

PRODUCTIVITY FACTORS AND DYNAMICS IN LATVIA

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Abstract. Productivity is crucial factor for the growth of Latvia's economy and prosperity. Although Latvia has achieved significant growth since joining the European Union, productivity growth has slowed in recent years. Today, the world is experiencing a strong shock due to Covid-19 crisis, the impact of which on productivity has not yet been widely studied.

The aim of this study is to analyse the dynamics of productivity in Latvia, structural changes in technological intensity, as well as the analysis of productivity-related factors. The impact of the Covid-19 pandemic on productivity is also analysed based on researchers' assessments and available information. The research is based on statistical data, studies, and policy documents. It aims to integrate the available data from a broad range of international and domestic sources from the perspective of Latvia. To determine the impact of the redistribution of labour resources on the overall productivity dynamics in the Latvian economy, the shift share analysis method was used.

The study shows that the low level of productivity in Latvia is largely related to structural factors - the low level of manufacturing and the dominant position of low-tech industries, the small share of knowledge-intensive industries, the business sector is dominated by SME companies, export structure, etc. The research argues that the redistribution of labour resources in Latvia in favour of more productive sectors is insufficient to have a significant impact on the faster growth of the overall productivity level of the economy. To facilitate productivity, it is important to strengthen innovation and investment in R&D, the new technologies, especially digitization, as well as investing in human capital, improving people's skills and competences.

Keywords: *productivity, economic policy, structural factors.*

JEL code: E24, J24, L60, O15, O30, O40

Introduction

Productivity is crucial factor for the growth of Latvia's economy and prosperity. Although Latvia has achieved significant growth since joining the European Union, productivity growth has slowed in recent years, and solutions need to be found to ensure faster productivity convergence. Today, the world is experiencing a strong shock due to Covid-19 crisis, the impact of which on productivity has not yet been widely studied.

Productivity dynamics are influenced by several factors, the identification and research of which is important not only for researchers, but also for public policy makers. Without an understanding of the factors that determine productivity dynamics, it is not possible to apply appropriate policy instruments to ensure sustainable economic growth.

The aim of this study is to analyse the dynamics of productivity in Latvia, structural changes in technological intensity, as well as the analysis of productivity-related factors. The impact of the Covid-19 pandemic on productivity is also analysed based on researchers' assessments and available information.

The research is based on statistical data, studies, and policy documents. It aims to integrate the available data from a broad range of international and domestic sources from the perspective of Latvia. To determine the impact of the redistribution of labour resources on the overall productivity dynamics in the Latvian economy, the shift share analysis method was used.

The research questions need to be answered: What are trends and dynamics of productivity and structural changes in technological intensity? What is the impact of the redistribution of labour resources on the overall productivity dynamics? How the Covid-19 pandemic affects productivity growth? What are the key reforms to boost productivity?

The first section of the study gives an insight into the literature on the subject and main conclusions on Latvia's productivity. In the second chapter, the authors describe the dynamics of productivity in Latvia and the pace of convergence. The third chapter deals with the productivity analysis by key industries and structural changes in technological intensity. The fourth, concluding chapter gives a description of productivity factors in Latvia such as innovation, R&D investment, digitalization, human capital. The article concludes with the main conclusions, proposals and recommendations of the study.

Literature Review

Productivity has been extensively studied in the world scientific literature. Many monographs and articles in scientific research journals, etc. have been published. International organizations, such as the Organization for Economic Co-operation and Development (OECD), the International Monetary Fund (IMF), the European Commission (EC), etc., also study productivity and look for solutions to promote it.

In particular, the issue of productivity has become relevant in recent decades, when there has been a decline in productivity growth in the world, especially in developed countries. The OECD points to several obstacles to productivity growth, including demography, education, inequality, globalization, the environment and debt. The pace of productivity growth is also significantly affected by the decline in knowledge-based capital accumulation and business start-up growth. One of the biggest problems according to the OECD, is the slowdown in the spread of innovation in the economy (OECD, 2015).

There has been growing recognition that promoting pro-productivity policies can be a particularly daunting task. Such a task is further complicated by the fact that when it comes to productivity, there is neither a silver-bullet solution, nor a standard set of reforms that can be implemented in the same way in every country (Renda, 2017, p. 197).

In order to achieve sound policy decisions based on independent analysis and recommendations, special bodies have been set up in several OECD countries - the Productivity Councils, which act as supervisory and advisory bodies in the field of economic policy, structural reform and regulation. In 2015, the OECD established the Global Productivity Forum (GFP), which aims to promote international cooperation between Productivity Councils. The EC has also set up a productivity analysis dialogue platform, like the OECD GFP.

In Latvia, too, awareness of the role of productivity in growth and prosperity is growing. Latvia's productivity promotion policy issues are included in several policy planning documents, for example, in the Latvian National Reform Program for the Implementation of the Europe 2020 Strategy, the National Development Plan, the Latvian Smart Specialization Strategy and others.

Research on Latvia's productivity and competitiveness, factors closely related to productivity, such as investment, innovation, digital technologies, employment, etc. is carried out both by international organizations such as the OECD, the IMF, the EC, etc., and Latvian researchers and state institutions.

The OECD studies on economic trends in Latvia highlight several factors that hamper productivity. The OECD Economic Surveys: Latvia 2017 (OECD, 2017) note that Latvia's low productivity is due to the relatively low participation in global value chains and the specialization of exporting companies in low-tech manufacturing. Reference is also made to the slow uptake of modern technologies, hampered by skills shortages and inadequacies. Conversely, limited access to vocational and higher education for low-income students and limited affordability of affordable housing in the region of Riga, which has the highest employment growth, are hampering skills development and better matching. Productivity growth is also hampered by underinvestment in R&D and weak innovation and cooperation between science and industry.

The 2019 OECD Economic Survey on Latvia pointed out that Latvia needs stronger productivity growth to improve its quality of life. Productivity growth has slowed down after 2008, as the financial crisis impaired the credit channel impeding stronger capital deepening and investment in innovation. The lack of skills, especially those needed to acquire digital technologies, and weak competition in some sectors with significant participation by state and municipal enterprises are also holding back productivity growth (OECD, 2019).

The IMF researchers point out that productivity growth is key to maintaining the pace of income convergence and that Latvia has made significant progress in raising productivity. At the same time, it is stated that maintaining productivity growth will not be simple, as easy gains have likely already been exhausted and firms are approaching their technology frontiers. Continued progress in implementing structural reforms will be needed to reduce the productivity gap improving the governance of public enterprises, improving the business environment, modernizing public infrastructure, and strengthening the judiciary (IMF, 2016).

