

ASSESSMENT OF DYNAMICS OF THE INDEX OF THE OF THE INNOVATION AND ITS INFLUENCE ON GROSS DOMESTIC PRODUCT OF LATVIA

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Abstract

Development of innovational activity is a determinative factor of economic development of any state. In each country the strategic plan of innovative development of economy is carried out. There is a need not only to state existing situation in development of innovative processes in the certain countries, but also to reveal the general regularities (vectors) of development of these processes. Innovative activity of the European Union states is measured through SII (Summary Innovative Index). Government policies can support innovation by continually reforming and updating the regulatory and institutional framework within which innovative activity takes place. However there is a question: why in one countries development of innovations happens more quickly and effectively than in other countries? Whether means it that the governments of some countries incorrectly choose ways of development of regional economy? Whether there are for all countries general laws of development of innovative economy? How to reveal lacks in the course of introduction of innovations in real economy and how to make use of experience of the advanced countries in development of innovative processes in the separate countries? Answers to these questions can be received in details investigating development of innovative processes in the separate countries, revealing the general tendencies of development of innovative processes in the different countries, and investigation interrelation between the growth of the index of the innovation (SII) and its influence on gross domestic product European States. The object of the investigation in the paper is the economy of Latvia. The indicators of the European Innovation Scoreboard (EIS) summarize the main elements of innovation performance. The analysis of an existing level of parameter SII, describing level of development of innovational activity of the state, and also the analysis of rates of change SII necessary for achievement by the state plans in view on growth of level GDP, will allow to reveal deviations in rates of development SII (really achieved and determined on the basis of the allocated correlation dependence between parameters SII and GDP) and also to reveal the reasons causing given deviations. The information received as a result of the analysis, will allow to correct in due time an innovation policy of the state, to remove the reasons causing a deviation really achieved and forecasted values of parameter SII, and to provide due to growth of innovational activity a necessary level of economic development (GDP).

Key words: Innovation, criteria, model, management, sustainable development.

JEL: O32, O47, O52.

Introduction

The main goal of the investigation is assessment of dynamics of the index of the innovation (SII) and its influence on GDP of Latvia. Gross domestic product (GDP) is the monetary, market value of all final goods and services produced in a country over a period of a year. The real GDP per capita (corrected for inflation) is generally used as the core indicator in judging the position of the economy of a country over time or relative to that of other countries. The GDP is thus implicitly, and often even explicitly, identified with social welfare – witness the common substituting phrase ‘standard of living’. Productivity of country industries affects the value of GDP. It is widely accepted that technological change and innovation are fundamental sources of productivity and sustainable growth. It is important to be able to measure innovation at the national level because, it is widely believed, technological innovation is one of the main drivers for sustained economic growth, if not the single most important driver. Technological capabilities are those that generate and manage technical change, including skills, knowledge and experience, and institutional structures and linkages. Industrial dynamics in-

creasingly depends on technological, not production capability. One of the most important drivers of technological change is R&D. We would like to explore the technological determinants of productivity (research and development - R&D, and innovation and production capability) in Latvia through a system of innovation perspective.

Indicators of European Innovation Scoreboard

The new EUROPE 2020 Strategy has singled out innovation as one of the key drivers that can get Europe out of the current crisis and also prepare its economy for the next decade. The Innovation Union Scoreboard (IUS) has been the main tool developed at the initiative of the European Commission to provide a comparative assessment of the innovation performance of EU Member States and regions. The European Innovation Scoreboard presents 18 indicators (see Fig. 1). The indicators are grouped into three main categories. Leading of the categories is “enablers”: basic framework conditions (education, research), public R&D expenditures as % of GDP, venture capital (early stage, expansion and replacement) as % of GDP. We would like to explore the technological determinants

of productivity (research and development - R&D, and innovation and production capability) in Latvia through a system of innovation perspective. From these indicators a so-called “tentative summary

innovation index” (SII) is constructed (see Table 1 and Fig. 1). The Summary Innovation Index gives an “at-a-glance” overview of aggregate national innovation performance.

