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TRENDS IN PRODUCTIVITY AND SOURCES OF PRODUCTIVITY GROWTH IN SLOVENIA

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ABSTRACT/RÉSUMÉ

Trends in productivity and sources of productivity growth in Slovenia

Slovenia's living standards measured in GDP per capita are currently some 20% below the EU15 average and have not yet reached their pre-crisis level. Given that most of this gap comes from differences in labour productivity, the paper looks at productivity trends and sources of productivity growth over past two decades. The largest labour productivity lags are in agriculture and mining and utilities, but lags are also present in services sectors such as information and communication activities, financial and insurance activities and professional services. The importance of the high and medium high technology manufacturing has risen in the last two decades, and their share in total manufacturing value added is relatively high in Slovenia. Growth accounting shows that total factor productivity (TFP) and physical capital were the main sources of economic growth before the crisis in Slovenia, while the contribution of human capital was low. With the crisis, however, the GDP growth turned highly negative due to large drops in TFP and the labour input contribution. The contribution from physical capital was also reduced, reflecting subdued investment activity. Slovenia has a high level of state control in the economy and low foreign direct investment (FDI). Using two different panel datasets – one spanning the OECD countries and another spanning Slovenia's economic activities - we find that improving both measures could significantly raise productivity.

This Working Paper relates to the 2015 *OECD Economic Survey of Slovenia* (www.oecd.org/eco/surveys/economic-survey-slovenia.htm).

JEL classification: O47, E24, J24

Keywords: productivity, Slovenia, high technology manufacturing, growth accounting, foreign direct investment

Tendances de la productivité et les sources de croissance de la productivité en Slovénie

Le niveau de vie de la Slovénie, mesuré en PIB par habitant, est actuellement inférieur d'environ 20% à la moyenne de l'UE15 et n'a pas encore atteint son niveau d'avant crise. Étant donné que la plupart de cet écart provient des différences de productivité du travail, ce document examine les tendances et les sources de croissance de la productivité au cours des deux dernières décennies. Les plus grands décalages de productivité sont présents dans l'agriculture, l'industrie minière, et les services publics. Des retards sont également présents dans certaines activités de services (information et communication, finance et assurance, et les services professionnels). L'importance de la haute et moyenne-haute technologie dans l'industrie manufacturière a augmenté au cours des deux dernières décennies, et leur part dans la valeur ajoutée manufacturière totale est relativement élevé en Slovénie. La comptabilité de la croissance montre que la productivité totale des facteurs (PTF) et le capital physique étaient les principales sources de croissance économique avant la crise en Slovénie, pendant que la contribution du capital humain était faible. Cependant avec la crise, la croissance du PIB est devenue fortement négative en raison de baisses élevées de la PTF et de la contribution du facteur travail. De même la contribution du capital physique a également été réduite, reflétant la faiblesse des investissements. La Slovénie est caractérisée par un haut niveau de contrôle de l'État dans l'économie et peu d'investissements étrangers directs (IED). À l'aide de deux ensembles de données de panel différents - l'un couvrant les pays de l'OCDE et l'autre les activités économiques de la Slovénie - nous constatons que l'amélioration des deux mesures pourrait augmenter significativement la productivité.

Ce Document de travail se rapporte à *l'Étude économique de l'OCDE de la Slovénie, 2015* (www.oecd.org/fr/eco/etudes/etude-economique-slovenie.htm).

Classification JEL : O47, E24, J24

Mots clés : productivité, Slovénie, industrie manufacturière à haute technologie, comptabilité de la croissance, investissements étrangers direct

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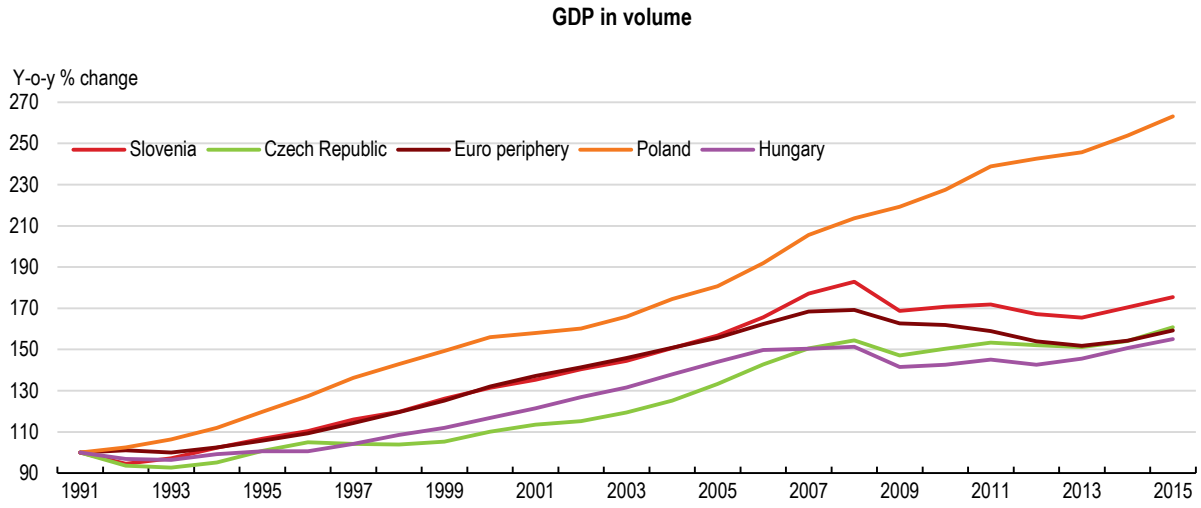
TRENDS IN PRODUCTIVITY AND SOURCES OF PRODUCTIVITY GROWTH IN SLOVENIA

By Urban Sila, Hermes Morgavi and Jeanne Dall'Orso[1]

I. Introduction

1. After independence upon the break-up of Yugoslavia in 1991, Slovenia experienced robust growth (Figure 1) and incomes rose steadily towards the EU average (Figure 2, panel A). However, Slovenia was hit hard by the crisis and the subsequent drop in output was one of the largest in the OECD. Living standards remain below the pre-crisis levels (Figure 2, panel B); GDP per capita in purchasing power parity in 2015 was 6% lower than in 2008. After a period of strong catch-up prior to the crisis, Slovenia's gap with the EU15 in terms of GDP per capita widened for over five years (Figure 2, panel A), only recently improving. Compared to other Central and Eastern European countries (CEECs), Slovenia is still ahead in terms of GDP per capita, but the CEECs' gap in GDP per capita with EU15 kept closing after the crisis. Slovenia's experience is in fact more akin to that of the other euro periphery countries (Greece, Ireland, Portugal and Spain)[2].