Similar conclusions can be found in the European Commission's materials. The Staff Working Document states: "Latvia remains a catching-up economy and its main national development focus is on increasing its GDP per capita. As evidenced by falling productivity growth rates, the easy gains of the early catch-up stage have been exhausted. This means that productivity growth will have to increasingly rely on knowledge-intensive activities. Latvia's weakest point has been innovation, which requires investments in research and development, in developing people's knowledge and skills, and in other intangible assets. Latvia would also benefit from boosting the economic potential of its peripheral regions - increasing their accessibility, and promoting energy efficiency, employment and investment opportunities. Finally, investments in social inclusion and healthcare are needed in order to tackle high inequality and uneven access to employment and public services "(European Commission, 2019, p.4).

In 2011, the Riga School of Economics commissioned by the State Chancellery to conduct an assessment of Latvia's competitiveness (Stockholm School of Economics in Riga, 2013). The competitiveness concept chosen by the authors of the Latvia Competitiveness Report (LCR) focuses on productivity in a broad sense. The LCR indicates the causes of the biggest problems in Latvia's competitiveness. It sets out priorities for action and recommends reforms in public administration. The authors of the study believe that the policy should focus on three thematic priority areas: reducing the shadow economy, improving the quality of the education system and improving transport infrastructure. A large informal sector leads to a significant misallocation of the scarce resources of the economy, shifting them to labour-intensive, low-productivity activities, especially in the services sector. The huge share of the informal economy forces entrepreneurs to focus on exploiting short-term opportunities rather than long-term investments to increase productivity. Education was chosen as a priority area both because it is relevant to all sectors of the economy (especially important for direct areas of competitiveness such as innovation) and because it has a long implementation period. In turn, improved transport infrastructure can have a positive impact on both production and the reduction of inequalities.

The authors of LCR considered that if the above issues are successfully addressed, in the medium term it should have a significant impact on other key areas, such as income inequality, innovation, productivity, industrial growth, GDP and capital markets. development. The LCR study concludes that there must be a political will to develop a permanent process for assessing and monitoring competitiveness, and that adequate and stable funding must be provided for this purpose. Further competitiveness assessment and monitoring should be carried out by an independent body outside the government, for example by setting up a Competitiveness Institute.

Certain aspects of productivity in the Latvia's context have been also looked at in the following research publications: productivity measurement (Fadejeva L., Melihovs A., 2009. *Measuring Total Factor Productivity and Variable Factor Utilisation: Sector Approach, the Case of Latvia, Bank of Latvia Working Paper*); effects of export entry on productivity, employment and wages (Benkovskis K., Masso J., Tkacevs O., Vahter P., Yashiro N., 2018. *Export and productivity in global value chains: Comparative evidence from Latvia and Estonia*); effects on productivity due to resource misallocations in Latvia during 2007–2014 (Benkovskis K., 2018. *Misallocation, productivity and fragmentation of production: the case of Latvia - Journal of Productivity Analysis, 2018 – Springer*).

K.Benkovsky's study indicates that Latvia's productivity lag is mainly explained by low total factor productivity, significant differences in the quality of production resources (human and capital). The study concludes that the distribution of resources between Latvian companies is far from efficient, and this means that without changing the productivity level of each individual company, we can significantly increase GDP only by moving labour or capital between companies (Benkovskis, 2015).

One of the most recent researches on productivity development in Latvia is the monograph “*Raising Productivity: Trends and Future Challenges*” (editor-in-chief – Inna Steinbuka), published in May 2019. The core study of the monograph (O.Baranovs, D.Baranova, G.Berzins, I.Skribane) provides comprehensive insights into the existing research on productivity in Latvia, identifies the topicality of productivity research, and the factors determining productivity. The authors analyse the dynamics of productivity in Latvia, including sectoral aspects. This study has identified main productivity enhancing policies in Latvia, in particular ensuring a stable macroeconomic environment, improving the quality of the business environment, improving the availability and quality of the workforce, promoting higher value-added production, and ensuring sustainable development; strengthening the competitiveness of Latvian regions and Riga. The authors discuss each policy domain in detail and argue that only systemic implementation of all policies and structural reforms can provide a desirable outcome (Steinbuka, 2019, p.8).

Latvia's competitiveness and the development of productivity-related factors in the international context are also characterized by ratings created by various organizations. For example, the Global Competitiveness Index (GCI) rating, published annually by the World Economic Forum (WEF), is a globally recognized tool for assessing national competitiveness (WEF, 2019). In general, it can be concluded from the GCI rating that the problems of sustainable growth of the Latvian economy must be solved complexes with the problems of increasing competitiveness, which in turn is not possible without changing the existing economic model. In creating a new economic model based on knowledge and innovation, special attention must be paid to the existing problems, such as the quality of the institutional environment, increasing the dynamism of business, strengthening the capacity for innovation.

Several conclusions can be drawn from the literature review on Latvia's productivity.

First, the productivity gap in Latvia from developed countries, although it has narrowed in recent decades, is still large. Latvia's productivity lag is mainly explained by low total factor productivity, significant differences in the quality of production resources (human and capital).

Second, productivity growth has slowed down after 2008, as the financial crisis impaired the credit channel impeding stronger capital deepening and investment in innovation. Maintaining productivity growth will not be simple, as easy gains have likely already been exhausted and firms are approaching their technology frontiers. Productivity levels in almost all sectors are about a third of the EU-15 average. Closing such gaps will require continued progress on structural reforms.

Third, increasing productivity and competitiveness requires a comprehensive and broader approach: strong performance in one area cannot compensate for poor performance in another. Productivity dynamics are influenced by several factors, the identification and research of which is important not only for researchers and entrepreneurs, but also for public policy makers. Without an understanding of the factors that determine productivity dynamics, it is not possible to apply appropriate policy instruments to ensure sustainable economic growth. Every measure of improving the factors influencing productivity must be assessed in the context of the common economic system, where changes in one element undoubtedly require qualitative and quantitative changes in other elements as well.

Fourth, productivity growth will have to increasingly rely on knowledge-intensive activities. Latvia's weakest point has been innovation, which requires investment in research and development, in developing people's knowledge and skills, and in other intangible assets. However, policy makers must not forget the "old" problems, such as weak institutions, infrastructure gaps, regional inequalities, etc. In addition, declining population poses an additional challenge to productivity growth, as declining users put pressure on infrastructure efficiency and other activities that provide only a local market.

