Political Economy of Innovation and Export Performance in the Emerging Market in the Light of the Regulations: Turkey After 1990s

Omer Tugsal Doruk and Ergul Soylemezoglu

Abstract Innovation is essential for the economy due to it accelerates to growth process. Due to technology lowers to cost and time for production stage, innovation is crucial for the economic growth. In this paper, technology intensive exports of the real/manufacturing sectors and regulatory framework, and its relation to the regulatory framework are examined in the emerging market. In this paper, the regulatory framework of innovation activities and its impact on technology intensive exports in Turkey are examined between 1990 and 2010. Obtained results show that there is some technology intensive exports interaction with the regulatory framework, there is technology intensity exports and the regulatory framework interaction is crucial in the long term, and there is no R&D intensity exports of the manufacturing sector in the short term.

Keywords Industrialization • Innovation • Political economy • Turkey

1 Introduction

The main drivers and determinants of innovation are political, regulatory and/or incentive frameworks could be counted as essential for the economy. In the countries those are intensive for export led growth policy for economic growth and development, the technology intensive sectors are essential for gaining comparative advantage, hence for ameliorating to GDP per capita. Due to those reasons, regulatory framework of the innovation activities is crucial for economic growth, also. The countries of which growth policies based on export led growth, R&D intensive exports have critical importance for economic growth, especially for the developing countries.[1]

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[1] Due to the terms of trade effect, R&D intensive exports are catalyzer for the economic growth.

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In this paper, technology, in terms of R&D spending, and technology intensive exports relationship is examined within the regulatory framework, and the interaction of the relationship with the regulatory framework between 1990 and 2010 thereby simple robust OLS method for Turkey, which is one of the most important emerging markets in the world. Furthermore in this paper, political economic environment of innovations of which main aims the reaching to broader consumer/customer in the long run, the political incentives, subsidies and regulative framework are investigated and scrutinized after 1980s in Turkey, within the globalization and industrialization era in Turkey.

The theoretical framework was given in first chapter, and in second chapter, empirical assessment is discussed, and in the last part of the paper, the results were discussed.

2 Theoretical Underpinnings of the Innovation and Development

Technology and economic development relation is essential for the economy. The roots of the relationship between the technology and economic development are dated with Schumpeter (1912). Schumpeter (1912) emphasized creative destruction features of innovation activities for economic growth.

The simple production process is taken as according to Solow (1957) Growth Model;

$$Y = A\,F\,(K,\ L) \tag{1}$$

Where K and L are capital and labor, respectively. A often denotes technology and improvements in the sector/economy. A increases to labor productivity and decreases to k per labor. Therefore A, innovation and technological development, is essential for the economics, especially, in the emerging markets. However, Solow growth model assumes that the A is exogenous for the economy. After Solow growth model, the endogenous growth models assume that the A is endogenous for the economy. The work dated with Romer (1990). However, Romer's (1990) R&D growth model assumed that technology is endogenous and one of the main source of economic growth.

McCahery and Vermulen (2001) and Westlundab et al. (2014) emphasize that generating new legal structures and government policies are crucial for innovation and start-ups. Srholec (2005) pointed out that the empirical literature confirms high-tech products are accelerating to economic growth, and developing countries export the high-tech intensive goods.

For Turkey, concentrating on export led growth policies, R&D and export relation is crucial for economic growth. However, there might still lack of infrastructure for technological development, investment, and climate for that aim.

3   Industrialization in Turkey After the 1980s

After 24th January 1980 Decisions, new industrialization era begun after Turkey had left export substitution industrial policy.[2] In this era, Turkish economy has been a more intensive for export oriented policies. Thus, manufacturing sector's role has been crucial for the economy for achieving to the goals of the policies. After 24th January Decisions,[3] Turkish economy has had experienced export oriented policies, and the financing of the policies has been feeding up by capital inflows.

Doruk et al. (2013, pp. 588–589) pointed out that the 24th January Decisions aimed at;

> In 1978, as a result of failure to pay the short-terms liabilities,. . . In the light of these developments, the "neo-liberalism" movement that started to be effective world-wide with Reaganomics and Thatcherism; the pressure by IMF, World Bank and OECD (that provide loan funding), and resigning of Demirel government, which led to the economic regulations to be called later as the Decisions of January 24, 1980, by the military coup led to that the military government undersigned the Decisions of January 24, 1980 for Turkish economy.

