 3, in which a system's particular state is mapped using a two-dimensional structure of human and ecosystem well-being. The reader can see a system's position but cannot discern why that system happens to occupy a particular location in the barometer (Bell and Morse 2003).

In general, the goal of sustainable development is to permanently improve living conditions (i.e., to improve both human and ecosystem well-being); therefore, social and economic developments must be environmentally friendly and set in a suitable institutional framework, thus ensuring both continual development and the availability of natural resources for future generations. As Stiglitz et al. (2009) state, "Active participation in sustainable development ensures that those who are

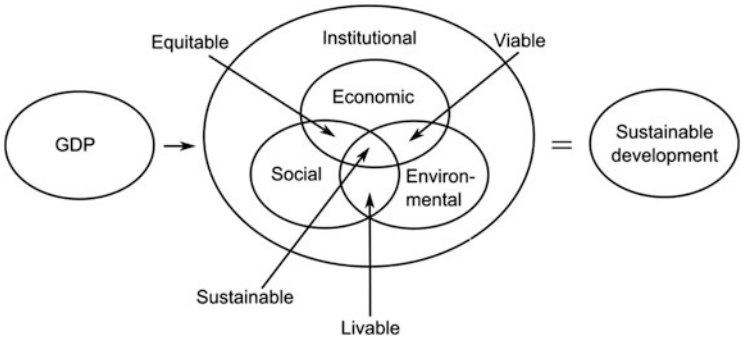

Fig. 2 The dimensions of sustainable development

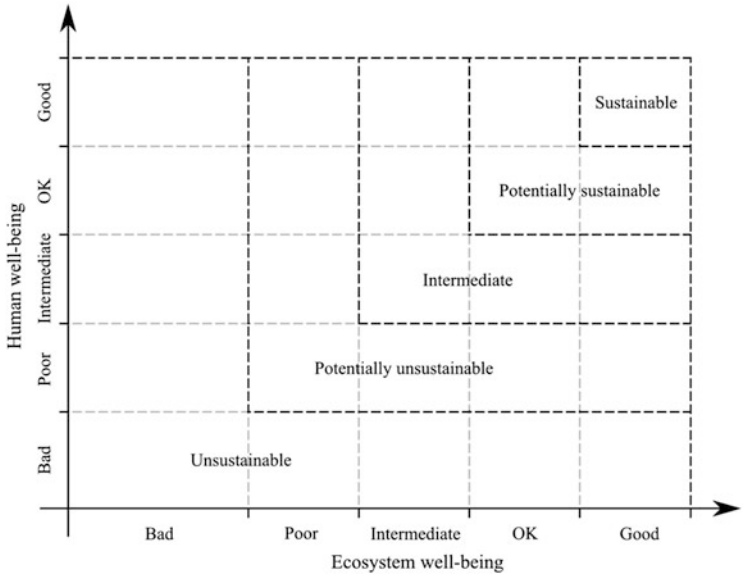

Fig. 3 Barometer of sustainability introduced by the World Conservation Union and the International Development Research Centre (Bell and Morse 2003)

affected by the changes are the ones determining the changes. The result is the enjoyment and sharing of the benefits and products generated by the change. Participation is not exclusive, ensuring equitable input, self-determination and empowerment of both genders and all races and cultural groups."

4 Measurement of Sustainable Development

It is possible to realise improvements in human and ecosystem well-being through the use of measurements of sustainable economic development, which indicate the areas that should perform better. The difficult task of measuring and comparing sustainable economic development among countries can be carried out using several methods. The traditional method consists of constructing indices that can cover different aspects of economic, ecologic, social or institutional aspects of well-being. This chapter is dedicated to general issues related to indices, for example, their history and construction. Sections 5, 6, 7 describe particular indices, whereas Sect. 8 introduces data envelopment analysis (DEA), an operational research tool that enables a comparison of countries according to their efficiency. More specifically, this section aims to assess how a particular level of GDP is achieved based on natural resources depletion and environmental pollution. Another method to compare countries with respect to sustainable development is that of multi-output production functions, which can be viewed as a special operational research technique and will not be further discussed because DEA can be viewed as a more general approach.

A number of methods of measuring national-level progress have been proposed, developed, and implemented to address sustainable development or less general areas. The most common method is to construct indices. Those indices can be generally placed into the following categories:

1. Indices that address the issues described above by making 'corrections' to existing GDP and SNA accounts (e.g., the human development index, the genuine progress indicator, green GDP, genuine savings, etc.)
2. Indices that directly measure aspects of well-being (e.g., ecological footprint, the environmental performance index, subjective well-being, gross national happiness, etc.);
3. Composite indices that combine the aforementioned approaches (e.g., the better life index, the living planet report, the happy planet index, etc.)
4. Indicator suites (e.g., national income satellite accounts, the Calvert-Henderson quality of life indicators, the millennium development goals and indicators, etc.)

As stated in Costanza et al. (2009), all of the indicators mentioned so far, including GDP, are based on the aggregation of a large number of variables into a single composite index. Many new measures of progress do not attempt this final aggregation step, but simply report many indicators separately: we call these "indicator suites". Such systems omit the final aggregation step, which answers the question of "what does this all mean?" to the user.

Numerous scientists and practitioners have discussed the desirability of integrating a suite of indicators into a single index for sustainable development (i.e., Stirling 1999). Experts are divided between those who see indicator suites as a good thing and those who stress their dangers.

According to the OECD (2008), aggregation is useful to summarise complex real systems with a view to supporting decision-makers. Aggregated information is easier to interpret than a battery of many separate indicators. It is possible to assess countries' progress over time. Aggregation can facilitate communication with the public (i.e., citizens, the media, etc.), promote accountability and enable users to compare complex dimensions effectively.

However, there are also some negative aspects of aggregating information. For example, aggregation may send misleading policy messages if poorly constructed or misinterpreted. It may induce simplistic policy conclusions. Aggregation can be misused, e.g., to support a desired policy, if the construction process is not transparent. The selection of underlying data and weights can be the subject of political dispute. Aggregation may disguise serious failings in some dimensions and increase the difficulty of identifying proper remedial action, if the construction process is not transparent. It also may lead to inappropriate policies if difficult-to-measure dimensions of performance are ignored. In reality, the lack of transparency caused by highly aggregated indicators is a serious problem.

Sustainability indices are quite prominent in the literature. The basis upon which these devices are founded—clarity for users—is bound up with the uses to which they will be put. Scientists and technicians are interested not only in data presented in tables or graphs but also in raw data. Decision-makers and managers require some degree of data condensation, particularly in terms related to goals and targets. Individual users (public) prefer highly aggregated data (such as an index) and visual devices (Bell and Morse 2003). This division can be illustrated by a "pyramid of indicators set" as shown in Fig. 4.

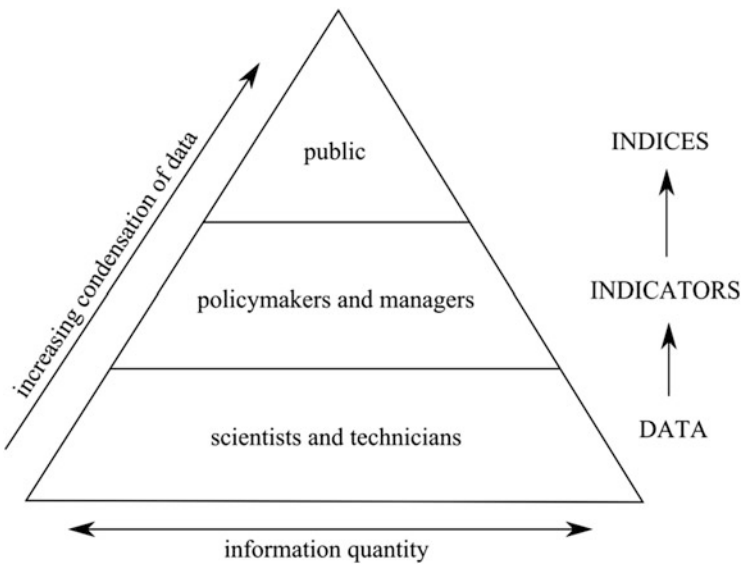

Fig. 4 Data condensation degrees related to different users (Bell and Morse 2003)

Like GDP, numerous measures comprise abstracted indicators that show an overall view, not comprehensive reports. However, some measures can be used to inform local and regional decisions. This represents an improvement on the misuse of GDP and economic growth as a proxy for well-being.

One question is whether GDP should be improved on, replaced by these other approaches, or supplemented. A case can be made for relying on measures that improve GDP because it would be rather straightforward to rearrange the accounting protocols to recognise that some expenditures now counted as beneficial should actually be counted as either harmful or defensive. However, it is worth reemphasising that GDP is not an appropriate measure of welfare and was never meant to serve that purpose. Advocates for supplementing GDP with these other measures note that although GDP is a poor measure of welfare, it nonetheless "serves crucial and helpful roles in macroeconomic policy" and is "unique in that it combines simplicity, linearity, and universality as well as carries the objectivity of the observable market price as its guiding principle" (Goossens and Mäkipää 2007).

Well-being metrics can provide a new, broader perspective to policymakers in the areas that matter to people. Such expanded sets of indicators can also open new horizons in traditional policy areas by providing new types of information, such as information about how people behave and how they feel about their lives (OECD 2013). For correct usage of well-being indicators, it is necessary to explore them in detail.

Therefore, we present and evaluate a set of tools that allow the measurement and evaluation not only of the results of economic growth but also of its complex social and environmental impacts. The professional and academic literature offers many newly developed alternative methodologies and indicators that attempt to measure the impacts of economic growth on societal development (broadly understood), including respect for the rules and requirements of environmental protection and sustainable development. These tools are based on newer approaches to the measurement of economic progress. This class of indicators contains e.g., the human development index (HDI), the genuine progress indicator (GPI), the index of sustainable economic welfare (ISEW), gross national happiness (GPH), the happy planet index (HPI), the better life index (BLI), the social progress index (SPI), etc.

An exclusive focus on economic performance is often tightly accompanied by pollution and wastefulness as negative by-products of economic performance that burden quality of life. For this reason, it is necessary to consider both economic and environmental indicators. Alternative indicators are often used to measure these types of sustainable economic performance, taking GDP as a base and modifying it to compensate for its shortcomings. This group of indicators includes the following indices: adjusted net savings (ANS), the genuine progress indicator (GPI), the index of sustainable economic welfare (ISEW), ecological footprint (EF), environmentally sustainable national income (ESNI), the better life index (BLI), etc. These indicators take into account environmental damage and the exploitation of natural resources, both of which are viewed as costs. This focus on environmental measurements of economic activity is relatively new. Note that interest in including the environment in economic performance began in the 1970s and 1980s, see Fig. 5.

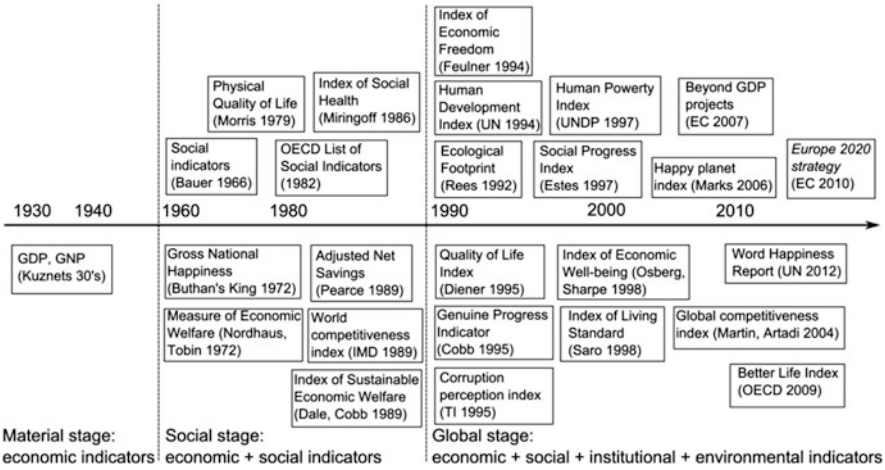

Fig. 5 Chronology of life-quality indicators introduction

Measuring the sustainability of well-being is key to ensuring that we will not undermine people's future well-being by improving well-being today. Even if we cannot predict the future precisely, we can measure some of the factors that are more or less likely to contribute to better lives in the future. This measurement begins by monitoring the resources (economic, environmental, human and social) that generate well-being over time and are passed on to future generations.

Significant efforts are still needed to develop a set of internationally comparable indicators for each type of capital, although metrics already exist for some of them (economic capital) and efforts are underway for others (environmental capital, human capital). Measuring the sustainability of well-being also requires assessing both the distribution of these resources across the population and whether these resources are managed efficiently, with a particular focus on the risks that may weigh on them.

As stated in OECD (2013), measuring better lives has become even more important today as many of our economies and societies have been stricken by the global financial and economic crisis. Understanding how people's lives have been affected and designing the best strategies to help them seems to be crucial. Therefore it is important to have information that is as accurate as possible about how both economic and noneconomic well-being have evolved during the crisis.

Many workers have lost their jobs since the beginning of the crisis in 2007, and many households have registered stagnating or declining levels of income and wealth. In 2013, there were nearly 16 million more unemployed people in the OECD area than before the crisis, and the number of people out of job for more than a year reached 16.5 million. Meanwhile, between 2007 and 2010, relative income poverty rose in most OECD countries, especially among children and young people (OECD 2013).

5 Environmental and Sustainable Development Indicators

Environmental and sustainable development indicators proliferated in the wake of the Rio Earth Summit's call for indicators of sustainable development (United Nations 1994, Agenda 21, Chap. 40). However, there is no universal set of environmental indicators. Although many indicators appear to be the same, most indicators are developed narrowly by an agency or organisation for specific, mission-oriented needs.

Most environmental and sustainable indicators are based on the idea of green national accounts or simply environmental accounting; in both cases, environmental costs are incorporated into measurements of economic activities. Environmental accounting is defined in the System of Environmental and Economic Accounts 2003 (SEEA-2003), which describes four basic approaches to environmental accounting (Smith 2007):

1. Measuring the relationships between the environment and the economy in both directions
2. Measuring environmental economic activities
3. Environmental asset accounts
4. Adjusting existing accounting measures to account for natural capital degradation

In the next sections, we provide a detailed description of widely used indicators that reflect both environmental performance and sustainable development.

5.1 The Better Life Index

One of the most famous quality-of-life indices is the Better Life Index, introduced by OECD's Better Life Initiative (OECD Better Life Initiative 2014). Life quality is verified through 12 key dimensions essential to well-being (see Fig. 1), which range from traditional measures such as income and jobs, health, education and the local environment, to personal safety and overall satisfaction with life. This variety of dimensions enables the identification of the relative strengths and weaknesses in a country's well-being (OECD 2013). One the BLI's primary advantages is that OECD also focuses on measuring inequality among societal groups with respect to different aspects of well-being.

The BLI is a composite indicator composed of various "dimensions" of well-being such as material living conditions (housing, income, jobs) and quality of life (community, education, environment, governance, health, life satisfaction, safety and work-life balance) (OECD Better Life Initiative 2014). However, the BLI has recently been criticised for not reflecting societal inequalities. Therefore, future editions of the index are planned to account for inequalities (e.g., between men and women or between people with low and high socio-economic status).

Values of BLIs ranging from 0 to 10 are presented in Table 2. It is evident that higher values are found in core countries. In contrast, CEE and periphery countries

Table 2 Better life index, 2011, EU countries/OECD members (OECD)

	Housing	Income	Jobs	Community	Education	Environment	Governance	Health	Life Satisfaction	Safety	Work-life balance	Overall
Austria	7.40	3.71	8.32	8.40	6.19	6.37	6.26	7.08	8.39	9.19	7.00	7.02
Belgium	9.27	4.13	5.20	7.34	6.84	7.89	5.88	7.30	7.10	7.02	8.46	6.95
Czech Republic	6.46	1.38	6.15	5.37	7.32	8.44	4.23	5.20	4.84	8.35	7.76	5.91
Denmark	8.33	2.63	8.41	9.57	6.75	8.87	6.72	6.54	10.00	8.46	9.11	7.57
Estonia	2.82	0.90	2.97	3.09	8.13	9.59	2.11	2.32	1.29	5.49	7.34	4.27
Finland	8.10	2.60	7.29	7.77	9.07	9.15	6.43	6.58	8.71	8.55	8.50	7.42
France	7.82	3.65	5.68	8.03	6.41	9.53	4.60	7.59	6.77	8.09	7.71	6.76
Germany	7.43	3.75	6.98	7.82	7.71	8.89	4.45	6.49	6.45	8.83	8.05	6.93
Greece	5.86	2.14	3.91	3.88	5.14	5.79	5.13	7.38	3.55	8.63	6.65	5.42
Hungary	3.76	0.95	3.29	5.21	7.13	9.00	4.81	2.17	0.00	8.46	6.99	4.82
Ireland	8.80	2.72	3.41	9.84	6.37	9.60	5.68	8.01	8.39	8.65	6.63	6.75
Italy	6.89	3.49	4.37	3.83	4.67	7.49	5.02	7.10	5.48	8.25	6.65	5.82
Luxembourg	8.10	. . .	7.23	8.62	5.22	9.59	2.98	7.51	7.74	8.27	7.32	7.01
Netherlands	8.61	3.89	8.72	8.51	7.24	6.03	5.59	7.85	9.03	8.23	8.76	7.51
Poland	4.43	0.85	5.65	7.13	8.00	5.19	5.20	3.37	3.55	9.18	6.65	5.46
Portugal	6.52	2.03	4.70	2.39	2.81	7.95	4.07	4.63	0.65	7.69	7.95	4.83
Slovak Republic	5.79	0.95	2.23	5.74	7.21	9.49	3.12	0.66	4.52	8.48	7.67	4.84
Slovenia	5.94	2.02	6.32	6.33	6.83	6.37	5.92	5.22	4.52	8.85	7.45	6.09
Spain	8.33	2.51	1.90	8.14	4.28	6.66	5.65	7.48	4.84	8.57	6.95	5.90
Sweden	8.06	3.43	8.32	9.26	7.70	10.00	8.27	8.27	9.03	8.19	8.16	7.86
United Kingdom	7.91	4.07	7.18	8.56	6.32	9.58	6.39	7.18	7.42	8.69	7.03	7.11

(continued)

Table 2 (continued)

	Housing	Income	Jobs	Community	Education	Environment	Governance	Health	Life Satisfaction	Safety	Work-life balance	Overall
EU	6.98	2.59	5.63	6.90	6.54	8.17	5.17	6.00	5.82	8.29	7.56	6.30
V4	5.11	1.03	4.33	5.86	7.42	8.03	4.34	2.85	3.23	8.62	7.27	5.26
CEEC	4.87	1.18	4.43	5.48	7.44	8.01	4.23	3.15	3.12	8.14	7.31	5.23
PERIPHERY	7.28	2.58	3.66	5.62	4.65	7.50	5.11	6.92	4.58	8.36	6.97	5.74
CORE	8.10	3.54	7.33	8.39	6.95	8.59	5.76	7.24	8.06	8.35	8.01	7.21

have lower values, primarily due to visibly lower values of income and health. Moreover, compared to the other countries in the EU, the periphery countries have remarkably severe problems related to jobs and education.

5.2 The Ecological Footprint

The Ecological Footprint (EF) measures human demand on the Earth's ecosystems. Therefore, EF accounting measures the extent to which the ecological demand of human economies either remains within or exceeds the capacity of the biosphere to supply goods and services. Based on this assessment, it is possible to estimate how much of the Earth it would take to support humanity if everybody followed a particular lifestyle. In other words, it measures the extent to which humanity is using nature's resources faster than they can regenerate.

Both the ecological footprint concept and its calculation method were developed by M. Wackernagel and W. Rees at the University of British Columbia in 1994—for more detail see Rees (1992), Wackernagel (1994) and Global Footprint Network (2012). The EF is measured in global hectares (*gha*), an indication of the proportion of the earth's surface required to support a particular activity. This unit takes into account the different bio-capacities of each land type for each country/area. The EF's primary advantage is that it is relatively easy to calculate the ecological footprint of individual nations and other geographically defined groups because we usually know their consumption levels and therefore we can easily calculate the impact of that consumption on the earth's resources. Conversely, the EF's weakness is its failure to include any economic, political or cultural factors such as well-being. Another weakness of the EF relates to destruction of bio-capacity by long-term processes such as climate change and the fact that a large proportion of the earth's surface represents deserts, mountains and deep oceans, which reduce its bio-capacity.

The latest results show that the United States, China and India have the largest ecological footprints. Of the EU countries (see Table 3), Denmark, Belgium and Estonia place the highest demand on resources. Moreover, the greatest positive differences between bio-capacity and ecological footprint, called ecological reserve, are found in Finland, Sweden and Latvia due to those countries' high bio-capacities, whereas the worst ecological positions are found in Belgium, the Netherlands and Italy. There are also obvious, considerable differences in the ecological footprints of the core and the CEE countries.

5.3 Environmental Performance Index

The Environmental Performance Index (EPI) represents a method of quantifying the environmental performance of a state's policies. In other words, "the EPI ranks

Table 3 Ecological footprint, 2007 (National Footprint Accounts 2010 Edition)

	Ecological footprint in gha/pers	Bio-capacity in gha/pers	Ecological reserve/deficit (if positive) in gha/pers
Austria	5.30	3.31	−1.99
Belgium	8.00	1.34	−6.66
Bulgaria	4.07	2.13	−1.94
Croatia	3.75	2.50	−1.24
Czech Republic	5.73	2.67	−3.07
Denmark	8.26	4.85	−3.41
Estonia	7.88	8.96	1.08
Finland	6.16	12.46	6.31
France	5.01	3.00	−2.01
Germany	5.08	1.92	−3.16
Greece	5.39	1.62	−3.77
Hungary	2.99	2.23	−0.76
Ireland	6.29	3.48	−2.82
Italy	4.99	1.14	−3.85
Latvia	5.64	7.07	1.43
Lithuania	4.67	4.36	−0.31
Netherlands	6.19	1.03	−5.17
Poland	4.35	2.09	−2.26
Portugal	4.47	1.25	−3.21
Romania	2.71	1.95	−0.76
Slovakia	4.06	2.68	−1.38
Slovenia	5.30	2.61	−2.70
Spain	5.42	1.61	−3.81
Sweden	5.88	9.75	3.86
United Kingdom	4.89	1.34	−3.55
EU	5.30	3.49	−1.81
V4	4.28	2.42	−1.87
CEEC	4.65	3.57	−1.08
PERIPHERY	5.31	1.82	−3.49
CORE	6.09	4.34	−1.75

how well countries perform on high-priority environmental issues in two broad policy areas: protection of human health from environmental harm and protection of ecosystem" (Hsu et al. 2014). The EPI was developed by Yale University (Yale Center for Environmental Law and Policy) and Columbia University (Center for International Earth Science Information Network) in collaboration with the World Economic Forum and the Joint Research Centre of the European Commission.

The EPI usually aggregates 20 indicators reflecting national-level environmental data, which are consequently combined into the following 9 categories (see Hsu et al. 2014):

1. Health impacts
2. Air quality
3. Water and sanitation
4. Water resources;
5. Agriculture
6. Forests
7. Fisheries
8. Biodiversity and habitat
9. Climate and energy

The EPI ranges from the worst to the best performers between 0 and 100. For a more detailed discussion on the EPI, see Hsu et al. (2013) and Hsu et al. (2014).

The EPI's main advantage is that an aggregated index is more complex than looking at each indicator separately. In addition, a single number or a score is more user friendly. Conversely, the EPI's weakness is that it consists of a difficult interpretation of composite indicators. Users should be concerned about real environmental performance rather than the index number as such.

Table 4 presents the EPI 2012 and 2014 values of the EU countries. Primarily due to low emissions, the top five EU countries were Latvia, Luxemburg, France, Austria and Italy in 2012 and Luxemburg, the Czech Republic, Germany, Spain and Austria in 2014.

5.4 Happy Planet Index

The Happy Planet Index (HPI) is an index of human well-being and environmental impact that was introduced by the New Economics Foundation (NEF) in July 2006. The HPI is designed to improve well-established development indices, such as GDP and HDI, which do not take sustainability into account. The HPI measures the extent to which countries enable their residents to live long, happy, sustainable lives. The index ranks countries according to the length (based on life expectancy) and happiness (questionnaire-based well-being measured on the scale 0–10) of the lives that they enable per unit of environmental input, measured by ecological footprint (see Abdallah et al. 2012). The HPI's main weakness is that it does not consider human rights issues.

Table 5 presents the HPI and the corresponding well-being values for the EU countries in 2012. The top three EU countries are the United Kingdom, Germany and Austria, and the worst three EU countries are Lithuania, Bulgaria and Luxembourg. The latter results are primarily attributable to the worst three countries' high ecological footprint, causing low well-being.

Table 4 Environmental performance index in EU countries (http://epi.yale.edu/)

	EPI 2012			EPI 2014		
	Value	World ranking	EU ranking	Value	World ranking	EU ranking
Austria	68.92	7	4	78.32	8	5
Belgium	63.02	24	17	66.61	36	22
Bulgaria	56.28	53	25	64.01	41	25
Croatia	64.16	20	14	62.23	45	26
Cyprus	57.15	44	23	66.23	38	23
Czech Republic	64.79	18	12	81.47	5	2
Denmark	63.61	21	15	76.92	13	9
Estonia	56.09	54	26	74.66	20	14
Finland	64.44	19	13	75.72	18	12
France	69.00	6	3	71.05	27	18
Germany	66.91	11	8	80.47	6	3
Greece	60.04	33	20	73.28	23	17
Hungary	57.12	45	24	70.28	28	19
Ireland	58.69	36	21	74.67	19	13
Italy	68.90	8	5	74.36	22	16
Latvia	70.37	2	1	64.05	40	24
Lithuania	65.50	17	11	61.26	49	27
Luxembourg	69.20	4	2	83.29	2	1
Malta	48.51	87	27	67.42	34	21
Netherlands	65.65	16	10	77.75	11	7
Poland	63.47	22	16	69.53	30	20
Portugal	57.64	41	22	75.8	17	11
Romania	48.34	88	28	50.52	86	28
Slovakia	66.62	12	9	74.45	21	15
Slovenia	62.25	28	18	76.43	15	10
Spain	60.31	32	19	79.79	7	4
Sweden	68.82	9	6	78.09	9	6
UK	68.82	9	6	77.35	12	8
EU	62.67	27.36	. . .	72.36	24.36	. . .
V4	63.00	24.25	15.25	73.93	21.00	14.00
CEEC	61.36	32.64	16.73	68.08	34.55	19.09
PERIPHERY	61.12	30.00	17.40	75.58	17.60	12.20
CORE	66.84	12.60	8.40	76.56	14.20	9.10

Table 5 Happy planet index, 2012 (www.happyplanetindex.org/)

	Value	World ranking	EU ranking		Value	World ranking	EU ranking
Austria	47.09	48	3	Italy	46.35	51	5
Belgium	37.09	107	22	Latvia	34.87	118	25
Bulgaria	34.15	123	27	Lithuania	34.55	120	26
Croatia	40.62	82	15	Luxembourg	28.99	138	28
Cyprus	45.51	59	7	Malta	43.10	66	9
Czech Republic	39.35	92	19	Netherlands	43.09	67	10
Denmark	36.61	110	23	Poland	42.58	71	12
Estonia	34.95	117	24	Portugal	38.68	97	20
Finland	42.69	70	11	Romania	42.18	75	14
France	46.52	50	4	Slovakia	40.13	89	18
Germany	47.20	46	2	Slovenia	40.17	87	17
Greece	40.53	83	16	Spain	44.06	62	8
Hungary	37.40	104	21	Sweden	46.17	52	6
Ireland	42.40	73	13	United Kingdom	47.93	41	1
EU	40.89	82.07	. . .	Periphery	42.40	73.20	12.40
V4	39.87	89.00	17.50	Core	42.34	72.90	11.00
CEEC	38.27	98.00	19.82				

6 Data Envelopment Analysis: A New Approach to Sustainability Measuring

This section offers an alternative perspective on the measurement of sustainable development that is based on data envelopment analysis (DEA). DEA's original goal was to evaluate the relative efficiency of decision-making units (DMUs) in a multi-input/multi-output context. Although DEA is typically applied to micro-economic agents such as banks or firms, we use to conduct an efficiency assessment of countries.

More specifically, DEA analyses the relative efficiency of the EU countries, which transform multiple inputs into multiple outputs in economic, environmental and social dimensions. DEA is a convenient tool for this purpose because it uses data observations to evaluate relative sustainable development by inferring information directly from the data set. Indeed, the need to work with physical indicators is addressed by Stiglitz et al. (2009) to develop "a clear indicator of our proximity to dangerous levels of environmental damage" that is in line with having sustainable development as one of its dimensions. DEA is actually a well-developed nonparametric technique for evaluating the relative efficiencies of DMUs with multiple inputs and outputs (Ramanathan 2003). Nonetheless, the adoption of DEA in the context of environmental performance measurements is still scarce. There are only a few studies that focus on sustainable development, including, e.g., Färe

et al. (1996), Zofio and Prieto (2001), Färe and Grosskopf (2004), Zaim (2004), and Zhou et al. (2008).

The text below is dedicated to the direct approach to environment-economic performance evaluation based on DEA. This technique has various advantages. First, a multi-dimensional perspective or independence on individual preferences can be stated. In contrast to sustainable development indicators, DEA can elaborate multiple inputs and outputs measured even on different scales without any requirement for functional relationships between inputs and outputs or market value assessment. It enables the identification and quantification of economic growth's multi-factor impacts on social development and environment. Finally, DEA is a technique that measures the relative efficiency of DMUs, showing which inputs and outputs cause the inefficiency of a DMU and the extent to which they do so.

In an economy, inputs are consumed to produce desirable outputs accompanied by undesirable outputs. DEA then either maximises the output subjected to a given amount of inputs or minimises the amount of inputs for a given output. Because the set of goods and services produced using a given number of inputs is often accompanied by socially undesired resource depletion and pollution, DEA in an ecological framework must be carefully applied when addressing environmental impact. In this context, DEA is intended not only to maximise the economic goods and services output but also to consider negative environmental effects at the same time.

According to Allen (1999) there are four possibilities for coping with pollutants:

1. Converting pollutants by taking their reciprocal or by subtracting the pollutant from a maximal value regarding the converted pollutant as usual output
2. Considering the pollutant as an input that—together with other inputs—should be minimised
3. Considering pollutants as the only type of input, factors subtracted from the value of a product
4. Considering pollutants as indirectly subtracting from the product

Because negative environmental effects of production should be minimised, we are interested in the second possibility how to treat pollutants. Therefore, we apply the input-oriented BCC model (Banker et al. 1984), adding undesirable pollutant as an input.

Now, a more detailed list of indicators related to 3 dimensions of DEA must be established. Country-level data for 2004, 2008 and the most recent period are used, which allows us to compare efficiencies, thus providing a type of dynamic analysis. Measuring the environmental efficiency of the EU countries, we follow Dyckhoff and Allen (2001), Halkos and Papageorgiou (2014), Halkos and Tzeremes (2014), Korhonen and Luptacik (2004), and Mandal and Madheswaran (2010) in treating undesirable pollution as input. It is worth noting that DEA is sensible to entry of data from which information is directly inferred. In our case, 3 inputs and 1 output are used in the input-oriented DEA. More specifically, the following proxies of dimensions of our interest are chosen: CO_2 emissions (kt, per USD current GDP), energy use (in constant 2005 PPP, kg of oil equivalent) and the poverty rate. These

Table 6 DEA: the EU countries' relative efficiency

	2004	2008	2012		2004	2008	2012
Austria	0.7965	0.7873	0.7437	Italy	1.0000	0.9598	0.9587
Belgium	0.5480	0.5428	0.5005	Latvia	0.5937	0.6777	0.5821
Bulgaria	0.3608	0.3940	0.3698	Lithuania	0.4594	0.5346	0.6021
Croatia	0.6991	0.7197	0.6629	Luxembourg	0.6768	0.7304	0.6867
Cyprus	0.7842	0.7021	0.7319	Malta	1.0000	1.0000	1.0000
Czech Republic	0.4205	0.4808	0.4613	Netherlands	0.7397	0.7359	0.6734
Denmark	0.8614	0.8485	0.8118	Poland	0.5310	0.5685	0.5557
Estonia	0.3764	0.4003	0.3610	Portugal	0.8114	0.8140	0.7861
Finland	0.4072	0.4431	0.4022	Romania	0.4727	0.5363	0.5236
France	1.0000	1.0000	1.0000	Slovakia	0.4195	0.5127	0.5173
Germany	1.0000	1.0000	1.0000	Slovenia	0.6000	0.6073	0.5774
Greece	0.8457	0.8391	0.7541	Spain	0.8934	0.8990	0.8948
Hungary	0.5912	0.5776	0.5482	Sweden	0.7212	0.7761	0.6079
Ireland	1.0000	1.0000	1.0000	United Kingdom	1.0000	1.0000	1.0000
EU	0.7004	0.7174	0.6898	Periphery	0.9101	0.9024	0.8787
V4	0.4906	0.5349	0.5206	Core	0.7751	0.7864	0.7426
CEEC	0.5022	0.5463	0.5238				

indicators are used as inputs to produce current GDP in US$ because they generally provide proxies of environmental, social and economic dimensions, the aspects of sustainable development that we want to assess.

The results of DEA for all dimensions—i.e., environmental, economic and social—and sustainable development aspects for all explored time periods—2004, 2008 and 2012—are shown in Table 6.

As observed, the best-performing countries are the largest old EU members, plus Ireland and Malta. All of these countries lie on the production frontier, which means that the given amount of output is produced with minimal requests on inputs, including pollution. These countries have a relatively high output and produce a small amount of pollution. In contrast, the relatively least-efficient countries overall are overall the CEE countries, namely, Bulgaria, Czech Republic, Estonia, Lithuania, Romania, and Slovakia. These countries' primary problem is their relatively high pollution. Thus, we call for precautions related to pollution abatement to increase these countries' relative efficiency and their support for sustainable development in the EU.

Moreover, the scope of this study was to offer an alternative to widely used indices that we believe are provided in the form of DEA results—i.e., efficiencies. After introducing this new indicator, it would be opportune to explore its relationship to other indices mentioned above. For this purpose we use both numerical and graphical analyses, which comprise the content of the following sections.

7 Are Indices and DEA Results Related?

First, we address the linear dependency of the analysed indicators. Thus, Table 7 reports the Pearson and Spearman correlation coefficients of both the mentioned indicators and GDP. The relationship between the abovementioned indicators and GDP in PPS per capita for 2012 is also presented in Fig. 6. The table and figures imply a strong relationship between the indicators and GDP in PPS per capita. The highest values of the Pearson correlation coefficients between GDP and BLI also support the theoretically formulated expectation because the BLI is derived from GDP. The weakest GDP relationships are those between GDP and EPI, GDP and DEA, and GDP and HPI. This is primarily because the EPI and HPI are not based on GDP and are focused primarily on issues such as environmental health or ecosystem vitality. Finally, a low Pearson correlation is observed between BLI and EF, BLI and DEA, HPI and EF, HPI and EPI, EF and EPI, EF and DEA and EPI and DEA. The low correlation between EF and EPI is particularly surprising. The primary reason for this finding may be that EF only measures human demand on the Earth's ecosystems, whereas EPI is more general because it focuses not only on ecosystem protection and resource management but also on the protection of human health from environmental harm. Note that these findings are mostly reinforced by Spearman correlation coefficients.

Relationships among the indices can also be assessed through principal component analysis (PCA, for more details, see e.g., Jolliffe 2002). Running the PCA on all indices (results reported in Table 8), we obtain PC1 carrying 52.8 %, PC2 carrying 27.7 % and PC3 carrying 12.1 % of total information (92.6 % overall). Component loadings show that indices GDP, BLI, HPI, EPI and DEA are positively correlated to PC1; EF and GDP are positively correlated and HPI and DEA are negatively correlated to PC2; HPI and DEA; EPI is positively correlated and DEA is negatively correlated to PC3 positively. Based on previous findings, we can state that with respect to PCA, some indices are related to GDP, including BLI, HPI, EPI and DEA.