Fifth, given the small domestic market, Latvia's main prospects lie with exporting higher value-added goods and services and growing its export market shares. Latvia's low level of productivity is determined by the relatively weak participation of producers in global value chains and the specialization of exporting companies in low-tech production. Therefore, the opportunities to increase the level of productivity of Latvian companies are mainly related to its ability to perform technological modernization and innovation, to expand participation in world value chains.

Sixthly, there must be the political will to develop a permanent process for assessing and monitoring competitiveness, and adequate and stable funding must be provided for this purpose. Further competitiveness assessment and monitoring should be carried out by an independent body outside government.

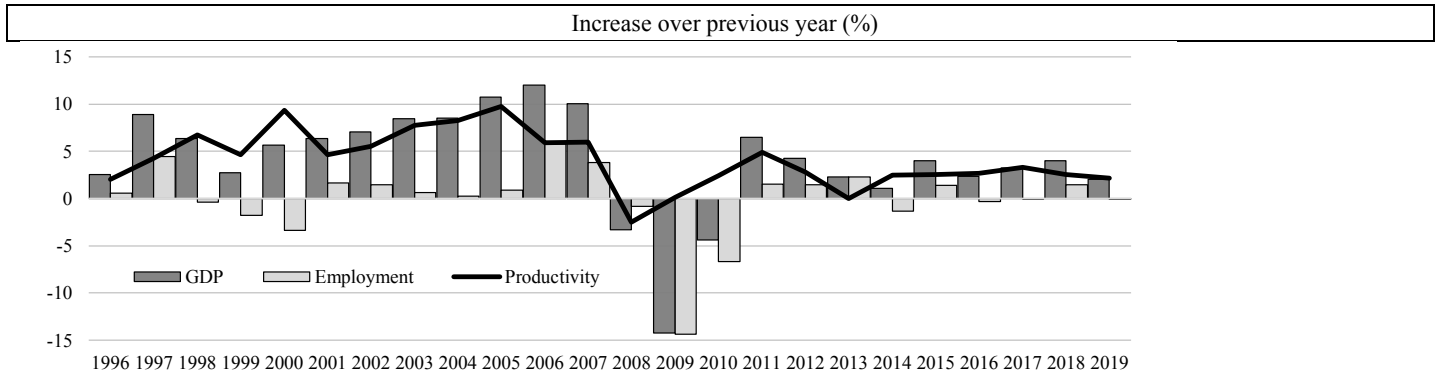
In general, we must agree with the conclusion in the monograph "Increasing Productivity: Trends and Future Challenges" that the research of productivity-related aspects in Latvia is fragmentary and lacks a systemic approach (Steinbuka, 2019). The research has been carried out mostly at the macro level, moreover, there is very little research based on company-level data, but cross-sectoral (meso-level) aspects are practically not analysed, which is largely related to the availability of data. This limits the scope for research-based and science-based structural policy recommendations. The impact of the Covid-19 pandemic on productivity has not been studied at all. It is true that too little time has passed to draw far-reaching conclusions about the impact of this pandemic on productivity.

1. Productivity dynamics in Latvia

The analysis of statistical data shows that the dynamics of productivity in Latvia since the mid-1990s has been rapid (Figure 1). Productivity in Latvia has increased almost 3 times since 1996. However, productivity growth rates in Latvia tend to decline. Faster growth was observed until 2008, especially after Latvia's accession to the EU, which became a significant stimulus for the inflow of foreign investment (mainly in the form of debt-generating flows).

The global financial crisis has affected not only the slowdown in economic activity but also productivity dynamics. In the first two years of the economic recession (2008 and 2009), it declined by almost 3 percent. However, it should be noted that the decline in productivity compared to the decline in GDP (by 17.4%) was insignificant and was mainly driven by strong labour market adjustments. By adapting to the new conditions and optimizing the attraction of resources, entrepreneurs reduced the demand for labour and the number of employees decreased by almost 15%, which partially compensated for the decrease in productivity.

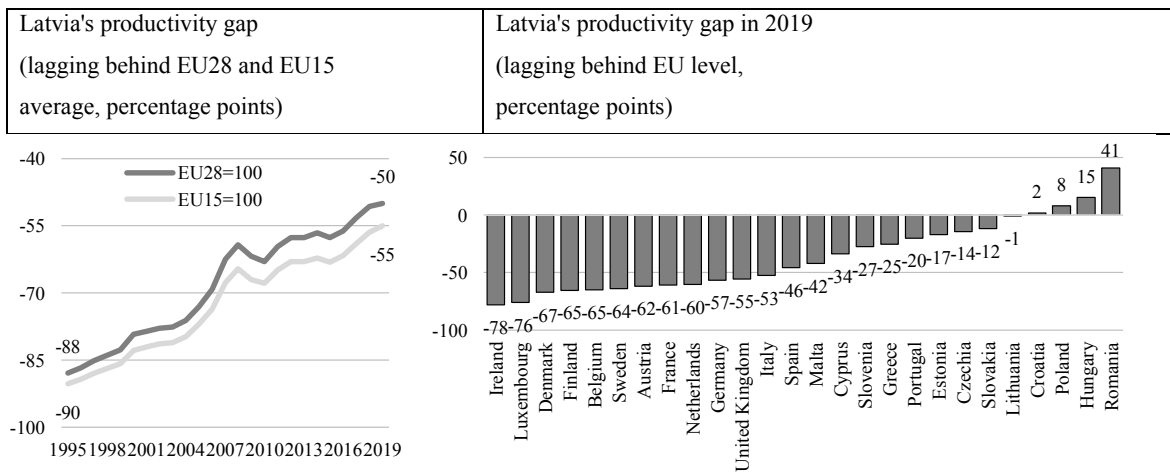
Positive productivity dynamics have resumed since 2010 but are much more moderate than before the crisis. In the last nine years (2011–2019), productivity has increased on average by 2.6% annually, i.e. almost 2.5 times slower than in 2007. The decline in productivity growth is mainly due to the slow transformation of human and physical capital into science-intensive activities. The financial crisis has worsened access to credit, hampering the deepening of capital and investment in innovation.



Source: author's construction based on the Eurostat data, 2020

Fig. 1. Annual productivity growth rates in Latvia

Although Latvia's productivity growth rates are among the fastest in the EU, compared to the EU's highly developed countries, there is still a large lag. In 2019, the productivity level in Latvia was only 49.8% (68.8% in Purchasing Power Standards) of the EU average, which is one of the lowest indicators in the EU (Figure 2).