The structural shifts in the economy have been directed to the economy after 1980. Furthermore Altıok and Tuncer (2013) pointed out that the structural productivity shift in the manufacturing sector could be derived from the 24th January Decisions, and is beyond the export led growth strategy which was applied. For Memis (2007) the rates of return has had increased path in the industry after the 24th January Decisions, which summarized to the new phase of Turkish economic system. For İsmihan and Metin-Özcan (2009) and Rodrik (2000), the development of industrialization era in the 1980s can be seen compared to the 1980s.

The innovation path of the industry is seen in Fig. 1, which shows innovation activities have been accelerated after the 2000s, especially after 2004 when the economy had been grown up after the 2001 crisis. As seen in Fig. 2, the exports of low technology intensive sector had increased to when the exports of medium-low intensive sector increased more than of the low technology intensive sector.

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[2] In this framework, infant industry policies were misleading policies for achieving to the industrialization target for Turkey, before the 1980s.

[3] In the light of the decisions of 24th January, Turkish Government embarked upon a series of reforms designed to accomplish the followings: remove price controls and subsidies, lessen the role of the public sector in commerce, emphasize growth in the private sector, stimulate private investments and savings, liberalize foreign trade, reduce tariffs, ease capital transfer exchange controls, privatize the Central Bank and reform the taxation system (Etkin et al. 2000).
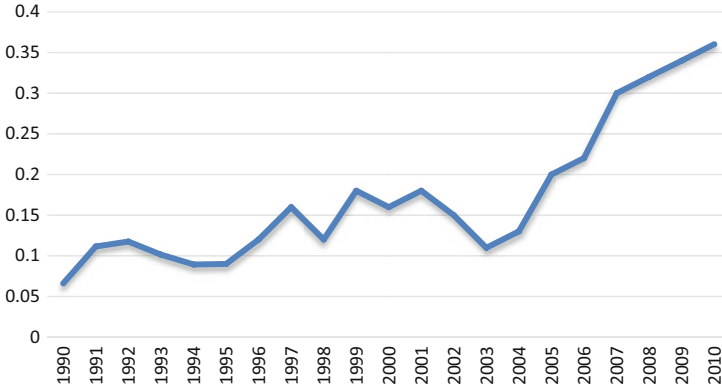
Fig. 1 The innovation path of the industry, R&D expenditures by business enterprises as of GDP %, between 1990 and 2010 [*Source* OECD (2014)]
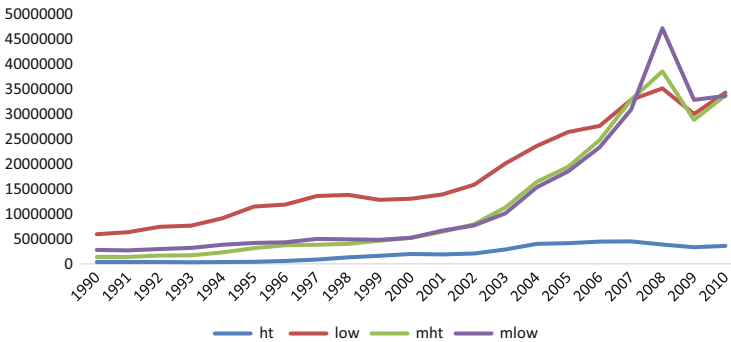
Fig. 2 The export performance of the industries in Turkey, between 1990 and 2010, $1,000 [*Source*: OECD (2014)]

4 The Regulatory Framework of the Innovation Activities in Turkey

The regulatory framework has been developing after the 1990s in Turkey, which is seen in the regulatory and incentive actions, plans in Turkey.

The patents are under the protection of the statutory decree no 551 having been effective since 1995 in Turkey. And the R&D deduction (incentive) is specified in the section "Other reductions" of the Corporate Tax Law No 5520. In order to benefit from the supports and incentives provided to the Technology Development Zones intended to be established, the companies are to be situated in the Technology development Zones (through establishing a new company/ opening a branch of any existing company) as specified in the Technology Development Zones Law No 4691. The "Law 5746 on Supporting Research and Development Activities" accepted on 28/2/2008 in order to promote innovation in our country was become