Table 7 Pearson (below the diagonal) and Spearman (above the diagonal) correlation, analysed for either 2012 or the most recent year

	GDP	BLI	HPI	EF	EPI	DEA
GDP		0.85*	0.58*	0.65*	0.41*	0.50*
BLI	0.91*		0.43	0.49*	0.57*	0.23
HPI	0.54*	0.50*		−0.03	0.38	0.63*
EF	0.59*	0.39	−0.15		0.11	0.04
EPI	0.44*	0.60*	0.26	0.22		0.25
DEA	0.47*	0.29	0.63*	0.01	0.13	

Note Correlation coefficients are computed based on the dataset without Luxembourg because that country's GDP is an outlier; significance varies due to the various sample sizes of the analysed indicators (i.e., BLI and EF); * p-value < 0.05

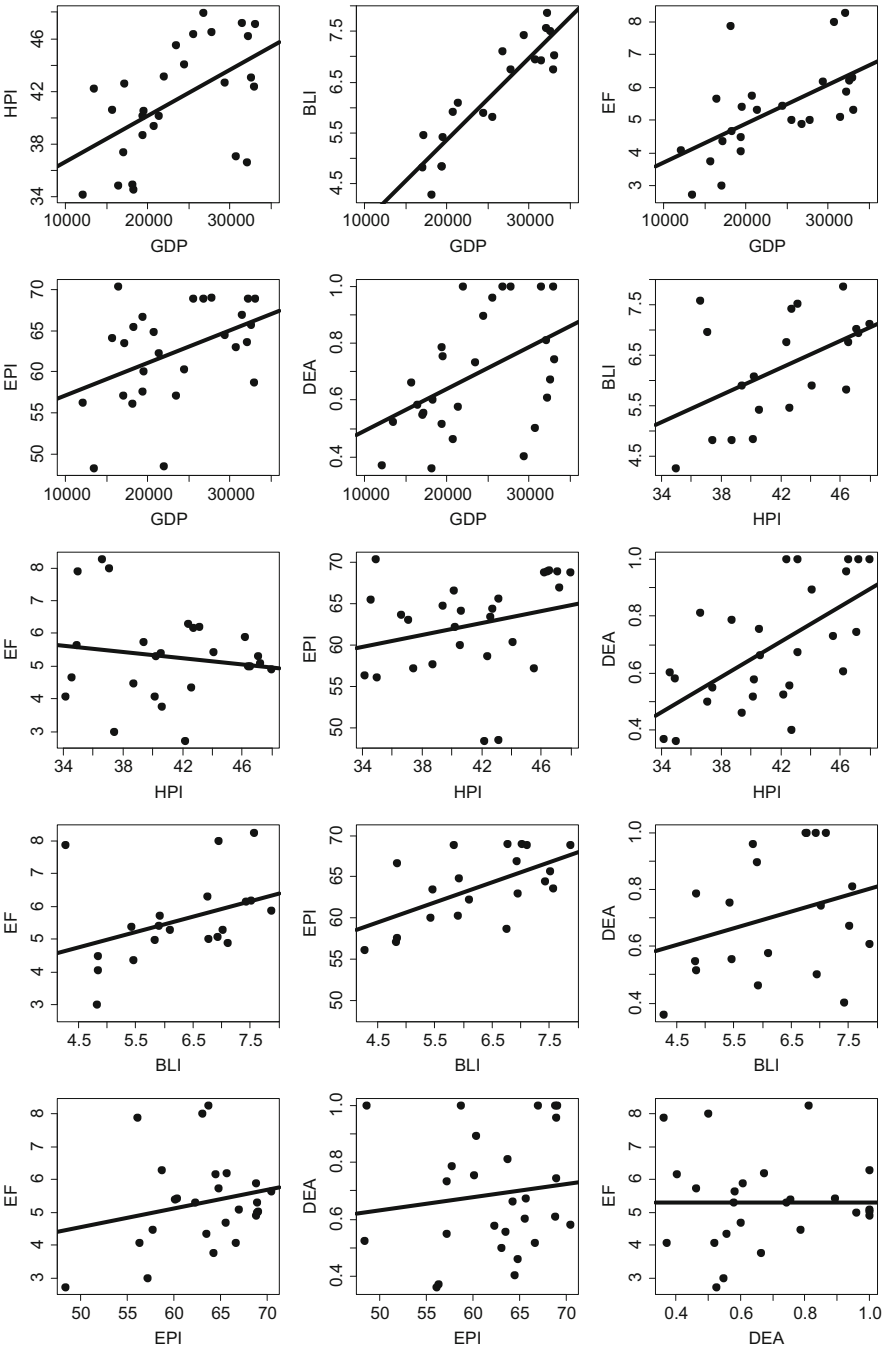

Fig. 6 Scatter plots of analysed variables, analysed for either 2012 or the most recent year (*Note* Constructed scatter plots are based on the dataset without Luxembourg due to outlier in GDP)

Table 8 Principal components analysis

Eigenanalysis of the correlation matrix				Eigenvectors (component loadings)						
Component	Eigenvalue	Proportion	Cumulative	Index	PC1	PC2	PC3	PC4	PC5	PC6
1	3.176	0.528	0.528	GDP	0.483	0.334	−0.127	−0.325	−0.010	0.730
2	1.662	0.277	0.805	BLI	0.489	0.298	0.118	−0.443	−0.230	−0.639
3	0.724	0.121	0.926	HPI	0.456	−0.395	0.073	−0.007	0.788	−0.101
4	0.248	0.041	0.967	EF	0.068	0.725	−0.154	0.564	0.325	−0.147
5	0.124	0.021	0.988	EPI	0.447	−0.165	0.558	0.555	−0.373	0.118
6	0.071	0.012	1.000	DEA	0.339	−0.301	−0.793	0.267	−0.286	−0.110

8 Similarity of the EU Countries: Cluster Analysis

All of the abovementioned indices tend to qualify particular aspects at both the micro and macro levels. At the state level (in our case, that of the EU members), indices can help us assess how aspects either are similar or how they evolve in particular areas. One appropriate technique used to explore the overall dis/similarity of the EU countries is cluster analysis; we employ the Ward method and Euclidean distance (for details see e.g., Everitt et al. 2001). Thus, Fig. 7 presents

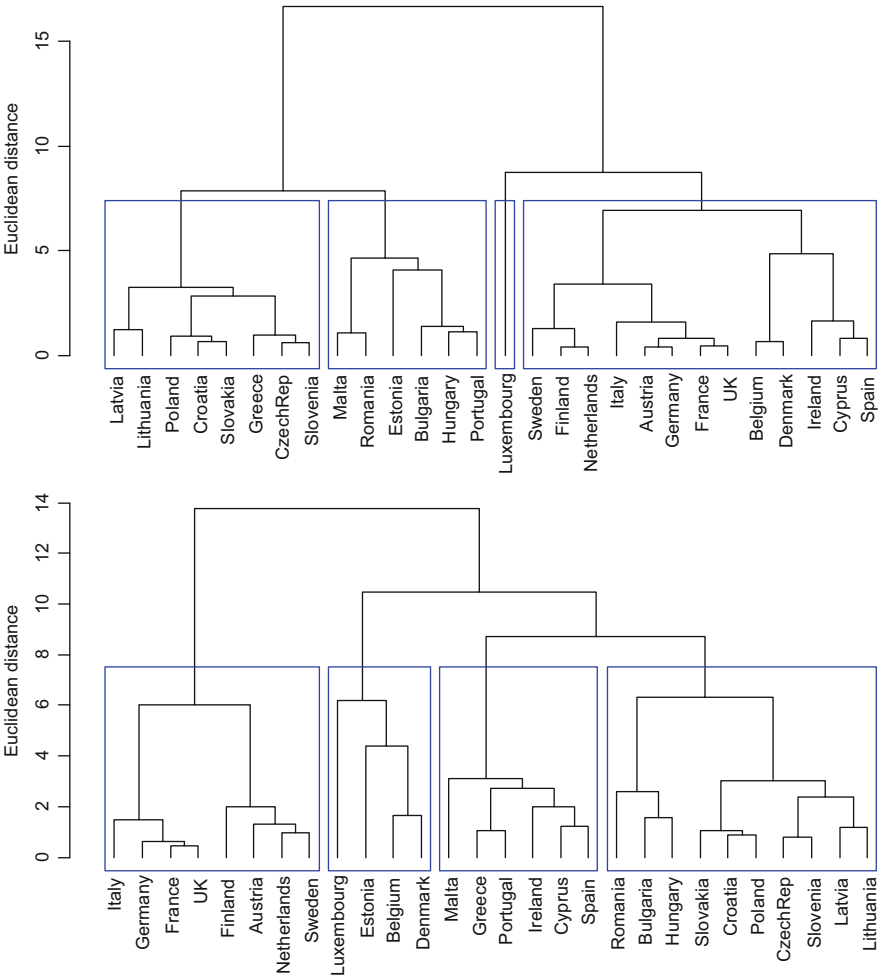

Fig. 7 Dissimilarity of the EU members with respect to economic, environmental and sustainable indicators (*Note* The top dendrogram is based on the GDP, BLI, HPI, EF and EPI indicators; the bottom dendrogram is based on the GDP, BLI, HPI, EF, EPI and DEA indicators; the Ward method and Euclidean distance are used for this figure's construction)

a dendrogram based on the selected economic, environmental and sustainable indicators in 2012 that show the dissimilarity of the EU members' attitudes towards the environment. In the comparative analysis of the economic, environmental and sustainable indicators, special attention is given to those indicators' ability to classify the individual countries/economies into generally accepted, homogenous groups.

First, we construct a dendrogram based on commonly used indicators, i.e., GDP, BLI, HPI, EF and EPI. There is a clear segmentation of the EU members into two main clusters. The first cluster generally consists of the core states; the better-performing periphery countries of Ireland, Italy, and Spain; and Cyprus. These countries have higher GDP in PPS per capita as well as BLI and HPI than the other countries. The second main cluster consists of the CEE countries and the southern states (except for Ireland, Italy and Spain). This second cluster can be further divided into two sub-clusters. The first sub-cluster consists of better CEE countries plus Greece. These countries have similar EPI values. The second sub-cluster consists of the South-Eastern EU states, plus Portugal, Malta and Estonia—i.e., states with relatively lower values of GDP in PPS per capita, EF and EPI than the other EU countries.

Second, for the dendrogram construction we use the indicators mentioned above plus the efficiency obtained from DEA. In comparison to the first dendrogram, we can see that core EU members (with the exception of Luxembourg, Belgium and Denmark) plus Italy, as better performing periphery countries create a separate cluster. The second main cluster can be divided into three sub-clusters. These clusters can be identified as small core EU countries, Estonia, periphery countries (with the exception of Italy), Malta, Cyprus, and CEE countries.

9 Concluding Remarks

Previous sections of this chapter introduced the concept of sustainable development and its measurement, which are important for the corresponding policy decisions. "Useful scientific information [. . .] improves [. . .] decision-making by expanding alternatives, clarifying choice and enabling decision makers to achieve desired outcomes" (McNie 2007). The first section is devoted to the indicators that measure economic and socio-economic progress and environmental quality in terms of the context (in terms of benefits and weaknesses) in which indices should be used without misinterpretations. The second part offers the alternative of using DEA for measuring sustainable development.

The goal of indicators is to provide information that separates relevant content from noise—to synthesise complex data. If properly presented, indices can enable understanding of the described complex phenomenon, can improve the situation that they describe, can diagnose problems by analysing trends, can identify patterns in the units analysed, can identify performance gaps, and therefore hold decision makers accountable (de Sherbinin et al. 2013).

Conversely, if interpreted incorrectly, decisions based on misinterpreting indices can lead to biased or even undesired results. Another weakness of indices is that many indices are tightly connected to projects that only last for a limited time, thus causing limited data availability and therefore a limited possibility of making intertemporal comparisons. Moreover, the methodology of many indices' construction changes over time, which also reduces the possibilities of conducting dynamic analyses. This implies that it is important to pay serious attention to the statistical methods and construction of aggregate indices, especially to the time-series perspective (Ebert and Welsch 2004). Because normalisation and weighting procedures significantly affect the resulting aggregate index, a contrasting outcome on an actual state can be obtained independently by different approaches. Thus, insufficient attention to the statistical methods of index construction can result in useless, if not misleading, information (Böhringer and Jochem 2007).

DEA shows a high potential for applications in the fields of environmental management and ecological control. It can be regarded as an objective tool that measures the relative efficiencies of DMU and therefore their positions within the set of DMUs. The goal of DEA is to directly infer information from available data. Accordingly, it does not separate desired from non-desired content but instead aims to assess the relative efficiencies of DMUs based on its data set. The advantage is that no piece of information is lost, although the data must be carefully chosen. In the sustainable development context, DEA provides a quantification that can be considered as a background for both economic development and environmental-protection activities.

In summary, the combination of indices and DEA provide a more complex picture of the described reality. We demonstrate this fact in the context of the EU countries. For example, the sustainable development indices can be used to find potential differences in sustainable economic performance among the EU Member States. Compared to the CEE and the periphery countries, the EU's core countries generally demonstrate higher values for all studied indices. Conversely, the core countries have bigger ecological footprints than the other countries, primarily due to their high proportion of heavy industry. When the DEA alternative is considered, ecological burden relative to output is more visible in the CEE countries, which implies a less optimistic perspective on sustainable performance. In contrast to indices, DEA explains how inputs are used to produce outputs and does not purely evaluate aspects. If this relationship is considered, the originally less-problematic CEE countries are revealed as less efficient. Consequently, we call for the appropriate use of indices—possibly accompanied by DEA to report the most relevant information.

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Part II
Policies for Competitiveness, Social Inclusion and Sustainability in the EU

Current Developments in Corporate Social Responsibility in the EU

Eva Abramuszkinová Pavlíková and Marcela Basovníková

1 The Concept of Corporate Social Responsibility

The concept of corporate social responsibility first appeared in the 1950s. Its significant lies in how management builds its relationships with partners, thus leading to improved reputation and credibility. The issue of corporate social responsibility is based on three levels of activities: economic activity, social development and environmental protection. CSR is voluntarily adopted behaviour that exceeds legal requirements. Certain regulatory measures create an environment that is more conductive to enterprises voluntarily fulfilling their social responsibilities (Kunz 2012; Pavlík and Bělčík 2010; Dytrt et al. 2006). Organisations that promote sustainable development should work to assure the permanent impact of their activities related to financial, environmental and social aspects (CQS 2014). "Customers and consumers want to guarantee that purchased products originate in an acceptable working environment. New strategy based on the sustainable development of human resources is achieving success in international markets" (Ekvalita.cz 2014).

According to Dahlsrud (2006), CSR definitions actually refer to five dimensions: environmental, social, economic, stakeholders and voluntariness. He argues that CSR definitions describe a phenomenon but "fail to present any guidance on how to manage the challenges within this phenomena. . . the challenge for business is not so much to define CSR, as it is to understand how CSR is socially constructed in a

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specific context and how to take this into account when business strategies are developed."

Other authors (Benabou and Tirole 2009) argue that there are three possible understandings of CSR: "The adoption of a more long-term perspective, the delegated exercise of philanthropy on behalf of stakeholders, and insider-initiated corporate philanthropy." The latter two understandings are built on individual social responsibility, which together with CSR can be motivated by intrinsic altruism, material incentives (law, taxes) and social or self-esteem concerns. Most CSR activities, especially in the environmental and social arenas, aim to reduce negative externalities (e.g., pollution abatement) or to generate positive externalities and provide public goods (e.g., financing hospitals). As Crifo and Forget (2012) summarise, the motivations for these activities include: "Deterring public regulations or public politics, responding to social pressure or private politics, or exerting one's own moral duty to undertake social activities."

What actually drives firms to engage in CSR? "The companies consider degree of risk. If suppliers do not meet the basic requirements related to their employees' working conditions, they become the target of public criticism and lose their market position" (Ekvalita.cz 2014). Lyon and Maxwell (2007) suggest that on one side there are increasingly important market forces, which include "win/win opportunities to cut costs by improving the efficiency of resource use, a growing tide of green consumers who are willing to pay extra for environmentally friendly products, labour market advantages with employees who have green preferences and a reduced cost of capital from green investors". Unsurprisingly, those authors stress the green-washing aspect of CSR, which involves engaging in activities with environmental benefits while suppressing information about environmental harms. On the other side, there are political forces, which are often the strongest drivers of environmental CSR and can take the form of regulatory threats, enforcement pressures or boycott threats from non/governmental organisations. Corporate CSR is likely to be socially beneficial if it is a substitute for government regulation (Lyon and Maxwell 2007). As Kotler and Lee stress, CSR is rapidly developing: "In the last decade, directional signals point to increased corporate giving, increased corporate reporting on social responsibility initiatives, the establishment of a corporate social norm to do good, and an apparent transition from giving as an obligation to giving as a strategy." (Kotler and Lee 2005) Decision-making reflects an increased desire to do good things. It seems to be more common to make long-term commitments and to offer in-kind contributions—for example, corporate expertise, technological support, access to services, donation of used equipment or employee volunteering time.

Research and experience show that companies that participate in CSR activities have experienced a range of benefits, including the following: increased sales and market share; strengthened brand positioning; enhanced corporate image and clout; an increased ability to attract, motivate and retain employees; decreased operating costs; and increased appeal to investors and financial analysts (Kotler and Lee 2005). CSR activities are also beneficial to government, local communities, society and the environment. It can accelerate sustainable micro-economic growth, change

habits, improve quality of life, and create employment and wealth with a special focus on waste management, a balanced ecosystem and a clean, green environment (Urip 2010). CSR requires engagement with internal and external stakeholders and therefore it enables enterprises to better anticipate and take advantage of rapidly changing societal expectations and operating conditions. It can drive the development of new markets and create opportunities for growth. By addressing social responsibility, enterprises can build long-term employee, consumer and citizen trust as a basis for sustainable business models. The level of trust is very important because it can help create an environment in which enterprises can innovate and grow. Businesses are not isolated: they operate on a global scale where the question of trust is essential. "Corporate social responsibility (CSR) has gone mainstream; an increasing number of companies are realising not only that CSR is their franchise to operate sustainably but also that their ability to establish trust with a new generation of consumers and citizens depends on how the company is perceived as an actor in society" (Louche et al. 2010).

CSR in relation to strategic management addresses the acquisition, development and utilisation of essential inputs that influence the design of processes related to creating products or services that satisfy customers' needs. The successful securing, deployment and development of any input is of human origin or linked to human activity, which means that the nature of relationships plays a crucial role, as noted by Abramuszkinová Pavlíková and Wacey (2013). Those authors introduce the concept of social capital, which stresses that trust in norms and reciprocity facilitates increased productivity in individuals, teams and organisations. Social capital promotes value-added collaboration, including on-going and demonstrative transparency, which can secure closer bonding among group members. CSR efforts demonstrate a firm's credibility and effectiveness because if trust in a firm is low, its efforts can be both fragile and easily damaged. There is evidence that responsible company behaviour influences employees' well-being. The results of a survey from the Baltic states show that measures of internal and external social responsibility are positively associated with job satisfaction. Employees' assessment of various aspects of their job is higher in firms that claim to be CSR-active towards both their internal and external stakeholders (Tamm et al. 2010).

2 CSR in Europe and the Role of European Institutions

Since the 1990s, CSR has been an important topic on the European agenda. The European Commission has defined CSR as "a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis" (European Commission 2001/366). The turning point for EU action in the field of CSR was the EU's March 2000 adoption of the Lisbon strategy, which aimed to transform the EU into the world's most competitive and dynamic economy by 2010; its intention was to create an economy capable of sustainable economic growth, with more jobs and greater

social cohesion. Through the use of CSR, enterprises can significantly contribute to the EU's treaty objectives of sustainable development and a highly competitive social market economy. CSR underpins the objectives of the Europe 2020 strategy for smart, sustainable and inclusive growth, including a 75 % employment target (Abramuszkinová Pavlíková and Wacey 2013).

Existing EU and national regulatory frameworks cover many issues related to CSR (environmental protection, health and safety, and employment practices) because there is no uniform, EU-level CSR legislation. The European Commission is aware that a strategic approach to CSR is increasingly important to enterprises' competitiveness. CSR can provide benefits in terms of risk management, cost savings, access to capital, customer relationships, human resource management, and innovation capacity.

In Europe, where two-thirds of private-sector jobs are in small- and medium-sized enterprises (SMEs), the CSR movement has been led by large companies. Small companies are usually based on the founder/owner's values and/or the local community's needs. Current trends include increasing attention on the part of European SMEs to the implementation of a structured CSR approach. In 2005, a business roadmap for Europe was outlined by CSR Europe, a network of more than 2,000 European companies. Key issues included the following: environmental protection, health and safety, equal opportunities and diversity, skills and competence building, and innovation and entrepreneurship. The strategies for addressing these issues were suggested as follows: "Through mainstreaming CSR in the company, stakeholder engagement, leadership and governance, communications and reporting, and business partnerships" (Visser and Tolhurst 2010).

To some extent, the economic crisis and its social consequences have damaged consumer confidence and levels of trust in business. To a large extent, public attention is focused on enterprises' social and ethical performance. By renewing efforts to promote CSR, the Commission aims to create conditions favourable to sustainable growth, responsible business behaviour and durable employment in the medium- and long terms. "Responsible business conduct is especially important when private sector operators provide public services. Helping to mitigate the social effects of the current economic crisis, including job losses, is part of the social responsibility of enterprises. CSR offers a set of values on which to build a more cohesive society and on which to base the transition to a sustainable economic system" (European Commission 2011a).

3 The Impact of European Policy on CSR

Since its 2001 Green Paper and the establishment of the European Multi-stakeholder Forum on CSR, the Commission has played a pioneering role in the development of public policy to promote CSR (European Commission 2001/366). In 2006, the Commission published a new policy with strong support for the European Alliance for CSR, a business-led initiative (European Commission

2006/136). This policy identified for EU action 8 priority areas that contribute to progress in the field of CSR: awareness-raising and best-practice exchange; support for multi-stakeholder initiatives; co-operation with Member States; consumer information and transparency; research; education; small- and medium-sized enterprises; and the international dimension of CSR.

Through the European Alliance on CSR, supported by approximately 180 enterprises, leading enterprises developed a series of practical tools on key issues such as gender equality, responsible supply-chain management and improving dialogue with investors about companies' non-financial performance (European Commission 2011a). National employers' associations also supported the Alliance and undertook numerous actions to promote CSR. There are still important challenges because many companies in the EU have not yet fully integrated social and environmental concerns into their operations and core strategy. Accusations persist that a small minority of European enterprises are involved in harming human rights and failing to respect core labour standards. Only 15 of the 27 EU Member States have national policy frameworks to promote CSR. The European Commission is exerting pressure to implement national strategies and government regulation related to CSR (European Commission 2011a).

In 2008 and 2010, the Council and the European Parliament both called on the Commission to further develop its CSR policy. In the Europe 2020 Strategy, the Commission made a commitment to renew the EU strategy to promote CSR. In its 2010 communication on industrial policy, the Commission promised to introduce a new policy proposal on CSR: the Integrated Industrial Policy for the Globalisation Era (European Commission 2010/614). The Single Market Act proposed to adopt a new communication on CSR by the end of 2011, which was followed by a renewed EU CSR strategy for 2011–2014 (European Commission 2011b, d/206, 681).

The indicators of progress cited by the European Commission included the following: "(1) The number of EU enterprises that have signed up to the ten CSR principles of the United Nations Global Compact has risen from 600 in 2006 to over 1900 in 2011, (2) The number of organisations with sites registered under the Environmental Management and Audit Scheme (EMAS) has risen from 3,300 in 2006 to over 4,600 in 2011. It is estimated that approximately 80 % of these organisations are enterprises, (3) The number of EU companies signing transnational company agreements with global or European workers' organisations, covering issues such as labour standards, rose from 79 in 2006 to over 140 in 2011, (4) The Business Social Compliance Initiative, a European, business-driven initiative for companies to improve working conditions in their supply-chains, has increased its membership from 69 in 2007 to over 700 in 2011, (5) The number of European enterprises publishing sustainability reports according to the guidelines of the Global Reporting Initiative rose from 270 in 2006 to over 850 in 2011" (European Commission 2011d/681).

Some European countries are known for their wide range of incentives and instruments to include CSR in their policy goals—for example, in the UK (in which the public sector plays the role of change promoter) and Sweden. Other countries, such as France (regulatory approach) and Germany, stress environmental

issues with a CSR background, regard international standards as important and rely on "soft law". In new EU Member States, the situation is very diverse, and systematic CSR initiatives are either missing or slowly developing. The Nordic nations foster a partnership-oriented strategy, whereas the Mediterranean countries, including Italy, focus on a multi-stakeholder strategy (Line and Braun 2007; Visser and Tolhurst 2010; Perrini 2007).

Six EU countries in EU have national CSR strategies and action plans—those countries include Belgium, Bulgaria, Denmark, Germany, Netherlands and Hungary. France, Ireland and Luxembourg have integrated CSR into a national sustainable development strategy. Poland and (in part) Portugal have integrated CSR into another national strategy. Finland, Spain, Sweden and UK have found other ways to include CSR—such as CSR-supportive frameworks and partnerships. Other countries are engaged in developing a CSR National Strategy—Austria, Cyprus, Estonia, Lithuania, Malta, Slovakia and Czech Republic (Martinuzzi et al. 2011). "The Commission has identified a number of factors that will help to further increase the impact of its CSR policy, including: (1) The need for a balanced multi-stakeholder approach that takes account of the views of enterprises, non-business stakeholders and Member States, (2) The need to better clarify what is expected of enterprises and to make the EU definition of CSR consistent with new and updated international principles and guidelines, (3) The need to promote market reward for responsible business conduct, including through investment policy and public procurement, (4) The need to consider self- and co-regulation schemes, which are an important means by which enterprises seek to meet their social responsibility, (5) The need to address company transparency on social and environmental issues from the perspective of all stakeholders, including enterprises themselves, (6) The need to give greater attention to human rights, which have become a significantly more prominent aspect of CSR, (7) The need to acknowledge the role that complementary regulation plays in creating an environment more conducive to enterprises voluntarily meeting their social responsibility" (European Commission 2011c/568).

According to the Commission and its guidelines, CSR covers: "...human rights, labour and employment practices (such as training, diversity, gender equality and employee health and well-being), environmental issues (such as biodiversity, climate change, resource efficiency, life-cycle assessment and pollution prevention), and combating bribery and corruption. Community involvement and development, the integration of disabled persons, and consumer interests, including privacy, are also part of the CSR agenda. The promotion of social and environmental responsibility through the supply-chain, and the disclosure of non-financial information, is recognised as important cross-cutting issues. The Commission has adopted a communication on EU policies and volunteering in which it acknowledges employee volunteering as an expression of CSR. In addition, the Commission promotes the three principles of good tax governance—namely, transparency, exchange of information and fair tax competition—in relations between states. Enterprises are encouraged, where appropriate, also to work towards the implementation of these principles" (European Commission 2011c/568).

The Commission puts forward a new definition of CSR as "the responsibility of enterprises for their impact on society". To fulfil this responsibility, it is necessary to respect the applicable legislation and collective agreements between social partners. Enterprises should implement a process to integrate social, environmental, ethical, human rights and consumer concerns into their business operations and core strategy in close collaboration with their stakeholders, with the aim of maximising the creation of shared value for their owners and/or shareholders, for their other stakeholders and for society at large. Furthermore, they should identify, prevent and mitigate their possible adverse impacts.

"The complexity of this process will depend on factors such as the size of the enterprise and the nature of its operations. For most small and medium-sized enterprises, especially microenterprises, the CSR process is likely to remain informal and intuitive. To maximise the creation of shared value, enterprises are encouraged to adopt a long-term, strategic approach to CSR and to explore the opportunities for developing innovative products, services and business models that contribute to societal wellbeing and lead to higher quality and more productive jobs. To identify, prevent and mitigate their possible adverse impacts, large enterprises, and enterprises at particular risk of having such impacts, are encouraged to carry out risk-based due diligence, including through their supply chains. Certain types of enterprise, such as co-operatives, mutuals, and family-owned businesses, have ownership and governance structures that can be especially conducive to responsible business conduct" (European Commission 2011d/681).

4 Certification, Standards and Norms for CSR

CSR standards are voluntary by nature and can be considered as "soft law" activities. Compliance with a "soft law" is voluntary and not legally enforceable, whereas compliance with a "hard law" is legally binding and enforceable. As Rasche (2010) argues, CSR standards can fill in governance gaps for which there either is no "hard law" or such law weakly enforced (e.g., working conditions in global supply chains). Adherence to standards is ensured either by the implementing corporation or by independent institutions (i.e., auditing bodies). Some standards (such as SA8000) assure mechanisms for engaging in CSR, whereas other initiatives broadly define general CSR principles but do not provide certification. For companies (especially large companies) seeking a formal approach to CSR, authoritative guidance is provided by internationally recognised principles and guidelines, in particular, the recently updated OECD Guidelines for Multi-national Enterprises, the ten principles of the United Nations Global Compact, the ISO 26000 Guidance Standard on Social Responsibility, the ILO Tripartite Declaration of Principles Concerning Multi-national Enterprises and Social Policy, and the United Nations Guiding Principles on Business and Human Rights. This core set of internationally recognised principles and guidelines represents an evolving and recently strengthened global framework for CSR. European policy

Table 1 Selected standards for CSR (Pavlík and Bělčík 2010, authors' modification)

Standard	Economic sphere	Social sphere	Environmental sphere
ISO 26000	X	X	X
SA8000	X	X	X
ISO 9001	X		
ISO 9004	X	X	
ISO 14001			X
ISO 14004			X

to promote CSR aims to be fully consistent with this framework (Kašparová and Kunz 2013). There are several certifications, standards and norms related to CSR, most notably ISO 26000, SA8000, ISO 9001, ISO 9004, ISO 14001, ISO 14004, etc., as shown in Table 1.

The most detailed standard for CSR is ISO 26000, which includes the economic, social and environmental spheres, all of which are also reflected in the SA8000 certification. The International ISO 26000 Guidance on Social Responsibility provides organisations with a manual for integrating socially responsible behaviour into existing strategies, systems, procedures and processes; the standard also emphasises the importance of results and performance improvement. This standard primarily defines the basic concepts associated with particular topics. ISO 26000 standards explains terms and definition related to CSR and it occupies itself with current trends in CSR, characteristics of CSR and government relationships with CSR. The principles of CSR, which typically address transparency, ethical behaviour, and human-rights stakeholders, are also explained in the standard. The standard concerns itself with all of the aspects that are important for a company's acceptance of social responsibility, for example, organisational management and practices in the areas of labour relations, the environment, manufacturing, civil engagement and community development. The ISO 26000 standard is intended for use by organisations of all sizes—large and small, in both developing and developed countries. This standard is intended for voluntary use; it is not intended for use in certification, rulemaking or the governance of contractual relationships.

5 Certificate SA8000

The SA8000 standard is an internationally recognised reference norm in the field of social responsibility. "SA8000 standard is used for certification as an independent assessment of the organisation's ability to perform the requirements, its customers, whether it fulfils regulatory requirements, and the organisation's own requirements with respect to its working environment within the effective functioning of all processes and incessant improvement of the management system." (Ekvalita.cz 2014) SA8000 is the most-recognised international criterion for socially responsible management of human resources. SA8000 is the first social accountability

standard for retailers, brand companies, suppliers and other organisations that also focuses on the global supply chain. SA8000 certification is available through an extensive network, IQNet, which involves 50 countries. "The SA8000 standard is based on international standards relating to working conditions, which are contained in the International Labour Organisation convention, the Universal Declaration of Human Rights and the Convention on the Rights of the Child. The main focus of the SA8000 standard is to improve conditions around the world." (CQS 2014) The SA8000 standard was issued by an international nongovernmental organisation, Social Accountability International (SAI), which is located in New York. SAI grants permission to certification bodies, which also perform audits in accordance with SA8000. Following a company's compliance with the requirements of international standard SA8000, certification can only be issued by an independent certification body accredited by SAI. The norm allows for the development, maintenance and enforcement of the policy and procedures of social responsibility in nine areas: working hours, health and safety, prevention of discrimination, work by children and adolescents, forced labour, freedom of association, restriction of disciplinary practices, remuneration sufficient to meet basic needs and system control for continuous improvement" (Ekvalita.cz 2014).

Working hours must comply with applicable laws and industry standards for working hours and holidays. The company must ensure a safe and healthy working environment and must make effective arrangements to prevent employees from suffering accidents or damaged health caused by work, that are work-related or that occur during work. Furthermore, the company must minimise risks in the work environment. The company must not support child labour. The company must treat all employees with dignity and respect. Top management must produce both a written social responsibility policy and a working conditions policy and must publish these policies in a noticeable, easily visible location on company premises. Furthermore, management must inform workers that the company has voluntarily committed to meet the requirements of the SA8000 standard. The policies must be adapted to all requirements of the SA8000 standard and to national and other regulations and requirements to which the company has committed. Furthermore, the policies must be regularly reviewed for continual improvement (Social Accountability International 2008).

Corporations can implement SA8000 in two ways. First, companies that operate their own production facilities can apply to certify those facilities through audits conducted by SAI-accredited certification bodies. Second, retailers, wholesalers and sourcing agents can sign up for the Corporate Involvement Program, which helps them to require SA8000 certification from their suppliers. The successful implementation of SA8000 is monitored by external auditors. Certification is awarded to a local production facility, not the entire value chain. SA8000 certificate is awarded for 3 years. Auditors are allowed to conduct follow-up visits and if the production process does not meet SA8000 requirements, it is permitted to withdraw certification. A critical evaluation of the limits of CSR in relation to SA8000 lead Rasche (2010) to the conclusion that different cultural and religious norms and traditions force the rules for this certificate to be interpreted according to different

contexts. He states as follows: "At best, standards can give corporations an idea about where reflections need to start and which issues are at stake. At worst, standards promote a 'going-by-the-book' and 'tick-the-boxes' attitude towards corporate responsibility, which has a marginal, if any, effect on real-life practices." CSR calls for creative work at organisations that must recreate standards in a particular context. Rasche (2010) proposes not to define more rules but to invest more time in training auditors (beyond mere cultural training) and thus to improve the quality of audits.

It is assumed that there might be benefits for CSR active companies, but economic explanations have not yet been extensively researched. For example Belascu et al. (2013) generally study the relevance of stock exchange indexes built on CSR principles as a tool to measure the financial performance of firms that adopt CSR as their approach to business. This comparative analysis of Polish companies was based on the CSR index of the Warsaw Stock Exchange; that index did not show superior financial performance of CSR-engaged companies compared to standard companies. The following indicators were used: liquidity, assets utilisation and efficiency, economic profitability, distribution of dividends, stock market performance, and financial return.

Basovníková et al. (2013) attempt to investigate whether there is a significantly different economic performance by companies that are SA8000 certified compared to their industry peer groups over the period before receiving the certificate. We found that business entities active in the service industry differed more from the observed performance variable's mean value than did entities active in the building industry.

There is a little empirical evidence available to indicate whether the companies that have received the SA8000 certificate offer a significantly better working environment in terms of safety, health, freedom of association or fair practices. There is also little knowledge about this standard on the part of customers and society. Obstacles for some companies to SA8000 certification include the application cost, the fee for accreditation and the soft competences needed to apply the standard. Some authors stress the possibility of the risk of the certificates being "sold" (Maç and Çaliş 2012).

In the next part, the SA8000 certification will be analysed in detail with special focus on the Italian situation related to corporate social responsibility. The economic analysis offers explanations about whether being CSR pro-active, especially SA8000 certified, also results in economic advantages.

6 The Italian Case Study: Economic Analysis

The development of a CSR profile in Italy should be understood in the general context of EU developments and the CSR agenda, namely, the 2001 Green Paper on CSR, followed by the 2002 communication on CSR, as explained in part 5.3. Italy is considered a leader in the dissemination of environmental and social management

systems. As Perrini (2007) summarises, "There has been a remarkable increase in ISO 14001 certifications, OSHAS 18001 certification, EMAS registrations, quality certification and environmental certification—Eco-Label, biological certifications, social labels and other environmental labels; the number of companies with a Social Accountability 8000 certification has also increased steadily."[1] The co-operation of the Italian Ministry of Labour and Social Affairs (with the involvement of Bocconi University and Confindustria) and the Italian Union of Chambers of Commerce in 2002/2003 started a process that initiated the definition of a systematic governmental CSR policy in Italy. Government played a facilitating role and helped companies recognise the benefits and limitations within the stakeholder network of private-sector experience, public-sector experience, public-private partnerships in CSR and entrepreneurial associations. The first proposal for a CSR/SC standard was presented in December 2002 by the Ministry of Labour and Social Affairs. The guidelines were introduced in the Social Statement, followed by companies taking a pro-active role with the goal of integrating private and public resources according to a modern welfare-mix approach. To support the implementation, local offices were opened to promote CSR culture and support firms' participation, especially that of SMEs. The Italian Multi-Stakeholder Forum on CSR was founded in 2004 (Perrini 2007). Companies' pro-active approaches included voluntary investments in the Fund of Social Commitment. The government introduced tax allowances and financial incentives for active companies followed by social reform, including pension-fund reform in which pension funds invested in socially responsible companies (CSR-SC 2003a, b; Chiarini&Associati 2014).

By implementing the SA8000 standard, organisations demonstrate—not only to their business partners but also to all interested parties—that they develop, maintain and enforce policies and procedures in the area of social responsibility, especially with respect to working conditions.

To identify which sectors are the most typical for SA8000-certified companies in Europe, the list of SA8000-certified companies for 2012 and 2013 was used. Overall, in the European Union, most of the SA8000-certified companies are operating in the service sector, which is the fastest-growing sector in most economies and seems to be more flexible than industry. Most industrial members operate in the construction industry. Although that industry sector declared a downward trend in business across the EU during the last 5 years, its interest in SA8000 certification has increased by approximately 12.5 %. The question is whether it is this negative economic development or other reasons that have inspired construction-firm owners, in the context of increasing market competitiveness, to introduce the SA8000 certification as a competitive tool. Table 2 shows the sectors with the highest number of SA8000 certificates, selected from a list of 63 sectors, and their percentage change between 2012 and 2013.

[1] OSHAS 18001: Occupational Health and Safety Management Systems; EMAS: Eco-Management and Audit Scheme.

Table 2 Number of SA8000-certified companies in Europe in 12 sectors (list of SA8000-certified companies, authors' calculations)

Sectors	2012	2013	Change (%) 2012–2013
Services			
Cleaning services	169	190	12.4
Social services	77	86	11.7
Business services	58	64	10.3
Transportation	54	67	24
Consulting	46	46	0
Food services	44	47	6.8
Waste management	33	41	24.2
Diversified services	32	40	25
Industry			
Construction	284	320	12.7
Food	74	90	21.6
Metal products	40	42	5
Engineering/development	34	40	17.6

Table 3 shows the differences between EU10 and EU15 countries for the 6 most-certified sectors on the SA8000 list in 2013. In the EU10 countries, the construction industry is the most certified, namely, in Romania and Bulgaria. For EU15 countries, the cleaning services industry holds the top position, followed by construction, social services, and food, transportation and business services. There is no doubt that Italy plays a leading role in selected sectors, and represents the biggest share the cleaning services and social services sectors.[2] Italy is the most-SA8000-certified country in the EU. Accordingly, we have decided to explore the Italian case in detail.

The number of SA8000 certificates in different regions is changing. Based on the analysis of the list of SA8000-certified facilities, which is updated by June 30 every year, it is clear that in most cases, interest in obtaining SA8000 certificate is increasing. Globally, SA8000 certification increased in 2013 over 2012 by approximately 10 %. The most developing regions in terms of SA8000 certification are Europe and Central Asia, especially Europe, Southern and Eastern Asia and the Pacific, as shown in Table 4.

The increase in Europe is not true in all of its countries—for example, the Czech Republic or Greece recorded the highest declines as shown in Table 5. We have selected only those countries with at least 10 or more SA8000-certified companies. Decreases could be influenced by companies that lost certifications due to strict rules for maintaining high CSR standards or could involve other cases in which the financial costs of certification or re-accreditation are considered.