Source: author's construction based on the Eurostat data, 2020

Fig. 2. Productivity convergence of Latvia with EU28 and EU15 average

In 2020, the Covid-19 pandemic has had a strong and lasting global impact on the socio-economic situation. As in almost all countries of the world, the economy in Latvia has entered a recession in 2020 due to the Covid-19 pandemic and the labour market has been significantly affected. However, its impact on productivity is unclear.

The impact of the Covid-19 pandemic has changed not only the labour market, but also poses significant challenges in accurately measuring productivity. The temporary closure of enterprises, the increase in teleworking and the introduction of social distancing affect data collection. Government support measures, such as downtime benefits, affect the recording of labour productivity (output per number of employees), as a person may not work (be idle), but statistics perceive it as a worker.

In this case, the productivity measured as output per hour worked seems a more appropriate measure of the efficiency at corporate level. However, the use of this indicator is also not ideal because a number of uncertainties regarding the use of short-time work schemes (European Commission, 2020a, p. 48-49).

In the conditions of "normal" economic growth, changes in productivity are similar, both in terms of output per the number of employees and against output per hour worked, then the results are very different due to the crisis. This is mainly due to both the peculiarities of labour market adjustments and the expected duration and depth of the crisis in companies' assessments.

By comparison, at the beginning of the 2008-2010 financial crisis, the number of hours worked continued to grow, while the number of employees decreased. As production or services declined, companies became more redundant, while existing workers worked more. At the same time, it should be noted that with the actual collapse of the current global financial system, it was clear in 2008 that the forthcoming crisis would be long-lasting - the economic model of the previous decade based on rapid credit growth ceased to exist.

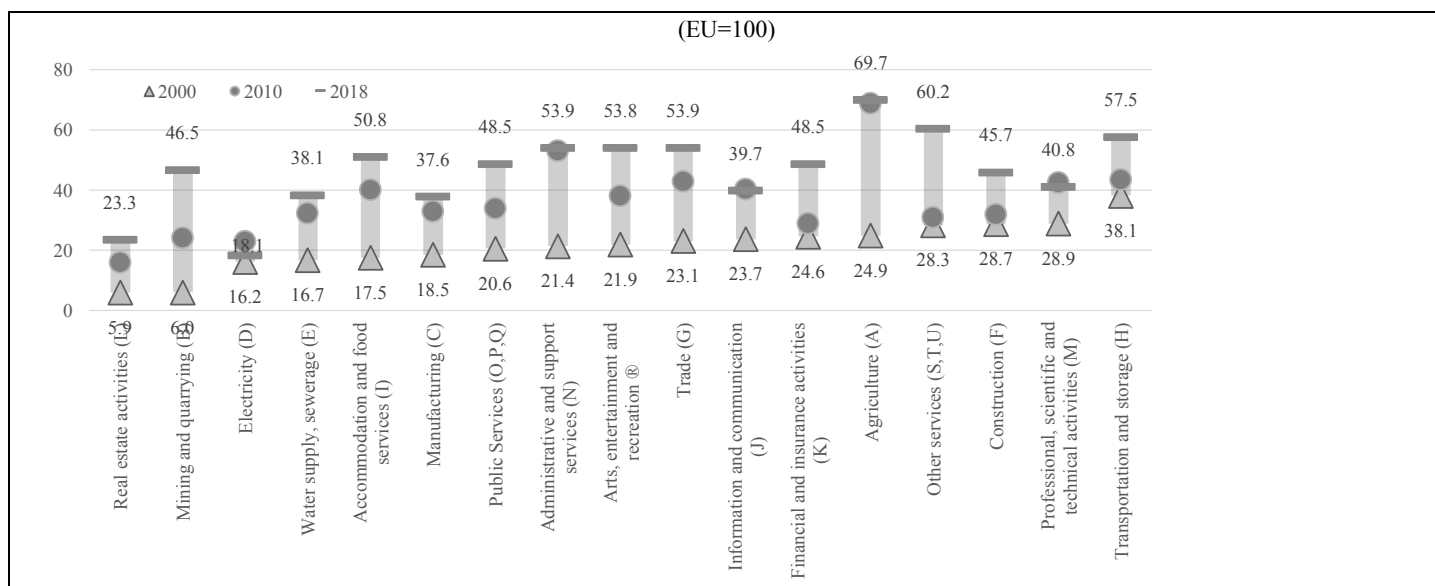
In turn, the crisis of 2020, when it started, was perceived as relatively short and quick to overcome. Initially, the most optimistic scenarios predicted a recovery of the V-type economy, believing that strict measures to limit the spread of the virus would yield good results and that the economy would return to stable growth in the second half of the year.

In terms of the number of hours worked, in the second quarter of 2020, which was the worst quarter affected by the Covid-19 crisis so far, productivity in Latvia has increased. On the other hand, in terms of the number of employees, it has decreased. Market sectors with relatively higher productivity levels are not more resilient to the Covid-19 pandemic shock than other sectors.

2.Productivity analysis by key industries and structural changes in technological intensity

Despite the slowdown in productivity in the post-crisis years, in most Latvian sectors they were faster than the EU average, which contributed to the reduction of the productivity gap with the EU also at the sectoral level.

In the period from 2000 to 2019, faster convergence of Latvia was observed in the primary sectors (agriculture and mining), where the productivity gap has narrowed by almost 40 percentage points. The slowest convergence rates were in the energy supply, professional and scientific services sectors (see Figure 3).



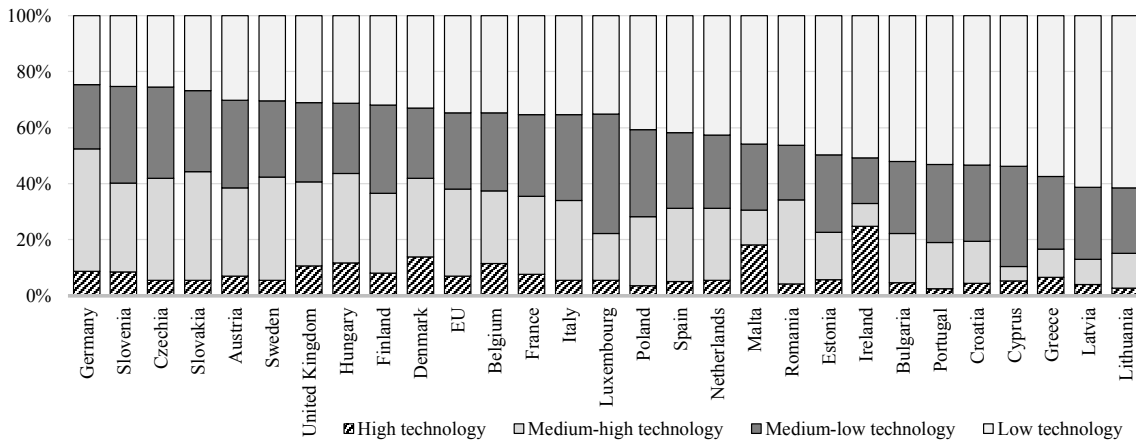
Source: author's construction based on the Eurostat data, 2020

Fig. 3. Latvia's productivity gap with the EU changes from 2000 to 2018

Analysis of the data shows that since 2011 the pace of convergence has slowed in some sectors. For example, in sectors such as agriculture, administrative services, IT services, professional and scientific services, productivity convergence to the EU average was faster until 2010, while it was very weak in the following years. Slowing down the convergence momentum could signal a "productivity trap" that requires overcoming structural reforms and significantly improving innovative solutions.