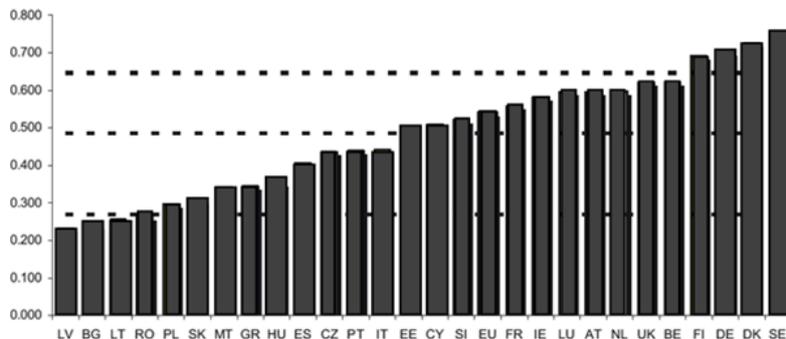


Fig.1. The Summary Innovation Index (SII) of the countries EU27 in 2011

Table 1. Summary Innovation Index (SII)

Countries \ Years	2006	2007	2008	2009	2010	2011
EU27	0.505	0.517	0.526	0.526	0.533	0.539
Latvia	0.163	0.191	0.205	0.215	0.213	0.230
Estonia	0.379	0.397	0.404	0.408	0.410	0.406
Bulgaria	0.159	0.173	0.192	0.205	0.216	0.239
Denmark	0.734	0.727	0.718	0.688	0.704	0.724

Figure 2 shows the current innovation performance of the countries (2011). As shown in Figure 2 there are four quadrants: countries above both the average EU-27 trend and the average EU-27 SII are moving ahead, countries below the average SII

but with an above average trend performance are catching up, countries with a below average SII and a below average trend are falling further behind, and countries with an above average SII and a below average trend are losing momentum.

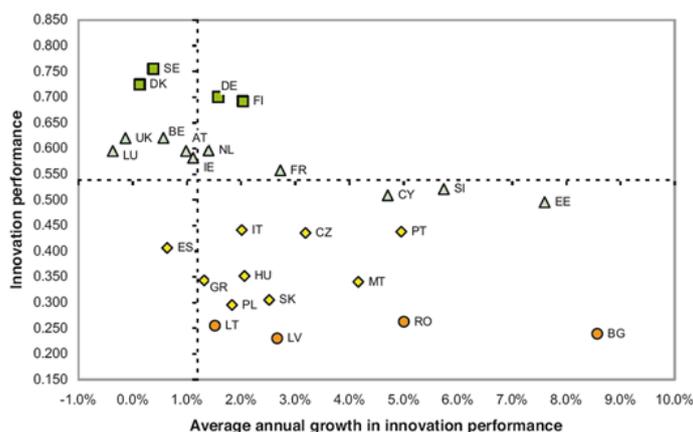


Fig. 2. Average annual growth rate of Innovation performance of the countries EU27 in 2011

Innovation leaders: Denmark, Finland, Germany, Sweden all show a performance well above that of the EU27 average. **Innovation followers:** Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Netherlands, Slovenia and the UK all show a performance close to that of the EU27 average. **Moderate innovators:** The performance of Czech Republic, Greece, Hungary, Italy, Malta, Poland, Portugal, Slovakia and Spain is below that of

the EU27 average. **Modest innovators:** The performance of Bulgaria, Latvia, Lithuania and Romania is well below that of the EU27 average. We would like to compare the innovation characteristics of Latvia with characteristics of Estonia and Bulgaria and one of innovation leaders Denmark.

Interrelation of the development of innovations and the development of economy

Let us consider in more detail one of the most topical issues – the impact of innovations, meas-

ured by means of indicators on the changes in the basic economic indicator – GDP per capita (see Table 2 and Fig. 3).