Figure 1. **Growth was strong after independence**



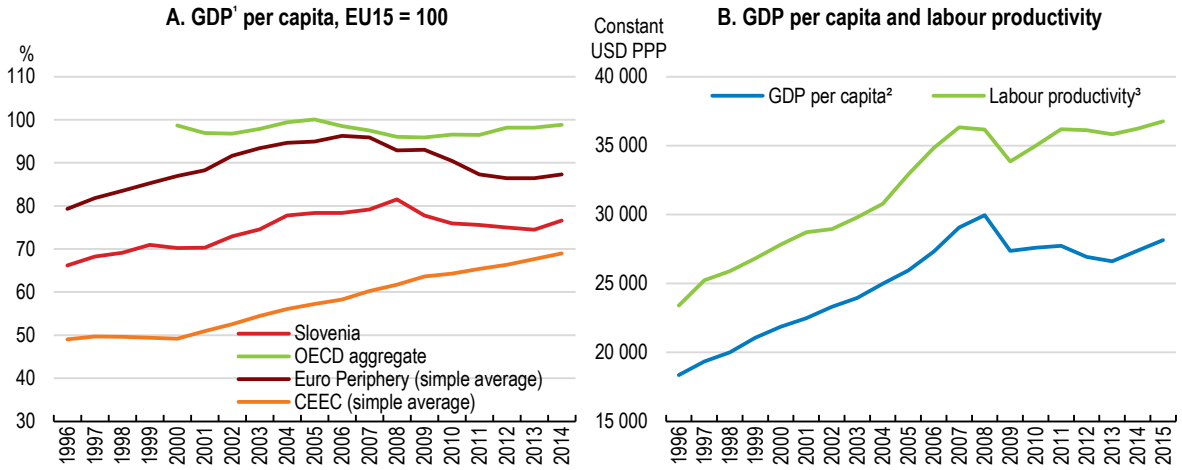
Source: OECD Economic outlook 99 database.

[1] Urban Sila and Hermes Morgavi are with the OECD Economics Department. Jeanne Dall'Orso was with the Economic Department when this paper was written. The authors thank Natasa Jemec, (Bank of Slovenia), Economics Department colleagues Piritta Sorsa, Gregoire Garsous, Zuzana Smidova and Rory O'Farrell for valuable comments on earlier drafts, and Anthony Bolton (also Economics Department) for editorial assistance.

[2] Historically, Slovenia has much in common with the other CEEC countries. However, as a member of the Eurozone Slovenia experienced the crisis in many ways similarly to other euro periphery countries. Both these country groupings, together with the EU15, will therefore be used as benchmarks throughout the paper.

2. Differences in labour productivity explain most of the gap in the living standards between Slovenia and the EU15 (Figure 3). Labour productivity - measured in GDP per hour worked - grew strongly before the crisis and dropped substantially in 2008 (Figure 2, panel B). It has, however, by now recovered to the pre-crisis levels. These more benign developments in labour productivity relative to GDP per capita reflect large adjustments in the use of labour (Figure 4). After the crisis there was a rise in the unemployment rate, but also a sizeable fall in the labour force participation and some adjustments in hours worked by the employed persons. It seems, nevertheless, that such labour market developments have been common across Europe, as most of the gap in the living standards is still explained by the gap in labour productivity. To return to the steady catch-up and improvements in living standards it will be therefore particularly important to sustain productivity growth, and also to revive employment and participation rates.

Figure 2. **Rapid catch-up stalled after the crisis**



Note: CEECs include Poland, Hungary, Slovak Republic and Czech Republic; Euro Periphery includes Spain, Portugal, Greece and Ireland.

1. GDP in million USD, current prices, current PPP.
2. GDP in USD constant prices, constant PPP (base year 2010).
3. Labour Productivity measured as GDP per thousand hours.

Source: OECD Productivity database.

3. Due to the importance of labour productivity for the gap in living standards as well as some large fluctuations in its growth we focus in this paper on exploring productivity developments and sources of productivity growth in Slovenia over the last two decades. In the next section we look at labour productivity across economic activities and in the following section at the role of high-technology manufacturing. In section IV we conduct a shift-share analysis to see whether productivity grows within economic sectors or whether productivity grows due to employment being shifted into highly productive sectors. Growth accounting in section V decomposes the GDP growth into contributions from physical capital, labour input, human capital and total factor productivity (TFP). In the next section we use time series techniques to identify any potential structural breaks in productivity growth. And finally, in section VII, using panel data analysis, we explore the effects of FDI and other institutional factors on productivity.