The low level of productivity is largely determined by the extremely low productivity in the manufacturing. In 2019, productivity in Latvia's manufacturing industry was almost 38% (52% in Purchasing Power Standards) of the EU average, which can be assessed as very low. Compared to 2000, the productivity gap has narrowed by almost 19 percentage points, reflecting a weak pace of convergence.

(2019, by number of employees)



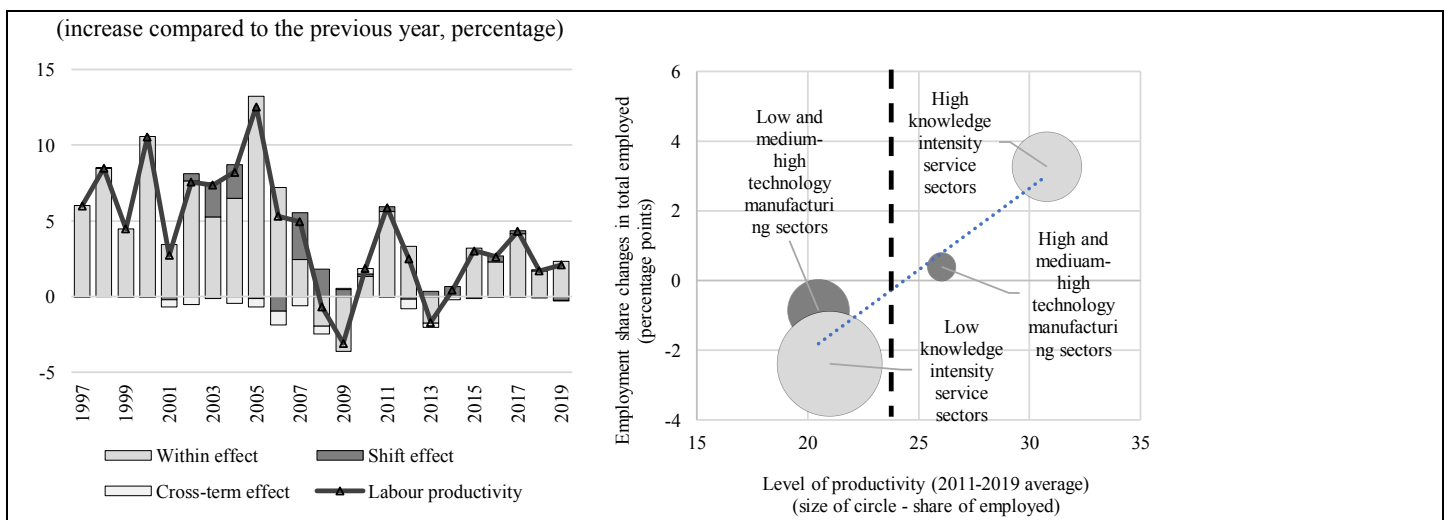
Source: author's construction based on the Eurostat data, 2020

Fig. 4. Manufacturing industry structure by technological intensity in the EU

The relatively low level of productivity and moderate dynamics of Latvia's manufacturing industry is largely determined by structural factors. The structure of Latvia's manufacturing industry is strongly dominated by low-tech industries, which in recent years account for more than half of the total value added of manufacturing and is almost one and a half times more than the EU average (see Figure 4).

Technological factors, such as the modernization of production, the improvement of existing technologies and the introduction of new technologies, play a key role in raising productivity levels. The transition from old to newer technologies contributes to productivity growth at the company and industry level. However, the effectiveness of such changes in raising overall productivity levels depends to a large extent on the redistribution of resources from the lowest to the highest productivity sectors, as well as on sectors with faster productivity dynamics.

To determine the impact of the redistribution of labour resources on the overall productivity dynamics in the Latvian economy, the shift share analysis method was used (see description of method: Ministry of Trade and Industry Republic of Singapore, 2018). This method makes it possible to determine the extent to which changes in total productivity affect individual sectors, assuming no change in the number of employees, and the extent to which they are affected by the movement of workers to higher productivity sectors as well as to more productive sectors.



Source: author's construction based on the Eurostat data, 2020

Fig. 5. Shift-share analysis of productivity in the market economy in Latvia

Fig. 6. Changes in the structure of employees in sectors with different productivity levels (2011-2019) in Latvia

In the period from 1997 to 2019 productivity dynamics in Latvia were mainly influenced by the within-sector effects, which show that productivity improvements mostly take place in each individual sector, under the influence of such factors as more skilled management, technology improvement, innovations, employee training, favourable market conditions and other sectors. due to specific factors (see Figure 5).

The shift effect of labour resources in Latvia is relatively weak - about 0.5 percentage points of annual productivity growth (1997-2019). The positive redistribution effect shows that in the analysed period the sectors with higher productivity have attracted more labour than the sectors with

lower productivity. However, their contribution to overall productivity growth was relatively small. Third effect (Cross-term effect), i.e., the impact of labour migration on sectors with faster (slower) productivity growth on overall productivity dynamics over the period under analysis was negative (0.2 percentage points on average per year). This means that industries with faster productivity dynamics attracted less labour than industries with slower productivity growth. Empirical studies show that in many cases this effect reduces overall productivity in the country. There are several interpretations of this phenomenon, for example, productivity growth is often linked to the optimization of production costs, redundancies and labour migration to sectors with slower productivity dynamics.

The analysis shows that employment is growing in sectors with above-average productivity, such as computer and electronic equipment, while employment is declining in some low-productivity sectors, such as light industry. However, many jobs are still being created in sectors with relatively lower productivity levels, such as accommodation and food service activities. In general, the redistribution of labour resources in favour of productive sectors is insufficient to have a significant impact on the faster growth of the overall productivity level of the economy (see Figure 6).