[2] In Italy, the term cleaning service is described as a specialized outside service providing a specific service to individuals, businesses, associations and homes, which is not how the term is described in every EU country.

Table 3 Number of SA8000-certified companies in EU10 and EU15 in 6 selected sectors in 2013 (list of SA8000-certified companies, authors' calculations)

EU10: selected sectors							
	Services				Industry		
	Business services	Cleaning services	Social services	Transportation	Construction	Food	Total
Bulgaria	0	0	0	0	77	0	94
Czech Republic	1	0	0	0	7	0	13
Lithuania	2	0	0	1	7	2	25
Romania	5	0	0	0	125	2	231
Slovakia	0	0	0	0	0	1	4
Total	**8**	**0**	**0**	**1**	**216**	**5**	**367**
EU15: selected sectors							
Belgium	0	0	0	1	0	0	6
France	0	0	1	0	0	0	5
Italy	52	179	83	62	92	76	1,068
Germany	0	0	0	0	0	1	3
Netherlands	0	0	0	0	0	2	4
Denmark	0	0	0	1	0	0	4
United Kingdom	0	0	0	1	0	0	10
Greece	1	0	0	0	2	1	15
Portugal	0	2	0	0	7	1	37
Spain	2	6	1	1	2	2	35
Total	**55**	**187**	**85**	**66**	**103**	**83**	**1,187**
Total EU10 + EU15	63	187	85	67	326	90	819
Italy in %	**80.00**	**95.72**	**97.65**	**91.18**	**28.22**	**84.44**	**66.42**

Other EU10 countries (Estonia, Hungary, Latvia, Poland): 0. Other EU15 countries (Luxembourg, Ireland, Finland, Austria, Sweden): 0. Total = number of certificates obtained in all sectors together.

Table 4 Number of SA8000-certified companies by World Bank regions in 2012/2013 (The World Bank 2012, authors' calculations)

World bank regions	2012	2013	Increase/decrease	Share in % of the total	
				2012	2013
North America	1	3	↑	0.03	0.09
Europe and Central Asia	1,484	1,590	↑	48.13	49.21
East Asia and the Pacific	614	679	↑	19.92	21.02
South Asia	844	819	↓	27.38	25.35
Latin America	110	98	↓	3.57	3.03
Middle East and North Africa	24	31	↑	0.78	0.96
Sub-Saharan Africa	6	11	↑	0.19	0.34
Total	**3,083**	**3,231**	**x**	**100.00**	**100.00**

Table 5 Number of SA8000-certified companies in selected European countries in 2012/2013 (list of SA8000-certified companies, authors' calculations)

Country	June 2012	June 2013	Change in %
Bulgaria	60	94	56
Italy	964	1,068	10.7
Portugal	31	36	16
Romania	269	231	−14
Spain	31	35	12.9
Lithuania	18	25	39
Greece	18	15	−17
Czech Republic	25	13	−48

This decrease could be attributed to changes in the Czech Republic's Law on Public Procurement, which until 2012 contained a requirement based on ISO certification. Because this was viewed as discrimination against companies involved in procurement, 2012 amendments to the law changed the certification requirement. We can therefore assume that this change could have influenced the reduced interest in SA8000 certification as a supplementary, quality-management-related certificate that could result in increased in the event of a public procurement contract. Another possible reason for such a decline could be related to the situation of companies that were certified in 2012 but did not meet the requirements for certificate renewal.

The highest increase was recorded in Italy, where in 2013 the number of certified companies increased by 104 compared to 2012, to 1,068 (10.7 %). In relation to the SA8000 certification, Italy occupies a very specific position because approximately 8 years ago, the standard's development was subsidised by the state, which supported its implementation and certification. Therefore, Italy currently has the highest number of certifications in Europe; world-wide, it represents one-third of all SA8000 certifications. Italy's support of the certification process can be considered as positive, especially with respect to the costs required for the certification. Audit compliance with the requirements to maintain the standard is unlike that for other certifications (such as ISO 9001 or ISO 14001): for the SA8000, audits are performed twice per year, implying that the enforcement of SA8000 conditions

within the validity period of the certificate is very strict. It is therefore conceivable that the relevant certificate holders have successfully implemented CSR into their business operations.

Italy's services and industrial sectors of services and industry participate in SA8000 certification at the highest rates. Cleaning services and social services represent the highest number of SA8000-certified companies in Italy. In these areas, the highest increase was recorded in 2013 over 2012, with a 12.3 % rate for cleaning services and a 15.3 % rate for social services. In the industrial sector, companies from the construction (93) and food industries (77) received the most SA8000 certificates in 2013, along with the highest increase in those certifications, both at approximately 20 %. There might be several reasons for these certification and increase rates. First, we have already mentioned the assumption that company owners might use SA8000 certification as a competitive tool. The second reason—also already mentioned—is that certification represents a declaration of socially responsible behaviour, which provides any necessary proof to third parties not only that not only a company but also its trading partners comply with SA8000 standards. For example, this "declaration" can be used in the context of outsourced services in cleaning or social services, which are often used by Italian state institutions. In most cases, state institutions include SA8000 certification in their tender requirements. Third, there are situations in which both service companies and industry companies are part of the customer-supplier chain. Because these companies are either suppliers or contractors, they are expected to act in accordance with the requirements set out in their customers' Code of Ethics. For this purpose, they use second-party audits, which are primarily conducted by independent certification companies at the customer's request. The result is decisive for suppliers and manufacturers to help control the entire supply chain. For manufacturers of fast-moving *Consumer Goods, the* principle of CSR i*s* increasingly important because it includes an evaluation of the labour and environmental conditions in their supply chains, effective risk-mitigation measures and the efficient and effective implementation of corrective measures.

Our contribution offers an economic analysis of data related to SA8000-certified companies from the Italian industrial sector. The primary reason for this is that although the Italian service sector has a larger number of SA8000-certified companies, industry is the most important sector of the Italian economy in terms of the country's involvement in international trade. In this analysis we used data for 89,000 Italian industrial companies registered in the Amadeus database. The focus was on financial ratios that comprise part of not only the traditional methods of conducting performance evaluations of companies but also of the indicators measuring a company's size. The selected companies were divided into 2 groups. The first group contained businesses that have adopted CSR in the form of SA8000 certificate; the second group contained businesses that had never received an SA8000 certificate. In the first research question we were interested whether there were systematic differences in the financial ratios of these two groups of firms. This was tested by means of a *t*-test for equality of means, the results of which are reported in Table 6.

Table 6 Development of economic indicators in Italian industrial companies (Amadeus database, authors' calculations)

Sample description	**Indicators**							
	Profitability							
	ROA (%)		**ROE (%)**		**ROCE (%)**		**Profit margin (%)**	
	2007	**2012**	**2007**	**2012**	**2007**	**2012**	**2007**	**2012**
Firms never joining	4.78***	3.79***	28.15**	11.54***	22.55*	13.30**	3.50**	2.65**
Firms joining	8.28	6.66	47.00	23.99	33.58	22.23	5.81	4.84
All observed firms	4.78	3.80	28.16	11.55	22.56	13.31	3.5	2.65
	Size							
	Employees		**Total assets**[a]		**Operating revenues**[a]		**Fixed assets**[a]	
	2007	**2012**	**2007**	**2012**	**2007**	**2012**	**2007**	**2012**
Firms never joining	32.72**	34.09	6.84***	7.22	7.51***	7.40	2.23***	2.53
Firms joining	66.28	93.04	14.30	20.60	18.10	33.20	5.52	10.20
All observed firms	32.75	34.14	6.84	7.22	7.52	7.41	2.24	2.53

Firms never joining are firms that have not received an SA8000 certificate. *Firms joining* contain information about firms that have an SA8000 certificate. Data are relevant for Italy, *** (**) (*) indicate statistically significant differences in means at the 1 % (5 %) (10 %) level

[a]In Mio. Euro

The first group of indicators listed in Table 6 belongs to the group of profitability indicators. In all cases, profitability is expressed as the ratio of profit to the amount of capital employed (equity or liability). To determine the return on the use of different levels of income, the most-used indicators are the following: EBIT (earnings before interest and taxes), EAT (earnings after tax) and EBT (earnings before taxes). In the case of determining the values of the indicators listed in Table 6, the earnings before interest and taxes were chosen, which are primarily used for inter-company comparisons (Růčková and Roubíčková 2012; Synek et al. 2011).

As shown in Table 6, for all of the indicators used, profitability in 2007 and 2012 was statistically significantly higher among firms that obtained an SA8000 certificate in or after 2007 than among firms that did not obtain a certificate. Similarly, we see that in both years considered, the firms that obtained an SA8000 certificate were larger than those that did not obtain a certificate. This suggests that it is primarily larger, more profitable firms that apply for SA8000.

We have chosen 4 main indicators for economic analysis: ROA, ROE, ROCE and Profit margin, which will be explained in detail bellow. The first of these indicators, ROA, indicates return on total assets. It expresses an appreciation of assets regardless of the structure of their funding sources. This indicator is most often used for intra-corporate benchmarking or for comparing enterprises in an industry. Therefore, to calculate this indicator, profit was also used (for the purpose of inter-company comparison), which is not affected by the financing structure, namely, EBIT (earning before interests and taxes). The ROA indicator shows the result before interest and taxes. Based on the figures shown in Table 6, it is clear that firms that have adopted CSR certifications such as SA8000 have an ROA value of approximately 3.5 % higher than those have not adopted such standards. The median of the ROA for all of the sample firms (that is, firms that have never adopted or accepted SA8000) is 4.78 %. Because the number of companies that have not adopted SA8000 (76,000) is significantly larger, the ROA median is quite similar to the value of a group without CSR certification.

Another indicator is return on equity (ROE). This indicator expresses how efficiently a company uses its owners' capital. For internal purposes, the most commonly used method is the calculation of net income (EAT—earnings after taxes). For the purpose of inter-company comparison, it is preferable to use pre-tax profit because in this way one can ensure comparability with usually non-comparable parameters related to the taxation of the relevant results of surveyed businesses. Both ROA and ROE show a much higher value for enterprises that have received SA8000, as opposed to companies that have not. The mean ROE reaches a value that is almost identical to the mean value of all of the enterprises in the sample.

A similar situation is also valid for the remaining two indicators: Profit margin and ROCE. The indicator ROCE (return on capital employed) explains a return on tangible capital (whether equity or liability) invested. Most often, the calculation of this indicator, along with the indicators ROA and ROE, uses EBIT and thus, before-tax profits. The last indicator is the profit margin. This indicator expresses the

company's ability to make a profit at a given level of sales. To determine the value of this indicator, net profit (after tax) is primarily used. This indicator can be compared to the branch average. If the average of the analysed company is lower than the industry average, it could be that the prices of the analysed company's products are too low and costs are too high. The results of ROCE and Profit margin confirm that the value of these indicators in SA8000-certified companies are higher than in companies that are not certified.

It can be stated that in all cases, including both companies that have received an SA8000 certificate and those that have not, there was a decrease in all indicators of profitability in 2012 compared to 2007. It is interesting that the companies with SA8000 certification experienced this decrease to a smaller degree than others—for example, for ROE, it was almost 12 %. It must be mentioned that from an economic perspective, there is a large difference between 2007 and 2012. In Italy, beginning in 2007 GDP was slowly decreasing with a slight increase after the 2010 crisis, which was followed by another decrease that lasted until 2012.

Given the number of analysed companies that are SA8000 certified, it is necessary to consider the mean value of all of the parameters that are close to the value of companies that are not SA8000 certified (especially those parameters with values that are almost identical). It also follows that when there is a slight decrease in revenues from operating activities, one cannot expect an increase in profitability, as is evident from Table 6. A company's size was assessed by the indicators that are most commonly used to determine the size of a business, such as number of employees, total assets, operating income and fixed assets. For companies that were not certified in 2012 compared to 2007, no significant changes occurred. Conversely, for certified companies, the change was quite large for all of the indicators. All of the values of previously mentioned indicators were higher in 2012 than in 2007.

A slightly more conclusive procedure to test whether SA8000 certification has had an influence on enterprises' overall performance can be obtained by using a standard difference-in-difference estimation strategy. In this way, we first control for NACE 2-digit industries and then test the hypothesis that firms that obtained the SA8000 certificate between 2007 and 2012 experienced either higher growth in terms of employment, total assets, turnover or fixed assets or better development of profitability indicators than firms that did not obtain the certificate because superior development would indicate the potential causal impact of SA8000 certification on firm development.

The results of this test are reported in Table 7. The numbers in the second row in this table indicate the percentage difference in the growth rate of the respective variables between firms that obtained the SA8000 certificate and firms that did not between 2007 and 2012 after controlling for industry (NACE 2-digit) fixed effects. If this number is positive, it is implied that the firms that obtained an SA8000 certificate experienced better development than that experienced by the benchmark of all other firms. If this indicator is negative, then the joining firms experienced worse development than the benchmark.

Table 7 Results of a *t*-test for higher growth in firms obtaining SA8000 certificates than those not obtaining the certificate (Amadeus database, authors' calculations)

	Coefficient	Std. error
Employees	0.141	0.088**
Total assets	0.176	0.068***
Turnover	0.132	0.103
Fixed assets	0.089	0.102
ROA (%)	−0.055	0.151
ROE (%)	−0.115	0.151
ROCE (%)	−0.028	0.133
Profit margin (%)	0.009	0.143

*** (**) indicate statistically significant differences in means at the 1 % (5 %) (10 %) level. Coefficients of NACE 2-digit industry fixed effects not reported

As shown in Table 7, the only cases in which a statistically positive difference-in-difference can be found for the development of the group of firms that obtained an SA8000 certification is in number of employees and total assets. This suggests that SA8000 certification potentially has a positive impact on firms' growth, a finding that is also corroborated by the results for other indicators of company size, where the difference-in-difference test also suggests the higher growth of firms obtaining the SA8000 certificate than for the benchmark of firms not obtaining this certificate. These results are statistically significant throughout.

In contrast, for the indicators of profitability we find no statistically significant differences in differences between the two groups of firms considered and the coefficients, although statistically insignificant, even suggest that the profitability of firms that received the certificate was lower than that of the benchmark.

In sum, therefore, these results imply that if SA8000 certification has any impact on firms' development, it would be on firm growth, not firm profitability. This is consistent with the anecdotal evidence from interviews both with firms that obtained these certificates and with certifiers who stated that the primary reason for obtaining such certificates was that particular customers required them as a necessary condition for expanding to certain markets.

7 Summary

This contribution explains the importance of the concept of CSR for the development of companies in the EU, namely, development related to environmental, social, economic, stakeholder and voluntariness dimensions. Companies can be motivated to be socially responsible not only by market forces but also by both political forces and public opinion. Trust levels is very important not only for other stakeholders but also for employees and their well-being. This is the case not only for large companies but also for SMEs. There is also a criticism issue related to the green-washing aspect of CSR or sales of the certificates.

The current trend in CSR can be described as a corporate giving strategy that includes long-term commitments. The European Commission has declared its support for a strategic approach to CSR as a vehicle for sustainable growth and responsible business behaviour, including responsibility for societal impacts. National-level progress in CSR implementation is different across EU countries. This chapter focuses on standards and certificates for CSR as "soft-law" activities. More specifically, it focuses on SA8000, which is the fastest-growing standard in Europe. Moreover, SA8000 has experienced exceptional development in Italy, where it was supported by many stakeholders, including governmental institutions. For a company, an SA8000 certification can be a good competitive tool. In addition, certification can be important for efficient and reliable supply-chain management, for fulfilment of a foreign customer's requirement to declare working conditions, for improved communication between employees and employers related to the work environment, for better management of risks associated with a company's work and labour-market reputation or as a measurable summary of an organisation's achieved results in social responsibility. Additionally, it might be required by state institutions for contracts to provide outsourced public services.

There are several conclusions from our empirical study of Italy. First, the study found that SA8000 is primarily used by larger and more profitable companies. Second, in 2007–2012, both Italian companies that were SA8000 certified and those that were not faced a decrease in all profitability indicators for 2012 compared to 2007. It should be noted that SA8000 companies experienced a smaller decrease than other companies. Third, based on a difference-in-difference estimation strategy, SA8000 certification could have a positive impact on firm growth but not profitability, which could support an argument for the importance of SA8000 certificates to companies expanding to other markets.

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The Internationalisation of Small and Medium-Sized Enterprises as a Path to Competitiveness

Lea Kubíčková, Marcela Tuzová, and Martina Toulová

1 Introduction

Enterprises' ability to engage in internationalisation is a common topic in both the academic and the managerial spheres. The framework for these discussions includes globalising, increasing competition, accelerating changes, and an increasing number of risks in today's markets. The discussions often address the specifics of the internationalisation process of small and medium-sized enterprises (SMEs). This is because SMEs are in a different position than large enterprises. The advantages of SMEs include their flexibility and ability to quickly respond to any market change, whereas their disadvantages include a lack of capital and difficulty in accessing foreign resources. Globalisation leads to the world economy's increasing internationalisation, resulting in, inter alia, increasingly intense international economic relations and interdependence among nations. Globalisation of the economy and the associated intensification of competition force companies to search for new ways to succeed in the integrating markets. Therefore, the primary challenge for SMEs in the twenty-first century is international competitiveness (Kadocsa and Borbás 2010). Globalisation causes enterprises to encounter strong foreign competition even in their domestic markets and therefore, even though they do not operate in foreign markets themselves, they must be able to cope with international competition to survive and grow over the long term (European Commission 2007). According to the European Commission (2013), a company's involvement in the internationalisation process stimulates its growth, increases its competitiveness, and strengthens its sustainability. It also increases revenues, brings new knowledge, and strengthens the company's key competencies. The fundamental

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prerequisites for a company's survival in the globalising environment are innovation potential, durability, and flexibility, i.e., the characteristics associated with SMEs (European Commission 2007). These companies' competitiveness is also crucial in the context of the internationalisation of large enterprises because SMEs frequently operate as partners or suppliers of large companies (Gunasekaran et al. 2011).

What does internationalisation mean? In 1977, Johanson and Vahlne defined internationalisation as a '*process in which companies gradually increase their engagement in international transactions*' (Johanson and Vahlne 1977, p. 23). Welch and Luostarinen (1988, p. 36) understand it as a '*process of increasing involvement in international operations*', whereas Calof and Beamish (1995, p. 116) define it as a '*process of adapting firms*' *operations (strategy, structure, and resources) to the international environment*'. In summary, the term refers to engagement in the international environment.

Many studies (e.g., Wilson 2006; European Commission 2007) have proven that internationalisation is very important to maintaining the competitiveness of enterprises of all sizes and that enterprises engaged in internationalisation have greater opportunities to achieve economic growth and a higher ability to implement innovations. Studies also show that internationalised companies achieve higher sales growth than companies that are not engaged in internationalisation. Pangarkar (2008) emphasises that the benefits achieved by SMEs through internationalisation outweigh the drawbacks and that SME performance increases with an increasing degree of engagement in the internationalisation process. Nevertheless, to achieve sustainable growth and profitability, SMEs must consider both the available resources and the acceptable level of risk when expanding their foreign trade activities (European Parliament 2012). '*It is not possible to build the competitiveness of the European Union without having a competitive sector of small and medium-sized enterprises*' (Gál 2010, p. 1).

For this reason, SMEs are examined with the intention of clearly identifying and describing their internationalisation process. The objective of the research is to find the essential motives for internationalisation—e.g., Thompson et al. (2007), Deresky (2010), Yip (2003), Rodriguez et al. (2010), Korsakiene and Tvaronaviciene (2012), and Stoian (2010)—and to identify possible barriers to engagement in foreign trade—e.g., Onkelinx and Sleuwaegen (2008), Leonidou (2004), and Pinho and Martins (2010). Various authors have attempted to identify the success determinants of SMEs' international activities, e.g., Katsikeas et al. (1997), Erikson et al. (1997), and Kubíčková (2011).

This chapter contains a case study on the specifics of Czech SMEs' internationalisation. The study defines the factors that motivate Czech SMEs to engage in the internationalisation process. Furthermore, it defines the main obstacles to Czech SMEs' internationalisation and answers the question of whether there are some common features of Czech SMEs that could be generalised as the determinants of success in internationalisation.

2 Importance of Small and Medium-Sized Enterprises

The importance of SMEs can be viewed from various perspectives, e.g., according to Veber (2008), SMEs have both a social and an economic dimension. Regarding the social dimension, Veber stresses the stabilising function of SMEs in society. Another social contribution of SMEs is the fact that they represent local capital, and their regional relationships are stronger than those of large companies. Moreover, they mitigate the negative effects of structural changes. They also increase employment and according to Kislingerová and Nový (2005), absorb the labour force that exceeds the capacity of large enterprises. In addition, their contribution to regional development is an important social aspect. They influence towns and villages' urbanisation and character because they often maintain and renovate local historical architecture, etc. The economic importance of SMEs, which is often discussed in the literature, e.g., Lukacs (2005), Fida (2008), lies particularly in their flexibility and ability to respond quickly to market changes. It enables SMEs to create conditions to develop and implement new technologies because they are flexible in **implementing small innovations, changes, and ideas** and in adapting to consumers' new needs. Moreover, SMEs very often operate in peripheral segments of the market in which large companies are not interested. They also decentralise business activities and oppose monopolistic tendencies. In general, SMEs produce more than one-half of all outputs and added value on a global scale and employ more than 60 % of all employees.

However, there is not a long tradition in Europe of studying SMEs. This is because most European economies in the early 1970s were characterised by the growth of large companies with centralised managerial structures. In contrast, there has been a large increase of the number of SMEs only within the last three decades.

3 The Specifics of Internationalisation of Small and Medium-Sized Enterprises

Despite today's increasing attention to the internationalisation process of SMEs, there is still inadequate empirical evidence upon which to base an assessment of the internationalisation processes of SMEs, according to Glas et al. (1999). It is difficult to find a comprehensive study that would closely examine the internationalisation process of European SMEs.

The results of the research carried out by the European Commission in 2009 (EIM 2010) show that a large proportion of European SMEs engages in foreign trade activities (40 %). Nevertheless, only a small proportion do so in countries outside of the EU internal market (only 7–10 % of internationally active SMEs). European SMEs most often choose export activities when entering foreign markets. The European Commission also has learned that SMEs from smaller countries are usually more engaged in internationalisation (Nagy et al. 2011). According to a

2012 report by the European Parliament (European Parliament 2012), it is very rare that European SMEs enter foreign markets alone. They are usually connected to other companies and partner networks which enable them to gain access to a large number of entities in foreign markets, including suppliers, competitors, and customers. However, SMEs are not always willing to engage in foreign trade activities. Only 4 % of European SMEs that are not yet active in foreign markets already have specific plans to engage in the internationalisation process. Many European SMEs, primarily the smaller ones, have no desire to enter foreign markets. The reason is either the specificity of their industry, potential entry barriers, or the fact that they operate as subcontractors for other medium-sized enterprises in their domestic market and thus must adapt to their partners' competitive strategies. However, some SMEs are not motivated to enter foreign markets because of their small size and limited resources, both of which pose insurmountable barriers to their competitiveness in large, distant foreign markets.

Spanish SMEs were significantly affected by the economic crisis, which interrupted their increasing engagement in internationalisation and caused it to decline. For most (nearly 73 %), internationalisation represents a long-term, gradual process. Furthermore, it is also possible to identify a relationship between the size of a Spanish company and its stage of internationalisation. Compared to micro- and small enterprises, medium-sized enterprises progressed the furthest in the internationalisation process (Nagy et al. 2011).

Italian SMEs are less willing to engage in foreign trade activities, even when operating in industries with a generally high degree of engagement in international trade. Ironically, this may be caused by concerns about excessive growth (primarily in the case of small enterprises). Owners of small enterprises are afraid of losing control of their businesses and being exposed to undue risk. The reason may also be that Italian SMEs lack capital and skilled human resources (European Parliament 2012).

Generally, Central and Eastern European SMEs in the European market enjoy the advantage of relatively competitive prices (ACCA 2012). However, such firms have greater difficulties in obtaining financial resources than do Western European SMEs (Nowinski and Rialp 2013). SMEs from some countries (e.g., Hungary, Spain) experience a problem internationalising caused by (to some extent) their entrepreneurs' insufficient language skills (Nagy et al. 2011).

According to Korsakiene and Tvaronaviciene (2012), it is also possible to distinguish significant differences between, for example, Lithuanian SMEs and Norwegian SMEs. Although Lithuanian SMEs usually enter foreign markets by exporting and primarily choose markets that are geographically close, Norwegian enterprises widely either use licensing/sub-contracting or appoint their own representatives in foreign markets; in general, they enter foreign markets through networking and business relationships. Therefore, the level of internationalisation of Norwegian SMEs is considered more advanced. Lithuanian SMEs engage in internationalisation gradually: they proceed carefully and attempt to avoid risk. These differences might be primarily caused by the fact that Lithuania's market

economy is much younger than Norway's market economy (Korsakiene and Tvaronaviciene 2012).

3.1 Motives for Internationalisation of SMEs

It is necessary to determine why SMEs decide to engage in internationalisation and whether it is possible to generalise their motivational factors. This issue has been addressed by, e.g., Thompson et al. (2007), Deresky (2010), Yip (2003), and many others. For example according to Rodriguez et al. (2010), the factors driving a business to internationalisation include the following: the search for new customers; compensation for low sales in domestic markets; the reduction of risk through diversification into foreign markets; compensation for lower incomes in some regions by creating the possibility of achieving higher incomes in other regions; the reduction of production, research, development, distribution, or purchase costs thanks to economies of scale; more profitable investment; compensation for shorter product life cycles by taking advantage of relatively homogeneous markets; increased prestige and global competitive advantage through the expansion of activities to a global level; increased sales in markets with high entry barriers; and reduction of production costs by moving particular operations to countries with a cheaper labour force. In addition, Stremtan et al. (2009) have addressed the determining factors that create the need for internationalisation. They have classified the determinants of internationalisation into four groups—commercial, industrial, environmental and opportunity. Harrison (2008) has devoted his research to the identification of the primary factors that motivate companies to engage in the internationalisation process and has stated that the motivating factors can be divided into 'overarching factors' (common factors) and so-called 'firm specific factors' (factors specific to a company).

Apart from the often-mentioned classification into internal and external motives, there is also a classification into 'pull' and 'push' factors, which are introduced by Onkelinx and Sleuwaegen (2008). These authors define 'pull' factors as stemming from the conditions and aspects of development in foreign markets that companies from other countries consider attractive and 'push' factors as reflecting specific circumstances related to a particular company, i.e., factors that are based on that company's resources, competitiveness, and product life cycle. Another classification is introduced by Czinkota et al. (2004), who divide motives into pro-active and reactive categories. Pro-active motives are originate from a company's internal decisions (e.g., efforts to implement strategic changes), and reactive motives de facto represent a passive reflection of a company's behaviour (e.g., motives that result from changing market conditions in the domestic or foreign market to which the company responds by developing its internationalisation activities). Other authors, such as Hollensen (2008), primarily focus on SMEs' motives for internationalisation (see Table 1) because there is an assumption that SMEs' motives for entering foreign markets are different from those of large companies.

Table 1 Primary motives leading small and medium-sized enterprises to engage in export activities (Hollensen 2008)

Pro-active motives	Reactive motives
Objectives related to company growth and increased profit	Proximity (both psychological and physical) to customers and the foreign market
Managerial decision	Small, saturated domestic market
Uniqueness of the product/investment in research and development	Unsolicited demand in the foreign market
Opportunities in the foreign market/exclusive information about the foreign market	Excess capacity (full utilisation of production capacity)
Possibility of achieving economies of scale	Expanding sales of seasonal products
Tax benefits	Competitive pressure

What motives lead European SMEs to engage in foreign trade operations? Are all European companies motivated by the same factors? The answers to these questions are provided by comparing the results of surveys that focused on the factors that motivate SMEs from different countries of the EU to engage in internationalisation. This comparison is based on studies conducted among SMEs in Sweden (Hanson and Hedin 2007), Finland (Pietila 2007; Minina and Dimitrienko 2011), Lithuania (Korsakiene and Tvaronaviciene 2012; Sekliuckiene 2013), Spain (Stoian 2010), Italy (Zucchella et al. 2007), Great Britain (Hutchinson et al. 2006), and Slovakia (Olejárová 2007). In general, it can be concluded that SMEs from the EU are motivated to enter foreign markets primarily by the possibility of achieving profit growth, business growth, and market expansion, the possibility of establishing international business relationships (networking), the uniqueness of their production, their possession of specific technologies, and their management's formal and informal ties with business partners abroad.

For SMEs from Slovakia, Lithuania, Finland, Sweden, and Spain, the most important motive is the insufficient size of the domestic market or demand. Domestic market saturation is especially motivating for Spanish and Lithuanian SMEs to engage in internationalisation. Competitive pressure is an important motivating factor for SMEs from Slovakia, Lithuania, and Spain. SMEs from Finland, Great Britain, Spain, and Italy have reported the personality of the company's owner/manager (i.e., his positive attitude towards foreign expansion, his personal and professional experience, and his attitude towards risk) as an important motive. SMEs from Spain and Lithuania reported as a major motive their qualified human resources, i.e., employees with language skills and knowledge sufficient for entering foreign markets. Diversification of risk is an important motive for the internationalisation of Slovak and Lithuanian SMEs. Spanish and Slovak SMEs are also motivated by the existence of foreign demand for their products. The psychological proximity of foreign markets is important for Lithuanian companies, whereas for Finland, it is geographical proximity. Furthermore, SMEs from Lithuania mention as an important motivational factor the instability of the domestic business environment and the better economic situation in foreign markets. When compared to other studies, excessive production capacity motivates

only Spanish SMEs to enter foreign markets. Simultaneously, both Spanish and British SMEs are also motivated by the support of the national, regional, or private agencies and consulting organisations that provide important initial information and help SMEs to find and establish business contacts. One interesting finding stems from a study focused on Slovak SMEs. Slovak companies reported as a significant factor the benefits associated with a cheaper labour force, which leads to lower prices of Slovak products compared to products from other countries. In addition, Slovak SMEs are motivated to penetrate the Czech market by the possibility of testing their products in a psychologically and geographically close market. This helps them to learn whether their production is suitable for customers in more distant foreign markets.

As these findings suggest, the motives for SMEs' internationalisation vary considerably among countries and it is difficult to trace similarities not only between countries that are geographically close (e.g., Sweden, Finland, Lithuania) but also between countries with 'similar' European histories. For example, companies from Spain and Lithuania had a larger number of common motives than did companies from Lithuania and Slovakia. It is therefore difficult to generalise the factors that motivate European SMEs to internationalise. To identify the key motives for engaging in the internationalisation process, it is necessary to conduct detailed research in each country.

3.2 Barriers to Internationalisation of SMEs

Many SMEs have only a limited ability to engage in the internationalisation process. According to Fliess and Busquets (2006, p. 4), barriers to internationalisation may include '*all restrictions which prevent companies from initiating, developing, or maintaining business operations in foreign markets*'. Many authors, e.g., Leonidou (2004), Onkelinx and Sleuwaegen (2008), and Siringoringo et al. (2009), divide the barriers to internationalisation into internal barriers related to the company's resources and capabilities and external barriers created by the business environment in the domestic and foreign markets in which the company operates or wishes to operate.

Surveys among SMEs that focus on identifying barriers to internationalisation (for example, the OECD's 2009 study in co-operation with APEC, which focuses on the main barriers and motivators for SMEs' internationalisation) show that most SMEs perceive external barriers to the internationalisation process as less significant than internal barriers. However, the overall result of the surveys was that it is necessary to distinguish whether a SME is already active in a foreign market. Companies that are not active in foreign markets more strongly emphasise the risk of encountering financial barriers (i.e., internal barriers), whereas companies that are already engaged in the internationalisation process consider barriers connected to the overall business environment, including trade barriers (i.e., external barriers) as more threatening. Accordingly, the question arises of whether it is

Table 2 Ten major barriers to internationalisation as perceived by SMEs (OECD 2009)

Order	Description of the barrier
1.	Insufficient working capital to finance exports
2.	Identification of foreign business opportunities
3.	Limited information to find/analyse markets
4.	Inability to establish contacts with potential foreign customers
5.	Obtaining reliable foreign representation
6.	Insufficient time of managers to address internationalisation
7.	Lack of employees and/or employees untrained in internationalisation
8.	Difficulties in setting competitive prices
9.	Insufficient support/incentives from the home country government
10.	Too-high transport costs

possible to deduce from these conclusions that the internationalisation process is a learning process for SMEs because at the beginning of its internationalisation efforts, a company must overcome internal barriers and only later, with increasing engagement in international markets, does an SME develop an interest in external, business-environment-related barriers.

To summarise the primary barriers that SMEs cite as the most common reasons why they are not engaged in the internationalisation process, we can use the above-mentioned study of the OECD (2009). The ten major barriers to internationalisation according to that study are shown in Table 2.

Which of these barriers are encountered by European SMEs? This issue was asked by studies conducted among SMEs in Lithuania (Korsakiene and Tvaronaviciene 2012), Portugal (Pinho and Martins 2010) and Great Britain (Hutchinson et al. 2006), Slovakia (Olejárová 2007), along with a survey conducted by the European Commission (EIM 2010). These investigations have helped identify the major internal and external barriers to the internationalisation of European SMEs. The biggest internal barriers to European SMEs' internationalisation have been identified: the low price competitiveness of products or services, the high cost of engaging in internationalisation, insufficient product quality, product characteristics, a lack of qualified human resources, and language barriers. The biggest external barriers for European SMEs' internationalisation are the following: insufficient capital, insufficient information, insufficient public support, administrative costs related to product transportation, legislation and regulations in the foreign markets, tariff and other trade barriers, and cultural differences. The European Commission's research (EIM 2010) also highlighted that SMEs that have not yet operated in foreign markets perceive barriers to entry as generally stronger than do SMEs that are already internationally active. Perceptions of barriers in the context of exporting and non-exporting enterprises are analysed in a study conducted among Portuguese SMEs (Pinho and Martins 2010). Exporting Portuguese companies perceive the following as the most important barriers to internationalisation: the size of the company, the degree of attractiveness of the industry, and logistical issues (primarily the inability to find suitable storage

facilities abroad and a limited ability to physically control the flow of goods). Non-exporting Portuguese SMEs perceive the following as the most important barriers to internationalisation: the age of the enterprise, the intensity of competition in the industry, and administrative barriers in the target market. However, they are also influenced by barriers similar to those identified by the European Commission, namely, the lack of information about the potential market, insufficient financial support, cultural differences, and a lack of qualified human resources. SMEs in Lithuania and the UK stress the importance of barriers such as the lack of information about foreign markets, strong competition in foreign markets, government restrictions, administrative demands, and differences in consumer behaviour. SMEs in the UK also perceive as important barriers adverse movements in the exchange rate, difficulties in understanding foreign business practices, different product standards abroad, difficulties in obtaining adequate representation in the foreign market and problematic/slow payments from abroad. The two latter barriers are also perceived by Slovakian SMEs. The specific barriers to entry into foreign markets identified by Slovakian SMEs were insufficient manufacturing capacity, managers and other employees' lack of time to prepare export transactions, fear of losing control over the company due to a rapid expansion, lack of knowledge of products in foreign markets, lack of transparency in obtaining financial resources and problems with applying for European subsidies via national institutions.

According to the managers of several Spanish SMEs, the motives that lead companies to engage in internationalisation are stronger than the hindering barriers, and it is worthwhile to overcome the hindrances (Stoian 2010). If SMEs engage in foreign trade activities, it is important that they succeed and achieve their desired results. Furthermore, knowledge of the key factors of success in the internationalisation process can positively influence the decision making of other SMEs related to engaging in international trade.

Similar to the motivations for internationalisation, the available data enable only a limited ability to identify differences in perceptions of the barriers to the internationalisation process among long-time EU members, countries that have recently joined the EU, and non-EU countries. The perception of barriers to internationalisation, as shown by the surveys in companies in individual countries, are slightly different, however, many barriers occurred across all of the analysed studies.

3.3 Key Success Factors of SMEs in Foreign Trade Operations

If a company overcomes the barriers to internationalisation and enters a foreign market, it must remember that success in the internationalisation process depends on many factors. Many authors have recently identified these factors, e.g., Harrison

et al. (2000) claim that if a company wants to become internationally successful, its internationalisation process should comply with five basic principles:

1. The company should have a well-developed and clearly defined mission that reflects a true commitment to international business
2. The company should have the ability to recognise and adapt quickly to consumer preferences and to opportunities in the international market. It should work with products that reflect its competitive advantage
3. The company should understand the behaviour of consumers from different cultures. It should be able to evaluate the nature of cultural differences
4. The company should continuously improve and should maintain high product quality so that its products can compete in both the domestic and international markets
5. The company should conduct effective market research, including research on market requirements

So what are the key factors that determine the success of SMEs in foreign markets? Studies of the internationalisation of SMEs in the UK (European Commission 2007) and Spain (Stoian 2010) suggest that the major factor in the success of SMEs' internationalisation is the international focus of company founders, owners, or key persons influencing a company's decisions. This focus primarily comprises attitudes, skills, and previous experience. Furthermore, a study conducted among Spanish SMEs highlights the significance of knowledge of international trade and technological advancement in a company's industry to achieving success in foreign markets. The issue of success in the internationalisation process was also addressed by Kjellman et al. (2004), who conducted a survey among Finnish small companies in 2004. The survey showed that managers of Finnish companies believe that a company's competitive advantage is clearly associated with customer satisfaction. The most commonly reported factors of success in the international field are contained in the following statements:

- Our competitive strategy is based on an understanding of customer needs
- Success in key foreign markets is driven by the need for satisfied and loyal customers
- The company must respond quickly to negative customer feedback

Because this issue has not been covered in the context of individual EU countries, it is difficult to generalise the factors that can help European SMEs to succeed in the internationalisation process. It will be necessary to conduct research in each EU country.

4 Case Study: Internationalisation Process of Czech SMEs

For the purpose of clearly defining the specifics of the internationalisation process of Czech SMEs were carried out surveys among SMEs operating in various sectors of the Czech economy. The surveys took place during 2010 and 2012 at the Mendel University in Brno and were conducted as written questionnaires created via the ReLa[1] system. To approach the description systematically, first the case study focuses on the motives for the internationalisation. Second, there are addressed barriers that Czech SMEs encounter when engaging in the internationalisation. Finally, the factors of success are scrutinised because the comprehensive description requires also an answer to the question whether there are any common features of SMEs that determine their success in foreign markets.