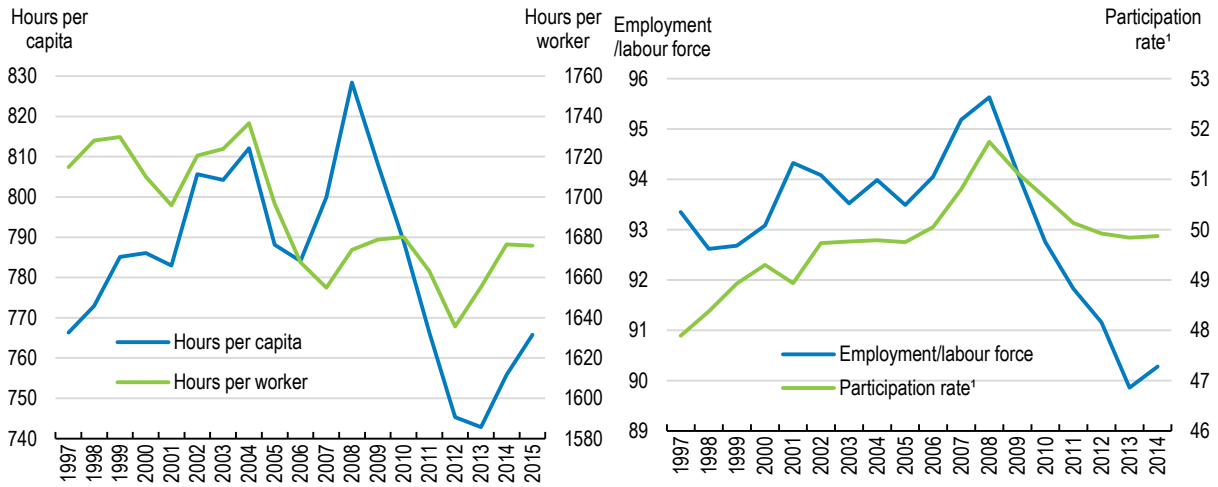
Figure 3. **Sources of living standards differences**

Percentage point difference in GDP[1] per capita with respect to the EU15

1. GDP in million USD, current prices, current PPP.
2. Labour Productivity measured as GDP per thousand hours.
3. Average hours worked per capita.

Source: OECD Productivity database.

Figure 4. There has been large adjustment in labour utilisation after the crisis



Note: Hours per capita can be decomposed into hours per worker (total hours / total employment), participation rate (labour force / population) and employment / labour force. The last term is equivalent to (1 – unemployment rate).

1. The crude activity rate (or crude labour force participation rate) refers to the ratio of the total labour force (aged 15 and over) to the total population.

Source: OECD Level of GDP per capita and productivity database, for Panel A; and OECD Short-Term Labour Market Statistics database, for Panel B.

II. Labour productivity is strikingly low in some sectors

4. In the last two decades there have been some changes in the sector composition of the Slovenian economy (Figure 5)[3]. In terms of the share in total value added there has been a secular decline in agriculture, while on the other hand services sectors such as professional activities and wholesale, retail and transport activities saw a secular rise. Construction and real estate activities experienced a strong pro-cyclical dynamics over the crisis, and today have a lower share in total gross value added (GVA) than in the year 2000. Interestingly, the manufacturing sector was strongly diminishing in relative importance prior to the crisis, but has now almost fully recovered its previous share in total GVA. On the other hand, its employment share has continued declining, indicating rising labour productivity. Agriculture has also been losing its employment share, while professional activities, public sector and information and communication activities saw rising employment shares. Compared to the EU15, Slovenia in 2015 still had a lower share of services in employment and gross value added (GVA), with significantly higher shares of agriculture, mining and utilities and manufacturing (Table 1).

5. Prior to the crisis all sectors - with exception of real estate activities - experienced growth in labour productivity (Figure 6). However, measured in GVA per employed persons, in the post crisis period (2008-2015), all sectors - with exception of agriculture - turned to a much slower or negative productivity growth (Figure 6, panel A). Likewise, if we measure productivity in terms of GVA per hour[4] (available only for more recent years), productivity growth has been slow over the last decade and many sectors have experienced negative labour productivity growth, especially construction and arts, entertainment and recreation (Figure 6, panel B). Manufacturing and agriculture, on the other hand, exhibited positive productivity growth in terms of GVA per hour also after the crisis.

6. Labour productivity remains on average 45-50% below the EU15 average (Figure 7). The worst performing sectors in this respect are agriculture (with the crop and animal production, hunting and related service activities subsector particularly underperforming). Productivity in agriculture is even below average among the CEEC countries[5] (not shown in Figure 7). Another sector with a high gap is mining and utilities, with the mining and quarrying subsector underperforming, but also water supply; sewerage, waste management and remediation activities[6]. Labour productivity is low also in information and communication activities (in particular in publishing activities and in motion picture, video, television programme production; programming and broadcasting activities), in financial and insurance services and in professional services (especially in rental and leasing activities). Manufacturing productivity is about 47% below the level in the EU15 with the lowest gap in printing and reproduction of recorded media and the highest gap in manufacture of coke and refined petroleum products. The gap is also high in manufacture of computer, electronic and optical products. Sectors where Slovenia shows the smallest gap in productivity towards the EU15 are the wholesale, retail and transport services, arts, entertainment and recreation, and real estate services.