3.Productivity factors

Productivity growth is determined by several fundamental factors. These include investment and capital intensity, the ability to integrate into global value chains and increase export potential, innovation and investment in R&D to develop new products, services and methods, the benefits of new technologies and the role of scientific and technological progress in intensifying production, especially digitization, as well as investing in human capital, improving people 's skills and competences, and increasing the body of knowledge that motivates people to be productive.

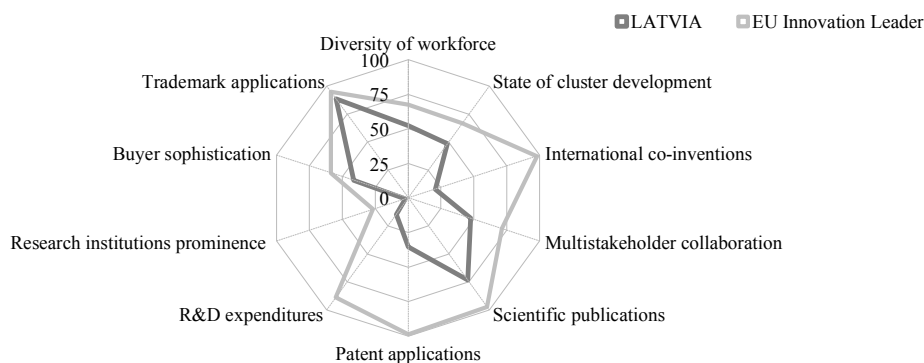
The organization and management of the production process, the specialization and concentration of production, the territorial location of production facilities, as well as the establishment of cross-sectoral horizontal and vertical links are also important for increasing productivity.

Here we analyse some of the above factors, namely innovation, R&D investment, digitization and human capital.

As it was mentioned before, Latvia's weakest point has been innovation.

In terms of innovation capacity, Latvia is ranked 52nd in the GCI 4.0 rating. In the assessment of this pillar, Latvia lags far behind not only the EU's innovative economies, but also all EU countries, except Romania. Latvia's low innovative capacity is not favourable for the future and is currently significantly limited by the low quality of research institutions, weak international cooperation in science and research, weak cooperation between scientists and entrepreneurs, low level of investment in research and development and other factors (see Figure 7).

(distance to the leader, rating from 0-100)



Source: author's construction based on the Global Competitiveness index data, 2019

Fig. 7. Comparison of Latvian and EU innovative economies by innovation capabilities

In the European Innovation Scoreboard 2020, published annually by the European Commission, Latvia ranks 23rd among 27 EU countries and is included in the group of moderate innovators for the fifth year in a row. Latvia's innovation index (Innovation Index) has increased by 22.6% since 2012 (EU average - by 8.7%) (European Commission. 2020c). The basic conditions for innovation, which include an innovation-friendly environment and financial support, are marked as Latvia's strongest drivers of innovation performance. Since 2012, the assessment of such dimensions of innovation performance as the availability of qualified and educated labour force, the attractiveness of the research system has increased. However, the activities of Latvian entrepreneurs in the field of innovation have remained relatively weak for a long time. This is evidenced by low business investment in research and development (R&D) and a small share of innovative companies.

Since 2000, the level of investment R&D (% of GDP) has increased almost 1.5 times, which was mainly due to a significant increase in investment R&D until 2007. In the following years, it averaged 0.6% of GDP, which is twice the target of 1.5% of GDP by 2020.

Private sector funding is small, accounting for about 1/4 of total R&D investment (0.2% of GDP), which is significantly lower than the EU average, where entrepreneurs provide more than half of total R&D investment funding. In the long run, the level of R&D investment by companies has not increased, but in recent years there has even been a downward trend.

The low level of business investment in research is influenced by both supply-side factors (such as the poor quality of research institutions) and demand-side factors, i.e. low share of R&D intensive industries (especially manufacturing) in the structure of the economy. High and medium high R&D intensity sectors in Latvia 2010-2018 was 5.2% of GDP on average, including 2% of GDP in manufacturing. In most EU Member States, on the other hand, the share of these sectors is much higher.

The development of the Latvian research and innovation system is also hindered by the imbalance of human capital and the fragmentation of the management of the research and innovation system in Latvia. The European Commission's Staff Working Document report points out that human capital imbalances, skills shortages and still weak links between research and industry, as well as weak cooperation within industry, are important factors hindering the development of Latvia's research and innovation system (European Commission, 2020d). Overcoming structural barriers is a significant challenge for Latvia's progress towards an innovative and knowledge-based economic model.

A breakthrough in innovation requires a change in public attitudes (innovation is not a hobby, but a necessary condition for prosperity growth) and the incentives for innovation need to be improved accordingly. The legal framework for the innovation system also needs to be improved, including the roles and responsibilities of the institutions and non-governmental organizations involved, and the system of state support for the creation, commercialization and practical implementation of intellectual property. The state should consider the possibility of coordinating the commercialization of outstanding innovative products in Latvia, so that our inventions are realized in our country and not sold to others (Steinbuka, 2019). Latvia's performance in the field of innovation could benefit from a more active involvement of the largest state-owned companies, which have the resources to afford significant investments.

Digitization is another determinant of productivity. Latvian companies lag significantly behind in the use of digital technologies, entrepreneurs lack digital skills and knowledge, skills, as well as appropriate tools (eg productivity tools for digital trade, cross-border online trade, etc.) compared to OECD member states.

Although after the introduction of high-speed broadband network Latvia exceeds the OECD and EU average level, only a few Latvian companies use new digital technologies, such as analysis of large databases, radio frequency identification technology, etc.

In the ranking of Digital Economy and Society Index (DESI) 2020, Latvia ranks 18th among 28 countries. Latvia's level of digital development generally corresponds to the EU average. In terms of connectivity (4th place) and digital public services (5th place), Latvia's indicators exceed the EU average, but in terms of the use of Internet services (19th place), human capital (24th place) and digital technology integration (23rd place) aspect lags behind (European Commission, 2020b).

Regulation plays an important role in the digital economy. Policymakers need to be aware that there are areas where there is limited scope for new business models, so the challenge is to create a regulatory framework when new business models enter the market. The current regulatory models are based on the institutional framework, while entrepreneurs do not base their activities on the institutional framework, but on specific functions. The crisis caused by COVID-19 revealed the importance of digitalisation for society's ability to adapt quickly to new circumstances. It also showed Latvia's weaknesses and became a strong impetus for the faster introduction of digital technologies in several areas. It is important to continue to promote understanding of the wide range of applications of digital technologies, as well as to improve the range of state tools to support digital transformation processes.