4.1 Data Description and Processing

Regarding motives for internationalisation, the surveys provided data from SMEs from various industries, namely, engineering (93 respondents), construction (65 respondents), food (71 respondents), wood processing (58 respondents), and textiles (98 respondents). Answers from 385 Czech SMEs are processed in Sect. 4.2, which addresses the motives for internationalisation.

To define barriers to internationalisation (Sect. 4.3), we processed the answers from 91 Czech SMEs across all sectors. The sample of the surveyed SMEs was structured according to the field of the firms' economic activities, using the CZ-NACE classification. The structure of the sample was as follows: 16 companies from group G (wholesale and retail), 12 companies from group M (professional, scientific, and technical activities), 23 companies from group F (construction), 25 companies from group C (manufacturing), 4 companies from group A (agriculture, forestry and fisheries), 2 companies from group S (other activities), 1 company from group H (transportation and storage), 2 companies from group J (ICT companies) and 6 companies that operated in other economic areas.

With respect to identifying the key success factors for SMEs (Sect. 4.4) ascertains the subjective views of their managers. The surveys were conducted among SMEs operating in the wine-making (66 respondents), food (165 respondents) and engineering (100 respondents) industries. To learn managers' subjective views, they were asked to assign a weight between 1 and 5 to each factor, wherein 5 represented the most important factor. The assigned weights were averaged and the calculated values determined the factors that the respondent regarded as crucial when entering foreign markets. To avoid relying only on the subjective views of the managers of the surveyed companies, hypothesis testing was conducted. Next, the

[1] ReLa—Research Laboratory, system developed at Mendel University in Brno. It enables to collect, store, and evaluate the primary data.

influence of individual characteristics of enterprises (i.e., factors) on export intensity was tested. The indicator of export intensity can be expressed as the proportion of foreign sales to total sales and according to the literature, it is applied as a measurable indicator of SMEs' successful foreign operations. This indicator was set in intervals of relative sales volumes and does not have a normal distribution; accordingly, it was necessary to employ non-parametric testing. The hypothesis testing was performed on the basis of Spearman's correlation coefficient and only the data from engineering companies were used because only those data provided information about export intensity. The 5 % level of significance ($\alpha = 0.05$) was applied and the basic decision rule for rejection of the null hypothesis was employed, i.e., the null hypothesis on the independence of variables was rejected when the calculated *p*-value was lower than the significance level.

To identify the key success factors, another approach based on the definition of a successful company and its common features was used. The successful companies were defined based on their export intensity, whether they fulfilled most of their foreign trade objectives, and the profitability of their foreign trade activities. To designate a factor as 'key' in terms of success in internationalisation, the factor had to be common to at least 50 % of the successful companies. This multi-dimensional approach was applied to SMEs in the information and communication technologies sector (ICT). In addition, hypothesis testing was performed in the context of using this approach. To test independence between variables, the Pearson's chi-square test of independence was applied.

4.2 Motives for Internationalisation of Czech SMEs

The search for internationalisation motives revealed why Czech SMEs decide to engage in the internationalisation process. In this context, the aim was also to determine whether the increase in Czech SMEs' competitiveness plays a significant role in their decision-making process related to engaging in foreign trade operations.

Although their data were processed separately, it can be generally concluded that SMEs from various sectors de facto have the same motives for entering foreign markets, with only the order of their importance differing. The most commonly reported motives for the internationalisation of Czech SMEs across all sectors are foreign demand for a company's products or services, lack of demand in the domestic market, expansion of customer portfolios, efforts to increase a company's turnover, efforts to increase sales, and the existence of foreign business contacts (Kubíčková et al. 2014). The list includes both pro-active and reactive motives. The most frequently reported motive, foreign demand for products or services, is considered reactive because it arises out of changing conditions in the foreign market. However, there are some differences among industries regarding motives for internationalisation. The comparison of SMEs from different industries in terms of key motives is shown in Fig. 1.

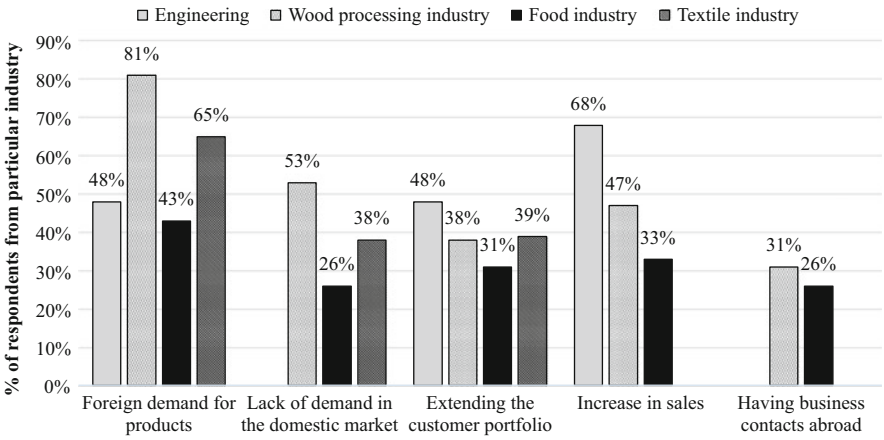

Fig. 1 Czech SMEs' key motives for internationalisation

Although foreign demand for a company's products is the key driving force for SMEs from the food, wood-processing, construction and textile industries, engineering SMEs are driven to enter foreign markets primarily by the potential increase in sales (Kubíčková et al. 2014). Another factor, efforts to enlarge the scope of a company's activities, represents a motive for more than one-third of SMEs in the engineering, wood-processing and food industries. In addition, issues connected with competitiveness and competitive pressures play a role in the internationalisation decision-making process among SMEs from particular industries. Whereas almost one-quarter of respondents (24 %) from the engineering industry stated improved competitiveness as a motive (a pro-active motive), for almost one-half of respondents (45 %) from the wood-processing industry (Kubíčková et al. 2014) and 15 % of respondents from the textile industry, competitive pressure in the domestic market (a reactive motive) is important. Moreover, issues connected with working capacity play a role: more than one-third of SMEs from the wood-processing industry and almost one-quarter of SMEs from the food industry reported better utilisation of production capacity among their motives for entering foreign markets. It is also noteworthy that only SMEs from the wood-processing industry are to any great extent (33 %) motivated to participate in internationalisation by the possibility of setting higher prices in foreign markets (Kubíčková et al. 2014).

SMEs from the wood-processing and food industries reported de facto having the same five key motives. Although having much in common, each industry contains specific features that determine companies' decisions related to entering foreign markets. For example, when companies in the food industry decide whether to internationalise, the fact that the Czech Republic has joined the Schengen area carries virtually no weight, whereas more than one-third of SMEs in the wood-processing industry and 11 % of SMEs in the textile industry reported Schengen area membership as a motive for entering foreign markets. In the context of SMEs'

Table 3 Motives for internationalisation reported by Czech SMEs (author's research)

Motives for internationalisation most frequently reported by Czech SMEs	
Pro-active motives	Reactive motives
Increase in sales	Foreign demand for the company's products
Increase in profit	Insufficient demand in the domestic market
Extending the customer portfolio	Accession to the Schengen area
Enlarging the scope of the company's activities	Competitive pressure in the domestic market
	Excess capacity (better utilisation of production capacity)
	Better business conditions abroad

primary motives for internationalisation, it is worth noting that the motive of 'subsidies and grants for exporting companies' was not considered as significant in any of the analysed sectors: only seven of the 385 Czech SMEs surveyed mentioned that motive.

The comparison of the most frequently reported motives of Czech SMEs with the motives presented by Hollensen (2008) shows that for Czech SMEs, reactive motives for internationalisation are slightly predominant (see Table 3).

We can summarise that economic globalisation and intense competition force companies to search for new ways to maintain their competitiveness. The results show that competitive pressure in the domestic market often motivates companies to engage in the internationalisation process. Internationalisation may therefore represent a way not only for large companies but also for SMEs to remain competitive even in today's globalised environment among ever-intensifying foreign competition.

4.3 Barriers to the Internationalisation Process of Czech SMEs

The second phase in the process of identifying the specifics of Czech SMEs' internationalisation activities is to analyse the barriers encountered by them when entering foreign markets. The key question is whether SMEs across economic sectors subjectively perceive the same barriers to foreign market entry and which barriers to SMEs' internationalisation process are the biggest.

Based on a comparison of the barriers most frequently mentioned by Czech SMEs and the results of the OECD survey (see Table 2) aimed to determine market-entry barriers perceived by SMEs world-wide, we can summarise that Czech SMEs and SMEs from other companies perceive the same barriers. Only the order of barriers is different (Toulová and Votoupalová 2013). From the subjective perspective of Czech SMEs, the most significant barriers are the difficulties of finding foreign business opportunities, the difficulty of establishing contacts with foreign customers, the lack of employees (or the lack of employees with the necessary

knowledge and experience in foreign business operations), excessive transportation costs and the difficulty of obtaining reliable foreign representation (Toulová and Votoupalová 2013). These barriers belong to the category of internal barriers, but other barriers to internationalisation frequently reported by both Czech SMEs and foreign SMEs also include external barriers (e.g., insufficient state support, whether financial or otherwise).

Quite interesting findings prompt a comparison of perceptions of barriers to internationalisation between companies that have already entered foreign markets and companies that have not. Previous research highlights that Czech SMEs that do not operate in foreign markets perceive barriers to internationalisation more strongly. Companies already engaged in the process of internationalisation report as the greatest barriers to internationalisation of SMEs the need to increase product quality while maintaining current prices, excessive transportation costs, and exchange rate risks. Conversely, SMEs that operate only in the Czech market report as the biggest barriers to penetrating foreign markets difficulties in finding foreign business opportunities, difficulties in establishing contacts with customers in foreign markets, and a lack of employees (i.e., a lack of trained employees who would have knowledge about entering foreign markets) (Kubíčková and Toulová 2013).

Knowledge of how SMEs perceive barriers to the internationalisation process could help public authorities to prepare specific export-promotion programs for SMEs. Some subjectively perceived barriers that discourage SMEs from engaging in the internationalisation process could be eliminated by raising SMEs' awareness about various modes of foreign market entry because one way to overcome barriers to the internationalisation process is the choice of an appropriate mode of entry into a foreign market. Because one of the biggest barriers perceived by Czech SMEs is the difficulty of finding foreign trade opportunities, they could choose indirect exporting, which consists of using independent intermediaries who have contacts in the foreign market.

A mixture of indirect and direct exporting is export co-operation (community), which is created when domestic companies co-operate and export products to foreign markets together. In this way, companies that lack contacts in the foreign market can benefit from the contacts of companies that are interested in joint export activities, e.g., in terms of expanding their product portfolios, diversifying or reducing risk, or reducing export costs. Another mode of entry into a foreign market, licenses, represents a possible solution when there are strong barriers that prevent penetration of a foreign market. Barriers can be overcome by issuing a license. Licensing can also be used when an enterprise lacks sufficient capital to enter a foreign market by using other, more capital-intensive procedures.

Accordingly, the possibility of eliminating some barriers to the internationalisation process by choosing the appropriate mode of foreign market entry raises the question of whether the right choice of entry mode can represent the determinant of an SME's success in internationalisation.

Table 4 A comparison of subjectively perceived factors of success in internationalisation by Czech SMEs across different sectors (Kubíčková et al. 2015, author's research)

Wine-making industry	Food industry	Engineering
High product quality (average weight 4.55)	High product quality (average weight 4.45)	Product quality (average weight 4.57)
Foreign contacts (4.10)	Choosing the right export product (3.84)	Flexibility and adaptability (4.27)
Choosing the right export product (3.90)	Choosing the right foreign market (3.77)	Competitive advantage (4.12)
Skills of the company management (3.78)	Skills of the company management (3.75)	Qualification of employees (4.1)
Adherence to company objectives (3.64)	Competitiveness (3.70)	Skills and experience of the company management (3.67)
Correct estimation of consumer preferences (3.60)	Language skills of managers (3.40)	Knowledge of marketing (3.66)
Effective promotion (3.44)	Appropriate pricing strategy (3.40)	Brand and company image (3.59)
Appropriate pricing strategy (3.22)	Choosing the right time to enter the foreign market (3.40)	Planning (3.35)
Choosing the right time to enter the foreign market (2.89)	Adherence to company objectives (3.12)	Sufficient capital (3.24)

4.4 Factors of Success for SMEs in the Internationalisation Process

Although both Czech and foreign literature contains many models for SMEs' business success, it is quite difficult to find a consistent methodology to identify the key factors of SMEs' success. The problem lies in the very definition of a successful company, or the definition of success in internationalisation. One way to define the key factors of SMEs' success in the internationalisation process is to ascertain their managers' subjective views. A comparison of the subjectively perceived success factors by Czech SMEs from different economic sectors is shown in Table 4.

As Table 4 shows, the most significant factors of success as subjectively perceived by SMEs' managers include high product quality, flexibility and adaptability, employees' qualifications, contacts abroad, competitiveness, choice of an appropriate product for a particular foreign market, choice of the right country for export, and managers' skills. The least important factor, according the SMEs' representatives, are the timing of foreign market entry. It is interesting that the key determinants of success in the internationalisation process are almost identical in food and the wine-making industries. The success factors for engineering SMEs are slightly different.

To avoid relying only on the subjective views of managers of the surveyed companies, hypothesis testing was performed. Only the data from engineering SMEs were processed. The hypothesis H_{01}-H_{03}, defined below, test the

Table 5 Results of hypotheses testing on the basis of Spearman's correlation coefficient (Kubíčková et al. 2015, author's research)

Pairs of variables/hypothesis	*p*-value	Can be H_0 rejected?
Intensity of export and entry mode (H_{01})	0.565244	No
Intensity of export and duration of foreign trade activities (H_{02})	0.009160	Yes
Intensity of export and number of countries (H_{03})	0.000022	Yes

independence between two variables—i.e., the characteristics of enterprise and the intensity of exports—which could be considered as measurable indicators of success in internationalisation. First, the null hypotheses were formulated and then the corresponding alternative hypotheses were determined. The null hypotheses were set as follows:

- H_{01}: The success of SMEs in internationalisation is not dependent on the mode of entry into a foreign market
- H_{02}: The success of SMEs in internationalisation is not dependent on the length of time the company has been operating in the foreign market
- H_{02}: The success of SMEs in internationalisation is not dependent on the number of countries in which the company operates

The alternative hypotheses were formulated on the dependence of variables. Table 5 shows the results of hypothesis testing.

Based on the *p*-value of each hypothesis (see Table 5), the success of engineering SMEs in internationalisation is not determined by their particular foreign entry mode. Conversely, success is influenced by the length of time the company has been operating in the foreign market and by the number of countries in which the company operates.

It is interesting that none of the factors that had a provable influence on SMEs' success in internationalisation (intensity of export)—that is, neither the number of countries in which the company operates nor the amount of time the company has been operating in foreign markets—was reported among the subjectively perceived key determinants of SMEs' success in foreign markets. This may be caused by the fact that the indicator of export intensity itself does not indicate a company's success in a foreign market (whereas this reasoning can be found in the literature) because it does not reflect profitability.

This finding raised doubts about the originally considered method of evaluating the internationalisation success by generalising the subjective views of the surveyed SMEs from various sectors. Therefore, another approach to identifying a successful company had to be applied and subsequently, the common features of SMEs that could be considered successful had to be determined. To perform a comprehensive evaluation of SMEs (relying only on the intensity of exports proved to be insufficient), two criteria were added to the intensity of exports. These criteria were based on the multi-dimensional character of the indicators of SMEs' international

performance. The first criterion was whether the surveyed SMEs fulfil all or most of their foreign trade objectives and the second was whether the company generates profit via its foreign trade activities. This procedure for identifying the determinants of SMEs' success in foreign markets was applied to SMEs operating in ICT. To designate a factor as 'key' in terms of success in the internationalisation of SMEs operating in ICT, the factor had to be common to at least 50 % of the companies that were successful.

Which factors can be considered as the key to success in the internationalisation process of ICT SMEs? Based on the evaluation of the data obtained, the following are the key success factors (Kubíčková 2013):

- Regular training of key employees
- Choice of the appropriate mode of entry into the foreign market
- Number of export markets and choice of the right export markets
- Language skills of the key employees
- Frequency of communication with foreign partners

These key success factors were compared with the results of previously performed testing of the influence of SMEs' characteristics on the intensity of export in engineering SMEs (hypothesis H_{01}—H_{03}). One interesting finding was that in the engineering SMEs, the number of export markets proved to be a relevant factor in terms of revenues. The significance of the 'mode of foreign market entry', however, has not been proven for engineering SMEs, whereas this factor was a key determinant of success for the ICT SMEs. Thus, it is possible that the choice of an appropriate mode of foreign market entry might not affect foreign trade revenues but is likely to affect the profitability of a company's foreign trade activities and the fulfilment of its foreign trade objectives. The reason for this is that the mode of entry into a foreign market most likely influences, among other things, the risks arising out of the international operations.

To verify the key determinants of the success of the ICT SMEs, hypothesis testing using the Pearson's chi-square test of independence was performed. The null hypotheses on independency between variables were set as follows:

- H_{04}: The company's success in foreign markets does not depend on the training of key employees in foreign trade
- H_{05}: The company's success in foreign markets does not depend on the mode of entry into foreign markets
- H_{06}: The company's success in foreign markets does not depend on the number of foreign markets into which the company exports
- H_{07}: The company's success in foreign markets does not depend on the language skills of key employees
- H_{08}: The company's success in foreign markets does not depend on the frequency of communication with foreign partners

Alternative hypotheses corresponding to hypothesis H_{04}-H_{08} were set on dependence between variables. The *p*-values given in Table 6 indicate that the regular training of key employees in foreign trade, choice of the right mode of entry into

Table 6 Results of hypothesis testing on the basis of Pearson's chi-square test of independence (Starnovský 2012)

Hypothesis	*p*-value	Can be H_0 rejected?
H_{04}	0.0458	Yes
H_{05}	0.0372	Yes
H_{06}	0.0451	Yes
H_{07}	0.6906	No
H_{08}	0.0158	Yes

foreign markets, the number of penetrated foreign markets, and the frequency of communication with foreign partners can be considered as the key factors of success in the internationalisation process of SMEs operating in the ICT sector. The factor of the language skills of key employees could not be regarded as a key determinant of success in internationalisation. This fact is quite surprising because according to the literature sources, the language barrier is often mentioned as a significant hindrance to the internationalisation process and managers (for example, from the food industry) subjectively perceive language skills as a relatively important factor of success (see Table 4). For this reason, the language skills of key employees represent a factor that should be considered despite the fact that it was not proved to have a direct influence on SMEs' success.

Identification of the key factors of success in SMEs' internationalisation itself is insufficient to make it easier for SMEs to operate in foreign markets. If SMEs know the specific determinants of success in their sectors' foreign markets, it will be easier for them to focus on these factors. However, the internationalisation process is also affected by many risk factors. SMEs should also consider these factors if they want to succeed in their internationalisation efforts.

5 Conclusion

The main aim of this paper was to find the major specifics of SMEs' internationalisation process. The data obtained from the Czech SMEs provided a basis for the conclusion that SMEs in various sectors of the Czech economy have similar motives for entering foreign markets, but the order of their importance differs. The most frequently reported motives for the internationalisation of Czech SMEs were compared with the motives presented in the literature as the most frequent motives for internationalisation of SMEs world-wide. The comparison showed that for Czech SMEs, reactive motives slightly prevail, i.e., they more often decide to enter foreign markets because of some opportunity that appears in the foreign market.

The research showed that Czech SMEs' most significant barriers to entry into foreign markets included difficulties in finding international opportunities, difficulties in establishing contacts with foreign customers, and the lack of employees who possess the necessary knowledge and experience in foreign trade operations. The ten biggest internationalisation barriers reported by Czech SMEs were compared

with the ten biggest barriers reported by SMEs worldwide. The result is that Czech companies perceive almost the same barriers as foreign SMEs, but the order of their importance is different.

It was found that there are some differences in the motives for involvement in the internationalisation process, in the perception of barriers to internationalisation and in the perception of internationalisation success factors not only among SMEs from different European countries but also among SMEs from different sectors within a country. Therefore, it is evident that it is not possible to design a single policy to support the internationalisation process of all European SMEs—it is always necessary to respect the specifics of particular countries. It is also apparent that competent authorities should reflect on sectoral specifics of the internationalisation process in each country when designing a policy to support SMEs' internationalisation efforts.

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Key Aspects of Competitiveness: Focus on European Small and Medium-Sized Enterprises

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1 Introduction

Globalisation of world economic systems refers to the tightening competition in various countries' internal markets. The internal markets are so-called relevant markets for most small and medium-sized enterprises (SMEs), which represent more than 99 % of business entities in the European Union. Moreover, SMEs represent a very important portion of employers and are substantial drivers of GDP. Conversely, SMEs' business activities involve relatively high overhead costs (Tejinder 2010), which is why it is becoming more difficult to cope with competition from low-cost producers, especially from Asia.

Europe's economic performance is witnessing changes in comparison to other leading world economies. EU authorities are estimating that by 2050, Europe's share of GDP would be half of its current share of 29 % because of economies such as China, India or Brazil, which are improving their year-to-year performance faster than the EU (European Union 2013).

Economic globalisation thus increases pressure on SMEs' competitiveness, which inevitable is interconnected with their innovation activities. The term competitiveness was used almost solely at the corporate level till the end of the twentieth century. From this perspective, a company is supposed to be competitive under conditions of sustainability and enhancement of its results in various areas, i.e., to sustain or increase market share, to sustain financial stability and to meet liabilities to business partners and stakeholders. A business entity's competitiveness can be derived either from lower costs and consequently from lower prices or it can be derived from higher quality. Thus it can be stated that under conditions of decreasing market demand for a company's production, the company begins to

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fail to meet its liabilities, loses its competitiveness and as the final consequence, leaves the market. A company's competitiveness on both price and quality is inevitably related to innovations. This fact has been heavily emphasised during the last decade.

The problem area of competitiveness has gradually broadened from the corporate level, and innovations are becoming an inevitable part of national economies or integration units and have attained increasing importance. The competitiveness of European national economies as the counterweight to that of the US was one of the motivations for establishing the European Union. Nevertheless, the EU has not yet overcome the US in many areas of competiveness. The main area of interest of the European policy of world competitiveness against the most-developed economies arises out of the Lisbon Strategy for growth and jobs that was developed in 2000. SMEs are that strategy's main area of interest. One of the Lisbon Strategy's objectives is to make Europe the "most dynamic and the most competitive economy in the world". SMEs became the priority: their importance was accentuated in the Small Business Act, formulated by the European Council in 2008 and adopted in the European Commission's policy for SMEs. Subsequently, the Europe 2020 Strategy was introduced in 2010 and represents the EU's 10 years growth strategy, which is based on assumption of "growing to a sustainable and job-rich future", and it identifies the EU's lower level of investment in research, development and innovations as its economic weakness. Accordingly, one of the primary goals of the Europe 2020 Strategy is smart economic growth based on knowledge and innovations. One of the measures introduced to achieve the goal of EU economic growth is based on improving the framework conditions for business to innovate. In particular, the need to improve intellectual property protection and access to capital for SMEs have been stressed. Under these assumptions, a yearly cycle of economic policy co-ordination, called the European Semester, has been established as part of the Europe Strategy 2020. The European Commission's 2013 European Semester recommendations about what is needed to return to growth and jobs are based on a thorough assessment of every Member State's plans for public finances and policy measures to boost growth and jobs. European Semester recommendations deliver a Council opinion about the EU member country convergence programme for 2012–2016. This recommendation stresses substantial growth effects, which could follow from prioritising public expenditures on innovations.

The term innovations can be understood or defined in many ways, in which there can be found similar or dissimilar components. However, most definitions contain a need for newness and many definitions of innovations establishing a condition for implementing newness into business practise. Accordingly, there have emerged assumptions about the interconnection of lifetime needs and societal benefits within the definition of innovations. On the one hand, innovations are to some extent the essential prerequisite for sustaining the viability and competitiveness of not only business entities but also national economies. On the other hand, there exist a number of both objective and subjective factors that limit corporations' innovative potential or possibly even eliminate innovative activity. The aforementioned factors are defined as barriers to innovation.

2 Specification of Innovation Barriers

Innovation barriers can be primarily divided into two groups: external or exogenous barriers, which cannot be distinctively influenced; and internal or endogenous barriers, which either objectively or subjectively occur on the side of the enterprise. The aforementioned endogenous barriers can be diminished or even completely eliminated.

Hadjimanolis (1999) further divides innovation barriers into barriers connected to a supply or a demand side and barriers connected to a general environment. Supply-side barriers involve, for instance, unavailable raw material or financial resources. Demand-side barriers are connected to customers' needs and their attitude about the risks of innovation, with limitations in the domestic or foreign markets. General-environment barriers involve government regulations and anti-trust interventions by relevant government authorities.

Madrid-Guijarro et al. (2009) classify internal and external barriers narrowly, namely:

- Internal barriers:
  - Lack of financial resources
  - Inappropriate human resources
  - Weak corporate financial position and
  - High costs at high risk
- External barriers:
  - Turbulent business environment
  - Lack of external co-operation opportunities
  - Lack of information
  - Lack of government support

Innovations require firms to permanently overcome the various types of barriers mentioned, based on the fact that a forthcoming change is inevitably connected with innovation processes. Innovation and its substance inevitably force an enterprise to confront the more or less serious risks of both exogenous and endogenous factors (Madrid-Guijarro et al. 2009; Genus and Coles 2006). The negative impacts of possible risk can be a very serious constraint on innovations, according to Borgelt and Falk (2007).

Many studies note that the primary barriers of innovations are as follows (e.g., Silva et al. 2007; Tiwari and Buse 2007; Rammer et al. 2006):

- High costs, more precisely, the financial needs of innovations
- Institutional restrictions
- Human resources
- Corporate culture
- Information flows and
- Government policy

The most serious innovations barriers are identically defined as high innovation costs coupled with their implementation. If the factor of high innovations costs is combined with risk and uncertainty, both of which are inevitably connected to the innovation process, consequently there can appear another innovation barrier, namely, a lack of internal financial resources to implement an innovation and subsequently, the difficulty in accessing external financial resources. The significant risk of innovations, which is primarily connected to the high costs of innovation, must confront corporate management's attitude about risk. Corporate management's attitude about risk seems to be a very serious innovation barrier, especially in SMEs, which usually must manage extremely limited financial resources. It is objectively evident, and this is also highlighted in Souitarise (2001), that corporate management of innovative enterprises is characterised by a positive attitude about risk. Shortages of higher-risk loans as an innovation limitation are stressed even by well-established, innovative companies regardless of economic size. The reason for this finding relates to the reluctance of external finance providers to value knowledge assets, which primarily take the form of intellectual property. Consequently, the aforementioned facts result in unwillingness to invest in knowledge-based companies (European Union 2013).

2.1 Evidence from the Czech Republic

Based on secondary research, the results of which are presented in previous sections, the authors identified the variables, whose influence on enterprises' innovative potential has been verified by a statistical sample of 250 SMEs (Tabas et al. 2011). With respect to the structure of the questionnaire utilised in the primary research, the observed variables were not demarcated identically to the variables that had been identified by the aforementioned studies. The variables used in the authors' primary research are as follows:

- Size of business entity
- Legal form of business entity
- Type of business activity
- Membership in professional bodies
- Ownership of business entity (foreign stakeholder)
- Independence of business entity (constituent of a business group)
- Sources of financing for innovations
- Own R&D
- Settlement and
- Government support

The influence of the business entities' size on innovativeness is questionable. As stated in the previous part of this chapter, some studies assume that SMEs have innovative potential as a result of their flexibility. Other studies oppose that notion, arguing that larger corporations have greater innovative potential primarily due to

their better access to financial and other resources, e.g., human resources. The authors' study (Tabas et al. 2011) employed the Chi-square test for independence of two nominal variables, which proceeded within a statistical sample of SMEs, at significance level $\alpha = 0.05$, proving the validity of the null hypothesis, namely, that there is no statistical dependence between variables. In this context and also regarding divergence in current studies, it is possible to objectively assume that the size of a business entity has factually no influence on its innovation potential. It is more likely that institutional organisation, corporate culture and other similar factors influence a corporation's innovation potential and its size. The same methodical approach was applied to prove the independence of enterprises' innovation potential and the use of a legal form of business entity.

The type of business activity, as a possible factor influencing the enterprises' innovative potential, is taken into account because some types of business activities are highly innovative; however, some types of business activities are not connected with innovations at all. Nevertheless, considering the fact that innovations are not inevitably technical and because innovations can also be defined as processes and activities, the assignment of innovation potential to any enterprise regardless of its business activity, is not excluded. This hypothesis was proven by a test for the independence of the variables of innovative potential and type of business activity. It was proven at significance level $\alpha = 0.05$ that there is no statistical dependence between the two variables mentioned. The results of the authors' study (Tabas et al. 2011) factually correspond to the Community Innovation Survey, which defines innovation activities throughout various industries and branches.

Studies of various authors note that enterprises' participation in professional bodies or their presence in clusters should support the development of innovative potential through access to information, more precisely by sharing the know-how knowledge base. The Chi-square test proved at a significance level $\alpha = 0.05$ that statistical dependence exists between mentioned two variables. Considering that it tested only variables specifying a business entity's participation in professional bodies, chambers, etc., but no other forms of co-operation, the stated dependence can be identified as relatively low.

Another investigated influence on the existence of innovation potential was business-entity ownership, more precisely, whether an investigated enterprise has a foreign partner. This variable is coherent with the possible provision of resources by an economically stronger foreign partner. Resources are considered to exist not only in the form of financial assets but also in the form of a knowledge base, managerial skills, etc. A Chi-square test on independence of variables at a significance level $\alpha = 0.05$ identified the non-existence of statistical dependence between innovation potential and its ownership.

The ownership of a business entity is coherent with another observed variable, namely, the independence of a business entity, i.e., capital interconnection of a particular business entity with other bodies, and more precisely, if a business entity is a part of group of enterprises, namely, part of a holding. It is not a common practise in the Czech Republic for a parental company to draw upon the resources of its daughter companies. In such a case, the daughter companies must address the

lack of resources available to finance innovations. Conversely there are cases, in which a parental company finances the development of its daughter companies. A Chi-square test does not provide information about direction of dependence: only variables' dependence or independence can be stated. A Chi-square test on independence of variables at a significance level of $\alpha = 0.05$ proves that there is no dependence between innovation potential and a business entity's economic independence.

Financing resources are an often-discussed barrier to SMEs' innovations, especially with respect to the lack of own resources and lack of access to external capital for financing the innovation. At a significance level of $\alpha = 0.05$, it was disproven that there is dependence between innovation potential and financial resources. With respect to the result of dependence of variables, it can also be stated that almost 66 % of investigated business entities have financed the implemented innovation only from internal financial resources. A combination of internal and external financial resources has been used by 31.5 % of business entities.

Many authors state and prove that a business entity's innovation potential is dependent on whether the enterprise engages in its own R&D. The coherence between innovation potential and R&D was another object of the Chi-square test at a significance level of $\alpha = 0.05$. The Chi-square test proved at a significance level of $\alpha = 0.05$ that there is statistical dependence between two mentioned variables, and it proved the results of previous studies of dependence between innovation potential and R&D.

With respect to the potential for coherence between innovation potential and available infrastructure, we further tested whether there is dependence between innovation potential and the settlement of a business entity, more precisely, the size of municipality where the entity is located. We presumed that a town's developed infrastructure has a positive influence on the innovation potential of settled business entities. However, this presumption was not proven. A Chi-square test at a significance level of $\alpha = 0.05$ shows independence between variables' innovation potential and settlement size, despite the fact that most enterprises with innovative potential settle in towns with more than 50,000 inhabitants. However, we have identified that the largest number of enterprises without innovative potential also settle in such towns. From our mentioned findings, it can be deduced that the size of settlement influenced only the concentration of business entities; it has no influence on innovation potential.

A perception of government support in the context of anti-crisis government measures that react to worldwide economic crisis has also been tested, in coherence with the investigated relationship between SMEs' innovative potential and government support. A Chi-square test at a significance level of $\alpha = 0.05$ proved that there is a statistical dependence between variable perceptions of government support and innovation potential. According to our results, it can be stated that perception of government support of SMEs influences both business entities' competitiveness and to an even greater extent, influences the national economy. Government activities to support business-entity development are perceived as insufficient and can be identified as a barrier to innovative potential.

Subsequently, dependence between above-mentioned variables has been proven by a Chi-square test at a significance level of $\alpha = 0.05$. Nevertheless, this type of test does not express the strength of statistical dependency. In light of this fact, a normalised Chuprov's coefficient of contingency has been applied to measure such dependency. The strongest dependency was observed between innovation potential and R&D (0.246), the second-strongest dependency was observed between innovation potential and the perception of government support for innovation activities (0.166), and the third-strongest dependency was observed between innovation potential and financial resources (0.162).

These results were also proven by the subsequence research, which describes the subjective intensity of 20 potential barriers of innovations in five categories. These categories are as follows (Tabas et al. 2011):

- Financial resources
- Human resources
- Organisational barriers
- General infrastructure and
- Government support for innovations

The financial resources category has been identified as the most intensive in the sense of innovation activities limitation, whereas the unavailability of external financial resources, especially in the form of bank loans, seems to be the problem perceived by business entities as the most intensive. The perceived intensity of the 20 barriers is included in Fig. 1, which presents the weighted averages of weights subjectively assigned to given barriers by analysed business entities.

In that figure, it is also visible that the top of the list of selected barriers is primarily composed of organisational barriers mixed with finance-related barriers. The first external barriers are composed of errors in government bodies' administration and a lack of relevant knowledge by government staffers. Conversely, administrative requirements for subsidies and other forms of government support are perceived as a less-intensive barrier. This is primarily because of specialised organisations that provide services to facilitate subsidy applications. Nevertheless, this increases innovation's demands on financial resources.

When confronting these results with those obtained by observations of the dependence between innovation potential and selected barriers to innovation, methodological differences are obvious. Nevertheless, when the observed barriers to innovations are divided into the same five categories, it is possible to compare dependence between a given category of innovation barriers and the innovation potential of a business entity to the perceived intensity of these categories of barriers. From this perspective, it is possible to partially conclude that the most serious barriers to innovation for SMEs are unchanging. These barriers remain the same, whereas financial resources constitute the primary barrier, especially because of SMEs' limited financial resources, low equity capital and the consequent relatively high risk of debt investors. In other words, the highest barriers to innovation are disposable capital and its proportional structure between equity and debts.

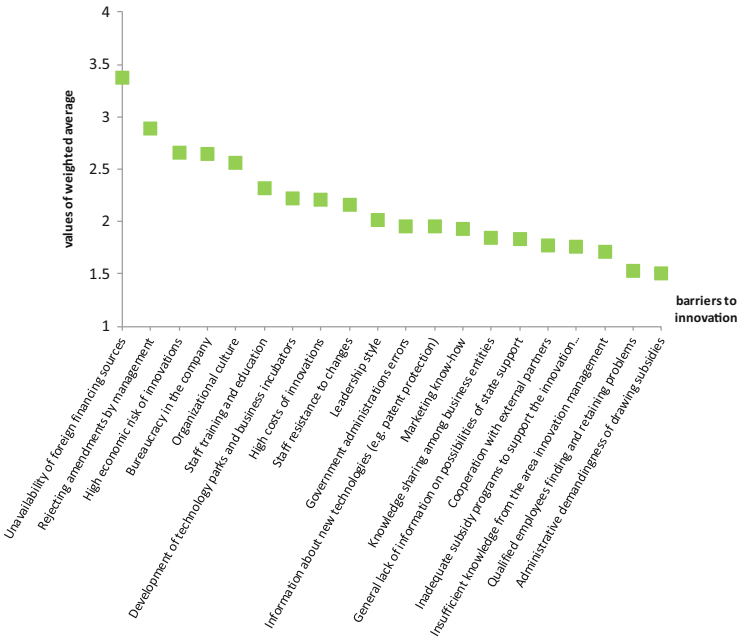

Fig. 1 Perceived intensity of barriers to innovation

However, these results arise out of research conducted in the Czech Republic. For comparison, the authors have selected two other countries based on Eurostat's (2013) innovativeness ranking. The selected countries are Portugal, the country at the top of the ranking, and Poland, the country at the bottom of the ranking.

2.2 Evidence from Poland

Wziatek-Kubiak et al. (2010) have conducted a study on the innovation barriers perceived by Polish manufacturing firms. Two groups of innovative firms—persistent and occasional innovators—are distinguished, and differences between these two groups are also determined from the perspective of perceived innovation barriers.

In 2008 only 23.10 % of business entities in Poland were engaged in innovation activities. In 2010, it was 28.14 %, after Bulgaria (27.11 %) the second-lowest level in the EU. These results are far below the European average of 52.94 % innovative enterprises. Nevertheless, when focussing on the categories and primary characteristics of persistent and occasional innovators, only slight differences have been observed. There is no difference between the groups related to ownership. In the surveyed sample, approximately 20 % of the enterprises are foreign owned, and this share is more or less the same among both permanent and occasional innovators.

There is also almost no difference between permanent and occasional innovators in medium-sized enterprises, but significant differences do exist between the two groups in the contexts of small and large enterprises. Twenty-four point five percent of large firms and 12.8 % of small firms are permanent innovators, whereas 11.5 % of large firms and 28.1 % of small firms are occasional innovators—in other words, the proportion is exactly opposite that of permanent innovators (Wziatek-Kubiak et al. 2010).

As noted above, some studies argue that the size of an enterprise is a factor that impacts innovation activities in both positive and negative ways. It is obvious that innovations in SMEs are conducted differently than they are in large enterprises. Nevertheless, enterprise size should not be considered as a barrier to innovation even if it undoubtedly is a factor that indirectly influences other factors that are barriers.