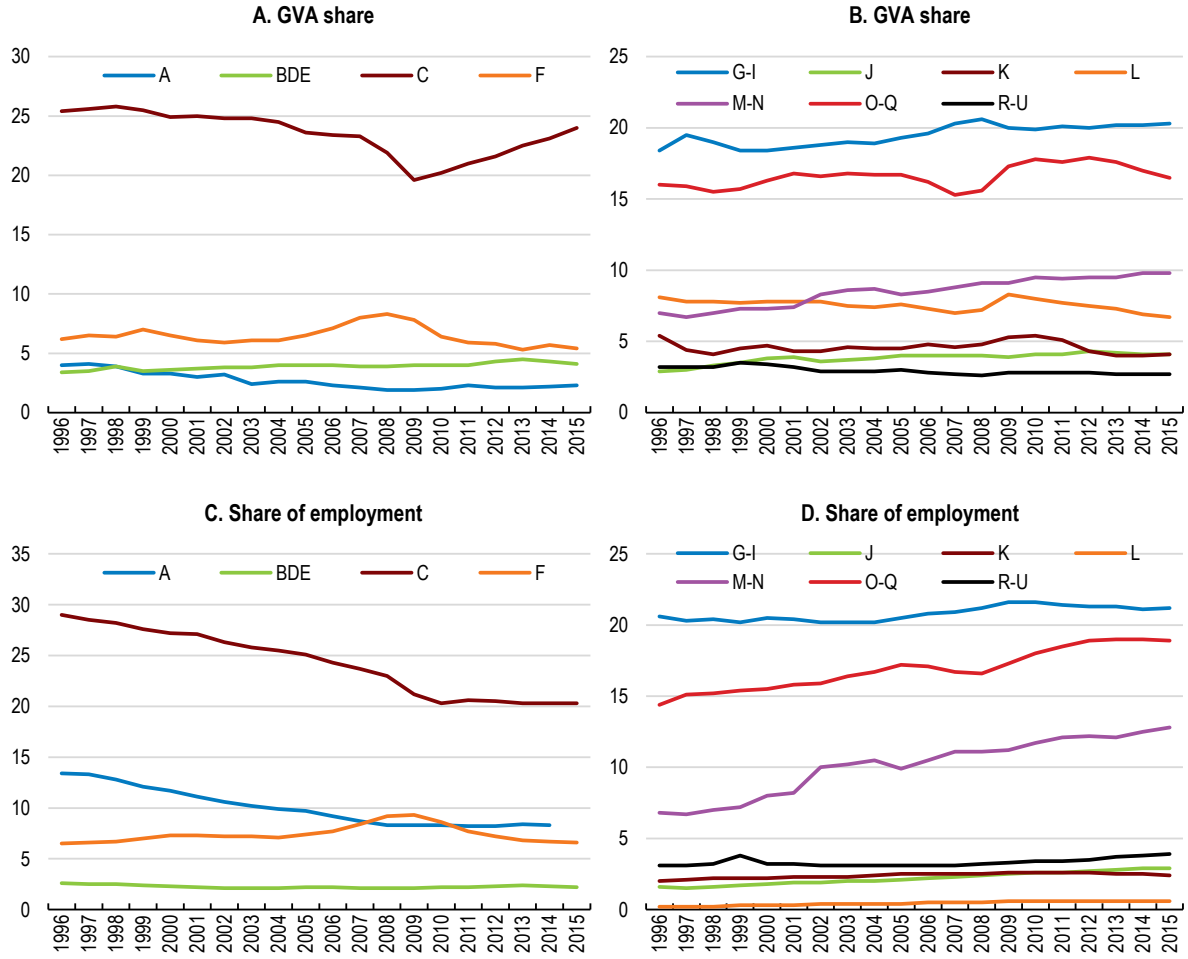
[3] See also Annex for designation of economic sectors.

[4] Labour productivity based on hours worked is a more appropriate measure of productivity. However, often labour productivity based on the number of employed persons is the only one available or available for a longer period of time. For this reason, we often report both measures in the paper.

[5] Productivity in agriculture in other CEECs is on average 1/3 below the EU15 average, while in Slovenia it is about 2/3 below.

[6] More detailed breakdown is based on data from the year 2013 due to lack of more up-to-date information.

Figure 5. **Evolution of the share of gross value added (GVA) and employment[1] across sectors**



Note: Sector designation is as follows: A - Agriculture, BDE - Mining and utilities, C - Manufacturing, F - Construction, G-I - Wholesale, Retail and Transport, J - Information and Communication, K - Finance and Insurance, L - Real Estate, M-N - Professional activities, O-Q - Public sector, R-U - Arts, entertainment and Recreation.

1. Gross Value added at current prices. Share of total employment, domestic concept.

Source: Eurostat National Accounts detailed breakdowns.

Table 1. **Shares of employment and gross value added (GVA) across sectors (2000 and 2015)**

Employment[1]						
	2000			2015		
	Slovenia	CEEC	EU15	Slovenia	CEEC	EU15
Agriculture	11.7	10.9	3.8	8.2	6.2	2.9
Mining and utilities	2.3	3.5	1.3	2.3	2.5	1.2
Manufacturing	27.2	23.7	16.7	20.3	21.5	12.6
Construction	7.3	6.3	7.2	6.6	7.1	6.1
Wholesale, retail and transport	20.5	22.0	24.6	21.2	24.3	25.0
Information and communication	1.8	1.8	2.8	2.9	2.6	3.0
Finance and insurance	2.2	1.9	3.0	2.4	2.1	2.8
Real estate	0.3	1.3	0.9	0.6	1.4	1.1
Professional activities	8.0	5.5	10.4	12.8	8.5	13.8
Public sector	15.5	20.3	23.1	18.9	20.2	24.8
Arts, entertainment and recreation	3.2	2.9	6.1	3.9	3.5	6.8