Table 1 R&D framework in Turkey, in terms of regulation after the 1990s

Corporate tax law No 5520 (Art. 10/1-a)	Law 5746 on supporting research and development activities	Technology development zones law no 4691
100 % R&D discount	100 % R&D discount	Corporate tax exemption
	Income tax withholding support (80–90 %)	Income Tax exemption (100 %)
	Support for employer's share in social security premiums (50 %)	
	Stamp duty exemption	Stamp duty exemption (payrolls)
	–	VAT exemption

Source PWC (2014)

effective at the beginning of the month following the issuance of the Law after issuance thereof in the Official Gazette No 26814 dd. 12 March 2008 to be applied until 31/12/2023. In this sense, it is believed that the full effects of this law were commenced as of 2009 This law covers the supports and incentives related to the technology centers and R&D centers in Turkey established as per the Law no 3624 dd. 12/4/1990 by the Small and medium Sized Industry Development and Supporting Administration presidency, R&D projects and pre-competition collaboration projects as well as techno-venture capital. There are laws in our country supporting innovation, which emphasized to establishment of KOSGEB. Such laws and the advantages granted thereunder are given below; R&D Reduction under the Corporate Tax law No 5520, supports and Incentives provided under the Law No 5746, Supports and Incentives provided under the Law No 4691, and Cash Support Programs (PWC 2014). The regulatory framework of innovation in Turkey was depicted in Table 1. [4]

5 Empirical Framework

In the empirical analysis of the paper, simple ordinary least squares (OLS) method is used due to accessing to limited data in Turkey.[5] The time span is between 1990 and 2010.

The hypotheses of the paper are as follows;

H1: R&D expenditures by industry accelerate to the technology/R&D intensive exports thereby the regulations.

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[4] Furthermore the national programs are as follows: TÜBİTAK-TEYDEB Support Programs, TTGV (Turkey technology Development Foundation) R&D Project Supports, San-Tez Support Program, KOSGEB Support Programs, International Programs, European Union (EU HORIZON 2020 Programme), Eureka and Eurostars Reduction, exemption, support and incentive elements covered under the laws specified tax deduction, income tax withholding support, social security premium support, stamp duty exemption, techno-venture capital support, R&D support, and corporate tax incentives (PWC 2014).

[5] The data are available after 1990 for Turkey. For detailed information; stats.oecd.org

H2: All the regulations are effective in the long term for interaction with the technology/R&D intensive exports in Turkey.

H3: High technology intensive sector is less effective for the exporting of technology/R&D intensive goods in Turkey due to late established regulatory framework in the industrialization progress.

In the light of the hypotheses, in this paper, four models are calculated, which are examining to the relation between technology/R&D intensive sector exports and regulatory framework in Turkey. The models are based on the equations are as follows;

$$HTX = \beta 0 + \beta 1 R\&Dt + \beta 295t + \beta 308t + \beta 495*HTXt + \beta 508*HTXt + \varepsilon t \quad (2)$$

$$LTX = \beta 0 + \beta 1 R\&Dt + \beta 295t + \beta 308t + \beta 495*LTXt + \beta 508*LTXt + \varepsilon t \quad (3)$$

$$MLTX = \beta 0 + \beta 1 R\&Dt + \beta 295t + \beta 308t + \beta 495*MLTXt + \beta 508*MLTXt + \varepsilon t \quad (4)$$

$$MHTX = \beta 0 + \beta 1 R\&Dt + \beta 295t + \beta 308t + \beta 495*MHTXt + \beta 508*MHTXt + \varepsilon t \quad (5)$$

where HTX denotes high technology industry exports for Model I; LTX denotes low technology industry exports for Model II; MLTX denotes middle-low technology industry exports in Model III; MHTX denotes middle-high technology industry exports in Model IV, respectively. R&D is R&D expenditure by business enterprises as of GDP. 95*HTX and 08*HTX denote the 1995 regulation and 2008 regulation interaction terms for high technology industry exports. 95*LTX and 08*LTX denote the 1995 regulation and the 2008 regulation interaction terms for low technology industry exports. 95*MLTX and 08*MLTX denote the 1995 regulation and the 2008 regulation interaction terms for low medium technology industry exports. 95*MHTX and 08*MHTX denote the 1995 regulation and the 2008 regulation interaction terms for medium high technology industry exports.