In addition, the evidence from Poland shows that the most important barriers to innovation belong to the financial-barriers group, which contains the following factors are noted (Wziatek-Kubiak et al. 2010):

- Very high innovation costs (approximately 65.5 %)
- Lack of financial funds (approximately 58 %) and
- Lack of financial sources outside the firm (approximately 52 %)

From the perspective of a business entity's general growth, the last point is a particular threat, exacerbated by the high cost of innovation.

On the other hand, the Polish authors' findings meet the outcomes of the various aforementioned studies on innovation barriers. There are also information barriers related to a lack of information on technology (approximately 28.9 %) and a lack of information on the market (approximately 25 %). Higher in the range, we again see the factor of a lack of qualified personnel (approximately 44.5 %).

Consequently, the high risk of innovations is cited not only with respect to the high cost of innovation but also with respect to another factor presented as an innovation barrier by the Polish authors: uncertain demand for innovative goods and services (approximately 48.5 %). Those authors note that a large number of innovative enterprises perceive the uncertain demand for innovative products and the excessive cost of innovation as significant impediments to innovation.

All of these factors are highly correlated with barriers to innovation. It is evident—and not only from the Polish evidence—that complementarity among the barriers to innovation exists, whereas the top-ranking barriers, i.e., financial barriers, prompt issues related to other barriers.

2.3 Evidence from Portugal

Portugal is on the opposite end of the scale in number of innovative enterprises. After Iceland (63.83 %) and Belgium (60.88 %), Portugal takes third place, with 60.34 % innovative enterprises (Eurostat 2013). From the perspective of

comparison with Poland, barriers to innovation perceived by Polish manufacturing enterprises would be interesting if there were any differences. Nevertheless, the study of Silva et al. (2007) on innovation barriers of Portuguese manufacturing firms shows that the differences are only minor.

Silva et al. (2007) analyse the barriers to innovation confronted by Portuguese industrial firms. Portuguese evidence again shows that the top of the innovation-barriers scale is occupied by the group of financial factors; first, the high cost of innovation (40.27 %); second, the lack of financial resources (39.60 %); and fourth, the high economic risks (27.52 %). In between, third place goes to the lack of skilled personnel (30.20 %). Subsequently, we see organisational rigidity, government regulations, lack of customer responsiveness, lack of technology information, and lack of market information.

The aforementioned Portuguese study also demonstrates a significant relationship among barriers to innovation. As has been was statistically proven, the high cost of innovation has a significant effect on an entity's willingness to innovate. Business entities that are concerned about excessive innovation costs have a smaller propensity to innovate. A lack of financing resources is also joined to propensity to innovate because firms facing a scarcity of financial resources tend to engage in fewer innovation activities.

Even if there is a great difference between the proportion of innovative enterprises in Poland and in Portugal, according to ANOVA applied at the 0.05 significance level, there is no statistically significant difference between these two countries related to innovation barriers.

In conclusion, there is public support to encourage innovation activities in the EU defined by a willingness to improve conditions and access to finance for research and innovations in Europe. EU authorities expect that innovative ideas can be transformed into products and services that consequently will have a positive effect on economic growth and job creation. Specifically, individual Member States are implementing the so-called Innovation Union as part of the Europe 2020 strategy, which the European Parliament has pushed through and placed high on its political agenda. Contemporaneously, the European Commission has been working on initiatives that are anchored in the Innovation Union documents and actively help EU Member States reform their current systems, promote the exchange of knowledge and best practices and finally, monitor progress on this field (European Union 2013).

As shown by the theoretical background and both primary and secondary data, the most serious barrier to SMEs' innovations—regardless of country—is financial resources. Accordingly, the next part is focused on this barrier to investigating the capital and property structure of both innovative and non-innovative companies.

3 Innovative Branches in the EU

Eurostat is the monitoring system for business entities' innovation activity in the EU. Its monitoring is conducted as a harmonised survey on the innovativeness of specific sectors, providing information about type of enterprises, types of innovations, innovations' development aspects and financial sources used. This research is called the Community Innovations survey; its first data collection was launched in the early 1990s.

This part is based on secondary Eurostat data on innovation activities, types of innovations, and expenditures on innovations for 2006–2010. From this data, it is obvious that the most innovative companies are in the information and communication technologies sector (NACE classification J) as expected, and in the manufacturing industry (NACE classification C). As is clearly visible in Fig. 2, both of the branches mentioned presented a stable trend between 2008 and 2010. However, to define the differences in financing innovations, the branches with the highest changes—i.e., the highest increase and decrease in the proportion of innovative enterprises—have been selected. These branches include real estate activities (NACE classification L) and accommodation and food-service activities (NACE classification I).

3.1 Data

The study is focused on European SMEs. The empirical part of this contribution uses the corporate financial statements of the sampled companies. The ultimate source of financial data was the Amadeus database of Bureau van Dijk. The searching strategy for companies included the following steps:

- Selection of active companies (i.e., exclusion of bankrupt companies or companies of unknown economic status in July 2012) settled in the EU and
- Filtering companies according to industry classifications of economic activities (NACE rev. 2) in light of the results of the 2008 and 2010 Community Innovation Surveys and identified innovativeness trends among observed industries (namely, manufacturing, information and communication activities, accommodation and food service activities, and real estate activities, respectively)

The application of the searching strategy using the Amadeus database of Bureau van Dijk resulted in the following research sample, which includes 120,380 business entities broken down as follows:

- 43,925 business entities active in the manufacturing industry
- 16,350 business entities active in information and communication activities
- 19,902 business entities in accommodation and food-service activities and
- 40,203 business entities in real-estate activities

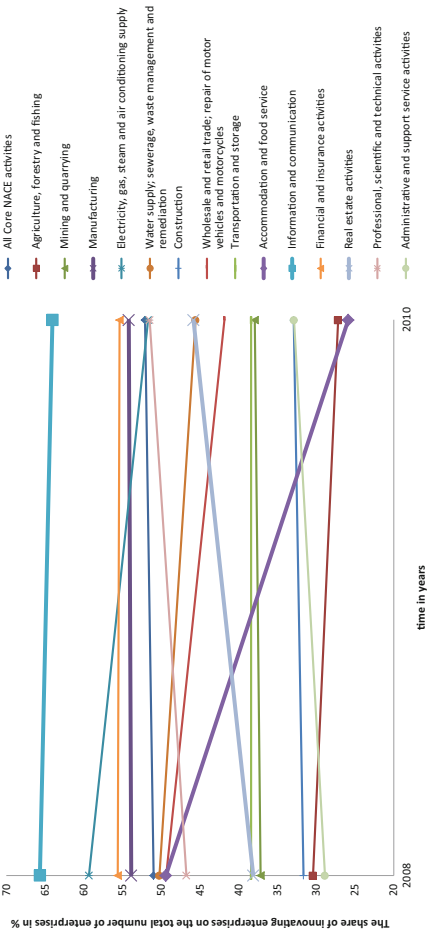

Fig. 2 Development of innovative enterprises in business branches according to NACE classification

Consequently, ten selected variables and their development in the 2004–2014 time series for each business entity in the research sample were extracted. The authors consider these variables relevant to reveal the following influences of innovation activities on enterprises' financial status:

- Sales, as one of elementary indicators of a company's growth
- Cash flow
- Earnings before interest, taxation, depreciation and amortisation (EBITDA), as a level of profit that is the closest to cash flow, whereas differences between EBITDA and cash flow can indicate investments and/or debt instalments
- Capital structure, measured as the ratio of equity to long-term capital
- Property structure, measured as the ratio of fixed to total assets
- Interest ratio, defined as simply as possible as the ratio of interest paid to long-term debt, plays an additional role
- Return on capital employed (ROCE), calculated from profit before taxation
- Return on equity (ROE), calculated from net profit
- Cash flow to operating revenues ratio, measuring the success of collecting revenues because operating revenues are mostly equal to sales
- Labour productivity, measured as the cost of employees to operating revenues ratio, i.e., the lower the value, the higher the labour productivity

In this statistical sample, methods of descriptive statistics and correlation analysis are applied to define characteristic features of business entities' financial position and performance according to the NACE classification. Subsequently, analysis of variance (ANOVA) has been applied to find statistically significant differences between the research sub-samples, i.e., between the respective branches. From this perspective, the necessary source of general data on SMEs' innovativeness and on the innovation performance of European countries is Eurostat (2013). The data source is Eurostat, especially for data related to not only the number of particular types of innovation in SMEs but also expenditures on innovations.

3.2 Characteristic Features of Companies' Capital Structure in Innovative Branches

As mentioned above, the statistical sample contains more than 120,000 European SMEs from four branches that are defined as statistical sub-samples:

- The manufacturing industry
- Information and communication activities
- Accommodation and food-service activities and
- Real-estate activities

Information and communication activities and the manufacturing industry are continually at the top level of innovativeness. Real-estate activities have shown the highest growth of innovativeness among the observed industries; conversely, the highest decrease in innovativeness has been observed within the sample of business entities in accommodation and food service.

All of the results of the descriptive statistics are summarised in Table 1. In particular, the rates of growth of the indicators defined above are quite interesting when they are considered in combination with all of the premises about the levels of innovativeness of the studied business branches.

Large differences are observed in property structure, which has consequences for ROCE. Sales and investments are e.g., conjoined in EBITDA and profitability. From the perspective of investments and innovativeness, the useful life of fixed assets is also very important; in manufacturing, the useful life of fixed assets is much longer than it is in information and communication.

Of course, the authors reflect all of the differences among the selected branches along with the fact that the observed period of 2004–2012 includes the financial crisis. Accordingly, the growth rates for the analysed indicators do not stand alone; instead, they are analysed in terms of their mutual consequences.

The branches also differ in the aspects of the tangibility of their innovations. Comparison of the results of selected branches raises the fundamental question of what is considered to be an innovation. In this respect, it is necessary to ask this question not only in the context of the real-estate industry (i.e., the branch with the highest growth of innovativeness) but also in the context of the branch that features the most negative results for the frame of the observed indicators. Conversely, in the context of accommodation and food services, some changes have ceased to be considered innovations. In this way, we stress the problem of defining and measuring the effects of an innovation.

3.3 Differences in Capital Structure of Companies in Innovative and Non-innovative Branches

To identify the economic differences between innovative and non-innovative branches, the analysis of variance (ANOVA) has been applied. Because the results of ANOVA are nonsense in the cases of absolute variables such as sales, cash flow and EBITDA, for these variables the ANOVA has been applied to their annual changes. First, the method has been applied to the four statistical sub-samples together after the pairs of sub-samples have been analysed to find differences among branches with different levels of innovativeness. The existence of significant differences among the four analysed branches in each variable is presented in Table 2.

Interesting results can be identified with respect to the significant differences in profitability ratios. As visible in the table, significant differences exist among the

Table 1 Descriptive statistics of the selected business branches

		ICT		Manufacturing		Real Estate		Accommodation and food	
		Absolute value	Index of growth	Absolute value	Index of growth	Absolute value	Index of growth	Absolute value	Index of growth
Sales (th EUR)	**2012**	597.7618	1.0221	1,843.2179	1.0634	124.5008	0.8963	445.5755	1.0189
	2010	584.8642	1.0119	1,733.3856	0.9043	138.9008	0.8997	437.3221	1.0261
	2008	577.9801	1.1475	1,916.7593	1.1189	154.3773	0.8895	426.2007	1.0700
	2006	503.7038	1.1643	1,713.1185	1.1831	173.5639	0.6784	398.3093	1.1279
	2004	432.9733	**1.0840**[a]	1,447.9354	**1.0622**[a]	255.8314	**0.8352**[a]	353.1558	**1.0598**[a]
Cash flow (th EUR)	**2012**	49.1119	1.0571	100.5242	1.0573	64.4584	1.0435	34.8560	0.9100
	2010	46.4570	0.9583	95.0766	0.8614	61.7743	1.2382	38.3024	1.0886
	2008	48.4768	1.1658	110.3797	1.1105	49.8901	0.8474	35.1857	1.0072
	2006	41.5825	1.1952	99.3933	1.1781	58.8733	1.1454	34.9345	1.1370
	2004	34.7914	**1.0900**[a]	84.3688	**1.0448**[a]	51.4012	**1.0582**[a]	30.7243	**1.0320**[a]
EBITDA (th EUR)	**2012**	60.2653	0.9977	132.9530	1.0169	86.1941	1.0097	42.3819	0.8953
	2010	60.4072	0.9499	130.7408	0.8129	85.3671	1.0498	47.3407	1.0431
	2008	63.5949	1.1144	160.8397	1.0821	81.3177	0.9642	45.3844	1.0251
	2006	57.0679	1.2030	148.6320	1.2027	84.3336	1.1339	44.2713	1.1318
	2004	47.4365	**1.0617**[a]	123.5812	**1.0184**[a]	74.3726	**1.0376**[a]	39.1156	**1.0202**[a]
Capital Structure	**2012**	0.4709	1.0143	0.4741	1.0110	0.6251	1.0143	0.4879	0.9933
	2010	0.4642	1.0095	0.4689	1.0336	0.6163	1.0030	0.4911	1.0007
	2008	0.4599	1.0591	0.4537	1.0923	0.6144	1.0567	0.4908	1.0319
	2006	0.4342	1.0886	0.4153	1.1169	0.5814	1.1566	0.4756	1.1419
	2004	0.3989	**1.0424**[a]	0.3719	**1.0626**[a]	0.5027	**1.0560**[a]	0.4165	**1.0402**[a]
Property Structure	**2012**	0.2122	0.9740	0.2872	0.9934	0.6540	0.9974	0.6040	0.9799
	2010	0.2179	0.9837	0.2891	1.0011	0.6558	1.0046	0.6164	0.9872
	2008	0.2215	0.9907	0.2888	1.0604	0.6527	1.0238	0.6244	0.9891
	2006	0.2236	0.9646	0.2724	0.9607	0.6375	1.0035	0.6313	0.9821
	2004	0.2318	**0.9782**[a]	0.2835	**1.0033**[a]	0.6353	**1.0073**[a]	0.6428	**0.9845**[a]

(continued)

Table 1 (continued)

		ICT		Manufacturing		Real Estate		Accommodation and food	
		Absolute value	Index of growth	Absolute value	Index of growth	Absolute value	Index of growth	Absolute value	Index of growth
ROCE	**2012**	0.1534	0.8895	0.1095	0.9532	0.0658	0.8840	0.0909	0.6755
	2010	0.1724	0.7493	0.1149	0.6607	0.0745	0.8728	0.1346	1.0044
	2008	0.2301	0.8775	0.1739	0.8596	0.0853	0.7070	0.1340	0.8844
	2006	0.2622	0.9635	0.2023	1.0584	0.1207	0.9536	0.1515	1.0467
	2004	0.2722	**0.8664**[a]	0.1911	**0.8700**[a]	0.1266	**0.8492**[a]	0.1448	**0.8902**[a]
Cash flow to Operating revenue	**2012**	0.1051	0.9819	0.0666	0.9919	0.3433	1.0456	0.0952	0.9275
	2010	0.1070	0.9768	0.0671	0.9787	0.3283	1.1284	0.1027	1.0410
	2008	0.1096	1.0054	0.0686	1.0078	0.2910	1.0134	0.0987	0.9623
	2006	0.1090	0.9917	0.0681	0.9946	0.2871	1.0352	0.1025	0.9980
	2004	0.1099	**0.9889**[a]	0.0684	**0.9932**[a]	0.2774	**1.0548**[a]	0.1027	**0.9813**[a]
ROE	**2012**	0.1361	1.0314	0.0940	1.0449	0.0742	0.8675	0.0891	0.6636
	2010	0.1319	0.7771	0.0899	0.6910	0.0855	1.0968	0.1343	1.0938
	2008	0.1698	0.9574	0.1301	0.8782	0.0779	0.5405	0.1228	0.8024
	2006	0.1773	0.9370	0.1482	1.0392	0.1442	0.8522	0.1531	0.9704
	2004	0.1893	**0.9208**[a]	0.1426	**0.9010**[a]	0.1692	**0.8136**[a]	0.1577	**0.8671**[a]
Interest Ratio	**2012**	0.1463	1.1003	0.1560	1.1563	0.0585	1.0397	0.0845	0.9636
	2010	0.1330	0.7251	0.1349	0.6510	0.0562	0.6330	0.0876	0.7813
	2008	0.1834	1.1944	0.2073	1.1540	0.0888	1.3175	0.1122	1.1298
	2006	0.1536	1.3832	0.1796	1.2256	0.0674	1.1955	0.0993	1.3981
	2004	0.1110	**1.0715**[a]	0.1466	**1.0158**[a]	0.0564	**1.0091**[a]	0.0710	**1.0443**[a]

Labour Productivity	**2012**	0.3632	1.0354	0.2585	1.0071	0.2103	1.0414	0.3372	1.0215
	2010	0.3508	1.0477	0.2567	1.0788	0.2020	1.0083	0.3301	1.0225
	2008	0.3348	1.0419	0.2379	1.0163	0.2003	1.0635	0.3229	1.0248
	2006	0.3213	1.0267	0.2341	0.9864	0.1883	0.9836	0.3150	1.0227
	2004	0.3130	**1.0379**[a]	0.2373	**1.0216**[a]	0.1915	**1.0238**[a]	0.3080	**1.0229**[a]

[a]*Note*: average index of growth

Table 2 Results of four sub-samples ANOVA

Variable	*p*-value	Significant difference
Growth of sales	0.009021	Significant
Growth of cash flow	0.930228	Insignificant
Growth of EBITDA	0.955192	Insignificant
Capital structure	0.000053	Significant
Property structure	0.000000	Significant
ROCE	0.001002	Significant
ROE	0.111409	Insignificant
Cash flow to operating revenues	0.000000	Significant
Cost of employees to operating revenues	0.000000	Significant

four branches in values of ROCE, but with 95 % probability there is no significant difference in ROE. This leads to a hypothesis that the significant difference that exists in ROCE but not in ROE is caused by the use of long-term debts in a company's capital structure. This is also proven by the significant difference in capital structure. Nevertheless, it is obvious that differences need not be statistically significant between some branches even if the overall result provides a different interpretation. Consequent, pairs ANOVA has also been applied to the principle of each branch.

First, we have the two most innovative branches—i.e., manufacturing enterprises and ICT companies. Unlike the overall results of the four groups together, the partial results of this pair differ in the following areas:

- Growth of sales (*p*-value 0.8027; insignificant)
- Capital structure (*p*-value 0.7149; insignificant) and
- ROCE (*p*-value 0.0785; insignificant)

The other results of the test of the hypothesis on the statistical insignificance of differences between two sub-groups—i.e., here between manufacturing enterprises and ICT companies—correspond to the overall results presented in Table 2. This means that statistically significant differences exist here only with respect to property structure, which is logical because of the different demand levels related to the fixed assets of these two branches, cash flow to operating revenues ratio and labour productivity, whereas theory notes that the values of these indicators differ among the branches.

When analysing the next pair—ICT companies and real-estate businesses—the results absolutely replicate the overall results for the four sub-groups. It is necessary to repeat that ICT is the top innovative branches and has a stable rate of innovativeness; moreover, the real-estate business shows the highest growth of innovativeness between 2008 and 2010. From this perspective, the analogy of the financial indicators of these two sub-groups is very interesting. Accommodation and food services are the branches with the highest decrease in the number of innovative

enterprises. Accordingly, unlike the overall results, the results of this pair differ as follows:

- Growth of sales (p-value 0.8027; insignificant)
- Capital structure (p-value 0.7149; insignificant) and
- Labour productivity (p-value 0.2241; insignificant)

Moreover, these results are quite interesting in the overall context of the two ICT pairs. Unlike ICT, the rate of sales growth in accommodation and food service is statistically indifferent; however, it is significantly different in the real-estate business. As has already been proven, real-estate sales are decreasing while sales in all other branches are increasing. There is also an important sign in labour productivity. Unlike both ICT and accommodation and food service, in which the cost of employees to operating revenues ratio oscillates approximately 30–36 %, in real estate the maximum of that ratio is approximately 21 %. The real estate business is also exceptional in its capital structure. The other branches show the share of equity in their capital structure as less than 50 %; in the real-estate business, it is between 60 and 64 %. This significantly different capital structure with a significantly higher share of equity combined with decreasing sales but the highest labour productivity again leads to a question: What is an innovation in the real-estate branch? It is probable that in real estate, different types of employment are regarded as an innovation. Unlike sales, which are decreasing, labour productivity is stable. Here, labour productivity is measured with the ratio of the cost of employees to operating revenues. Because sales are decreasing by an average of 16.48 % per year, based on this ratio's general assumptions, the relative stability of labour productivity requires a substantial decrease in the cost of employees. In this way, assumptions about "innovations" related to this branch's types of employment cite the financial crisis as a primary cause.

The second-most-innovative branch is represented by manufacturing enterprises. Comparison of the pair of manufacturing enterprises and the real estate business again shows results that are absolutely the same as the overall results. This means that the following statistically significant differences exist:

- Growth of sales
- Capital structure
- Property structure
- ROCE
- Cash flow to operating revenues and
- Labour productivity

Simultaneously, these results are the same as the results of comparison of the real-estate business and ICT. For comparison, we examine the results of the second pair of manufacturing enterprises and accommodation and food services. Unlike the overall results, this pair shows differences, including the following:

- Growth of sales (p-value 0.9207; insignificant)
- Capital structure (p-value 0.1749; insignificant)
- ROCE (p-value 0.2532; insignificant)

Other results correspond with the overall results of the four statistical sub-samples (see Table 2). Thus, the basic outcome is that the three branches' sales growth and capital structure are the same, even if one of the branches has the highest decrease in innovativeness. In this context, it is obvious to discuss the assumptions about what is supposed to be an innovation for accommodation and food services. It is probable that this branch requires continual changes (e.g., routine changes of product groups), and because these changes are made so often, they are an inevitable part of normal processes. Accordingly, such changes are no longer intended to be innovations, which could also explain the decrease of innovativeness in this branch.

The final tested pair is real estate and accommodation and food services as representatives of the highest increase and deepest decrease in innovativeness, respectively. This pair is supposed to be the most interesting one, but its results are the same as the overall results of the four sub-groups, with the sole exception of the ROCE ratio. Namely, the *p*-value here is 0.0541, which means that there is an insignificant significant difference; however, its probability is very close to the chosen significance level. Focusing on the results, it is clear that this pair denies the assumptions of the theory that innovations have positive effects in financial performance of a business entity. Overall financial results of the branch with decreasing number of innovative business entities are objectively better than the financial results of the branch with the highest increase in the number of innovative business entities. Moreover, the results for the branch with a decreasing number of innovative enterprises are very close—statistically, they are the same as the results for the most innovative branches. All of these results lead to the important general assumption that to obtain a relevant measurement of innovativeness, it is inevitable to rigorously define both innovation and its content.

4 Conclusions

"To innovate means to regenerate." (Wright 2012) The only tool for economic "survival" in a highly competitive global market is innovation. Currently, innovations seem to be a crucial process for companies to at least maintain or even to improve their competitiveness. Global competition stresses continual improvements in every sphere of a business entity's activities. In this way, innovations are almost the almost only tool to maintain customers and subsequently, to maintain a company's market position or market share and thus to sustain its financial performance, in other words, to maintain the company as a going concern.

Nevertheless, innovation is not only about competitiveness at the company level but also about competitiveness at the national and multi-national levels. Governments spend huge amounts of money to improve their countries' competitiveness via their domestic companies' competitiveness and to increase GDP. However the question is whether these investments to "national innovativeness" have the intended effect.

In this context, a very important question is the substance of what comprises an innovation. A range of definitions of innovation is also based on classifications of innovations, although it is possible to find many taxonomies that classify innovations according to various criteria in the literature. At the most general level, an innovation may be defined as something that adds value to nearly anything. Nevertheless, to speak about innovation, the condition of successful implementation in practice or realisation on a market must be simultaneously fulfilled. To measure innovation potential, it is necessary to be able to identify and evaluate possible barriers to innovation, which are intended to be the main factors that prevent business entities from engaging in innovation processes.

Almost all studies of barriers to innovation consistently mention one group of barriers as the most serious: financial barriers. Accordingly, it is possible to say that the circle is completed; governments spend a great deal of money and business entities draw attention to the lack of financial resources to develop their innovation potential.

Here, the research was aimed at differences in the capital structure and financial performance of innovative and non-innovative industries and focused on four branches: the two most innovative (i.e., ICT and manufacturing), which are relatively stable in their innovativeness; and the two that have experienced the greatest changes in innovativeness (i.e., the real-estate business, which has shown the highest growth in innovativeness, and the accommodation and food services business, which has shown the deepest decrease in innovativeness). It would be possible to expect that increasing innovativeness is causing the real estate businesses to approach the performance of the most innovative branches and vice versa: the scissors between innovative branches and the accommodation and food-services business will show an increasingly large gap. Nevertheless, the opposite phenomenon has been observed. There are only minimum differences in the capital structure and financial performance of innovative branches and accommodation and food services; conversely, there are large differences between innovative branches and the real-estate business. These similarities and differences are clearly visible in Fig. 3.

With respect to the capital structure, we can conclude that during 2004–2012, there were only minor changes in favour of equity. This means either that the lack of external debt capital has really existed, or conversely, that the investments during this period were "risky" in the eyes of debt capital providers and that these financial resources were provided on the condition of stable capital structures, i.e., with the requirement of additional investments in equity. In any event, both the unchanged capital structure and property structure in the context of increasing EBITDA primarily resulted in the preservation of profits in enterprises and innovations and financing emanating mostly from internal financial resources. In other words, enterprises can only achieve a debt level that does not change their capital structure.

Accordingly, we return to the aforementioned circle and present the question of whether this circle is truly completed. As has already been stressed repeatedly, government bodies spend huge amounts in favour of innovativeness improvement. Simultaneously, business entities cite a lack of financial resources as the top barrier

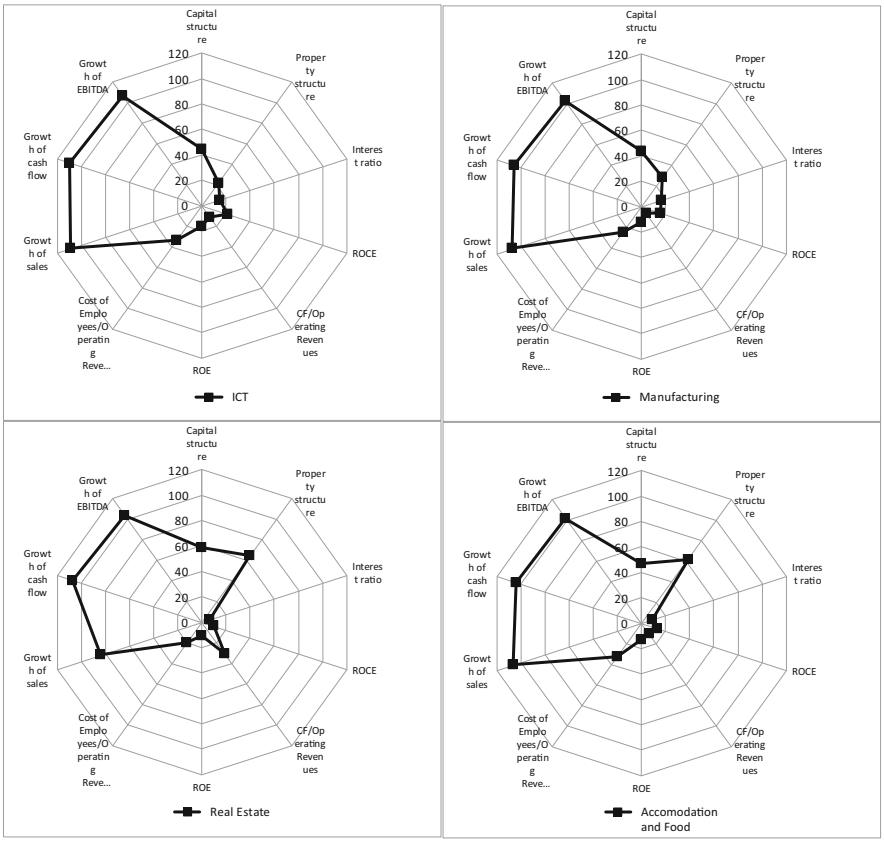

Fig. 3 Differences in the characteristic financial figures of the selected branches: mean values and indexes of growth, 2004–2012

to innovations. However, we have identified very controversial results about the branch observed to have the highest growth of innovativeness according the Community Innovation Surveys of 2008 and 2008, along with the respective corporate financial data samples. Specifically, a decreasing trend in sales can be stressed despite the fact that sales of other observed branches are continually increasing.

Government bodies attempt to ameliorate the problems of a lack of financial resources for innovations and subsequent competitiveness issues through the use of various subsidies and other promotional programmes. Nevertheless, we are still circling the problem if it is really enough simply to put more money into the economy to subsidise innovation activities. From this research, it is important to conclude that one very important problem is the precise definition of innovation and its content. Therefore, it is quite likely that there are continual changes that have not been introduced as innovations at all in some branches, despite the fact that these innovations could be essential for the competitiveness of those branches'

businesses. Conversely, there are branches in which dismissing employees due to decreasing sales is presented as process innovation. According to this assumption, subsidies are useful, but only if they are meaningfully allocated, i.e., if they are provided to the branches in which such subsidies are utilised effectively. In conclusion, we are opening another problem, which is the area of innovation effectiveness and the necessity of its measurement. It is not enough merely to observe the number of innovations, the number of innovative enterprises and the amount spent on innovation programmes. Instead, the effects of innovations on both the company and national (and multi-national) levels also must be observed. Accordingly, we ask whether there truly is a lack of financial resources available for innovations in Europe or whether the real barrier to innovations is the lack of a measurement of innovation effectiveness?

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Pigouvian Carbon Tax Rate: Can It Help the European Union Achieve Sustainability?

Danuše Nerudová and Marian Dobranschi

1 Introduction

In 2010, the European Union launched Europe 2020 strategy, which should help Europe to emerge stronger from the crises and to design the EU economy for the next decade. In that material, three main drivers were identified—smart growth (fostering knowledge, innovation, education and digital society), sustainable growth (making EU production greener and more resource efficient) and inclusive growth (enhancing labour-market participation, skills acquisition and the fight against poverty).

To achieve the above-mentioned priorities, the European Commission introduced seven initiatives. One of them represents resource-efficient Europe, under which the EU should support the shift towards a resource-efficient, low-carbon economy. The European Commission believes that increasing resource efficiency will be key to securing growth and jobs for Europe. It should bring major economic opportunities, improve productivity, decrease costs and boost competitiveness. To do so, it is also necessary to develop new products and services and to find new ways to reduce inputs; minimise waste; improve management of resource stocks; change consumption patterns; optimise production processes, management and business methods; and improve logistics. All of the above-mentioned strategies should result in the rapid development of the "green technology" sector and stimulate innovations. One of the tools that might help achieve the above-mentioned targets is environmental taxation.

Environmental taxation represents the key instrument for achieving economic sustainability. Sustainability can be achieved on both sides. Simply by making environment-polluting resources more expensive, resulting in higher prices for goods produced by using such resources, consumers may be forced to change

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their behaviour. On the other side, the introduction of environmental taxation could produce a significant change in the price of production inputs and therefore may force producers (companies) to use more environmentally friendly technologies, which should increase the demand for innovations in environmental area.

As mentioned by (Ekins et al. 2011), for example, those industries that reduce pollution, increase resource productivity or foster a switch to renewable resources are collectively called "environment industries". According to the study of (Ernst & Young 2006), the estimated total turnover of eco-industries in the EU25 is €227 billion, of which €214,000 million corresponds to the EU15 area. In constant prices, eco-industries' turnover in the EU15 area increased approximately 7 % between 1999 and 2004.

The aim of this paper is to analyse the possibilities for carbon taxation in the EU and to identify the limitations of the rationale on which environmental taxation is based. Starting with an analysis of the literature, the basic challenges that Pigouvian taxes should confront and such taxes' efficiency in internalising the external cost of environmental damage, this research develops an additional mechanism that enhances the efficiency of taxes on negative externalities.

The first part of this paper is focused on the Pigouvian theory of applicability in the case of environmental externalities, and the second part of the paper aims to propose an efficient system that will enhance abatement policies' efficacy with respect to pollution. Even if taxation mechanisms to internalise external costs will cause some distortionary effects, we intend to propose a system of taxation and compensation that will not only promote environmentally friendly behaviour but also incentivise the transition to environmentally friendly technologies.

The second part of this paper is based on the empirical analysis that follows the appraisal of the Pigouvian rationale. Taking into consideration the objective of future carbon taxation—fossil fuels consumption and their inelastic own-price elasticity—the empirical analysis seeks to estimate the impact of current environmental levies on green patents in European Union member states. We consider that the efficiency of abatement policy is strictly related to its capacity to enhance green forms of energy and therefore, one of the core elements of the alternative technologies trajectory remains within the advancement of green innovation.

2 Literature Review

Negative externalities can be defined as the uncompensated impact of one's personal or company action (or one's company) on well-being. Cheung (1978) and Kapp (1969) consider externalities and social costs as difficulties that arise when the economic activities of one individual or firm in consumption or production generate an effect (an externality), whether beneficial or detrimental, on some other individual or firm that is not a party to those activities. The private costs of an activity, which together with the associated private benefits determine the scale on

which it operates, will then diverge from its "social" costs, which determine the socially desirable scale of production.

Approaching negative externalities from the perspective of environmental damages (air pollution, water and soil pollution), these negative externalities should be perceived as costs.

Hardin (1968) describes the tragedy of commons, in which the relationship between costs and benefits, actions and effects are difficult to determine. He argues that acknowledging we live in a finite world means that the per capita share of world's goods will steadily decrease in time as the world population increases. With respect to environmental externalities, Hardin believes that there is a denial of harm of the external costs inflicted by an individual who pollutes, even when society as a whole, of which he is part, suffers. Approaching the analysis of private and social costs in an aggregate manner, Hardin attempts to connect private costs with social costs by assuming that the individual is part of a society and that many people's private costs are actually social costs borne by the entire society. The underlying rationale is that of an unbreakable relationship between private and social costs. An approach that analyses private costs and benefits separately from social costs is misleading. Individuals cannot and do not recognise the environmental harms produced by pollution until growth itself as a commodity is affected by environmental destruction.

In attempting to answer the question of how negative externalities can be eliminated or mitigated, various proposals have been implemented, such as emission taxation and cap-and-trade systems with marketable pollution permits. These mechanisms attempt to tackle the negative effects of pollution from different perspectives. Whereas taxation of emissions is levied on all of the emissions produced, the cap-and-trade mechanism is an alternative instrument to reduce pollution. This mechanism establishes a "cap" or limit of carbon emissions that a polluter can emit in a single year. This limit is reduced over time to decrease pollution.

One of the most common perspectives used to tackle negative externalities is to put a price on pollution. Following Pigou's theory of negative externalities and their elimination, a tax equal to the social cost per pollution unit should be imposed until the polluter fully internalises the costs of its economic activities.

Pigou (1928) states that there should be a tax equal to the marginal social damage created that will internalise the external cost of a producer's activity into his private costs. Aware of the limitations of this approach, Pigou's followers offer adjustments of his theory of externalities. Sandmo (1975, 2011) embraces indirect taxation as a tool to correct inefficiencies of resource allocation. That author's contribution is a fundamental one for treating environmental externalities—by analysing the second-most-optimal tax structure, he introduces the term of additive property. He further highlights that environmental taxes should be enacted in the context of an existing tax system. According to Sandmo, consumer income and relative prices will differ over time, in which case their social damage will be a different (meaning that the tax rate on pollution should be adjusted according to pollution's corresponding social damage). The optimal tax on externality as a

creative commodity should be calculated using a weighted average of the marginal social damage and inverse elasticity of demand of that particular commodity. Meade (1952), by analysing the issue of the "creation of atmosphere," stresses that the taxes or subsidies required either to promote creation of atmosphere (i.e., environmental protection) or to discourage unfavourable pollution represent net additions to society's general fiscal burden. Both Sandmo (1975) and Meade (1952) argue that the introduction of a new carbon tax will increase the excess burden of the existing tax system, advocating for an additional set of measures to decrease the efficiency costs of environmental levies.

Further, Sandmo argues that Pigouvian taxes can be useful if inserted into a more comprehensive (complex) system of indirect taxation. This means that the Pigouvian rationale applies if used in a modified form that considers distributional effects. Bovenberg and Goulder (1996) find that in the presence of distortionary taxes, the optimal environmental tax rate is generally below the rate proposed by Pigouvian theory—even if the resulting revenues are used to lower other distortionary taxes. In the same spirit, Cremer et al. (1998) adopt the concept of Sandmo (1975) and prove that the optimal carbon tax rate on externality generating commodities is lower than the Pigouvian tax. The level of that tax is diminished through the additive property of the existing fiscal system, which adds certain distortions to market prices. Conversely, Sandmo (1975) considers that if an agent's activities produce social benefits that are deflected onto others, he should be compensated. Concerned about the efficiency of carbon taxes on GHG emissions, Sandmo argues that pollution can be mitigated if carbon taxes are enforced by other regulations that are imposed on harmful and polluting goods. Oates (1995) considers that carbon taxes not only reduce the level of polluting activities but also provide important incentives for the research and development of new abatement technologies. One author with a different view on the optimal environmental tax rate is Jaeger (2011), who advances the double-dividend hypothesis.[1] He argues that if carbon taxation is introduced in a second-best setting, then given that a double dividend will occur, the net additional benefits from revenue recycling[2] will increase marginal social benefits and consequently, the tax rate should be higher than that espoused by the Pigouvian principle. Metcalf and Weisbach (2009) argue that imposing a carbon tax upstream and taxing inputs will ensure the low cost of controlling and enacting such taxes. This will minimise costs regarding control and monitoring and will provide maximum coverage. Upstream taxation is an efficient

[1] The double-dividend hypothesis holds that environmental taxation can have two inter-related outcomes: increased environmental protection through pollution reduction and increased efficiency of the fiscal system. To achieve the second outcome or "dividend", the revenues resulted from environmental taxation can be "recyclated" by cutting existing, distortionary taxes.