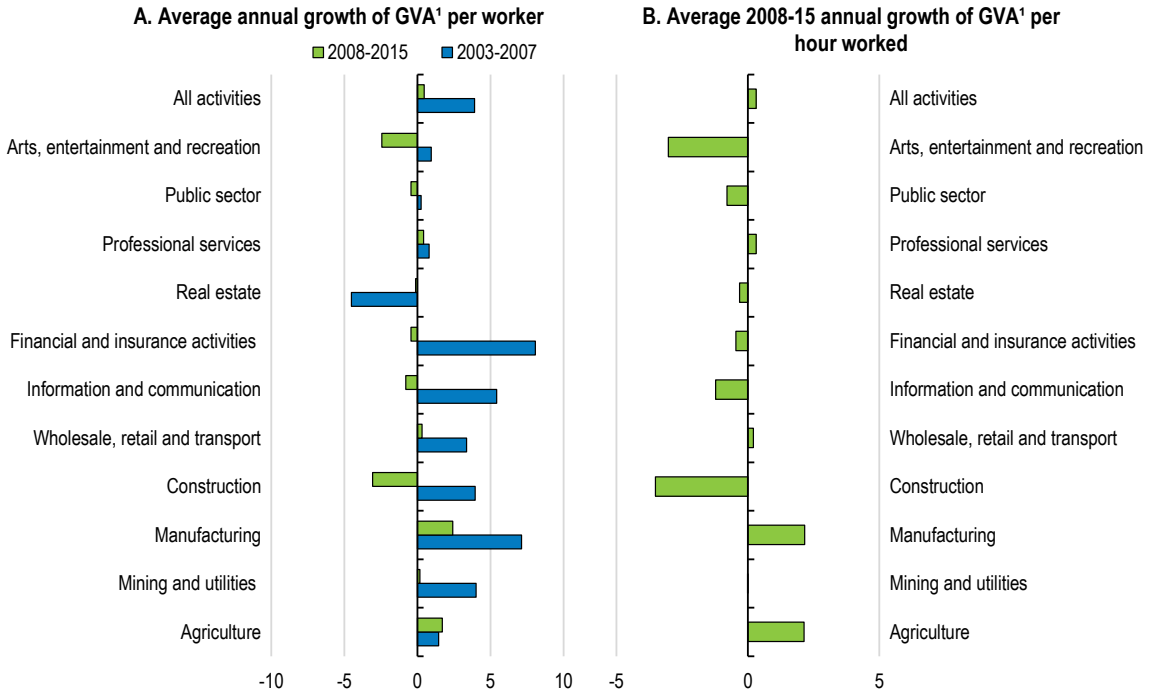
Gross value added[2]						
	2000			2015		
	Slovenia	CEEC	EU15	Slovenia	CEEC	EU15
Agriculture	3.3	4.3	2.0	2.3	3.2	1.4
Mining and utilities	3.6	5.1	3.3	4.1	4.8	3.2
Manufacturing	24.9	22.6	18.7	24.0	23.0	15.1
Construction	6.5	6.7	5.8	5.4	6.8	5.3
Wholesale, retail and transport	18.4	22.1	19.3	20.3	21.0	18.7
Information and communication	3.8	4.1	5.0	4.1	4.6	5.0
Finance and insurance	4.7	3.4	4.9	4.1	4.0	5.4
Real estate	7.8	7.7	9.7	6.7	7.0	11.4
Professional activities	7.3	6.4	10.0	9.8	7.7	11.1
Public sector	16.3	15.1	17.8	16.5	15.2	19.5
Arts, entertainment and recreation	3.4	2.5	3.5	2.7	2.8	3.7

1. Percent of total employment.
2. Share in total gross value added (in current prices).

Note: CEEC represents a simple average and includes Poland, Hungary, Czech Republic and Slovak Republic. EU 15 is the Eurostat aggregate.

Source: Eurostat National Accounts detailed breakdowns.

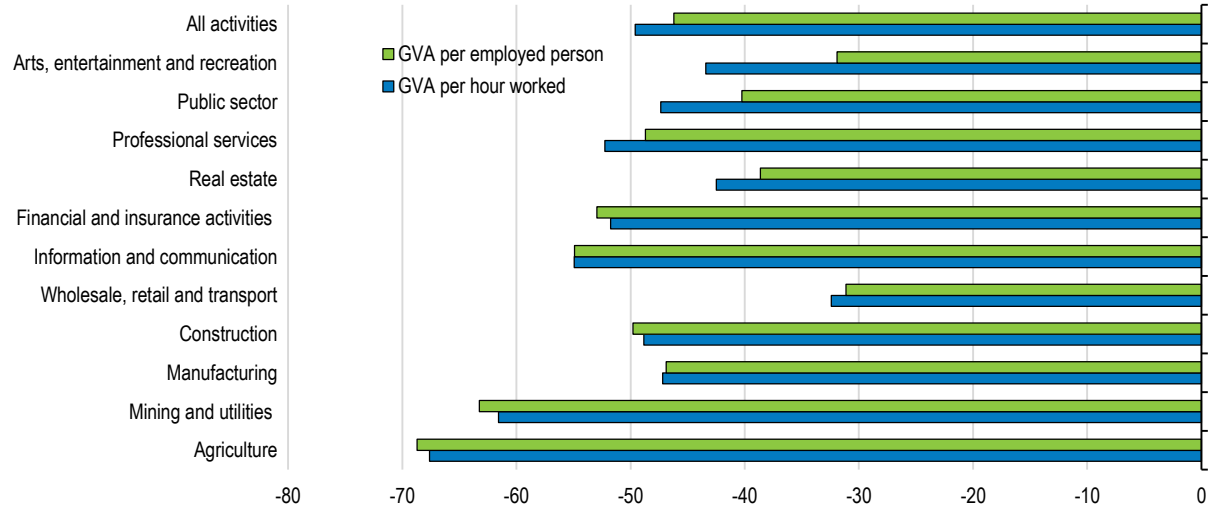
Figure 6. **Growth in labour productivity across sectors**



1. GVA in volume terms in million euros per employed persons or per hour worked (reference year 2010).
Source: Eurostat National Accounts detailed breakdowns.