The availability and quality of the workforce play an important role in increasing productivity. The main directions of improving the availability and quality of labour force that are relevant for Latvia are the following:

- addressing demographic and migration issues;
- improving the availability and quality of education at all levels;
- promotion of retraining and further training.

The availability of labour is significantly affected by negative demographic changes - population decline and aging, relatively high mortality, negative natural growth and negative migration balance.

In 2019, the Latvian labour market was rapidly approaching its potential. The levels of employment and economic activity of the population in 2019 reached historically high marks. The high level of relative labour market indicators was influenced by economic growth, but also to a large extent by negative demographic trends. The total population has been declining for a long time, the share of the retirement age population is increasing, and the working age population is declining.

The shortage of labour affects both the increase in wages and labour costs - the increase in the average gross wage in the period from 2017 to 2019 was 7.8% per annum. Meanwhile, labour productivity growth has remained almost three times lower over the period considered. With the increase in labour costs, Latvia is rapidly losing its competitive advantage in low-cost market segments.

As in most countries of the world, the labour market in Latvia in 2020 is affected by the economic shock caused by Covid-19. The Covid-19 package has significantly curtailed economic activity in almost all sectors of the economy, primarily and most deeply affecting sectors such as passenger transport, travel agency and tour operator reservation services, accommodation and catering services, arts and cultural activities, sports centres and other sectors directly related to population movements and assemblages. The number of jobs in the directly affected sectors is about 60-70 thousand jobs, which is 7% of the total number of jobs in the economy. It should be noted that in many of these areas' activity may remain low for a long time.

Productivity growth will be largely driven by the restructuring of the economy from low- and medium-low-tech to medium-high and high-tech industries, thus affecting not only aggregate labour demand but also its structure, increasing the share of high-skilled jobs on the one hand and reducing low-skilled jobs. and the share of medium-skilled jobs on the other hand. One of the key factors for the future competitiveness of economies will be the ability of education systems and entrepreneurs to adapt to the new requirements of economic transformation.

In order to promote the development of human capital, several reforms have been implemented or started in Latvia, for example, the reform of the content of vocational education, the arrangement of the network of general education institutions, the introduction of a new higher education financing model, etc. However, the impact of the reforms is slow, and their positive effects on overall productivity levels can only be expected in the medium to long term.

The Ministry of Economics of Latvia forecasts that in the medium and long term, if the current structure of labour force training is maintained the following significant labour market disproportions are expected (Ministry of Economics, 2020):

- Lack of highly qualified specialists in natural sciences, ICT and engineering.
- Surplus of the workforce with higher qualifications in social sciences, business and humanities sciences.
- Shortage of labour force with vocational secondary education.
- Surplus of the workforce with secondary general education, basic education and lower levels of education.

In order to reduce possible labour market disproportions in the future, the problems need to be addressed in a complex way. For example, it is difficult to increase the number of students in science and engineering if students in primary and secondary education already have poor knowledge and little interest in the exact subjects. It should also be borne in mind that possible solutions in higher education, secondary, vocational secondary education and basic education will have a significant impact in the long term. Changes in formal education have relatively little effect on medium-term problems.

Seeing that the problem of labour shortage will intensify in the future, it is necessary to strengthen the adult education system in order to ensure the transition of labour from unproductive to growing sectors. The main directions should be to increase digital skills for the society, with a specific focus on each target group, to reduce the share of the low-skilled, and to acquire skills demanded in the labour market in the future.

The main impediments to the creation of an effective lifelong learning system are the low interest of the population, as courses and programs for building individual competencies and leisure interests are mainly required, without linking it with the possibility to increase one's income in the labour market. Weak regional mobility should also be mentioned as a barrier. It is not uncommon for potentially low pay not to motivate longer training courses. On the corporate side, more active involvement in employee training is limited by the existing economic model, which is dominated by "low-cost" strategies and does not pay to invest in employee education. The effective development of the system is also limited by the mismatch between the supply and demand of curricula, as the adult education market often has cheap, lower-quality offers. In turn, publicly monitored educational institutions are limited by administrative and funding mechanisms, which are currently not motivating.

The economy is constantly undergoing greater or lesser structural change. In order to prepare for and adapt to these changes, it is necessary to make anticipatory changes in the labour market, which include medium- and long-term labour market forecasting, dialogue between the parties involved

and decision-making on changes in the training structure. Such a well-functioning system can prevent labour market disproportions in the future and is an important element in facilitating the adjustment of labour supply and demand.

Although Latvia has been working on such a system for several years, the restructuring that precedes change in the Latvian labour market is still incomplete and insufficiently targeted, and a structured and integrated restructuring management model has not been developed to address labour market issues. There are also insufficient comprehensive discussions at all levels in Latvia about the future trends and needs of the labour market.

Conclusions, proposals, recommendations

1. Addressing productivity is gaining more momentum in scientific, public and political debate. However, the research of productivity-related aspects in Latvia is fragmentary and lacks a systemic approach. The research has been carried out mostly at the macro level, moreover, there is very little research based on company-level data, but cross-sectoral (meso-level) aspects are practically not analysed, which is largely related to the availability of data. This limits the scope for research-based and science-based structural policy recommendations.
2. The analysis of productivity dynamics in Latvia shows that it has been quite rapid in recent decades and has exceeded the EU average growth rates. Since 1996, it has increased almost 3 times. However, productivity growth rates in Latvia tend to decline.
3. Compared to the EU's highly developed countries, there is still a significant gap. Latvia's productivity lag is mainly explained by low total factor productivity, significant differences in the quality of labour and capital. The study shows that the low level of productivity in Latvia is largely related to structural factors - the low level of manufacturing and the dominant position of low-tech industries, the small share of knowledge-intensive industries, the business sector is dominated by SME companies, export structure, etc.
4. In 2020, the Covid-19 pandemic has had a strong and lasting global impact on the socio-economic situation. However, its impact on productivity is unclear. In terms of the number of hours worked, in the second quarter of 2020, which was the worst quarter affected by the Covid-19 crisis so far, productivity in Latvia has increased. On the other hand, in terms of the number of employees, it has decreased. The analysis shows that market sectors with relatively higher productivity levels are not more resilient to the Covid-19 pandemic shock than other sectors.
5. The low level of productivity in the economy is largely determined by the extremely low productivity in the manufacturing. In 2019, productivity in Latvia's manufacturing industry was almost 38% (52% after PPS) of the EU average. The relatively low level of productivity and moderate dynamics of Latvia's manufacturing industry is largely determined by structural factors. The structure of Latvia's manufacturing industry is strongly dominated by low-tech industries, which in recent years account for more than half of the total value added of the manufacturing industry, which is almost one and a half times more than the EU average.
6. The analysis shows that employment is growing in sectors with above-average productivity levels, such as the manufacture of computer and electronic equipment, while employment in some low-productivity sectors, such as light industry, is declining. However, many jobs are still being created in sectors with relatively lower productivity levels, such as accommodation and food service activities. In general, the redistribution of labour resources in favour of more productive sectors is insufficient to have a significant impact on the faster growth of the overall productivity level of the economy.
7. Productivity growth is determined by several fundamental factors. These include investment and capital intensity, the ability to integrate into global value chains and increase export potential, innovation and investment in R&D to develop new products, services and methods, the benefits of new technologies and the role of scientific and technological progress in intensifying production, especially digitization, as well as investing in human capital, improving people's skills and competences, and increasing the body of knowledge that motivates people to be productive.
8. Innovation activity in Latvia is relatively small. Small investments in research and development, low overall results in the field of innovation and average results in the field of education have a negative impact on Latvia's efforts to achieve higher productivity. Latvia's performance in the field of innovation could benefit from a more active involvement of the largest state-owned companies, which have the resources to afford significant investments.
9. Making full use of digital opportunities is essential to maintain productivity and improve living standards. In Latvia, the fixed broadband coverage of households still lags the EU average, and a digital divide has developed between urban and rural areas. Half of the Latvian population lacks basic digital skills that prevent them from using the Internet effectively. The integration of digital technologies in companies is well below the EU average. Latvia has not developed a comprehensive strategy for the digitization of companies. The lack of highly qualified professionals, including ICT professionals, is becoming an increasing barrier to investment and innovation and will be exacerbated in the future.