[2] Revenue recyclation according to the double-dividend hypothesis is the instrument used to produce the second outcome: decreasing the distortionary effect of pre-existent direct taxation. Carbon taxation enactment should be followed by cuts to other direct taxes, such as income and capital gains, so that the revenues collected from environmental levies are "recyclated" to decrease the excess burden of the current fiscal system.

way to tax because of "economies of scale" in the process of taxation. A neutral position is adopted by Christiansen and Smithson (2015), who argue that it is cheaper to tax emissions proxies than to tax measured emissions. In addition, they recommend a hybrid abatement policy in which taxes and command-and-control policies should be enacted to mitigate CO_2; they maintain the use of both methods will offset each one's weaknesses.

There are also alternative opinions. Baumol (1972) adopts the opposite position from Sandmo, stressing that Pigouvian taxes are the only way to reduce externalities because they oppose complementary policies and granting compensation. Baumol argues that the difficulty of measuring the social cost of pollution is a major shortcoming of the Pigouvian rationale. He proposes pollution reduction based on a set of minimum standards of acceptability. In this manner, Pigouvian taxes will mitigate emissions by establishing a certain threshold of pollution that should be achieved through levies.

Fullerton and Wolverton (1997), following the example of Eskeland (1994) and Sandmo (1975), use the concept of a presumptive Pigouvian tax—meaning that if it is not possible to tax commodities that create environmental externalities, then other related or complementary goods can be taxed at a rate that should reflect marginal social damage. Those authors then argue that any type of indirect tax that acts as a proxy for the direct taxation of emissions can be called a presumptive tax. According to the authors, this two-part instrument improves the abatement policy and can enhance desired behavioural changes related to consuming "clean" goods.

Bruha and Scasny (2004) take Pigouvian tax to a higher level, stressing that if this tax is accompanied by cuts in other distortionary direct taxes, such as labour or capital taxes, the neutrality of carbon tax will increase, leaving the amount of public revenue unchanged.

Following the Pigouvian rationale, economists have made some adjustments to the Pigouvian theorem of negative externalities treatment. On the one hand, Ghandi and Cuervo (1998) and Gahvari (2013) stress that is either difficult and costly or impossible to determine the exact social cost of pollution and therefore a second-best solution should be applied. In this case, abatement policies should choose a "target of socially acceptable environment quality and determine a tax that will achieve this target". On the other hand, Fullerton (2009) and McAusland & Najjar (2014) argues that imposing taxes on carbon emissions should respect one central issue—i.e., that the costs of environmental taxation to reduce GHG emissions should be justified by its environmental benefits.

Coase (1960) dismisses the Pigouvian theory and states that the issue of negative externalities can be solved through a bargain between a polluter and a third party. Coase assumes that negative externalities are reciprocal in nature and these externalities represent a cost imposed on a third party that is not part of a transaction. Approaching the issue of negative externalities in a framework in which all rights are established, Coase maintains that problem of external costs would be solved through a bargain where a deal could be struck between the parties. This solution can be valid only in a setting with zero transaction costs and therefore, Coase's

theorem encounters the insurmountable issue of positive transaction costs related to environmental externalities.

Even if Coase's theorem of eliminating external costs by bargaining is inapplicable in the case of environmental externalities because of high transaction costs, in his attempt to criticise Pigouvian theory, Coase offers some consistent clues regarding the issue of pollution. One of them is the lack of property rights as the source of externalities or as defined by Coase, the under-defined property rights issue. To solve the issue of environmental externalities, the problem calls for a redefinition of property rights. Lewin (1982) notes that if property rights are established from the start, transactions and exchanges of resources will be well defined and the exchange process will contain no negative externalities. Lewin refers to the concept of social cost in the sense of opportunity cost. The idea of alternative choice governs the concept of cost in a market economy. Pollution contains more features than solely the idea of cost as a choice between alternatives. Lewin considers that the efficient treatment of negative externalities such as pollution should employ the principle of strict liability. In this situation, the approach to negative externalities is not to assign property rights but to establish when rights have been violated and then to apply the required corrective measures. Considering pollution as an indirect form of harm, a nuisance that affects third parties, then the polluter is liable to pay compensation.

In his critique of Coase's theorem, Libecap (2009) considers that the inapplicability of bargains between polluter and victim is caused by a lack of clear property rights, uncertainty, a lack of complete information and high transaction costs. To propose an optimal carbon tax, according to Libecap, the decision-maker should have not only information about the social cost of pollution and the optimal level of production but also information about private production and compliance costs.

3 Fallacies and the Myopic Approach Towards Environmental Externalities Internalisation of Pigouvian Taxation Rationale

Buchanan (1999) performs a detailed analysis that approaches the issue of externalities from different perspectives. In his paper on social and private costs, he takes both an objective and a subjective approach to private and social costs. Buchanan and Stubblebine (1962) define Pareto optimality by comparing it to "private" equilibrium, stating that there will be no Pareto optimal resource allocation if the state taxes A (the polluter) for the harm inflicted upon B (the third party that suffers the damage) because in such a case, the tax will create a diseconomy to A and B will not be charged or forced to act according to the diseconomy so created (i.e., through taxes). The author recommends a bi-tax—on A and B, in such a manner that neither of the agents could be better off at the expense of the other. In other words, when A

is taxed, he should adjust his private equilibrium but B should also be charged to internalise the costs that A should endure because of the tax.

If one admits that in case of environmental externalities (seen as negative), the social costs are also endured by the polluter itself, then by using a perfect Pigou Tax (that will calculate the exact social cost imposed on third parties), treating the polluter as the net beneficiary of its activities the diseconomy resulted (or the cost of tax) will have a double impact on its losses. In this situation, Buchanan's statement about Pigouvian taxation of negative externality holds true.

However, a proxy tax (meaning not the exact "external cost" that pollution inflicts on third parties) and compensation will have a feature of Buchanan's proposed bi-tax: first, A will be charged for its pollution, but through a price mechanism, A will also transfer a part of that tax burden to B. In this case, B also pays for A's diseconomies that arise out of the pollution tax. Conversely, compensation is a tool to eliminate the diseconomies of those As that choose non-pollutant technologies, but it has also a second effect of allowing Bs to benefit from "clean" products. When a company pollutes while producing commodities, it creates negative externalities that harm not only others but also itself. In this case, we have invisible costs of pollution that are endured by the polluter. Because it is not possible to calculate the exact social costs of pollution, a polluter is not capable of internalising its costs. If we ignore this invisible cost of pollution to its source (polluter), by imposing a tax we charge the polluter twice. According to Buchanan, this policy creates a diseconomy by taxing the polluter (A), who should adjust his new private equilibrium. Buchanan's useful insight should be considered to adjust the Pigouvian rationale that underlies carbon taxation.

Figure 1 represents the traditional treatment of negative externalities in a first best-setting scenario, according to the Pigouvian rationale. In a situation in which A's economic activities inflict negative externalities seen as external costs on B as a third party, then there is a difference between marginal private cost (hereinafter MPC) and marginal social cost (hereinafter MSC). To internalise the external costs from A's activity, Pigou proposes a tax (t_x) equal to the damage inflicted on B, which reflects MSC, where:

$$MSC = MPC + t_x \tag{1}$$

Before tax enactment, the difference between MPC and MSC is represented in the triangle ABC as the welfare loss from A's activity. Increasing the price from P_0 to $P_0 + t_x$, through taxation of negative externalities, the output quantity of A's activity will decrease from Q_0 to Q_1, reaching the social optimum.

To enact a sustainable fiscal instrument that would curb pollution in an efficient manner, the design of a future carbon tax should follow an adjusted Pigouvian principle. The tax rate that targets the damage created should also be adjusted by the corresponding set of social benefits that arise from that unit of pollution, establishing a tax rate that would not generate larger costs than the pollution itself. The sustainable feature of the environmental tax comes not only from its ability to reduce pollution but also from its capacity to avoid increasing the distortionary

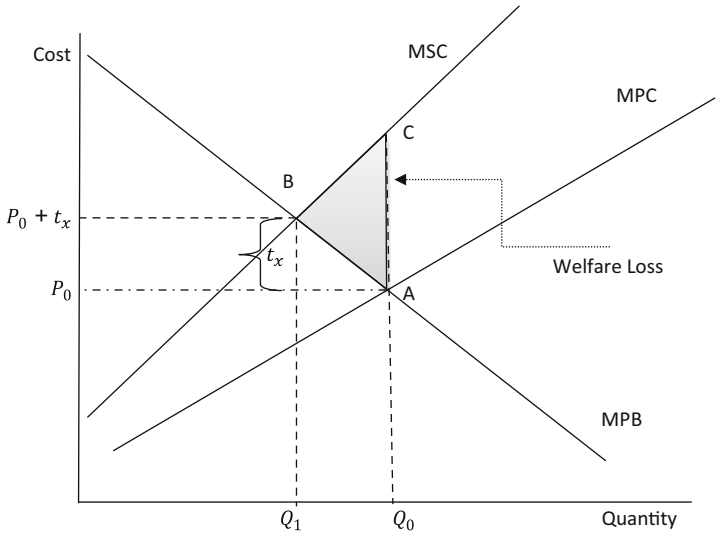

Fig. 1 Pigou carbon tax on negative externalities

effects of the existing fiscal system. The principle on which the carbon tax is based should consider the bilateral flow of benefits and costs (both private and social) between consumers and producers. Even if we focus our attention on producers as the main source of pollution, we should analyse their economic activities in an aggregate frame.

To extend this analysis, we use an example of an energy plant *A* that produces its energy exclusively from coal. In a situation without pollution taxes, *A* has net benefits in which the MPC does not include the external costs from pollution inflicted on third parties (B). In this case, according to Pigou's theory, the state should impose a tax on *A* equal to the negative externalities inflicted on B, as shown in Eq. no. 1. Conversely, if we consider that electric energy production and consumption results not only in external costs but also in external benefits to third parties, we therefore add the marginal social benefits (hereinafter as MSB) curve to Fig. 2.

We assume that the negative external costs of coal-produced energy are larger than the external benefits of consuming electric energy. Under this assumption, according to Fig. 2, due to the introduction of the MSB curve, the welfare loss from A's polluting, represented by triangle ABC, is smaller than in the previous scenario (see Fig. 1—triangle ABC), in which the external benefits were excluded. Considering that the welfare loss from energy production is reduced by the external benefits of its consumption, the carbon tax rate should be lower than the Pigouvian principle, in which external costs are lowered by corresponding external benefits. Therefore, tax rate t_x should be adjusted according to the external benefits to t'_x. This particular example of energy production using coal represents a useful example of contradictions: its production and consumption creates both private and social

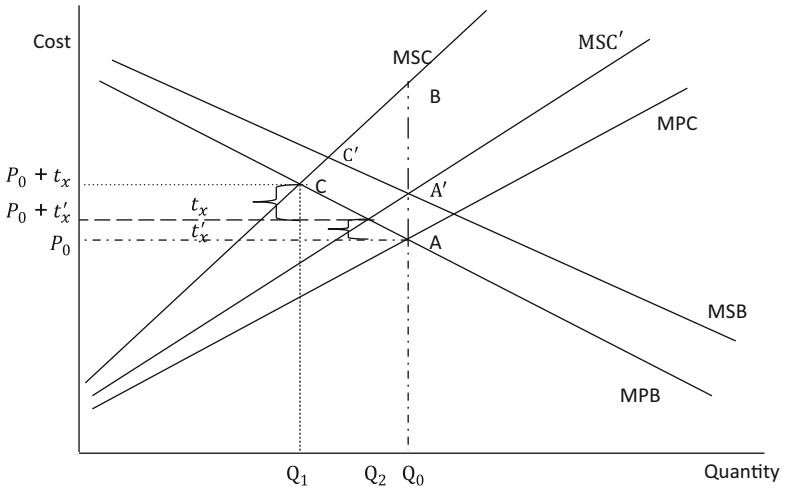

Fig. 2 Adjusted Pigouvian tax rate on carbon emissions

benefits and costs. Next, a tax on negative externalities must tackle a complex set of interrelated costs. To establish the optimal carbon tax rate, the state should consider the bundle of private and social benefits, not only the external costs.

It can be argued that through coal burning, the smoke emitted will affect third parties' health, and the environment will suffer serious damage (air, water, climate changes)—all of these consequences can be considered social costs. However, electricity is used for daily activities such as education, public order and safety, justice, defence and private economic activities. Even simple night lights "produce" less violence and crime (because of street lights and public video cameras); in addition, street lights decrease road accidents by signalling road changes (red and intermittent lights, warning lights)—these examples represent just a few of the social benefits of electricity production and consumption. One cannot analyse (and treat) private costs (and benefits) in a framework separate from social costs (and benefits) when attempting to design an efficient carbon tax system that aims to eliminate environmental externalities.

Ramsey (1927) proposes the inverse elasticity rule to ensure efficient commodity taxation without inflicting major distortions upon demand and supply, by heavily taxing those commodities whose own-price elasticity of demand is highly inelastic, a situation in which the state will assure a constant stream of revenues without producing significant changes in consumption. With respect to the issue of the carbon tax's revenue collection and redistribution functions, one can relate to the Ramsey rule of inverse elasticity to question the carbon tax's impact on pollution. The demand for energy and fossil fuels is highly price inelastic and therefore, any carbon tax on fossil-fuel consumption alone will not produce significant distortions. There will be some decreases in "dirty goods" consumption and less carbon will be emitted, but on a global level the decreases will be insignificant to effect environmental protection.

A carbon tax should be designed by following the fundamental rules of taxation. The first of these is that a tax should be a function of an observable economic outcome. Taxing consumption of energy or fuels used to produce energy has an economic outcome that is obvious. The second rule that a carbon tax should comply with is neutrality. The fundamental purpose of the tax is not to collect revenues for the public budget, but to improve the framework of environmental protection. All of the canons stressed in the literature regarding optimal taxation should be diverted towards optimal taxation for environmental protection. Compared with other measures to tackle environmental externalities, such as cap-and-trade systems, carbon taxation offers the advantage of revenue recycling. Once a carbon tax has been enacted, one should design a system that does not amplify the distortions of the existing fiscal system, but through tax-and-compensation aims at two goals: environmental protection and lowering the distortions of direct taxes such as capital and labour taxes.

4 Analysis of Carbon Taxation Sustainability Using Proxies

Beginning with the idea of required additional instruments that should support carbon taxation to enhance its effectiveness and efficiency, we turn our attention to the revenue stream that the state can collect, which can be used to finance a multi-instrument package to promote environmental protection using carbon taxation as its core element.

We believe that the current state of insignificant improvements in environmental protection and relatively minor decreases in carbon emissions is because of both carbon taxation's lack of effectiveness and an incomplete, inappropriate abatement policy towards green innovation.

OECD statistics are the source of the data used in this analysis. Raw statistical data for 11 OECD countries, for 1998–2011 were used. Through an empirical analysis, we intend to make pertinent arguments to build a functional foundation that will enable governments to finance additional carbon-tax policies that will enhance the tax's efficiency. Even if carbon taxation encounters difficult challenges, its primary advantage—revenue—should be combined with other instruments to compensate and thus incentivise green behaviour at the corporate level. Designing a carbon tax at the business level requires a set of incentives to first assure tax compliance and then tax efficiency. We believe that compensation at the corporate level will have a positive impact on green innovation.

This set of incentives should be specifically directed to the formation of abatement capital. Allowing companies to create funds designed for environmentally related R&D will enable the development of new, environmentally friendly technologies. Joining carbon taxation and compensation to encourage green innovation represent a resolution to the problem of pollution abatement, and only a constant process of trial and error by the private sector will provide technological advances that will overcome the issue of carbon emissions and fossil-fuel depletion.

Table 1 Correlation results between public spending on environmental R&D, environmentally related taxes and green patents in OECD countries

State	Correlation results: environmental tax and green patents	Correlation results: public spending for environmentally related R&D and green patents
Austria	0.252	−0.421
Belgium	−0.834	0.322
Denmark	−0.346	−0.660
Finland	−0.638	−0.642
France	−0.847	0.460
Germany	−0.201	−0.812
Italy	−0.827	0.666
Netherlands	0.589	−0.817
Norway	−0.839	−0.690
Sweden	−0.454	−0.456
UK	−0.769	0.350

Adopting this assumption, we analyse the relationship between public spending on environmentally related R&D as a percentage of total public spending and the number of green patents created beginning with in, on the one hand, and environmentally related taxes as a percentage of total taxes, on the other hand, by correlating these variables using the data published by OECD Green Growth Indicators for European Union countries, which are presented in Table 1.

As shown in Table 1, the correlation results offer some useful information about the efficiency of public spending and environmentally related taxes for green innovation. We do not find a single case in which both public spending and environmental taxes are positively correlated with green innovation. In most cases, there is an opposite, negative impact on innovation from both public-sector involvement and environmental levies, which allows us only to conclude that public spending on environmental R&D is inefficient and that the abatement policy pursued through environmental taxation should be redesigned to promote private sector investment in green R&D.

To strengthen our argument, we analyse the impact of public spending on environmentally related R&D as a percentage of total public spending on green innovation by regressing a series of exogenous, independent variables using a stepwise regression on green patents, using data from 26 European Union countries published in the OECD Green Growth Indicators Database for 1990–2010.

The multiple variable regression equation[3] can be defined as follows:

[3] We decided to use panel-data multiple regression to focus our analysis on a large number of observations over different countries, which would provide more efficient and asymptotically consistent estimates. Stepwise regression using the backward method of including all of the independent variables in a single multiple regression was used. This method offers the possibility of choosing the "best" set of explanatory variables for a regression model. We expect that the estimates

$$lnGreen_{i,t} = \beta_{0i,t} + \beta_1(lnPubs)_{i,t} + \beta_2(lnEnv)_{i,t} + \beta_3(Industry)_{i,t} + \beta_4(lnGDP)_{i,t} + \beta_5(lnPop)_{i,t} + \varepsilon_{i,t}$$

Where $Green_{i,t}$ represents the number of green patents as reported by the OECD in country i at time t, $\beta_{0i,t}$ represents the constant, $Pubs_{i,t}$ is public spending on environmentally related R&D in country i at time t, $Env_{i,t}$ is environmentally related taxes in country i at time t, $Industry_{i,t}$ represents the industry share as a percentage of total added value in country i at time t, $GDP_{i,t}$ is the economic growth in country i at time t expressed as a percentage using 1990 as a base year, $Pop_{i,t}$ is the population growth in selected country i at time t and $\varepsilon_{i,t}$ represents the error term. Before estimating the multiple regression equation, we tested the panel data for unit root,[4] in which only Industry variable proved to be stationary and the other five explanatory variables were non-stationary. To overcome this issue, we used the logarithmic function to transform the variables so that our model became a log-linear one. Because the model assumes that the elasticity coefficient between dependent and independent variables remains constant, then the estimates obtained could be interpreted as elasticities. Taking into consideration that environmental taxation will affect fossil-fuel consumption and assuming that own-price elasticity of demand for these goods is highly inelastic, the efficiency of carbon taxation is heavily reliant on the availability of substitutes. Therefore, the main method to enhance alternative forms of energy is to enhance green innovation. One method to analyse the relationship between the environmental levies in OECD countries is to consider the impact of these taxes on green patent growth in the private sector.

The results obtained, presented in Table 2, confirm the expected negative correlation of public spending on environmentally related R&D, as obtained in the previous correlation on individual sample countries.

Another important result obtained is that environmentally related taxes in the analysed countries do not has a causal relationship with green innovation, meaning that there is no correlation between environmental taxes and green innovation. The control variables introduced into the regression equation aim to create an appropriate framework in which the impact of environmental taxation on green innovation is analysed by considering the need for alternative forms of energy in a context of continuous economic, population and industry growth.

According to our results, over the last 20 years, neither increased industry share in total added value nor increased population has facilitated innovation related to environmentally friendly technologies. The same negative impact on green innovation is found for economic growth, an increase in which results in fewer green patents.

obtained will confirm the previous correlation results, which show that the impact of public spending on environmentally related R&D will have a minor or even a negative impact on green innovation.

[4] The augmented Dickey-Fuller test (ADF) and the Levin, Lin and Chu test were used.

Table 2 The results of log-linear model estimates on green innovation

Dependent variable: green innovation				
Variable	Coefficient	Std. error	t-statistic	Prob.*
C	8.168087	0.781273	10.45484	0
Pubs	−0.3697	0.189448	−1.95145	0.0522*
Industry	−0.02254	0.021017	−1.07264	0.2845
Env	−1.52922	0.431106	−3.5472	0.0005*
Population	0.003088	0.000971	3.181274	0.0017*
GDP	−4.3813	3.881437	−1.12878	0.2601
R-squared	0.125745	Mean dependent variable		6.023102
Adjusted R-squared	0.107757	S.D. dependent variable		1.64832
F-statistic	6.990214	Durbin-Watson statistic		0.098795
Prob (F-statistic)	0.000004			

Statistically significant at the significance level for *1 %, **5 % and ***10 %
Method: Stepwise regression; Selection method: Stepwise forwards; Stopping criterion: *p*-value forwards/backwards = 0.5/0.5

There are some important conclusions that should be made. First, public spending on environmentally related R&D in analysed countries is inefficient if one chooses to relate its outcome to the green innovation evolution over the last 20 years. Second, the increase of industry share in total added value has not improved because of green innovation and thus—particularly in this sector—there is a constant need for investment in green R&D. Third, environmental taxes do not enhance green innovation, which means that their impact on pollution is insufficient.

5 Conclusion

Sustainability of carbon taxation depends on its underlying rationale. In a second-best framework, we argue that carbon taxation should use an adjusted Pigouvian principle. The aim was to highlight the limitations of the underlying rationale on which carbon taxation is based. This approach constitutes one of the first steps for an ample-analysis construction that seeks to improve and appropriately resolve the challenges faced by carbon taxation as the key instrument of abatement policy. Because Pigou's proposal is to impose a tax on externality-creating commodities, economists have undertaken labourious work to subject Pigouvian theory to an intense analysis to determine its applicability and efficiency with respect to internalising external costs. Both proponents and opponents of the Pigouvian taxation rationale have made not only substantial contributions but also many relevant proposals to enact an adequately designed carbon tax, which will have a significant impact on the goal of reducing pollution.

Our attention was focused on one of the central challenges that Pigou's theory on externalities should overcome: determination of the social cost of damaging the environment. In this case, the carbon tax rate should be lower than originally advocated by Pigou: first, because the new tax enters an already distortionary fiscal system; and second, because a share of the external costs of pollution is borne by the polluter. In these circumstances of reciprocal dependencies, the efficiency of carbon taxes on pollution mitigation is significantly decreased. We complement the arguments with an empirical analysis, which suggests that the current carbon tax has a limited impact on environmental innovation and therefore, additional instruments such as compensation are required. Constrained by both a reduced tax rate and the risk of increasing the distortionary effects, carbon tax sustainability is heavily dependent on the implementation of additional instruments.

Accordingly, abatement policies cannot rely solely on carbon taxation, but complementary instruments should also be introduced. One of methods to enhance pollution mitigation could be to use revenues collected through the carbon tax as compensation to incentivise the research and development of new abatement technologies.

We argue that an efficient abatement policy that will curb carbon emissions strongly depends on the additional instruments implemented to enhance carbon taxation. Therefore, is important to note that carbon taxation has not only the attribute of affecting consumption patterns but also the advantage of revenue creation. The revenues collected should be used to support compensation in the form of tax expenditures under specific conditions. The purpose of compensation should be abatement-capital formation, seen as an incentive to green technology development. Moreover, revenue recyclation through capital or payroll tax cuts should seek to boost the production and consumption of less carbon-intensive goods. Carbon tax efficiency for environmental protection sensibly depends on the availability of substitutes, such as alternative source of energy.

The level at which this tax should be adopted to have a significant impact on pollution abatement is multi-national. Taking into consideration that each individual country's contribution to global carbon emissions is relatively small, we support multi-national, co-ordinated carbon tax enactment. At the European Union level, there are long-run prospects for co-ordinated action, in which through collaboration and mutual agreement, a European carbon tax could be implemented across all of the EU member countries.

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Part III
Strategies and Instruments: The Potential for Policy Learning

A Lesson for the Contemporary European Periphery from the Transition Process of the CEE Countries

Luděk Kouba

1 Introduction

How can we rebuild the competitiveness of the so-called periphery countries? That is one of the biggest challenges for the contemporary European Union. In this chapter, we focus on the development of the Central and Eastern European (CEE) countries in their transition period as a possible source of inspiration for the reform process in European periphery countries. The purpose of this chapter is to discuss the following two research questions:

1. What are the important factors that distinguish between successful and less successful CEE countries during their transition period?
2. What is a possible lesson from the transition process in the CEE countries for contemporary European periphery?

Section 2 contains initial remarks, terminology and classification of the CEE countries according to their successfulness in the transition process. Section 3 provides a list of crucial factors. Section 4 states some factors of minor importance for countries' success in the transition process. Finally, Sect. 5 offers a summary of the previous outcomes and a discussion of the second questions.

2 Successful and Less-Successful CEE Countries

Focusing on processes during the CEE countries' transition period, we should start with a definition of how we approach the term CEE countries. First, these countries had more-or-less centrally planned economies until the late 1980s. This means that

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they had an economic system in which the government owned and managed the vast majority of production facilities and in which prices and wages were not determined by supply and demand. Second, these countries had a common general aim in the early 1990s: a transition to a more effective economic system based on the principles of a market economy, thus enabling increased living standards.

Generally, we can talk about a common direction of transition. However, with respect to particular features of transition strategies, there were many ambiguous questions: First, where specifically were these countries going? Towards a social-market economy, a Scandinavian type of welfare state, the Anglo-Saxon model or a uniquely Eastern model of a market economy? Second, how fast should the economic system be transformed—through shock therapy or a gradualism approach?

Moreover, the initial transition intentions were often quickly modified, depending on the following issues:

- The level of economic development (more-developed Western CEEs versus less-developed Eastern CEEs)
- Their historical experience with democracy and market economy (Western CEEs versus Eastern CEEs)
- The quality of informal institutions (i.e., culture, social capital)
- The level of transformation in the 1980s (more liberal Poland, Hungary, Slovenia versus strictly centralised Czecho-Slovakia and Bulgaria)
- The first results of transition (relative success versus failure)
- Citizens' reactions (acceptance of first negative impacts of reforms versus refusal of the entire transition process and sentiment to re-enter the socialist era)
- Consistency of economic policies, etc.

Analysing the situation in particular CEE countries, we can assume that social-economic development was relatively heterogeneous during the transition period. From a long-term perspective, evaluating the overall success of the transition process in Central and Eastern Europe shows the existence of a few groups of countries. Accession into the EU as part of the so-called first wave in 2004 may serve as a clear-cut criterion for dividing the groups. The Visegrad Four—i.e., the dynamically growing Baltic countries and the wealthiest country in the region, Slovenia—unquestionably converge both quantitatively and qualitatively with the developed countries in Western Europe over the longterm. Their entry into the EU lends high credibility to their success in social and economic transition. The level of transition achieved (economic development, institutional character, democratic stability, a developed civil society, etc.) in most of the Balkan and post-Soviet countries, which form the second main group of CEE countries, is at a markedly lower level than in the successful group. Bulgaria and Romania are on the boundary line between the two main groups. Their accession to the EU in 2007 can be considered an incentive for the successful completion of the transition process rather than a reward for the level of transition attained. Croatia is a specific case, differing from all other

Table 1 A classification of the transition countries (criterion: accession to the EU in 2004)

Group	Countries
Successful countries	Visegrad, Baltics, Slovenia
"Between the groups"	Bulgaria, Romania, Croatia
Less successful countries	Balkan, Post-Soviet region

non-member countries in the former Eastern Bloc in its level of socio-economic development and moreover, having a real prospect of accession. Therefore, Bulgaria, Romania and Croatia form the third group of CEE countries (Table 1).[1]

In this chapter we address the first two groups of countries—i.e., 11 countries of the CEE country group. However, because of the lack of data, Croatia is only partially included in the following analysis.

3 Crucial Factors of Success

Discussing the factors of success during the transition period, we should focus particularly on the features of political and institutional environment. Compared to the causality of transition processes in other parts of world, the sequence of political and economic changes in Central and Eastern Europe was rather untypical. More specifically, most of the successful Asian countries first experienced economic reforms accompanied by economic growth and only later experienced political liberalisation and democratisation (Taiwan, Korea, Malaysia, Indonesia, however, China and Vietnam as well). As, e.g., Zakaria (2005) argues, a country must first become rich; an educated middle class grows and begins to demand democratic reforms. Central and Eastern Europe went down a different path: the autocratic regimes fell, democracy was born and only then were large-scale economic reforms implemented. Orenstein (2001:3) cites three particular factors in this development: first, the forceful personalities at the head of the opposition, such as Lech Walesa in Poland and Václav Havel in former Czechoslovakia; second, a democratic tradition (i.e., a tradition of relatively liberal policies) of most of the countries in the region, especially during the interwar period; and third, the strong impact of the European Union on these countries' adherence to the principles of democracy. In this context Åslund (2008) even claims that accession to the EU boosted democracy much more than economic growth. With respect to this debate on causalities in terms of political and economic changes, we should add the argument that at the least, the

[1] Based on the results of the transition, Åslund (2008) distinguishes among three groups of CEE countries: radical reformers (Central Europe, the Baltics) versus gradual reformers (South-Eastern Europe, most of the post-Soviet states) versus countries that have maintained the old dictatorships (Belarus, Turkmenistan, Uzbekistan).

Similarly, Lane and Myant (2007) distinguish among three groups of post-Communist countries: fairly successful transition countries (Estonia, Slovenia, East Germany, the Czech Republic, Poland, Ukraine) versus hybrid economies (Russia, Kazakhstan, Georgia, the Western Balkans) versus statist societies (Belarus, China).

Table 2 Features determining the success of the transition process in the CEE

Feature	Successful countries	Less-successful countries
Political stability (e.g., Grochová and Kouba 2011)	Only elite political instability (all)	Non-elite political instability (former Yugoslavia, Georgia, Ukraine)
Formal (political) institutions (e.g., Novotna 2011) (e.g., Novotna 2011)	Democratic elections (all)	Autocratic tendencies (Serbia, Belarus, Ukraine, Georgia, Central Asia)
	Parliamentary system (all except Romania)	Presidential system (Russia, Belarus, Ukraine, Georgia, Central Asia);
	Proportional election system (all)	Majoritarian election system
Informal institutions (e.g., Zweynert and Goldschmidt 2005)	Extended order based on Western Christianity tradition (all)	Holistic order based on Eastern Christianity tradition (Balkan and Post-Soviet countries)
Their compatibility with formal institutions (North 1990)		
Initial economic level		
Real prospect of accession to the European Union (e.g., Orenstein 2001)		

successful Central European countries were already relatively well developed at the beginning of the transition process. Noting that Slovenia, Czechoslovakia and Hungary belonged to the middle-income countries in the late 1980s shows that the above-mentioned ideas are not contradictory. Moreover, these initial conditions at the outset of transition were fundamental to the success of transition and integration strategies.

Analysing the topical literature, we can summarise a list of political, institutional and economic features that in our opinion, were very influential on the success of transition process in the CEE countries (Table 2).

Generally, political stability is considered to be the essential prerequisite for successful economic development, e.g., Alesina et al. (1996), Jong-A-Pin (2009), and Aisen and Veiga (2013). Nevertheless, the literature based on the ideas of the new political economy usually does not distinguish between two levels of political instability: so-called elite and non-elite political instability. Whereas non-elite political instability involves violent coups, riots or civil wars, elite political instability involves "soft changes" such as government breakdowns and fragile majority or minority governments. Inspired by Gyimah-Brempong and Dapaah (1996), who use the conception elite versus non-elite political instability in the case of Sub-Saharan Africa, in Grochová and Kouba (2011), we apply this perspective to political instability in the case of CEE countries. Exploring, e.g., the durability of governments, we can see that from 1993 to 2008, Poland and Latvia experienced 16 different governments, Estonia and Lithuania no fewer than 11. Furthermore, all

of the Czech Republic's governments between 1996 and 2010 were extremely weak and unstable, similar to both Slovak pro-reform governments under then-Prime Minister Dzurinda in 1998–2006, etc. Thus, we can generalise that all of these successful CEE countries suffered from considerable features of elite political instability during the transition period; that notwithstanding, they experienced fast economic growth and achieved their main goal—accession to the European Union. However, all of these successful countries managed to avoid the symptoms of non-elite political instability. Here we can see an important difference between our main groups—i.e., successful and less-successful countries. An illustrative example is the completely different course of separation in Czechoslovakia compared to Yugoslavia. Moreover, Croatia, which was initially perceived as a very promising candidate for rapid integration into European structures, lost its opportunity for progress in integration in the 1990s because of non-elite political instability (i.e., war and an autocratic regime). Only after the end of violent conflict in post-Yugoslavian area and the fall of Tudman's autocratic regime in 2002 did Croatia conduct a quick, successful integration process. Therefore, we can claim the following: non-elite political stability is the first precondition for a successful transition.

With respect to the set of formal institutions of a political character, the literature of the new political economy extensively discusses the significance of a political regime for economic development. Moreover, this question started to gain special popularity in the 1990s, simply because of the geopolitical changes that were related to the collapse of the Soviet bloc and the democratisation process in the CEE region [e.g., Alesina and Perotti (1994), Clague (1997), Olson (2000), Lindert (2003)]. From a general perspective, the results of this strand of research are relatively ambiguous—both democratic and autocratic states can prosper in the long-run, and both can experience long-term economic decline. Nevertheless, in the case of CEE countries aiming to integrate into the community of developed Western countries, democracy was imperative. For this reason, it is beneficial to highlight the character of political institutions in successful democratic countries. As Novotna (2011) summarises, all of the successful countries opted for parliamentary democracy and a proportional election system in the early 1990s.[2] In traditional Western democracies, of course, there exist various combinations of political systems (parliamentary—presidential, proportional—majoritarian election system, mono-cameralism, bi-cameralism and so on). However, the above-mentioned examples of the post-Soviet and Balkan countries that chose majoritarian election systems and in particular, a strong presidency could warn that after (long) periods of autocratic regimes, it is highly recommended to avoid political institutions based on a "winner-takes-all" principle. This implies that selecting parliamentary democracy with a proportional election system was another important determinant of a successful transition.

[2] Furthermore, within the entire group of new EU Member States, only the Romanian case involves a semi-presidential system.

Whereas essential changes in formal institutions—both political and economic—were at the core of transition, the authors of transition strategies also had to account for the post-socialist state of informal institutions. Over the last two decades, the most-cited concept of an institution is that of Douglas North (1990:3): "Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction." Nevertheless, discussing the role of informal institutions, we tend to use another of North's reformulations (1990, p. 4), which characterises information institutions as follows: "Formal written rules as well as typically unwritten conducts of behaviour that underlie and supplement formal rules." Informal institutions themselves are usually explained as norms, habits, conventions, customs, traditions, taboos, values, ways of thinking, codes of behaviour and so on. We prefer the latter definition because it includes the crucial requirement for compatibility between formal and informal institutions. Moreover, it enables us to include behavioural practices that can hardly be separated from norms or values. In the contemporary literature of new institutional economics, there is also a line of research addressing the relationship between informal institutions and economic development, e.g., Knowles and Weatherston (2006), De Soysa and Jūtting (2007), Foa (2008), and Hansen (2013). Furthermore, there is a strand-of-growth theory of new institutional economics that emphasises the importance of compatibility between formal and informal institutions, other than North (1990) [e.g., Mantzavinos (2001), Williamson (2009)], including influential papers by Greif (1993) and Tabellini (2010), who, however, use the term culture instead of informal institutions.

Compatibility between formal and informal institutions is an extraordinarily important issue in the case of the CEE transition economies because the CEE countries adopted a formal institutional framework of Western democratic market economies during a very short period. This begs the question of whether (or to what extent) people in the CEE countries were able and willing to think and behave according to the West's formal rules. Within this context, we can note papers by Zweynert and Goldschmidt (2005) and Kouba (2010). Kouba (2010) uses North's concept for a component explanation of the failure of the transition process in the former German Democratic Republic. Zweynert and Goldschmidt (2005) apply North's concept of dividing the CEE countries into two groups in a manner similar to our approach. They distinguish between Latin countries with a Western Christian tradition (Central Europe and the Baltic states) and Eastern countries with a strong, holistic Orthodox tradition. Zweynert and Goldschmitd claim that societies in Latin countries historically showed substantial progress towards extended order (which is typical of Western European countries). Therefore, during Communist period, their informal institutions were more resistant to incompatible formal institutions introduced from the Soviet Union. Moreover, these informal institutions were more compatible with Western formal rules during the transition period. The argument on extended order in Latin countries made by Zweynert and Goldschmitd is analogous to our group of successful countries—these had historical cultural ties to the West or, in other words, educated societies with relatively mature informal institutions. Conversely, in many less-successful or orthodox Eastern countries, people quickly

Table 3 GNI per capita (PPP, US dollars) (World Bank)

Country	1990	1995	2000	2010
Austria	19,152	23,116	28,417	40,307
Albania	2,822	2,980	4,378	8,559
Belarus	4,645	3,404	5,135	13,560
Bulgaria	4,973	5,346	6,069	13,455
Czech Republic	11,518[a]	13,385	15,279	23,456
Estonia	-	6,318	9,559	18,971
Hungary	8,538	8,678	11,292	19,725
Latvia	7,813	5,410	8,019	16,280
Lithuania	9,311	6,187	8,468	17,973
Macedonia, FYR	5,491	4,756	5,827	11,177
Poland	5,713[a]	7,300	10,476	19,311
Romania	5,167	5,329	5,618	14,602
Slovak Republic	7,703	8,336	10,945	21,772
Slovenia	10,439	13,114	17,567	26,118
Turkey	4,344	5,270	9,123	15,675
Ukraine	5,955	3,121	3,180	6,580

[a]1992

and convincingly refused reforms and began to demand the return of a strong government, often with autocratic tendencies. In conclusion, historic experience with democracy and informal institutions relatively adaptable to Western formal institutions were some of the key prerequisites for prosperous development in the CEE countries' transition period.

Following the discussion of institutions in CEE countries, it is necessary to stress that their quality is not exogenous in relation to economic development. This implies that the initial economic development level of particular CEE countries was another important determinant of successful transition and integration into the European structures. Based on available data, Table 3 shows that successful countries were already relatively more developed on the threshold of transition.