Figure 7. **Gap in labour productivity from the EU15 average across sectors**

Gap from the EU15, in % (2015)



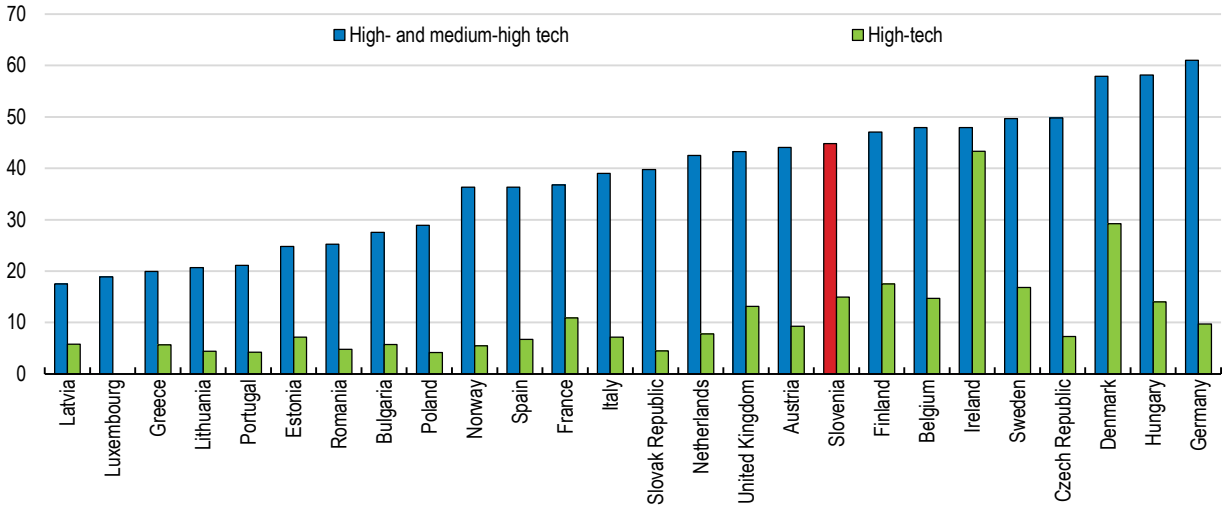
Note: Gross value added (GVA) per person employed measured as GVA in current prices, basic prices, million euros per employed persons (total employment). GVA per hours measured as GVA in current prices, basic prices, million euros per thousand hours. Note that there is a sizable difference in the productivity gap between this measure and the GDP per capita measure in the previous section. The difference stems from three factors – one is that GDP per capita is measured in PPP. The other one is that GVA is measured at basic prices, thus excluding indirect taxes but including subsidies on products. The third one is that here total employment is used instead of total population.
Source: Eurostat National Accounts detailed breakdowns.

III. High-technology manufacturing

7. The share of the high- and medium-high technology manufacturing has risen in the last two decades, from about 30% of total manufacturing GVA in 1996 to 45% in 2015[7]. There has been a rise in the high- and medium-high technology manufacturing such as manufacturing of basic pharmaceutical products, manufacturing of machinery and equipment and of motor vehicles, whereas there has been a decline in low-technology industries, such as wearing apparel, food products and furniture. Comparatively, the share of the high- and medium-high technology manufacturing in Slovenia is relatively high (Figure 8), but it nevertheless lags behind high performers such as Denmark, Germany or Sweden, and even Hungary. Despite the large share, labour productivity in the high- and medium-high technology manufacturing is low, only about 1/3 of that in Ireland or Denmark, for example (Figure 9). Yet, productivity in Slovenia is higher than in the CEEC peers.

Figure 8. **Share of high- and medium-high technology manufacturing is relatively high**

% in total manufacturing GVA (2015 or latest year available)



Note: GVA in basic prices and in current prices. Based on Eurostat aggregation of the manufacturing industry according to technological intensity, based on NACE Rev. 2, 2 digit level.

Source: Eurostat National Accounts detailed breakdowns and OECD calculations.

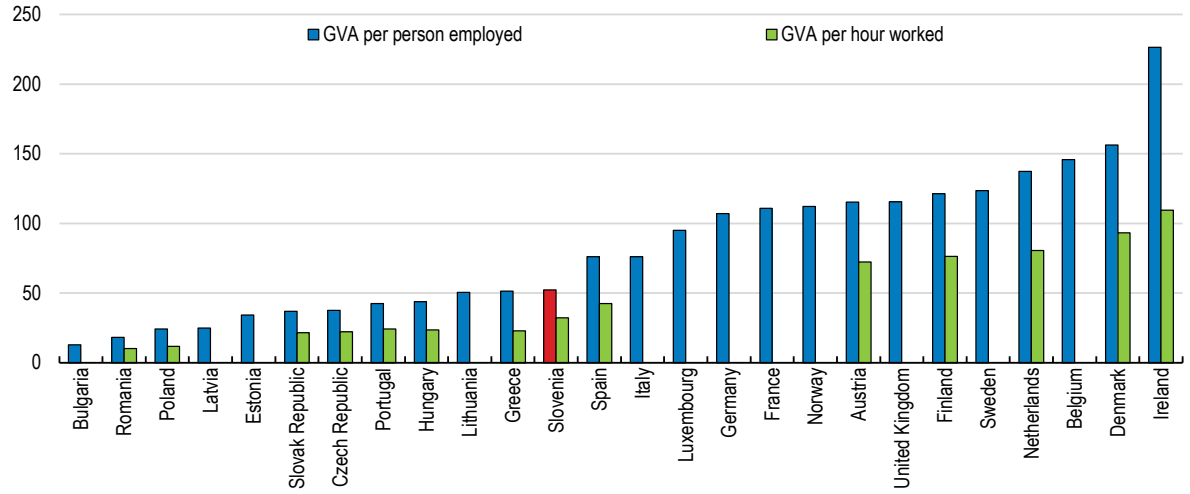
8. Raising further the role of high-tech manufacturing can increase productivity and wages, and raise growth more widely. In the last two decades productivity growth has been fastest in high-technology manufacturing by a high margin (Table 2) and the level of productivity in the high-technology sectors is the highest too – about 2.5 times the level in the low-tech manufacturing (Figure 10, panel A). High productivity also generates higher wages; in the high-tech manufacturing wages are about twice as high as in low-tech manufacturing (Figure 10, panel B).

9. Slovenia is relatively competitive in high and medium high technology products as indicated by the high contribution of these products in the trade balance. In 2012, these products contributed 6.5% to the trade balance, as compared to 4.2% in the EU or 1.0% in the US, on average (European Commission, 2014). Furthermore, the contribution has been increasing steadily in recent years.