10. The availability and quality of the workforce play an important role in increasing productivity. The main directions of improving the availability and quality of labour force that are relevant for Latvia are the following:
- addressing demographic and migration issues;
 - improving the availability and quality of education at all levels;
 - promotion of retraining and further training.
11. In order to reduce possible labour market disproportions in the future, the problems need to be addressed in a complex way. For example, it is difficult to increase the number of students in science and engineering if students in primary and secondary education already have poor knowledge and little interest in the exact subjects. Changes in formal education have relatively little effect on medium-term problems.
12. The economy is constantly undergoing greater or lesser structural change. In order to prepare for and adapt to these changes, it is necessary to make anticipatory changes in the labour market, which include medium- and long-term labour market forecasting, dialogue between the parties involved and decision-making on changes in the training structure. Such a well-functioning system can prevent labour market disproportions in the future and is an important element in facilitating the adjustment of labour supply and demand.

Bibliography

- Benkovskis K., 2015. Misallocation of Resources in Latvia: did Anything Change During the Crisis? Latvijas Banka, Working Paper, No. 5. Available at: https://www.macroeconomics.lv/sites/default/files/wp_5_2015-en.pdf
- Central Statistical Bureau of Republic of Latvia, 2020. Available at: <https://www.csb.gov.lv/en/sakums>
- European Commission, 2019. Staff Working Document. *Country Report 2019*. SWD (2019) 1013 Final. Available at: https://ec.europa.eu/info/sites/info/files/file_import/2019-european-semester-country-report-latvia_en.pdf
- European Commission. 2020a. European Economic Forecast: Autumn 2020, Institutional Paper 136, November 2020. Available at: https://ec.europa.eu/info/publications/economic-and-financial-affairs-publications_en
- European Commission. 2020b. Digital Economy and Society Index (DESI) 2020. Available at: <https://ec.europa.eu/digital-single-market/desi>
- European Commission. 2020c. European Innovation Scoreboard 2020. Available at: <https://ec.europa.eu/docsroom/documents/42981>
- European Commission. 2020d. Staff Working Document. *Country Report 2020*. SWD (2020) 513 final. Available at: <https://op.europa.eu/en/publication-detail/-/publication/6b686de2-5946-11ea-8b81-01aa75ed71a1>
- Eurostat, 2019. Available at: <https://ec.europa.eu/eurostat>
- International Monetary Fund. Republic of Latvia: 2016 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive Director for the Republic of Latvia. June 16, 2016. Available at: <https://www.imf.org/en/Publications/CR/Issues/2016/12/31/Republic-of-Latvia-2016-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-by-43983>
- Ministry of Economics of Republic of Latvia, 2020. Report on medium and Long-Term Labour Market Forecasts. Riga, 2020. Available at: https://www.em.gov.lv/lv/ekonomikas_attistiba/darba_tirgus/videja_un_ilgtermina_darba_tirgus_proгноzes/
- Ministry of Trade and Industry Republic of Singapore. 2018. Economic Survey of Singapore 2017. Box 2.1. A Shift-Share Decomposition Analysis of Labour Productivity Growth in Singapore. February 2018. Available at: https://www.mti.gov.sg/-/media/MTI/Legislation/Public-Consultations/2018/A-Shift-Share-Decomposition-Analysis-of-Labour-Productivity-Growth-in-Singapore/ba21_aes2017.pdf
- OECD. 2015. The Future of Productivity, OECD Publishing, Paris.
- OECD. 2015. OECD Economic Surveys: Latvia 2015, OECD Publishing, Paris. Available at: http://www.oecd.org/economy/surveys/Overview_Latvia_2015_Eng.pdf.
- OECD, 2017. *OECD Economic Surveys: Latvia 2017*, OECD Publishing, Paris [Online]. Available at: http://dx.doi.org/10.1787/eco_surveys-lva-2017-en
- OECD. 2019. *OECD Economic Surveys: Latvia 2019*, OECD Publishing, Paris. Available at: <https://doi.org/10.1787/f8c2f493-en>
- Renda A., Dougherty S. 2017. Pro-Productivity Institutions: Learning From National Experience, OECD Productivity Working Papers, Paris, 2017-07.
- Steinbuka, I. (editor-in-chief), 2019. *Produktivitātes celšana: tendences un nākotnes izaicinājumi* (Raising Productivity: Trends and Future Challenges). Riga, 2019 [Online]. Available at: <https://doi.org/10.22364/pctni>

Stockholm School of Economics in Riga and Baltic International Centre for Economic Policy Studies, 2013. *Latvia Competitiveness Report*. Available at: <http://www.biceps.org/assets/docs/LCR2013>

World Economic Forum. 2018. *The Global Competitiveness Report 2018*. Geneva, 2018. Available at: <http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf>

World Economic Forum. 2019. *The Global Competitiveness Report 2019*. Geneva, 2019. Available at: http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

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