Finally, another key determinant of a successful transition was, of course, permanent pressure from the European Union. More specifically, this pressure was an extraordinarily strong incentive for consistent reformatory policies in the case of those CEE countries that had a real prospect of accession to the EU.

In summary, the main determinants of the course and result of the transition process in Central and Eastern Europe were the level of (non-elite) political stability, the quality of institutional framework, the maturity and compatibility of informal institutions, the initial economic level and clear prospects for the future. The countries that had positive features within these categories were predestined to be prosperous during the transition (and integration) process.

4 Factors of Minor Importance

In our opinion, compared to the relevance of political and institutional factors, economic policies—both in the 1980s and pursuant to the reform strategies of the early 1990s—were actually much less important to the long-term success of CEE transition and integration strategies:

- Level of transformation in the 1980s
  - More liberal policies (Poland, Hungary, Yugoslavia) versus strictly centralised economies (Czechoslovakia, Bulgaria, the Soviet Union)
- Economic transition strategies
  - Åslund (2008): shock therapy: (Poland, the Czech Republic, the Baltic states; Russia-supported) versus gradualism (Hungary, South-Eastern Europe, most of the former Soviet Union)
  - Orenstein (2001): shock therapy (Poland) versus social liberalism (the Czech Republic)

Specific economic policies of the 1980s seem relatively irrelevant in terms of their impact on the course of the transition and integration period. In particular, Hungary and Poland were often cited as examples of countries that implemented many liberal reforms in the 1980s, including the abolition of binding central plans, partial price liberalisation and freedom of business, and these reforms were often interpreted as a comparative advantage. Conversely, during the 1980s, former Czechoslovakia was one of the most centralised countries in the world.[3] That notwithstanding, both the Czech Republic and Slovakia were ranked among the most successful countries of the transition period. Furthermore, the liberality of the Yugoslavian economy was completely insufficient to effect prosperous course of transition in the post-Yugoslavian republics (except for Slovenia). Table 4 summarises the development of the private sector share in the CEE countries according to EBRD data.

There is an extraordinarily vast literature analysing and identifying various transition strategies and discussing their implementation and results. First, the strand focused on whether to choose shock therapy or a gradualist approach to reforms, e.g., Roland (1994), Hoen (1996) and Popov (2007). With respect to the inclusion of CEE countries in particular categories, e.g., Åslund (2008), provides a relatively common categorisation, which is mentioned above. At first sight, the countries that implemented shock therapy seem more successful. However, in the long-run, at least Hungary from the latter group belongs in the group of successful countries (accession in 2004). In addition, the categorisation of particular countries in particular groups has achieved far from an unambiguous consensus. For instance,

[3] According to Tošovský (2000), only 2 % of Czechoslovak national income in the 1980s was produced in the private sector.

Table 4 Private sector share (% of GDP) (EBRD)

Country	1990	1995	2000	2010
Bulgaria	10	50	70	75[a]
Czech Republic	10	70	80	80[a]
Estonia	10	65	75	80
Hungary	25	60	80	80
Latvia	10	55	65	70
Lithuania	10	65	70	75
Poland	30	60	70	75
Romania	15	45	60	70
Slovak Republic	10	60	80	80
Slovenia	15	50	65	70

[a]2007

Orenstein (2001) labels reforms in the Czech Republic as socially liberal and contrasts them with shock therapy in Poland. Finally, transition strategies were implemented in the CEE countries over a long time horizon and thus, the original strategies were repeatedly modified depending on actual economic development, government changes and so on.

Let us now turn to the primary macro-economic policy trends in the transition period. Analysing fiscal policies, the former centrally planned economies in Central and Eastern Europe have redistributed a lower share of their GDPs and have maintained lower public debts compared to stable, Western market economies.

The available dataset on public finance indicators in the CEE countries starts with data for 1995. With respect to the ratio of government expenditures to GDP, only Hungary, Poland and Slovenia approach the EU15 average over the long term. Figure 1 also indicates the impact of the financial and economic crisis on public finance in specific countries. It is possible to identify a few swings such as that of the Bulgarian case in 1996, when the country experienced a simultaneous banking crisis, currency crisis and public-finance crisis. Apart from the effects of these crises, the most significant, purposeful change in policy trend can be identified in the case of Slovakia, where the government expenditure ratio decreased between 2001 and 2007 by approximately 15 % as a consequence of Slovakia's liberal policy of Dzurinda's reformatory governments. This Slovakian case can also be interpreted as the most visible example of a general trend within transition strategies: to sustain their competitive advantage within the convergence process, the CEE countries enabled the maintenance of relatively low taxes and thus a low level of redistribution.

With respect to public debt, unfortunately, the applicable dataset also starts with the 1995 data, which do not explicitly show the situation of CEE countries at the threshold of transition. Despite this weakness, the next figure suggests that Hungary and Poland had inherited higher indebtedness from the Communist period. Conversely, all of the other CEE countries started their transition processes with very low public debt levels—less than 25 % of GDP. However, a mildly growing trend of acceleration during the period of financial and economic crisis is typical of the

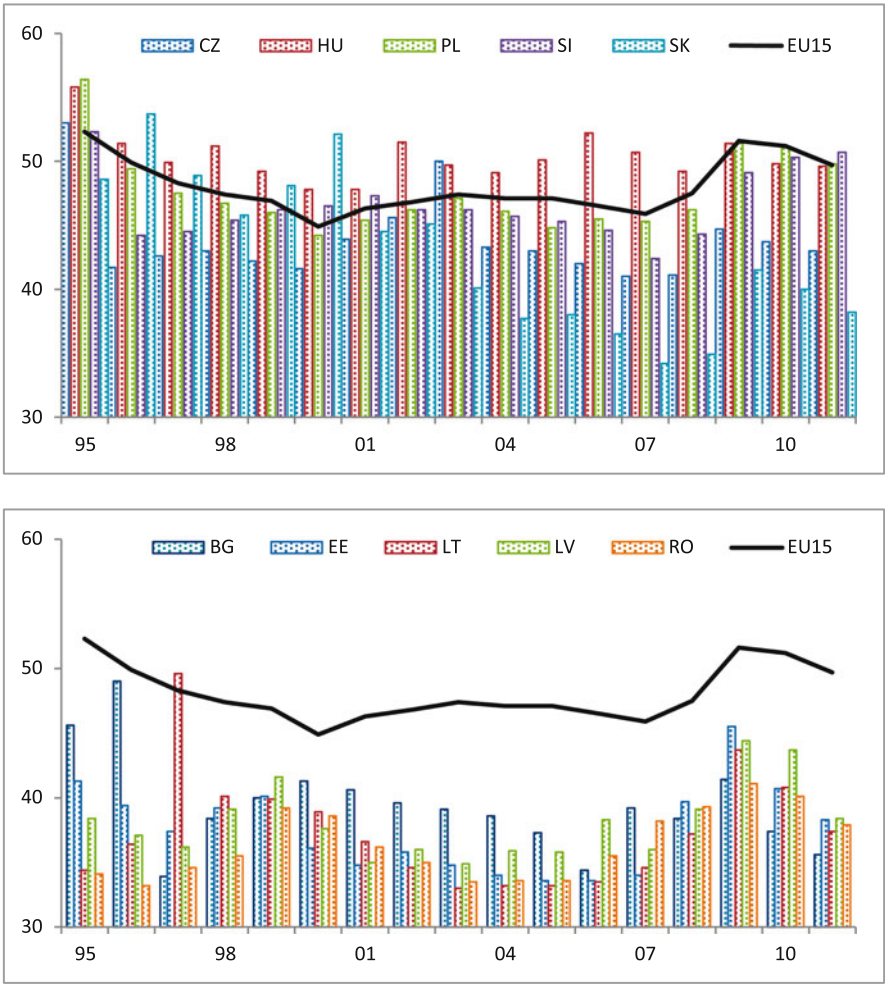

Fig. 1 Total general government expenditure (% of GDP) (Eurostat)

entire CEE region. Conversely, Bulgaria is a unique case because of its unprecedented drop in public debt after the 1996 crisis. Furthermore, the power of Bulgaria's rigidly restrictive policies appeared after 2008, as the country sustained its fiscal stability, unlike Romania or the Baltic states. Nevertheless, in the Baltic region we find another Eastern European solitaire related to austerity—that of Estonia, which permanently belongs paired with Luxembourg as the least-indebted states in Europe (Fig. 2).

If in the case of transition strategies for fiscal policy it is possible to identify at least some common trends in the group of CEE countries, the development in the monetary area was fully heterogeneous. In the early phase of transition only, monetary policy in all of Central and Eastern Europe was focused on the struggle

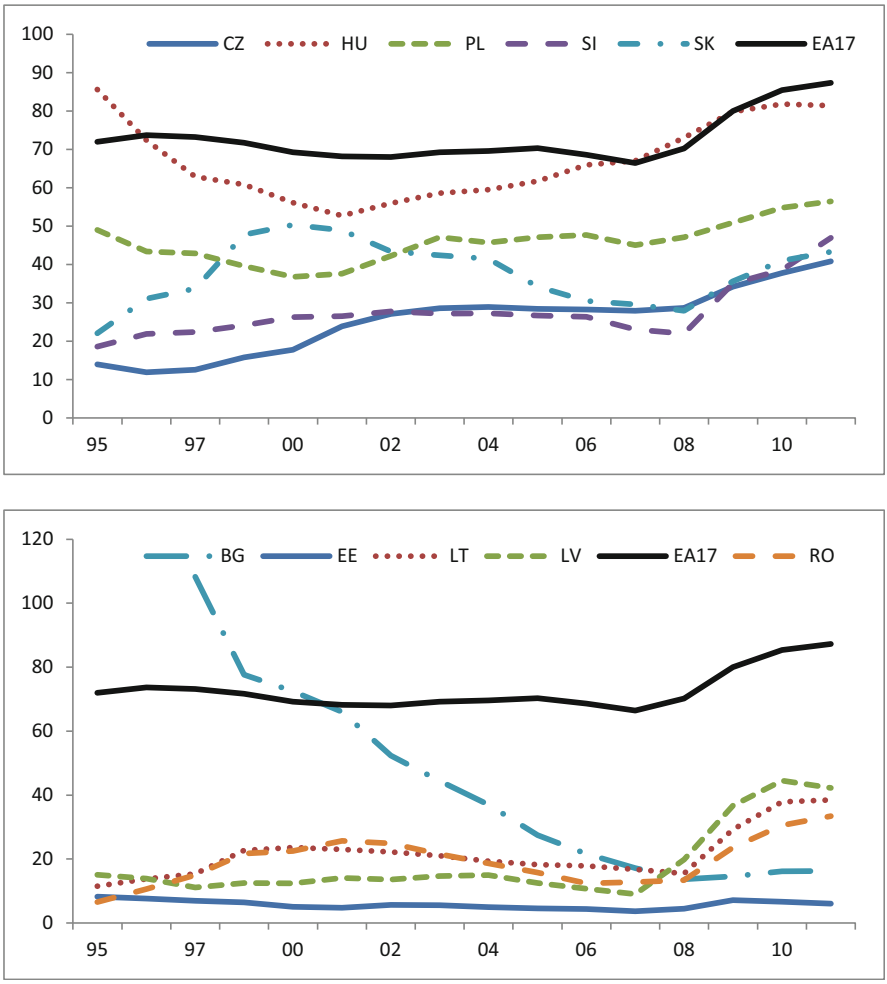

Fig. 2 Government consolidated gross debt in the CEE countries (% of GDP) (Eurostat)

against the consequences of price liberalisation. Next, during the entire transition and integration period, individual CEE countries implemented a broad range of either discretionary or rule-oriented monetary policies, which are summarised in Table 5.

The previous statement on heterogeneity in the monetary area is even clearer in the case of exchange-rate policies in CEE countries. Although the transition period was a phase of relatively rapid deregulation of exchange rates in connection with the liberalisation of both current and capital accounts, after assurance of acceptance to the European Union, individual countries implemented various exchange-rate policies. Currently, Slovenia, Slovakia and Estonia are members of the Eurozone,

Table 5 Monetary policy regimes in the CEE countries [Gnan et al. (2005), Vasicek (2009), Ziegler (2012)]

Country	Monetary policy regime
BG	Since 1997, currency board
CZ	1994–1997, exchange-rate and monetary-base targeting; since 1998, inflation targeting
EE	Exchange-rate targeting; since 2011, the Euro system
HR	Since 1994, exchange-rate targeting
HU	1994–2001, exchange-rate targeting; since 2001, inflation targeting
LT	Exchange-rate targeting
LV	Exchange-rate targeting
PL	1994–1998, exchange-rate targeting; since 1998, inflation targeting
RO	Exchange-rate targeting; since 2005, inflation targeting
SI	1995–2001, exchange-rate and monetary-base targeting; 2001–2006, inflation targeting; since 2007, the Euro system
SK	1994–1998, exchange-rate targeting; 1998–2008, inflation targeting; since 2009, the Euro system

Table 6 Exchange-rate regimes in the CEE countries [European Commission (2012)]

Country	Exchange-rate regime	Declared accession to EMU
LT	ERM II	No date; ASAP
LV	ERM II	2014
BG	Currency board	No date
CZ	Managed floating	No date
RO	Managed floating	2014
HU	Free floating	No date
PL	Free floating	No date; government priority

whereas Bulgaria, Czech Republic and Hungary have not set a date for Euro adoption (Table 6).

This implies that from a long-term perspective, not only the exante strategies of economic transition themselves but also individual economic policies in partial stages were not essential to the success of the transition process.

5 Conclusion

Focusing on the first research question, we identify the level of (non-elite) political stability, the quality of the institutional framework, the maturity and compatibility of informal institutions and initial economic level as the key determinants of a successful transition process in Central and Eastern Europe. Countries that have achieved positive features within these categories were predestined to become

members of the European Union. Moreover, we emphasise the importance of this clear prospect—accession to the EU—to the success of the transition process. However, the ex-ante strategies of economic transition themselves and individual economic policies in individual stages of transition were, according to our analysis, not essential to the success of the transition process from a long-term perspective.

Focusing on the second research question, we can provide an original parallel with the periphery countries that is based on our analysis of development in the CEE countries during their transition period. Currently, periphery countries' situation is often considered the most significant problem in the EU. To create a competitive and sustainable economic model, the periphery countries must implement essential, vast reforms. Therefore, they are in a position that is rather similar to that of the CEE countries in the 1990s. What can we thus learn from the East's transition that will help reform the South? In our view, the periphery countries need to find a direction on the horizon of the next 10–15 years. In the context of a chronic public-finance crisis, a policy of budgetary savings is inevitable. Nevertheless, the periphery countries should also attempt to formulate a positive vision. Analogously, the successful CEE countries undertook painful reforms in the early 1990s. However, these reforms were more accepted by their people because of the clear prospect of a so-called "return to Europe". Furthermore, without regard to right- or left orientation, both governments and elites in successful CEE countries consistently supported the integration process even with its related consequences. Similarly, in the peripheral countries it is crucial for a potential vision to find a broader political and social consensus. However, it is not very important whether the road to competitiveness should be based on, e.g., a knowledge economy, cheap exports or tourism because may be additional alternative path to prosperity. It is not the particular forms of economic policies, but the existence of a vision itself and its support across the political spectrum that can be the most important to the successful transition of peripheral countries.

Applying the criteria of success in the transition economies to the periphery countries, it is doubtless that all of them fulfil the criterion of economic development. Even after the crisis years, the relatively poorest country, Portugal has reached the level of 23,000 USD per capita, and the most problematic country, Greece, has reached 24,000 USD per capita (IMF 2014). However, in cases of the other factors of success, the evaluation is more questionable.

Political-stability rankings (The Worldwide Governance Indicators 2013) indicate that the position of the periphery countries has worsened since 2008. Nevertheless, these rankings do not distinguish between the features of elite and non-elite political instability. In the periphery countries, of course, there have been frequent government crises and early elections, along with demonstrations and strikes, which sometimes have even been marred by violence. That notwithstanding, we see these protests as signs of elite political instability: first, none of them toppled or cast doubt upon a democratic regime; second, the difference between the experience of non-elite political instability in the peripheral countries and the experience in Iraq, Libya, Syria and the Ukraine is more than clear.

Similarly, the interpretation of the characters of both formal and informal institutions in the periphery countries is somewhat ambiguous. The quality of their institutional framework is frequently criticised because of a high corruption level, a weak rule of law, excessive bureaucracy and inefficient government and regulatory frameworks (The Worldwide Governance Indicators 2013; Doing Business 2014); however, they are criticised compared to the most developed countries. Comparing such countries to Brazil, China, India or Indonesia, which are generally considered both highly dynamic and prospective in their economic development, the evaluations of the European periphery countries' institutional framework quality surpasses the evaluations for all of the four emerging markets named above. For instance, in the Ease of Doing Business Ranking 2013, the worst periphery country—Greece—is ranked at No. 72, while the best emerging market, China is ranked at No. 96.

With respect to informal institutions, despite a relatively long-lasting period of frustration and pessimism in the economies of the European periphery, these countries have an important comparative advantage: their relatively rich and well-educated citizens have lived for at least few decades in democratic countries with developed market economies. This therefore implies that informal institutions in the European periphery countries should be relatively highly compatible with the effectiveness of their institutional frameworks in the globalised world economy of the twenty-first century.

In summary, the criteria of a successful economic transition, which are based on our analysis of the CEE transition process, are also relatively fulfilled in the European periphery countries. This implies that political and institutional factors should not pose any fundamental obstacle to future economic development. Within the context of emphasising a positive vision with strong political support, we can name the example of current Italian Prime Minister Matteo Renzi. After years with no prospect for a charismatic leader in the periphery countries, this young politician has represented to Italians that Italy, after decades of declining influence in Europe, can fill the gap beside Germany in the EU's leadership instead of Francois Holland's France or isolationist Great Britain. Following a triumph in the 2014 European elections in which Renzi's Democratic Party received the most votes of any single party in the entire European Union, it is obvious that Renzi has retained a unique level of public support.

6 Summary

In this chapter, we focus on the development of CEE countries in their transition period as a possible source of inspiration for the reform process in European periphery countries. The purpose of this chapter is to discuss two subsequent research questions First, what are the important factors that distinguish between successful and less-successful CEE countries in their transition period? Second, what is a possible lesson from the CEE countries' transition process for the

contemporary European periphery? We identify the level of (non-elite) political stability, the quality of institutional framework, the maturity and compatibility of informal institutions and the initial economic level as the key determinants of the CEE countries' success in the transition process; in addition, we emphasise the importance of having a clear goal—i.e., accession to the EU. In our view, the periphery countries need to find a direction on the horizon of the next 10–15 years. Instead of particular forms of economic policies, the existence of a positive vision itself and its support across the political spectrum can be more important for the successful transition of the peripheral countries.

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Geospatial Infrastructure for European Union Sustainable Development

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1 Purpose of Geospatial EU Wide Infrastructure

The European Union (EU) countries are tightly connected spatially. Natural disasters and different environmental phenomena (e.g., pollution), environmental changes, or in general, any issue that is connected to the environment influences more than just a single country. These problems are solved by the EU governments as well as by many research projects. Additionally, both groups require spatial data from multiple countries. To outline the problem, examples of their activities will be presented.

1.1 European Union Government Activities

The EU is aware of sustainable development necessity (European Commission 2012). This topic is highlighted in many activities of the EU from different points of view. For example, one of the EU 2020 targets is to secure clean water, sufficient food and a clean and healthy environment (Target 3: *Climate change and energy sustainability* described in European Commission 2014a). This task is covered, among others, in *An EU strategy on adaptation to climate change* from April 2013 (European Commission 2013c).

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This document refers to the EU EEA report No. 12/2012 (European Environment Agency 2012) and provides a detailed list of environmental change expenses caused by geophysical, hydrological, climatological or meteorological events. The document also summarises the reconstruction costs of the events (between 1980 and 2011, direct economic losses in the EU just because of floods are calculated as more than €90 billion) and extrapolates future costs. The minimum costs of not adapting to climate changes are estimated to range from €100 billion a year in 2020 to €250 billion in 2050 in the EU. The EU anticipates higher protection costs that are estimated to be €1.7 billion annually up to year 2020 and €3.4 billion annually up to 2050 (Feyen and Watkiss 2011). As a reaction to this situation, the web-based project *Climate-ADAPT* (European Climate Adaptation Platform 2014) was launched in March 2012. The goal of the project is to provide useful resources to support adaptation policies and decision-making in this area.

Clearly, even from just an economic point-of-view, it is of the utmost important to precisely analyse previous floods and create models that are capable of covering future scenarios. Additionally, these models are clearly the results of the spatial analyses (basics described, e.g., in Willson and Gallant 2000) and in many cases must cover multiple countries. As previously mentioned, national borders do not restrict natural phenomena. A clear example is the influence of the Elbe River in the Czech Republic on floods in the Saxony region of Germany. Similar direct connections between spatial analyses, spatial data from multiple countries and EU policy can also be observed in further projects that influence the environment.

Nonetheless, it is necessary to emphasise that the unified European geospatial infrastructure does not benefit solely from government bodies focused on legislation. The key benefits are applied especially to organisations on operational levels, including research and education facilities or public administration. A selected research project will be described in Sect. 3.

2 INSPIRE: The Cornerstone of EU Spatial Data Policy

After the preparation phase in 2005–2006, *Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 Establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)* was published (European Commission 2007). This document outlines general rules for implementation of the European geospatial infrastructure. It is possible to simplify the key principles in two points:

1. **Data management efficiency:** All spatial data should be collected on the single (government) level in which it is most effective. Data collected on this level should be shared with all other levels as well as other users (e.g., companies, public administration or private users).

2. **Ease of use:** It should be possible to interconnect data from different EU countries. The spatial data should be easily identified and should be understandable, interpretable and in reasonable amounts and quality.

As a part of the directive, data sets that must be provided by all EU countries were listed. These are described in the *Definition of Annex Themes and Scope* document (European Commission 2008). For illustration, these data sets include cadastral parcels (Annex I), transport networks (Annex I), elevation (Annex II), land use (Annex III) and population distribution (Annex III).

2.1 Structure of INSPIRE Geospatial Infrastructure

Three basic services should be completed in 2013—view, download and catalogue services. These services are based on open standards maintained by *Open Geospatial Consortium*, allowing seamless interconnection of data sources from different countries.

The purpose of the view service is to display required spatial data as a common digital image. Using this standard, virtually any geographical information system or even a common web browser can display selected spatial data in the form of an image. Recently, this service has frequently been used on mobile devices. For implementation of this service, there are generally use standards called *Web Map Service* (Open Geospatial Consortium 2006) or related *Web Map Tile Service* (Open Geospatial Consortium 2010).

The download service is based on a similar principle, allowing the user to request a specified portion of spatial data. Nonetheless, the spatial data pieces are not only provided in the form of an image. The user receives the original form that allows further processing and analysis. *Web Feature Service* (Open Geospatial Consortium 2014) or *Web Coverage Service* (Open Geospatial Consortium 2012a) standards are used for implementation of this service.

The purpose of the catalogue service is to allow the user to browse easily through provided data pieces and search within them. *Catalogue Service* (Open Geospatial Consortium 2007) was chosen as an implementation standard.

The EU member countries are completing the implementation of described services. Although not all services are currently running, it is possible to argue that there is a viable geospatial infrastructure that has brought interoperability on an EU-wide level. The services overview can be found on *INSPIRE GeoPortal*.[1] Clearly, these services substantially simplify gathering spatial data for different spatial analyses.

[1] http://inspire-geoportal.ec.europa.eu/

3 Future of Geospatial Infrastructure

Although INSPIRE presents a huge leap forward, it is necessary to identify new potential uses of this unique infrastructure.

3.1 Achieving Real-Time

One significant potential ability of this infrastructure is to provide data in real-time or near real-time. The real-time advantage is clear. For example, *obsAIRve* or *CITEAIR*[2] projects are able to provide information regarding air quality within the EU. *Smart journey*[3] provides real-time travel and weather data. Certainly, these services are especially useful if they have at least EU-wide coverage, which is frequently not the case.

A substantial contribution to this field is the *Copernicus* project (European Commission 2014b). *Copernicus*, previously known as GMES (*Global Monitoring for Environment and Security*), is the *European Program for Earth Observation*, with the initial concept created in 1998. Copernicus will comprise a complex set of systems that collect data from two main sources: earth observation satellites and ground, airborne and seaborne sensors.

The Space Component, under the European Space Agency's (ESA) responsibility, comprises two different types of satellite missions: the Contributing Missions and the Sentinels. Contributing Missions are missions that make some data available for Copernicus; there are approximately 30 existing or planned missions. ESA is further developing five new missions called Sentinels (European Space Agency 2014). Sentinel-1 will provide all weather radar imagery, day and night, for land and ocean services (planned for launch in spring, 2014). Sentinel-2 will provide high-resolution optical imagery for land services and information for emergency services (planned for launch in 2015). Sentinel-3 will provide high-accuracy optical, radar, altimetry and temperature data for marine and land services (planned for launch in 2015). Sentinel-4 will provide data for atmospheric composition monitoring (scheduled to be launched in approximately 2017). Sentinel-5 will also be dedicated to atmospheric composition monitoring (scheduled to be launched in 2019; a Sentinel-5 Precursor mission is planned for launch in 2015).

The ground segment (sensors) relies on existing national (public and private) facilities and international agencies with the total infrastructure being coherently managed. Calibration and validation of data from satellites rely on essential information from monitoring networks.

Services (provided free of charge) will address six main thematic areas: Land Monitoring, Marine Monitoring, Atmosphere Monitoring, Emergency Management,

[2] http://www.airqualitynow.eu/

[3] http://smartjourney.co.uk/

Security and Climate Change (at different levels of maturity). As outlined in the *Copernicus Programme Description* (European Commission 2014b), "The main users of services would be policy-makers and public authorities who need the information to develop environmental legislation and policies or to make critical decisions in the event of an emergency case, such as a natural disaster or a humanitarian crisis". Most data issues provided by the different missions are distributed by the ESA; there are two main types of datasets: core datasets and additional datasets.

Copernicus supports applications in a wide variety of domains: e.g., urban area management, sustainable development and nature protection, regional and local planning, agriculture, forestry, health, emergency management, transportation and tourism. There is also the *Copernicus4Regions* initiative founded under the *7th Framework Programme for Local and Regional Authorities* (GMES4Regions 2014).

3.2 Looking for Details

Another type of data that can substantially improve geospatial services is data provided by LiDARs, so-called *point clouds*. Each point in the cloud represents a reflection of a laser beam from some obstacle. Each point has a space position and related properties (reflection index of the obstacle, etc.). Therefore, this type of data can describe precisely ground elevation or even a 3D shape of an object. In its universality, we can compare it with, e.g., aerial or satellite imagery in the visible spectrum. In addition, these images describe in detail the scanned area content; point clouds are 3D and can describe an object precisely, which is necessary for many types of analyses. The following section briefly summarises selected projects that are based on point cloud use. All of these projects can be used for reaching the targets outlined in the EU's *Climate ADAPT strategy* described in Sect. 1.

Water management is one of the most important fields, i.e., water reserves, irrigation, rain collection, related soil erosion and frequent flooding. Frequency of flooding is expected to increase (see EEA 12/2012 report). A successful example of point cloud use in this area is a project conducted by the Minnesota Geospatial Information Office. The office portal (Minnesota Geospatial Information Office 2014) describes results from all areas included in the project—erosion analysis, water storage placement, flood control and mapping, wetland mapping, protection and restoration. There are also calculated costs of LiDAR technology use comparison with on-the-ground inspections.

The point cloud-based water storage planning project in Ditch County (24 km^2) saved approximately 23,000 USD; in the Wild Rice Watershed District (25 km^2), the project saved approximately 75,000 USD. Measured data issues were also used for hydraulic and hydrologic modelling. Selected results were published in Galzki (2009) and Galzki et al. (2011).

Another important project focuses on shoreline protection (such protection is also described by the *Directive of Europe and Parliament and of the council establishing a framework for maritime spatial planning and integrated coastal management*—European Commission 2013b). Increasing sea levels and storms can dramatically change the shape of a coast. Two projects that used point clouds for modelling, the *Texas Shoreline Project* (2000) and *Shoreline Change and Beach/Dune Morphodynamics along the Gulf Coast* (2010–2012), solved the problem mentioned above. The project is summarised on the University of Texas web portal (Bureau of Economic Geology 2013) as follows: "Point clouds of Texas Gulf shoreline in 2010, 2011, and 2012 determined short-term shoreline change and its long-term context, map critical beach and dune attributes including the shoreline, potential vegetation line, and landward dune boundary, examine and quantify beach and dune morphology by determining elevation-threshold area (ETA) curves for differing geomorphic environments on the Texas coast, and establish a storm susceptibility index (SSI) for the Gulf shoreline. . .".

The Swedish government has been strongly focused on climate/environmental changes, at least since 2005 when the Commission on Climate and Vulnerability was founded. That commission recommended detailed mapping of the entire country (450,000 km^2) in 2007 for the purpose of analysis. Consequently, the LiDAR measurements were taken from 2009 to 2013. Similar measurements (generally not in this extension) were taken by other EU countries (e.g., Netherlands, Denmark, Switzerland). In other countries, mapping is in progress (e.g., Poland, Spain, the Czech Republic).

Certainly, the LiDAR measurements obtained can be used in the described applications for other projects that are not considered top EU priorities; nonetheless, measurements such as seismic activity research remain quite important. For example, there were 20 earthquakes measured just in Greece between 08/13-01/14 (European-Mediterranean Seismological Centre 2014) that were from IV degree (largely observed) to VIII degree (heavily damaging). This broad issue is monitored, e.g., by the *Central European Research on Geodynamics Project*, which is based on monitoring crust movements using high quality GPS measurements and permanent stations. However, Cowgill et al. (2012) described an approach based on point cloud use.

3.3 New Point Cloud Potential

A point cloud is essentially a set of three-dimensional points representing real world objects. There are many manners in which to derive new spatial data from point clouds. The basic idea behind creating new spatial data is identification of objects that are represented by the points. Once the objects are identified, they can be marked into map layers commonly used in different geospatial information systems. Currently, this process of object identification is generally performed manually. Therefore, methods that can simplify this extraction could substantially reduce

the time and cost of data processing. Even more, if point clouds describing some area are available, experts can decide later what specific spatial data layers to extract.

Forest mapping and analysis are other examples of processes that can benefit from this approach Holmgren and Jonsson (2004) described measurements of mean tree height, mean stem diameter, basal area, and stem volume in a 50 km^2 area of Sweden. The results from LiDAR measurements are more precise than results obtained by traditional methods. A further application in the Sierra National Forest is described in Peterson et al. (2007). In this project, point clouds were used for canopy bulk density and base height calculations and for development of the related fire behaviour model. The authors argued, "LiDAR is no longer an experimental technique and has become accepted as a source of accurate and dependable data that are appropriate for forest inventory and assessment". Similar applications can be observed in the private sector. The Bergvik Skog Company in Sweden uses point clouds as a tool for inventory of their forest and other real property that cover 2.3 million hectares. Another application of "3D forest measurement" is supported by Treemetrics Ltd. concerning decision-making tools and real-time harvest monitoring (Treemetrics 2014). With regard to these applications, it is also necessary to emphasise that forests cover 42 % of the EU landscape, and the percentage is growing (European Commission 2014c). In addition, the EU accepted in September of 2013 *A new EU forest strategy: For forests and the forest-based sector* (European Commission 2013a). Described methods can be used as models to help achieve success with this strategy.

In addition to forestry management, there are many different applications for LiDAR. For example, 3D reconstruction of urban environments can be conducted. Several projects are focused on roof identification (Yu et al. 2011; Awrangjeb et al. 2012). Roof identification is essential analysis for solar panel suitability evaluation (Jochem et al. 2009). A University of Lisbon research group evaluated part of Lisbon's roofs in such a manner, calculating the energy that would be produced if solar panels were placed in the most appropriate places (Santos et al. 2011). An analogous solution, based on geoweb services, is provided by the City of Boston. Among roofs, it is possible to reconstruct building footprints (Zhang et al. 2006), facades (Sun and Salvaggio 2013), (Hammoudi et al. 2010) or other objects commonly placed in cities. This automatic reconstruction can easily describe changes in an urban environment (Plessis 2012). That is especially useful, for example, for cultural heritage mapping and related change evaluation. Examples include the reconstruction of Stonehenge (Unver and Taylor 2012).

Furthermore, point cloud analysis brings substantial possibilities to the inventory process of entities distributed over a wide area such as roads, traffic signs or guardrails. These things must be regularly checked and their condition evaluated. The inventory process is generally conducted manually by an operator with a portable device equipped with a GPS and a specialised application. Alternatively, identical information can be obtained by an operator from images (and related data) generally recorded by a specialised car. This process is based on manual work; hence, it is time-consuming and relatively expensive. New algorithms allow

splitting the point cloud on discrete objects to evaluate the objects' properties. For instance, Landa and Prochazka (2014) presented a method for automatic identification of traffic signs positions. This approach brings the potential for greater reliability than previously used methods based on data obtained by cameras. Similar projects are focused on identification of different objects (Yokoyama et al. 2011; Chen et al. 2009; Hillel et al. 2012 and others). This semi-automatic object recognition can significantly speed up the entire process and therefore reduce its cost.

4 Conclusions

Clearly, there are many projects that are important to the effective management of the EU environment. Nevertheless, many of these projects require data not provided by the INSPIRE infrastructure, and in many cases, the data cannot be effectively provided because INSPIRE does not provide a sufficient technical base. Therefore, we argue that the INSPIRE infrastructure should be extended in several manners. First, Sensor Observation Service standard (Open Geospatial Consortium 2012b) should be adopted as a component of future INSPIRE specifications. This enables the infrastructure to provide effective data in real time or near real time; therefore, integration of completely new sets of data will be possible. Examples include air quality and traffic data.

Further, a useful component of INSPIRE should be point clouds of the EU countries. As described in the previous section, these data issues can be used for reconstruction of precise shapes (landscape, buildings, etc.) as well as for developing new spatial data layers (traffic signs, trees, etc.). The former application is already in use for advanced analysis of environmental changes (e.g., soil erosion), the latter for property inventory.

INSPIRE has created technical unification of spatial data sharing with the necessary legislation. INSPIRE is an important project that provides a basis for many applications from landscape management (e.g., forestry) to the geographical economy. To fulfil this task, however, INSPIRE must be up-to-date. The geoinformatics and related fields that benefit from this infrastructure evolve and require new types of data. If countries are not willing to maintain the infrastructure, there will be increasingly more projects that will create more flexible solutions of their own, which would cause a state similar to what existed before INSPIRE. Such a situation certainly would not provide a basis for the effective advanced solutions described in this chapter.

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Reforming Welfare States

Peter Huber, Thomas Leoni, and Hans Pitlik

1 Introduction

Advanced welfare systems in developed nations perform numerous important economic and social tasks. Governments provide more or less encompassing social insurance against the risks of unexpected income losses, they offer specific services, most notably health care and education, and they redistribute income and wealth via taxes and transfers to facilitate economic efficiency, to reduce poverty, to weaken social exclusion and to establish greater equality of starting positions. Expenditures related to social issues have become by far the largest spending category in the budgets of EU Member States. According to functional National Accounts statistics, general government outlays for social protection, health and education sum up to an average of 32.5 % of GDP in the EU28 (2012), reaching a maximum of 41.7 % of GDP in Denmark. The share of welfare spending as a percentage of overall government spending is above 50 % in all Member States except for Cyprus (at 48.9 %), and the (unweighted) budget share across all EU28 countries in 2012 sums up to 62.7 %.

Moreover, to accomplish objectives like protecting workers from arbitrary or unfair treatment and ensuring more efficient contracting, advanced welfare states frequently rely on systems of complex labour and employment laws. The available data demonstrate that such regulations differ significantly across countries in Europe (Koster et al. 2011), allowing for various configurations of labour market regulations and social expenditures, and there is almost no evidence for the development of a uniform "European Welfare State" (Hall and Soskice 2001). Despite the absence of a common definition and understanding of the role of the welfare state among the individual member states, in its Europe 2020 strategy, the EU envisions a new growth path for Europe that will be simultaneously "smart",

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"sustainable", and "inclusive". Nonetheless, with respect to the goal of inclusiveness, there is some evidence that the redistributive capacities of advanced welfare states have declined in recent decades. An OECD (2011) report highlights that market-income inequality went up in almost all OECD countries over the past 20 years. Since the mid-1990s, however, cash transfers and progressive income taxes no longer offset this development, despite higher overall cash transfer spending (Immervoll and Richardson 2011).

The possible causes for inequalities in incomes (and wealth, education, and health) are manifold. For overall well-being and sustainability, the problem of inequality of opportunity may be by far most important (Atkinson and Morelli 2011). There is some "fairness accord" that unequal outcomes of an income-generating market process are to a certain extent acceptable, particularly when they are rooted in different levels of individual effort. Ethically or morally based notions of fairness and justice, however, suggest that differences in external circumstances that are beyond an individual's control are mostly not considered tolerable sources of inequality (Lefranc et al. 2008). "Fair inequalities" may thus co-exist with "unfair" ones (Checchi et al. 2010). Already from this perspective, the impact of external factors (such as family background, gender, or ethnicity) on individual success and/or intergenerational mobility should be reduced.

Furthermore, inequality of opportunity seems to play an important role beyond questions involving justice and fairness. Removing certain forms of inequality may lead to the achievement of other economic objectives. For instance, whereas previous empirical studies do not produce clear-cut results regarding how income inequality affects growth performance (e.g., Banerjee and Duflo 2003), Crespo Cuaresma et al. (2013) analyse the impact of unequal educational outcomes on economic growth and find that beyond the link between educational attainment and income developments, intergenerational education mobility is positively related to economic growth. In particular, countries with reduced educational disparities in their younger cohorts have grown more rapidly over the last five decades than have countries with greater educational disparities in those cohorts.