[7] The classification into high-, medium-high, medium-low and low-technology manufacturing is based on Eurostat aggregation of the manufacturing industry according to technological intensity, based on NACE Rev. 2, 2 digit level. It can be found on http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:High-tech

Figure 9. **Labour productivity in high-technology and medium-high technology manufacturing could be improved**

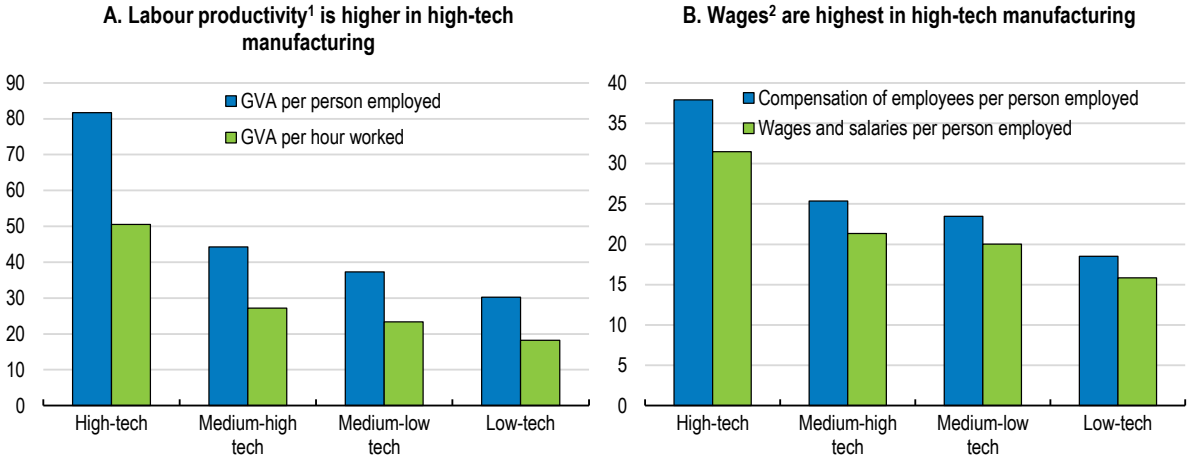
In 1000 euros per person employed/ 1000 hours (2015, or latest year available)



Note: GVA in basic prices and in current prices. Based on Eurostat aggregation of the manufacturing industry according to technological intensity, based on NACE Rev. 2, 2 digit level.

Source: Eurostat National Accounts detailed breakdowns and OECD calculations.

Figure 10. **Labour productivity and wages are higher in high-tech manufacturing**



Note: Based on Eurostat aggregation of the manufacturing industry according to technological intensity, based on NACE Rev. 2, 2 digit level. GVA in basic prices and in current prices.

1. In thousands of euros per person employed/ thousands of hours, 2015.

2. In thousands of euros per person employed, 2015.

Source: OECD National Accounts detailed breakdowns and Eurostat calculations.

Table 2. **Labour productivity growth has been fastest in high-technology manufacturing**

Annual % change in GVA[1] per hour

	High-technology	Medium-high-technology	Medium-low-technology	Low-technology
1997-2007	10.8	7.4	1.2	5.4
2008-2015	3.1	1.8	0.4	0.7

1. Gross value added at basic prices, in chain linked volumes, reference year 2005. The numbers for labour productivity growth measured in GVA per employed persons are similar, hence not reported.

Source: Eurostat National Accounts detailed breakdowns and OECD calculations.

IV. Shift-share analysis of labour productivity growth

10. The shift-share analysis decomposes aggregate changes in labour productivity into the within, the shift, and the interaction effect. The "within effect" (intra-industry) measures how much of the productivity growth comes from a sector increasing productivity of its operations. The "shift effect" measures the contribution to the aggregate productivity growth from reallocation of labour from low productivity sectors to high productivity sectors or vice versa. The "interaction effect" measures the co-variation between productivity growth and labour movements across sectors. It can be either negative - when productivity growth and labour resources growth have opposite signs - or positive - when the industry experiences both a growing allocation of labour input and a growing productivity. The most intuitive case of a negative interaction effect is when sectors are increasing their labour productivity by shedding labour.

Shift-Share analysis methodology

11. We follow the methodology in European Commission (2003). For each sector *i* labour productivity is defined as output *Y* divided by labour input *L*:

$$LP_{it} = \frac{Y_{it}}{L_{it}} \text{ , giving the aggregate productivity } LP_t = \frac{\sum Y_{it}}{\sum L_{it}} = \sum_i LP_{it} \frac{L_{it}}{L_t}$$

12. Therefore, labour productivity can be expressed as a sum of productivity among sectors weighted by labour shares. By first-differencing, we obtain:

$$\Delta LP = \sum_i \Delta(LP_i) \frac{L_{it-1}}{L_{t-1}} + \sum_i \Delta(\frac{L_i}{L}) LP_{it-1} + \sum_i \Delta(LP_i)\Delta(\frac{L_i}{L})$$

13. Dividing by LP_{t-1} to get the productivity growth rate and rearranging the terms, we obtain:

$$\frac{\Delta LP}{LP_{t-1}} = \sum_i \frac{\Delta(LP_i)}{LP_{it-1}} \frac{Y_{it-1}}{Y_{t-1}} + \sum_i \Delta(\frac{L_i}{L}) \frac{LP_{it-1}}{LP_{t-1}} + \sum_i \frac{1}{LP_{t-1}} \Delta(LP_i)\Delta(\frac{L_i}{L})$$

14. The first component on the right-hand side is the within industry effect, or the sum of labour productivity growth weighted by the initial output shares. The second component is the shift-effect and is the sum of proportional shifts in labour input weighted by the initial relative productivity levels. The last term is the interaction effect. The interaction effect is often negative since productivity changes and labour input changes have opposite signs.