Table 2. GDP per capita for Latvia, Estonia, Bulgaria and Denmark for time period 2007-2011

Countries \ Years	2006	2007	2008	2009	2010	2011
Latvia	16,000	17,700	17,300	14,500	14,700	15,900
Estonia	20,300	21,800	21,000	18,300	19,100	20,600
Bulgaria	10,700	11,800	12,900	12,600	13,500	13,800
Denmark	37,000	37,200	37,100	35,900	36,600	37,600

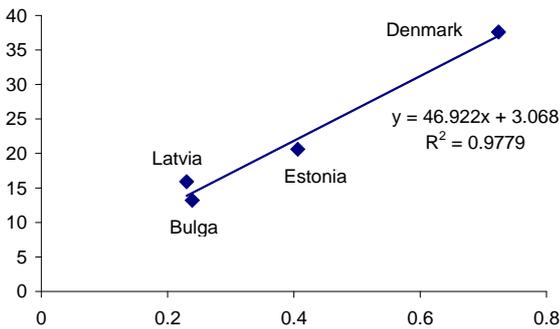


Fig. 3. SII and per capita GDP relationship for Latvia, Estonia, Bulgaria and Denmark in 2011

There appears to be a positive link between the SII and per capita GDP (Fig. 3). However, this positive link is purely due to the fact that the set of countries includes both “high-income” and “low-income” countries. In the Figure 4 is shown SII and per capita GDP relationship growth for Bulgaria and for Denmark for time period 2007–2011.

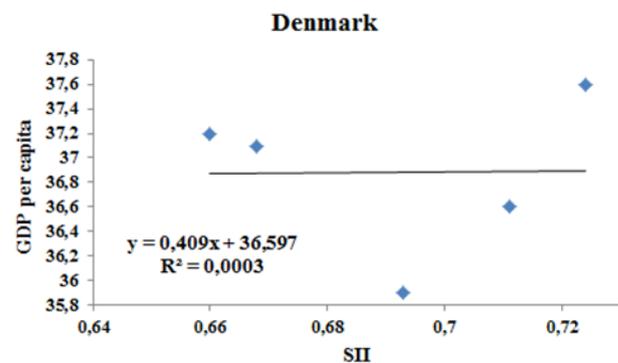
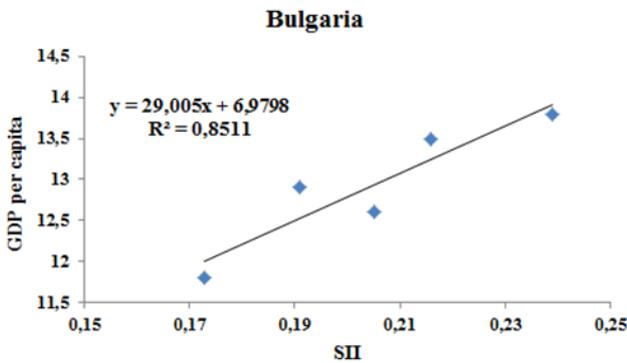


Fig. 4. SII and per capita GDP relationship growth for Bulgaria and for Denmark for time period 2007-2011

Comparing links between the SII and per capita GDP we show that more innovative countries appear to have grown at a slower pace than less in-

novative countries. In the Figure 5 is shown SII and per capita GDP relationship growth for Latvia and for Estonia for time period 2007–2011.

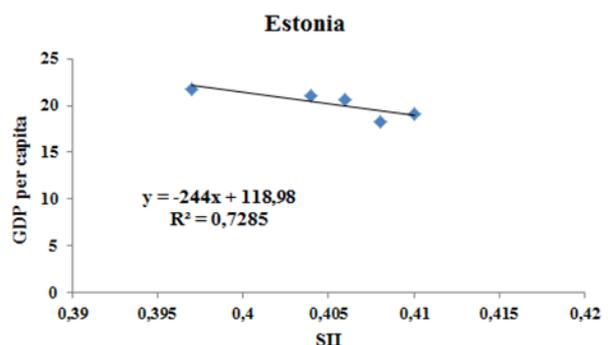
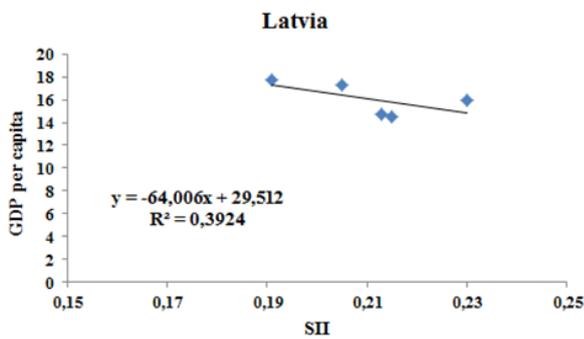