This finding is consistent with recent results suggesting that unequal outcomes due to dissimilar efforts contribute positively to economic development as incentives to work hard may be strengthened, whereas inequalities of opportunity are an obstacle for growth through reduced opportunities (Aghion et al. 1999). Marrero and Rodriguez (2013) explicitly investigate the relationship between these two different sources of inequality and growth and find a robust negative relationship between "inequality of opportunity" and growth and a positive relationship between "inequality of returns to effort" and growth. Taken together, these results lead to a revised understanding of the modern welfare state not just as an agent for the ex post redistribution of unequal incomes and wealth but more as a promoter of equal opportunities and labour market participation.

Against this background, advanced welfare states across Europe face broadly similar challenges.

- The emergence and diffusion of new technologies and the transformation from more traditional modes of industrial production towards those of post-industrial society, in addition to the associated impact of changes in life-styles and habits on the work environment, which not only generates new economic opportunities but also breed new forms of social risks. An on-going process of the individualization of lifestyles and pluralization of family forms, which has been accompanied by a shift in gender roles, also challenges traditional forms of insurance by welfare states.
- Globalization amplifies competitive pressures from within the EU and—even further—from non-European low-wage countries. On the one hand, this pressure may reduce employment prospects for particular societal groups, generating higher demand for new welfare state provisions. On the other hand, competitive forces and the increasing international mobility of tax bases further pressure the generosity of certain welfare regimes in Europe, particularly in the light of an on-going sovereign debt crisis.
- Demographic developments generate further reform challenges. Most European countries will face rapidly ageing societies and increasing diversity in foreign-born populations in the future. Rising longevity and falling fertility rates generate additional spending requirements for old-age-related issues such as public pensions and health care and simultaneously intensify fiscal strains as a result of rising old-age dependency ratios and potentially reduced economic growth (European Commission 2011). Increasing diversity, by contrast, is likely to raise demands on welfare states in terms of integrating foreign-born populations and will in all likelihood reframe the debate regarding equal opportunities among different segments of the population.
- Over time, maturing welfare states establish mutual dependencies among beneficiaries (voter groups), politicians and the welfare bureaucracy. Developed social security systems lead to entitlements for many social groups. Changing the rules creates winners that are often difficult to discern because benefits often accrue in the future and are diffuse and well-identifiable groups of losers that are often politically vocal. Implementing welfare state reforms is therefore a difficult and sometimes risky task for governments aiming to remain in office.

The remainder of this paper is based on the results of the recent 7th framework project (WWWforEurop—see: http://www.foreurope.eu/) and discusses these challenges in light of the current state of research in the respective fields. Section 2 is dedicated to the "new social risks" faced by European citizens as a consequence of socio-economic changes that are subsumed under the heading of "post-industrialization". Sections 3 and 4 address the challenges to welfare states stemming from globalization and the demographic evolutions of European societies resulting from ageing and migration. Section 5 tackles the question of welfare state reform from the perspective of political economy, whereas Sect. 6 discusses avenues for future research and draws some policy conclusions.

2 Post-industrialization, New Perspectives on Social Risks

The first of the challenges to European welfare states discussed above has led to wide-ranging discussions regarding the capacity of these states to address social risk in an effective and sustainable manner. These discussions have often been framed by the notion of "new social risks", which can generally be understood as situations in which individuals risk experiencing welfare losses as a consequence of long-term trends, such as de-industrialization and tertiarization of employment, women's entry into the labour market and the increased instability of family structures (Bonoli 2007, Pintelon et al. 2011). The problems associated with such risks include precarious positions on the labour market, the working poor, lack of sufficient social insurance and/or the inability to reconcile work and family. Thus, new social risks are typically related to changes in the sphere of the labour market or the family, and frequently result from the intersection of these two life domains (Bonoli 2006).

Depending on the definition and the perspective of interest, a list of new social risks can be home to a varying number of risk categories. There is, however, broad agreement with respect to the identification of social risk typologies. Their "novelty" must be interpreted broadly, emphasizing the quantitative dimension with respect to the quality dimension. Although most risks were also present in the past, their quantitative importance and relevance as specific social policy targets have greatly increased over recent decades (Huber and Stephens 2006). Most of the recent research—and controversy—has focused on understanding the driving forces behind these risks, their distribution across population groups and the interaction between different risk typologies. Following the synthesis by Pintelon et al. (2011), we can distinguish between three different and semi-competitive perspectives on social risk: the notion of the individualization of risk, the life course perspective and the more traditional social stratification approach.

The first perspective stresses that contemporary societies have become more fragmented and biographies more individualized, thus diminishing the role of social class and of its intergenerational transmission as structuring factors of social risk. From this angle, horizontal life trajectories and lifestyle have become more important than hierarchical determinants of inequality (Vandecasteele 2007). Social class and other external constraints have been losing importance, whereas preferences and individual agency have become increasingly relevant. Hakim (2000) for instance, has developed a "preference theory" to emphasize the role of preferences as determinants of women's life choices, arguing that social structural factors and the economic environment are declining in importance. There are indeed some indications that social stratification matters less than it used to with respect to certain risks, such as the likelihood to be affected by short-term poverty (Vandecasteele 2007). Similarly, unemployment today is more broadly spread across the population than it was in the "Golden Age" of post-war Europe, when it was confined to small groups in the workforce. These observations have led some authors to speak of a "democratization" of risk, arguing that the expansion of

flexibility and precariousness and the de-standardization of life-courses lead to a "risk society" (Beck 1986).

The life-course approach shares certain common ground with the individualization perspective, emphasizing the role played by biographical events as determinants of welfare. Welfare losses such as poverty spells can be triggered by life-course transitions (e.g., family formation and the transition from education to employment) as well as by "risky life-events", such as family partnership dissolution and health shocks, and must be understood in this context. Additionally, problems experienced during any specific life-cycle phase may be either a consequence of earlier difficulties or a precursor to later ones (NESC 2005). Both the life-course and the individualization approach emphasize the importance of agency in responding to biographical events. The life-course approach is, however, more likely than the individualization thesis to incorporate elements of hierarchical stratification in its analysis.

The fact that "traditional" determinants of social outcomes are less relevant than in the past should in fact not lead us to overstate the case for a "democratization" of risk. Social stratification research continues to emphasize the relevance of socio-economic background, gender, ethnicity and social class for numerous outcomes, including the duration of poverty, unemployment and health (Whelan and Maître 2010). For instance, Wiborg et al. (2010) examine how social origin affects unemployment risks and social assistance reception over the early life course and find that social background has a stable impact over the life course on the probability of being disadvantaged.

This finding is consistent with the findings in the literature on cumulative (dis) advantage processes, which posit that the relative (dis-)advantage of an individual or social group over another grows over time, which means that inequality with respect to factors such as cognitive development, wealth and health increases over time (DiPrete and Eirich 2006). In the framework of life-course analysis, this research has focused on how events experienced earlier in the life-course influence lifelong development and have enduring consequences on life chances (Schafer et al. 2011). A large body of literature confirms the existence of long-term consequences of childhood adversities on later life trajectories, particularly with respect to well-being and health outcomes (e.g., Brandt et al. 2012). These findings highlight the importance of early life circumstances and lend support to the view that modern welfare states should pay attention to addressing inequalities in opportunities.

From today's perspective, the most promising avenue of research to identify levers for social policy development is thus the combination of the life-course and social stratification perspectives on social risks. For instance, Whelan and Maître (2008) show that social class and life-cycle stage influence the occurrence of social risks in an interactive manner. Vandecasteele (2011) finds that life course events do not trigger identical poverty effects for different social classes and affect the most vulnerable groups disproportionately. Social class and life-course perspectives should therefore be viewed as complementary—rather than competing—hypotheses (Pintelon et al. 2011). This interdependence between stratifying ("vertical") and

biographic ("horizontal") elements is further complicated by the role of institutional factors. Welfare state institutions and policies thus have a profound effect on the occurrence and distribution of social risks.

Comparative studies reveal substantial differences between welfare states in their efficacy with respect to equalizing opportunities, to prevent risks and/or to compensate persons for welfare losses. Numerous findings highlight the relevance and usefulness of clustering exercises in the tradition of Esping-Andersen (1990) to facilitate the interpretation of institutional effects on welfare state outcomes. There are, however, a number of caveats with respect to classifying countries according to Esping-Andersen's welfare state typologies. In recent decades, European countries belonging to the same "welfare regimes" have undergone reform experiences of different magnitudes and speeds, resulting in specific reform patterns and increased heterogeneity within welfare regimes. In addition, recent research has shown that the outcomes of a classification exercise can change depending on the policy or welfare state dimension chosen. The usefulness of welfare state categorizations, thus, must be judged on an ad hoc basis, depending on the time period, the country selection and the topic under scrutiny.

The heterogeneity of welfare policies and institutions thus represents a further challenge for researchers, while providing scope for comparative analysis and identification of best practices. As suggested by Bonoli (2007) some welfare states, particularly Nordic states, have been more successful than others in adapting to changed social risk patterns and can provide useful benchmarks for reform. In light of institutional complementarities and country-specific reform patterns, detailed policy recommendations must rely on analyses that pay great attention to national circumstances.

A field in which such an analysis can provide important insights is the reconciliation of family and work, which has important repercussions on female labour market outcomes because of the continuing unequal gender division regarding unpaid work. The emergence of post-industrial labour markets has been accompanied by far-reaching changes in family life. The strong increase in the participation of women in the labour force, which was fuelled by a substantial leap in women's educational attainment, is arguably the most important trend in labour markets of the twentieth century (Goldin 2006) and certainly a salient trait of post-industrialization. On the one hand, it reflects an expansion of women's opportunities to pursue their individual self-fulfillment, to choose between different combinations of family and career involvement and to achieve economic independence. On the other hand, it has led to new tensions and needs. Because the increased level of female employment has resulted in neither an equal gender division of unpaid work nor an equivalent externalization of household activities to public or private service providers, it is primarily women who are exposed to the increased risk of experiencing some type of work-family conflict. A rapidly growing body of literature scrutinizes the opportunities and constraints associated with the multiple exigencies of family and working life as well as the outcomes that result from different individual strategies and a variety of policies (e.g., Janus 2012).

Theory and empirical evidence indicate that paid work is generally beneficial for physical and mental health and that employed persons enjoy better health than the intermittently or non-employed (Frech and Damaske 2012). This finding seems plausible because stable and steady employment is conducive to achieving economic security and is one of the most effective protective factors against poverty. Longitudinal studies confirm the findings of cross-sectional research showing the beneficial or neutral effects of employment on women's health (Klumb and Lampert 2004). Early life-course disadvantages tend to accumulate over time because more disadvantaged women are less likely to experience the work pathways associated with the greatest health benefits at later stages in life. However, the combination of work and care activities might also result in work overload and work-family conflicts. Moreover, outcomes may differ by country and country group, as work and family choices—as well as health outcomes—are shaped by different institutional settings.

This position is confirmed by Leoni and Eppel (2013), who find that women who enjoy favourable initial conditions, such as a parental home with high socioeconomic status, good childhood health conditions and high cognitive skills, are more likely to reconcile care for children with continuous employment over their life-course. This finding indicates that the moment at which women reach adulthood and start a family represents a crossroads for their future labour career. The results confirm that the pursuit of continuous employment for mothers is associated with more favourable health outcomes than career choices with only marginal or intermittent employment. This positive link however differs among welfare regimes. It is strongest in the Nordic and Eastern European countries, weaker in Continental European countries and insignificant for Southern European countries. In Southern Europe, where full-career mothers are in the minority, observable characteristics such as education and income are sufficient to explain the existing differences in health between groups. In the other welfare regimes in which employment of mothers is more common, the health effects may depend on opportunities to reconcile family with employment. These findings therefore are additional evidence that the combination of family and continuous employment is beneficial for individual well-being in a number of dimensions, which strengthens the case in favour of continuous efforts to expand policies in support of work-family reconciliation (even in times of tight budgets).

3 The Globalization Challenge for Welfare States

The notion that economic globalization is a challenge for established welfare state structures is based on theories of fiscal competition and on research into trade and factor market integration (Oates 1972, Garrett and Mitchell 2001). The conventional line of reasoning is that eliminating the barriers to international trade and factor movements, in combination with new technological developments, substantially reduces the costs of international transactions. While it is associated with a

number of important benefits (such as increased aggregate welfare) as a result of deepened international division of labour, globalization also increases competitive pressures for domestic firms to reduce production costs and for governments to adapt welfare state structures. Low-skilled workers at the bottom of the income distribution, in particular, are expected to bear the highest share of this burden in developed countries, whose comparative advantage is expected to be in the production of goods requiring the intensive use of high-skilled labour. Globalization—defined either as increasing trade or increasing foreign direct investments—is expected to be associated with a number of adjustments.

- The first adjustment will involve wage cuts as firms try to compete with imports from low-wage countries. According to this view, economic integration will exert downward pressures on the wages of unskilled workers in wealthy countries, thus leading to a substantial increase in wage inequality. If wages are not downwardly flexible, globalization will worsen employment prospects for some groups in society and amplify distributional conflicts. High wages for unskilled labour can only be maintained if firm productivity in developed countries is also high enough to maintain unit labour costs at competitive levels.
- Whereas globalization may increase wage inequality among skill groups, it may also affect other forms of inequality, such as those caused by ethnic and/or gender discrimination. In this regard, a recent World Bank report has taken a cautiously optimistic view—in contrast to conventional wisdom—based on the notion that discrimination may become unsustainable in international competition and because globalization goes hand in hand with better access to information, which may lead to the diffusion of less conservative gender norms and attitudes (World Bank 2011).
- Increased international competition and market integration may also erode the ability of welfare states to tax mobile goods and factors. To attract footloose industries, governments exposed to globalization will be "forced" to lower the tax burdens on capital and high-skilled labour. As a consequence, increasing net income for capital owners and high-skilled workers may also contribute to a rise of inequality within wealthy economies.
- Intergovernmental competition for internationally mobile tax bases will also shift public spending priorities. According to the conventional view, governments will have to cut social spending primarily, which benefits predominantly poorer segments of society. Moreover, state competition for capital will require more and better infrastructure inputs that also benefit mainly mobile firms (Keen and Marchand 1997).
- Likewise, regulations that drive up firms' production costs, such as environmental regulation or employment protection law, are also under scrutiny to become less strict or abolished. Competition for foreign direct Investment may undermine the regulatory capacities of countries and may lead to a "race-to-the-bottom" on social and environmental standards.

Therefore, globalization may simultaneously increase the need to redistribute and provide social insurance for the poorer segments of society and diminish the

ability of welfare states to redistribute income and wealth. The observed increase in market and disposable income inequality among many OECD countries noted in the introduction may therefore partly be attributed to the effects of globalization, on the one hand, and a reduced effectiveness of redistribution policies, on the other.

In the previous literature, the expected impact of globalization on welfare state expenditures and regulatory provisions is typically discussed as the "efficiency hypothesis" versus the "compensation hypothesis" (Garrett and Mitchell 2001). The efficiency hypothesis states that trade integration and international capital mobility generally constrain the welfare state. Under the assumption that governments maximize social welfare functions, competitive forces ultimately constrain benevolent politicians in striving for equality and efficiency. Hence, globalization is considered a danger for the functioning of the welfare state and, as a consequence, leads to calls for policy harmonization to mitigate downsizing pressures. From the perspective of political economy, globalization may, however, also serve as an indispensable corrective to tame a Leviathan state that redistributes tax revenues to influential interest groups and an ever-expanding public bureaucracy (Brennan and Buchanan 1980). This view of globalization is much more positive, as international competition forces governments to contain inefficient redistribution and wasteful spending. The welfare implications of the efficiency hypothesis hence differ, depending on the assumptions about the effectiveness and quality of government behaviour.

By contrast, the compensation hypothesis assumes that democratic governments face increasing political demands for social protection against a higher exposure of the economy to external shocks and a de-compressed wage structure (Iversen and Cusack 2000). From this perspective, governments respond with more protection against increased the social risks resulting from globalization, regardless of the higher costs of redistributive policies. One potential benefit of this reaction is that it increases employees' acceptance of trade liberalization and may thus improve the preconditions for a country's stable globalization path (Rodrik 1998).

Recent empirical studies find little or no confirmation of the "race-to-the-bottom" in taxation or welfare spending as a response to the forces of globalization (e.g., Meinhard and Potrafke 2012). Evidence on these issues is far more in favour of the compensation hypothesis, confirming Iversen and Cusack's (2000: 346) view that trade and financial liberalization has generated stronger policy interdependence among countries but that the seemingly causal primacy of globalization factors in shaping welfare state structures "... appears to be greatly exaggerated." In a more differentiated analysis Leibrecht et al. (2011) provide evidence in favour of the compensation hypothesis only for Western European countries. The results for Central and Eastern European countries imply that globalization leads to a significant decline in the share of social protection spending, which is more in line with the efficiency hypothesis.

This lack of clear evidence for a "race-to-the-bottom" may also be explained with "simple models" of states competing for mobile firms and taxpayers not fully captured by the complex interactions in institutional competition. A single policy instrument is typically not decisive for the locational choice of a firm; instead, it is

the quality of a bundle of policies and institutions associated with a country or region that tend to impact such locational choices. Governments imposing higher tax burdens can compensate firms with better legal or physical infrastructure or other investment incentives. Hence, there is no inevitable race to the bottom in social standards, welfare state spending or taxation.

A different problem pertains to the 'first round' effects of trade and financial markets integration: Does globalization really increase the need for social protection, and which forms of welfare state intervention are required as an adequate policy response? From this perspective, the dynamic process of adjustment following economic integration and trade liberalization remains underexplored (Dewit et al. 2009). Trade and technology may play mutually reinforcing roles in shaping labour market developments in wealthy countries. Modelling wage dynamics and unemployment has sparked research interest but remains incomplete. Thus, there is little knowledge regarding how welfare policies might be employed to spread the gains from globalization more equally.

A first case in point involves the effects of globalization on wage inequality. Until recently the dispute over the causes of increasing wage inequality in many developed countries over the past decades seemed to be settled in favour of skill-biased technological change. Katz and Autor (1999) identify skill-biased technological change as the main contributor to rising wage inequality. OECD (2011) also does not support the idea that globalization is a major source of increased wage inequality, as "[. . .] neither rising trade integration nor financial openness had a significant impact on either wage inequality or employment trends within the OECD countries. The wage-inequality effect of trade appears neutral even when only the effects of increased import penetration from emerging economies are considered." However, whereas traditionally advanced economies have traded mainly with other developed countries in the past, the recent rise in trade with low-income/low wage-countries (most notably China and India) has resulted in a shift in the structure of trade, which is associated with re-appearing fears that low-skilled workers from developed countries might lose out in competition with workers from developing countries.

Against this background, Lechthaler and Mileva (2013) differentiate between the short- and long-term distributional consequences of trade liberalization. These authors show that over both the short and long-runs, income inequality increases following trade liberalization. In the short-run, the increase is driven by a rise in the wage differential between skill-intensive and low-skill-intensive sectors. Over the medium to long-run, inequality increases due to a rising skill premium in the exporting sector. Thus the skill premium reacts only slowly to globalization, whereas wage inequality across sectors jumps on impact and then slowly recedes. As a consequence, labour market policies of developed countries should concentrate on providing moving subsidies to high-skilled workers so that they can switch the sector of their employment more easily or, equivalently, provide well-functioning matching services to reduce mobility costs to high-skilled workers. In addition, low-skilled workers value the option to train and become high-skilled in

the exporting sector; in fact, having this option drives the result that these low-skilled workers are not the main losers from trade liberalization.

By contrast, Kopasker et al. (2013) argue that country-specific productivity responses to shocks, which have been explained by differences in labour market institutions and/or in aggregate economic structures, may also impact the effectiveness of active labour market policies (ALMP). If firms of differing productivity levels are exposed to a globalization shock, then optimal ALMP suggest taxing firms and subsidizing workers in most cases. This toughens export selection, increases average industry efficiency, and expands aggregate demand by increasing workers' income. From a welfare perspective, a policy that entails picking winners by taxing exporters to sustain aggregate demand and employment via worker subsidies is preferable to a policy that does not discriminate between production for the domestic markets and exports. These policy results therefore go against the widespread assumption that hiring subsidies are more effective than worker subsidies in encouraging labour force participation as well as in generating employment. Thus, ALMP can be understood as effective in sustaining labour market participation and employment levels.

4 Demography

The demographic challenges facing the welfare state arise from two parallel developments: a noticeable ageing and a substantial increase in the ethnic diversity of the resident population. Thus, the European Commission's (2011) population forecast predicts a noticeable increase in old age as well as total dependency ratios for the overall EU and for each and every country of the EU until 2020. The old age dependency ratio (i.e., the population aged 65 or older as a percentage of the population aged 20–64) is thus predicted to rise from 28 to 42 %, and the total dependency ratio (the population aged 19 or under and the population aged 65 or older as a percentage of the population aged 20–64) from 63 to 78 % by 2020. Simultaneously, this forecast also predicts a substantial increase in migration to the EU and suggests a cumulative net immigration of approximately 13.3 million persons or 2.7 % of the EU population by 2020. Whereas this increase in migration is sufficient to keep the population from falling below its current level, it will not prevent a decline in the working age population, which would require immigration of a number equal to approximately 5 % of the EU's total population (or 24.6 million people) by 2020.

With respect to migration, however, more is at stake than just the number of migrants arriving from a sending country because its structure in terms of ethnicity and education can also have important effects on economic development. A substantial body of literature discusses the potential impact of increasing ethnic diversity on regional development and frequently argues that increasing ethnic diversity in a country may have a substantially positive effect by increasing productivity and innovation, although it may also result in increasing decision-making

costs and the potential for ethnic conflicts (Alesina et al. 2002). Similarly, migration experts (e.g., Chiswick 2005) have frequently argued that developed countries such as the EU countries should aim to attract more highly educated migrants and several studies have shown that highly skilled migrants can have a substantially positive impact on the competitiveness of an economy in terms of innovation, founding of new enterprises and exports as well as in terms of foreign direct investments (e.g., Hunt and Gauthier-Loiselle 2008). Nonetheless, many studies (e.g., Belot and Hatton 2008) also indicate that the EU as a whole is not as successful at attracting high-skilled migrants as other major receiving regions, such as Canada, Australia and the USA.

A further issue with respect to the potential challenges that migration poses for the welfare state, are the potential costs of migrants to the welfare state. In this respect, the literature frequently arrives at contradictory results. Whereas comparative studies such as OECD (2013) suggest that migrants are typically not a burden to the welfare state, a recent survey of the European country study literature concludes that "the general picture to emerge is one of higher immigrant use" of welfare programs (Barrett and McCarthy 2008). Huber and Oberdabernig (2013) show that these differences in results are likely due to the heterogeneity among immigrant populations in the EU. Not controlling for observed characteristics, these authors show that in about half of the 19 EU countries analysed, migrants receive more benefits than natives. Similarly, in about half of the countries, migrants contribute more to the welfare state than natives, measured in net terms.

Once individual and household characteristics—as well as income—are controlled for, however, these differences disappear across countries. Among the differences in characteristics contributing to this effect, differences in age, education and marital status of the household head contribute most, in addition to differences in household sizes between native and migrant households contribute most. Moreover, in a number of countries, the lower incomes of migrant households—which may result from labour market discrimination—also contribute significantly. Selective migration and sound integration policies—coupled with programs aimed at avoiding the marginalization of migrants into informal and black market activities—thus would most likely be the most effective policy measures to prevent increased migration from having detrimental fiscal effects on state budgets.

In addition, ageing has far-reaching implications for economic development and financial sustainability. In the ageing literature, there is some debate regarding whether older cohorts are less productive than younger cohorts, with quite a number of studies finding an inverse U-shaped relationship between age and productivity (Lindh and Malmberg 1999) according to which productivities peak between 30 to 44 years of age. Via its impact on consumption, ageing may also impact the savings rate and the production structure of economies. Martins et al. (2005) found that economies with a high share of elderly also tend to have lower savings rates and show that the share of consumption expenditures not only for health but also for housing increases with age, whereas expenditures for entertainment, transport and education decrease with age. Based on these results, Martins et al. (2005) predict a

substantial increase in the aggregate share of health expenditures for the OECD based on ageing. Another strand of the literature has focused on the potential impacts of ageing on labour markets but provides mixed results. Although Shimer (2001) finds a strong relationship between the proportion of youth and unemployment rates in the US—with a larger share of young persons increasing aggregate unemployment rates—Foote (2007) finds that changes in the age structure of the population have no significant impact on aggregate unemployment rates.

However, the major challenges posed by demographic ageing are associated with the fiscal sustainability of welfare states and old age pension systems. For instance, the European Commission's (2012) ageing report estimates that strictly age-related budgetary expenditures in the EU will increase by 4.1 % points of GDP until 2060, with countries such as Belgium, Cyprus, Luxembourg, Malta, the Netherlands, Slovenia and Slovakia experiencing increases in excess of 7 % points. Given these projections, Hammer et al. (2013) argue that the consequences of population ageing for overall economic development and public finances, in particular, not only depend on the extent of demographic change but are also determined by the design of the economic life cycle (i.e., by the relation between the age of individuals and their economic activities). Introducing economic dependency ratios built on data measuring age-specific averages of consumption and labour income extended by the time used for unpaid work, these authors find substantial differences across countries.

Hammer et al. (2013) find that the life cycle deficit (LCD—as a measure for the total consumption of children and elderly persons that cannot be covered out of their own labour income) for young people lies between 20 % of labour income in Austria and 29 % in Italy, and in old age it amounts to between 21 % in Sweden and 30 % in Hungary. In Sweden, the average person has a life cycle surplus of 38 years. Conversely, in Slovenia, Italy, Finland and the UK, the average person has only 32 years with a life-cycle surplus, which indicates that the design of the economic life cycle plays an important role in the redistribution of resources. For instance, the low value of the LCD in younger ages for Austria is driven by early-age entry into the labour market on average, whereas the low value of the LCD in old age for Sweden can be explained by the late exit from the labour market. As a consequence, reforms of welfare states directed at increasing the fiscal sustainability of pension systems must consider the interactions between various institutional arrangements and life cycle surpluses and deficits.

5 Social Acceptance and Implementation of Welfare State Reforms

European welfare states thus face enormous reform challenges. On the one hand, governments are confronted with political demands to address old and new social risks rooted in globalization, migration, ageing, technological change, revised

patterns of work, shifting family structures and other forms of social modernization and life-style changes. On the other hand, these same governments are confronted with an imperative to improve competitiveness and consolidate public finances. The pursuit of these objectives typically requires a substantial overhaul of established welfare state structures (i.e., either large parametric or encompassing structural reforms). Moreover, implementing such policy changes in advanced welfare states involves not only certain economic challenges but also poses inherent political problems. In democratic systems, the interactions of voters, politicians, vested interest groups and the public bureaucracy give rise to numerous impediments to reforms and (seeming) irrationalities.

Policy persistence is frequently said to be rooted in institutional factors of the political decision-making process, whereas successful implementation of welfare state reforms is often attributed to a crisis-type culmination of economic problems. Conventional wisdom holds that cutbacks of social benefits and welfare services, increasing the retirement age, or easing of strict labour market regulations carry with them huge electoral risks for an incumbent government (Pierson 1996, Buti et al. 2010) as resistance to reform often stems from concerns about its asymmetric distributional effects.

Welfare state reforms almost always create groups of winners and losers. The unpopularity of reforms that are beneficial for the long-run economic and social prospects of a society is mainly attributed to the fact that the potential winners from such a policy change large and heterogeneous societal groups, whose members are neither informed about the gains nor well-organized. By contrast, the potential losses from welfare state reforms are mainly concentrated in well-defined constituencies. They are frequently well-informed beneficiaries and insider groups, including the welfare bureaucracy, that are able to organize effectively and voice opposition to disadvantageous policy changes. As a consequence, voters expecting to lose from reforms will dominate at the ballot box over the potential winners, making retrenchment policies highly unlikely. Thus, the central question becomes the following: "Under what circumstances are governments able to pursue unpopular and politically risky reforms of the welfare state?"

The first finding is that the adverse electoral effects of such reforms may be overstated. In an analysis of structural reforms in OECD countries, Buti et al. (2010) find that market-oriented welfare state reforms are not automatically associated with electoral losses by the acting government during the following elections. The electoral impact of such policies differs strongly depending on the type of reform considered. Policy measures that hurt large groups of insiders such as changes in the pension system or reductions of employment protection legislation seem to reduce the electoral chances of the implementing government. Particularly in countries with rigid product and labour markets in which reform needs appear to be most pressing, reform-oriented governments tend to be voted out of office.

Another strand of the literature has developed the idea that governments facing both electoral constraints and severe welfare reform requirements tend to follow a strategy of "blame avoidance" (Pierson 1996). Governments aim to mitigate the

negative electoral consequences of economically necessary austerity programs and welfare benefits cuts by means of "scapegoating" (e.g., reforms that appear to be imposed by international organizations), reducing the visibility of reforms, restricting the losses to certain segments of the voting population, or by means of the development of direct and indirect schemes and political bargains to compensate (potential) losers (Pierson 1996). Such a policy strategy will, at best, produce incremental policy changes and will not enable ruling governments to push through substantial reforms (Bonoli 2011).

The role of partisan politics for welfare state reforms is debatable. Against the background of increasing fiscal consolidation pressures in many Western European countries, partisan differences seem to have become less important to the reform of welfare states (Castles 2001). Giger and Nelson (2011) argue that certain governments or parties within ruling coalition governments—depending on their ideological backgrounds or partisan positions—can even claim credit for retrenchment policies. Cuts in social policies may be tolerated or supported by some voter groups, and retrenchment policies are politically rational under certain circumstances, particularly for religious or liberal parties. The results by Van Vliet et al. (2012) indicate that left-oriented governments must provide higher unemployment protection than their non-leftist counterparts but that this effect depends on the background economic situation. Rising unemployment rates leading to increased budgetary pressures reduces left-wing governments' inclination for stronger unemployment protection.

Although such political difficulties in implementing welfare state reforms are almost universal in Western democracies, the ability of reform-oriented governments to overcome impediments to change also depends on a country's institutional framework. Constitutionally fixed decision-making rules and governance structures are of extraordinary importance to implement reform and can prove to be a major obstacle to substantial policy changes. The persistence of inefficient policies is often explained by formal institutional arrangements that generate gridlock and lead to veto positions for powerful political players. Most prominently, Tsebelis (2002) argues that increasing the number of veto actors impedes decisive political action. Thus, political systems with numerous veto points may be less suited to implement significant reforms. Applied to questions of welfare state reform, it follows that a large number of institutional and non-institutional veto players with strongly opposing partisan interests tend to inhibit both expanded benefits and the implementation of new services as well as radical cutbacks (Bonoli 2001). In line with these hypotheses, Ha (2008) reports that globalization exerted an upward pressure on welfare spending in 18 industrial countries over the 1960–2000 period, but the extent to which governments responded to rising welfare demands is negatively related to the number of political veto actors and their ideological distance in the structure of those governments.

The implementation of "more than just incremental" policy reforms is thus frequently attributed to a crisis-like culmination of economic problems, which will finally lead to a substantial shift from the previous political equilibrium (Pitlik and Wirth 2003). In the wake of a crisis, status quo preserving interest groups are

more likely to accept uncertainties associated with substantial reforms, and governments also have a greater propensity to bear the higher risks of the temporary economic hardships associated with structural changes. Crises may also stimulate change based on the policy learning of government officials, interest groups and the electorate. In revealing that the current policy model has failed, an economic downturn may convince policy makers and voters about the inferiority of the status quo policy strategies and generate incentives to implement fundamental alternatives.

However, reforms may also be impeded by the characteristics of the particular government sector that they apply to. For instance, in their case study of the rehabilitation services for the disabled, Scharle and Váradi (2013) suggest that fiscal constraints, historical commitment to equal rights, policy making capacity, and decentralization are important drivers of change. Whereas some of these factors may be, at least in the short-run, beyond the control of policy makers, some can be strengthened by governments wishing to promote the long-term performance of the welfare system. This strengthening can be achieved by enhancing the capacity of the public administration to commission and communicate empirical evidence supporting the case for reform, designing adequate policy changes and by monitoring the implementation of these changes. In addition, setting up more or less independent agencies to monitor policy implementation can also help strengthen the reform commitment of governments and defend their case in the face of opposition.

Moreover, the reform preferences of citizens may also be shaped by factors other than narrow self-interest. Behavioural economics stresses that these preferences may also be shaped by the perception of the procedural and distributive fairness of the available reform options (e.g., Alesina and Angeletos 2005), in addition to relatively stable cultural and social norms, conventions, moral values, and/or personal traits, such as informal institutions (Margalit 2013). Highly persistent core beliefs might thus be at the heart of explanations for the lack of willingness to undertake fundamental welfare state reforms. In addition, the empirical literature shows that trust and examples of reform from other countries can positively affect reform acceptance. Trust is an important driver for reforms because it lowers societal transaction costs for all types of compromise and compensation mechanisms that are conducive for a successful crisis strategy but might also lead to welfare state expansion if lower transaction costs reduce free riding (Aghion et al. 2010). Reform examples in comparable and/or neighbouring countries can help with information problems of all types. Further handicaps for reforms may stem from high societal discount rates in ageing societies—causing overemphasized of up-front reform adjustment costs to long-run reform benefits (Lechthaler and Mileva 2013)—and from poor economic knowledge about the future benefits of policy changes and from behavioural phenomena that tend to favour the status quo (Heinemann 2004). In addition, social capital or social cohesion may promote the social acceptability of reforms because it is easier overcome reform resistance in cohesive societies with high levels of horizontal and vertical solidarity (Easterly et al. 2006).

These additional constraints may be particularly relevant for the on-going large-scale reforms in Southern Europe. Heinemann and Grigoriadis (2013) show that several of these reform obstacles are empirically correlated with the individual inclination to accept reforms. The perception of procedural fairness (i.e., satisfaction with the way democracy works) together with trust are key to accepting reforms. Trust in national institutions fosters reform acceptance, and there is a strong correlation between trust in EU institutions and reform acceptance. Thus, Southern European countries may face severe handicaps in any reform process as the combination of party patronage, prevalence of corruption, and inefficient public administration undermines trust in acting politicians and bureaucrats.

More generally, Pitlik and Kouba (2013) suggest that people are willing to confer an important role to government only if this role is consistent with core beliefs *and* if the quality of the public administration is considered high (Rothstein et al. 2011). These authors find that trust in people is generally associated with greater support for redistribution and for government intervention only if the perceived quality of administration is high and confidence in companies is low. Employing Rotter's (1990) concept of a "locus of control", these authors find that the feeling of individual life control is strongly negatively related to attitudes for income equalization and government intervention (Bavetta and Navarra 2012). Nonetheless, the higher the confidence in government in relation to confidence in major companies, the smaller is individual opposition to redistributive and interventionist policies, given the level of life control. Among people who do not believe in the ability to control their own lives, both a high perceived quality of public administration and a low confidence in major companies enhances the preferences for redistribution and intervention. With regards to the external locus of control, Pitlik and Kouba focus on religiousness or belief in God. Here, the results are ambiguous. People who are religious seem less favourable towards income equalization, which indicates a proximity to the substitution theory between religion and state as two possible types of insurance against adverse events (e.g., Scheve and Stasavage 2006).

Andréasson et al. (2013), define social cohesion as a multidimensional concept that consists of five orthogonal components that they label "social divisions", "modern values", "traditional nationalism", "institutional commitment", and "fairness as merit"; these authors find that most dimensions of social cohesion do not influence the occurrence of reforms. However, fairness as merit is shown to positively affect on policy changes. Moreover, a certain degree of social division seems to be helpful in handling a crisis. From this perspective, therefore, social cohesion promotes reforms only when based on an understanding of fairness as merit.

6 Conclusions and Directions of Future Research

To the extent that policies in welfare states are directed at removing inequalities of opportunity, the literature surveyed in this paper indicates that re-distributional policies following a social investment approach are more likely than not to be conducive to growth. The frequently postulated trade-off between efficiency and equality thus does not generally apply. Countries looking for growth-friendly social policies should focus primarily on policies that provide equal opportunities and avoid exclusion or discrimination on the basis of gender, ethnicity or other characteristics. Although this conclusion may seem trivial, the empirical evidence on differences in economic outcomes between genders, ethnicities and socio-economic groups documented in the contributions surveyed (and in many others) suggest that EU Member States still have some room to improve with respect to providing equal opportunities to all residents.

Realistically, a policy based on removing inequalities in opportunities alone is unlikely to meet the changing demands on the welfare state. Some form of "traditional" redistribution and social insurance against the risks of unexpected income losses must also be a feature of any future European welfare state. The literature suggests that an analysis of redistribution over the life cycle and the impact of life-cycle events—as well as a more detailed analysis of unpaid work—is required to design effective polices. This analysis, particularly, applies to areas in which gender aspects enter the analysis.

In any case, welfare state reforms entail not only economic questions regarding the design of optimal policies but also problems regarding how the general public, third-party actors and vested interests can be motivated to support reforms. Theoretical reasoning and empirical results jointly suggest that a theory of welfare state reform resistance is severely flawed if it is simply based on the view of reform-resistance driven only by narrow self-interest. By contrast, the evidence underlines the role of core beliefs in the process of attitude formation and procedural fairness considerations. Voters require minimum confidence in their democratic institutions to accept the uncertainties involved in far-reaching institutional changes.

These findings are not only helpful in understanding the difficulties and constraints of designing sustainable reform strategies; they may also support the development of more convincing crisis strategies. Reforms cannot be successful if they only address market inefficiencies and weaknesses of the social and economic system. In addition, a promising reform strategy must also aim to build up faith in governmental institutions and public administration. A shortfall of credibility is one of the serious bottlenecks for a successful and comprehensive recovery of a region.

It should, however, also be acknowledged that different EU member states have largely different experiences with reforms and are also characterized by different reform needs. Some of these countries have addressed employment and social challenges far more effectively than others. Some have used more gradual means

of adjustment, often following a major reform step, whereas others seem only to be able to adjust by means of a radical break. Similarly, member states differ vastly in their reform requirements and readiness within different subsystems of their welfare states (education, health care or the pension system), such that it is difficult to identify one reform pattern for all EU countries. Therefore, there is substantial need for more in-depth country level analysis of the needs, preconditions and impediments of welfare state reforms.

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