The correlation relation between the variables is depicted in Table 2. As seen in Table 2, R&D expenditures by business enterprises are highly correlated with medium-low industry exports, and high-medium industry exports positively by 90.6 and 90.9 %, respectively. Also the correlation analysis indicates that there might be multicollinearity problem if the variables will be used together for multivariate regression analysis.[6] Due to ordinary least squares estimations have autocorrelation and heteroscedasticity problem, all the models are in Table 3 estimated with robust standard errors.[7]

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[6] Multicollinearity problem is defined as a high degree correlation between the independent variables in the multivariate regression analysis. For avoiding to the estimation bias, all the independent variables were separately used in the regression analysis.

[7] All the models were estimated with standard errors (not robust) before, however, due to autocorrelation and heteroscedasticity problems, we estimated robust models. The non-robust estimates could be requested by the authors.

Table 2 Correlation relation between the variables

Variable	High technology industry export	Medium-low industry export	Medium-High industry export	Low industry export	R&D expenditures by business enterprises_
High technology industry export	–				
Medium-low industry export	0.811794	–			
Medium-high industry export	0.878244	0.985991	–		
Low R&D industry export	0.927993	0.946087	0.978148	–	
R&D expenditures by business enterprises	0.735561	0.906668	0.909066	0.882947	–

Table 3 Estimation results

	Dependent variable: high technology industry exports	Dependent variable: low technology industry exports	Dependent variable: medium-low technology industry exports	Dependent variable: high-medium technology industry exports
$R\&D\ by\ business\ enterprise_t$	−17,699.69 (0.55)	884,985.5 (0.74)	−256,308.7 (0.80)	−5,297.0 (0.99)
D_{2008}	6,698.32 (0.56)	−280,912.8 (0.74)	79,863.56 (0.80)	1,569.56 (0.99)
D_{1995}	−360,259.3 (0.00)	−7,259,320 (0.00)	−3,092,838 (0.00)	−1,700,766 (0.00)
$Constant$	362,118.6 (0.00)	7,205,440 (0.00)	3,120,383 (0.00)	1,701,361 (0.00)
I_{D2008}	−0.001 (0.57)	0.005 (0.75)	−0.001 (0.80)	−0.000351 (0.99)
I_{D1995}	1.00 (0.00)	0.99 (0.00)	1.001 (0.00)	1.00 (0.00)
R^2	0.99	0.99	0.99	0.99
$F\ stat_{p\ value}$	0.00	0.00	0.00	0.00

Note: the p values are shown in the parentheses. F statistics show the p values

According to the estimation results, there is a significant and negative relation between 1995 regulation and high technology exports, high medium technology exports, low medium technology exports, and low technology exports directly. There is no direct effect and interacted benefits of 2008 regulation for technology exports of the manufacturing sector. However, the regulation of 1995 negatively affected on high, low, medium low and high medium technology exports. However, the interaction of the regulation of 1995 has been positively affected on high technology and high medium technology exports. The regulation supported to

high technology exports, high medium technology exports, medium low technology exports, and low technology exports. The R^2 of the all models are very high, and according to F statistics, all the estimated models are sensible and significant. For decision for hypotheses; all the hypotheses are valid, and not to be refused.

6   Concluding Remarks

In this paper, the political economic framework of the innovation and export performance of the manufacturing sector in Turkey are trying to be drawn after the 1990s.

The 24th January Decisions are crucial for the structure of industry and industrialization progress for Turkey. After the decisions, manufacturing has had progressively increasing path in Turkey. In this progress, two regulations are important for innovation activities which are 1995 regulation and 2008 regulations. Obtained results show that there are positive effects of the 1995 regulation in terms of interaction of the technology intensive sector. However, the results indicate that there is no significant interaction between the technology intensive exports and the regulation of 2008; the results show that there is a long term need for the expected impact of 2008 regulation in the markets.

Obtained results indicate that our hypotheses are not refused and valid. The hypotheses of the paper are crucial for understanding the long term impact of the regulations on R&D intensive exports, and for economic growth in Turkey. The results were found that *R&D* expenditures by industry accelerate to the R&D intensive exports thereby the regulations in the long term, not in the short term. All the regulations are effective in the long term for interaction with the R&D intensive exports, especially in the developing countries. High technology intensive sector is less effective for the exporting of R&D intensive goods in Turkey due to late established regulatory framework in the industrialization progress.

The limitation of the study is lack of data availability. For further studies, it might be available time span for estimating detailed analysis and/or models.

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