Fig. 5. SII and per capita GDP relationship growth for Latvia and for Estonia for time period 2007-2011

As shown in Figure 5, there is no positive link between the growth rate of the SII and the growth rate of per capita GDP for Latvia and Estonia. It is the result of nonefficient finansig of innovation activity in Latvia (see Fig. 6).

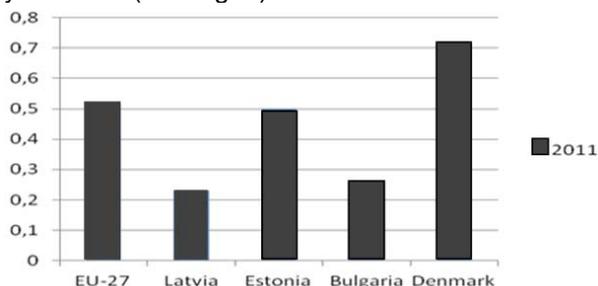


Fig. 6. SII Expenditures in 2011 for Latvia, Estonia, Bulgaria and Denmark

For Estonia the amount of SII Expenditures in 2011 comes nearer to the average level in Europe. Negative link between SII and GDP per capita (see

Fig. 6) can be the result of nonefficient innovation activity (strategy) in Estonia.

Main drivers of technological change

One of the most important drivers of technological change is R&D (R&D expenditures as % of GDP). R&D is one of the “enablers”: basic framework conditions (education, research) of the European Innovation Scoreboard. It is one of the most important drivers of technological change. It would be significantly to estimate the influence of R&D on GDP of Latvia, Estonia, Bulgaria and Denmark by benchmarking method. Benchmarking is the general name given to a range of techniques which involve comparisons between two examples of the same process so as to provide opportunities for learning. In this process researchers select examples of actual ‘best practice’ and then compare their performance with this. In the Fig. 7-10 are shown R&D% from GDP and SII change dynamics (A) and R&D and SII relationship (B) for Latvia, Estonia, Bulgaria and Denmark for time period 2007–2010.

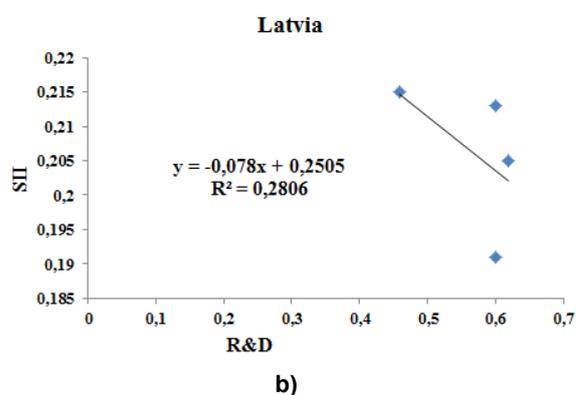
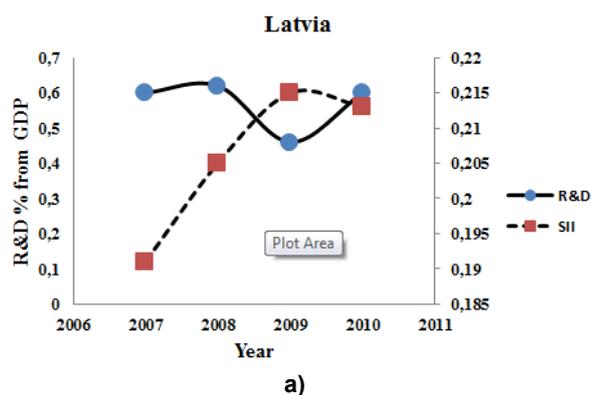


Fig. 7. R&D % from GDP and SII change dynamics (a) and R&D and SII relationship (b) for Latvia for time period 2007–2010

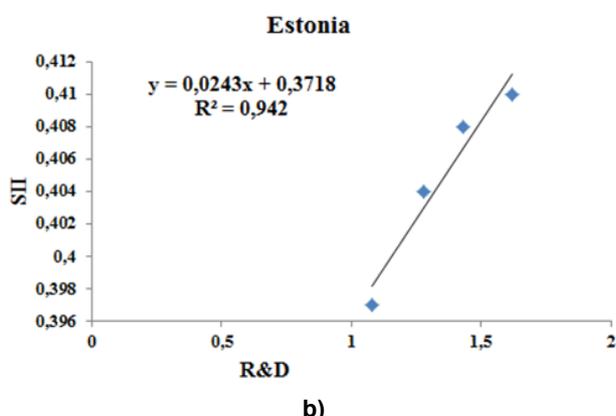
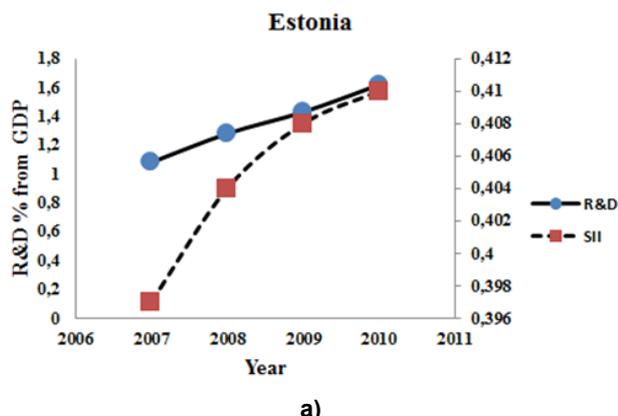


Fig. 8. R&D % from GDP and SII change dynamics (a) and R&D and SII relationship (b) for Estonia for time period 2007–2010

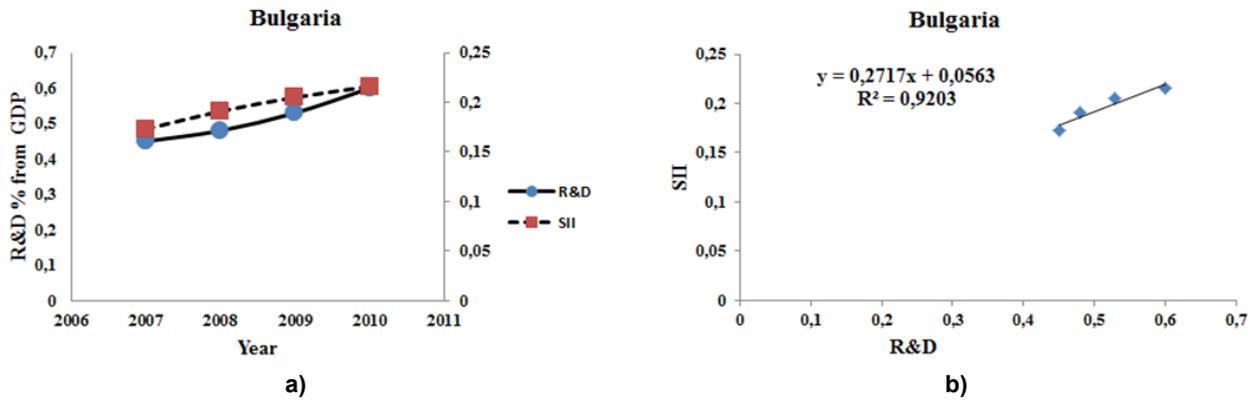


Fig. 9. R&D % from GDP and SII change dynamics (a) and R&D and SII relationship (b) for Bulgaria for time period 2007–2010

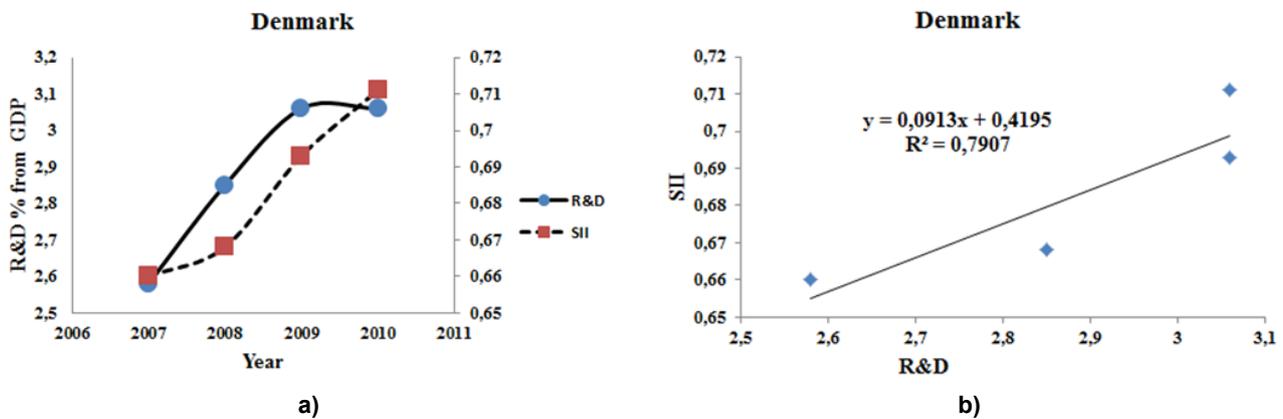


Fig. 10. R&D % from GDP and SII change dynamics (a) and R&D and SII relationship (b) for Denmark for time period 2007–2010

Innovation and technical change are the main drivers of economic growth, although it is difficult empirically to show the link between them. Differences in the abilities of countries to generate technical change are crucial for determining the speed and nature of the catching-up process. It is important to explore the technological determinants of productivity through a system of innovation perspective. Production capabilities are resources used at given technology, labour skills, product and input specifications, and the organizational methods and systems used. The distinction between production and technology capabilities is important for understanding technical change in country. Technological capabilities are those that generate and manage technical change, including skills, knowledge and experience, and institutional structures and linkages. Industrial dynamics increasingly depends on technological, not production capability. One of the most important drivers of technological change is R&D.

Conclusion

The distinction between production and technology (R&D and innovation) capabilities is important for understanding technical change in country.

Technological capabilities are those that generate and manage technical change, including skills, knowledge and experience, and institutional structures and linkages. Industrial dynamics increasingly depends on technological, not production capability. One of the most important drivers of technological change is R&D. Hence, as is the case with other factors, the issue is whether it is appropriate to isolate R&D as a driver of productivity growth from other factors. The question is how to create and adapt mathematical models regarding the current situation. Available Eurostat data according the model is Gross domestic expenditure on R&D, 2000-2010 (% share of GDP), GDP per capita and Summary Innovation Index (SII). The dependent variable in the regression is R&D in GDP. There is a functional relationship between R&D in GDP and GDP. The mathematical model helps to determine the relationship between R&D and GDP. Next step would be the qualitative institutional analyses of different economical indexes. Government of Latvia must focus more attention to funding for research and innovation (R&D). Good example for Latvia is the Danish model of financing R&D activities which shows:

- the attention towards innovation in SMEs, which could be bundled to improve their visibility and accessibility;
- the support to risk capital remains the largest policy measure in Denmark. This is consistent with the goal of the fund to create the best performing market for innovation finance in Europe;
- the increase of funding for innovation oriented policy could be achieved by increased funding from different ministries;
- new innovation policy measures were introduced in Denmark targeting private R&D investment, including increased public procurement of eco-innovations, support for large demonstration facilities. The launch of the different funds joint R&D projects has a positive impact for cooperation with universities and with research institutions.

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