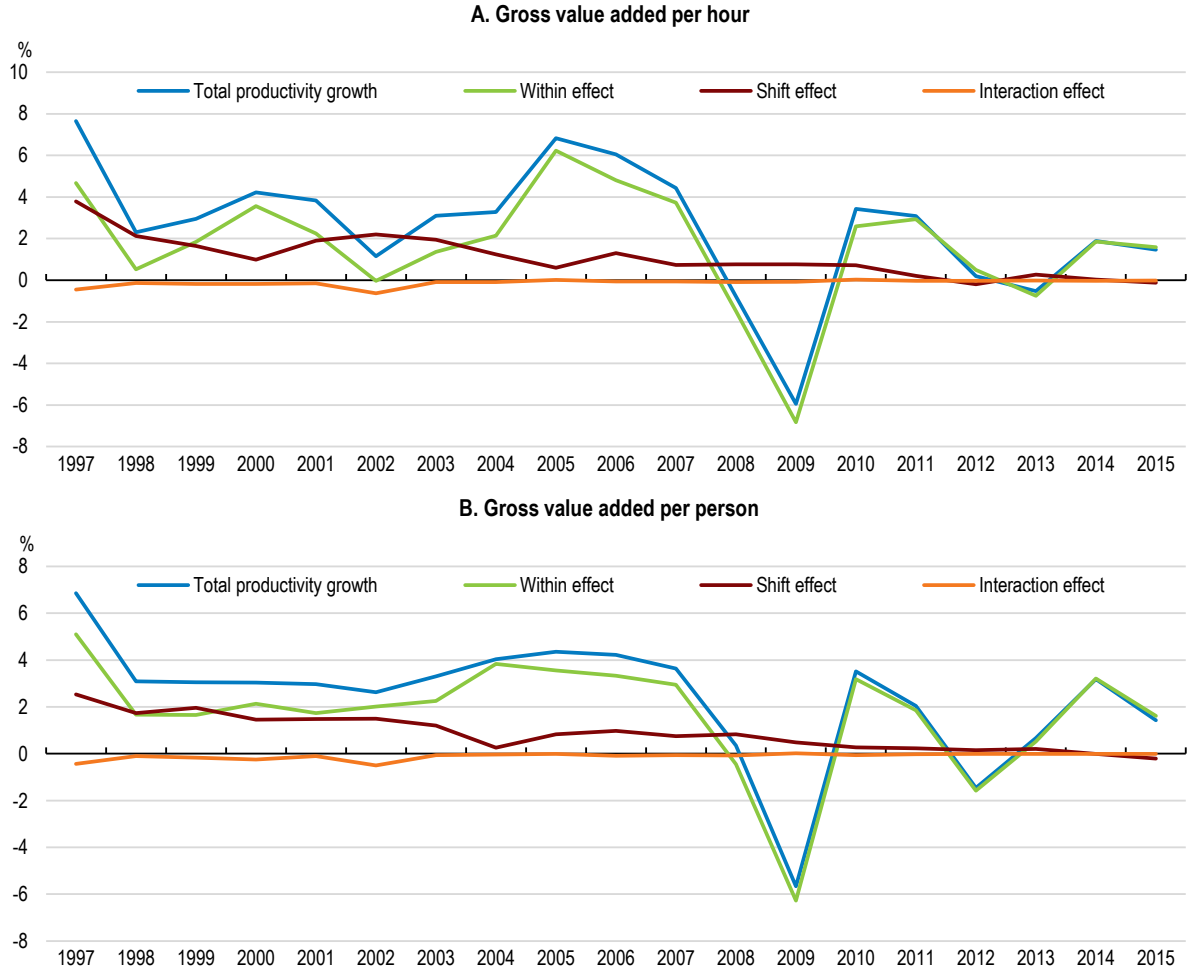
15. We base the analysis on Eurostat national accounts breakdowns, following the 11 sectors NACE rev. 2 decomposition. When computing shares among sectors, output is measured by gross value added (GVA) in basic current prices in euros. When computing growth rates, GVA is measured in constant prices

(million euros, reference year 2005). Labour input is measured either by hours worked or by total employment.

Results

16. As discussed in the *2009 Economic Survey of Slovenia* (OECD, 2009a), as a country moves from being a catch-up economy in transition, to a market economy closer to the technological frontier, within-sector productivity growth should become more important vis-à-vis the shift effect. As shown in Figure 11, between 1997 and 2007 within-sector effect indeed gradually accounted for more and more of the labour productivity growth in Slovenia while the importance of the shift effect recorded a secular decline, which in the last couple of years became close to zero. After the labour productivity drop in 2008 there are now signs of recovery to a positive productivity growth which is almost exclusively driven by the within sector effect.

Figure 11. **Evolution of labour productivity - Shift-Share decomposition**



Note: The within-sector effect measures the impact of productivity growth within each sector on total productivity growth, assuming labour shares are unchanged. The shift effect measures the impact of labour input reallocation across sectors assuming sector productivity is unchanged. The interaction effect measures the change in both labour share and productivity in each sector and accounts for the impact of labour re-allocation between sectors with varying productivity growth rates.

Source: Eurostat, OECD calculations.

17. Dividing the last 20 years into three sub-periods and comparing experiences of various countries (Table 3), Slovenia exhibited relatively fast total productivity growth prior to 2008. There were high contributions from within sector growth and the diminishing role of the shift effect. In this way, its experience was similar to other CEEC countries. Observing the post-crisis period (2008-2015), Slovenia experienced the biggest drop in average productivity growth and a large drop in the within effect. The shift effect has also been much reduced, although when looking over the whole 2008-2015 period, due to the fact that the total productivity growth has fallen greatly, the shift effect appears more important in relative terms.

Table 3. **Shift-share analysis of labour productivity across countries**

In percent, annual average

	GVA per hour worked					GVA per employed persons				
	Slovenia	**EU3 average**	**EU15**	**CEEC average**	**Euro Periphery average**	**Slovenia**	**EU3 average**	**EU15**	**CEEC average**	**Euro Periphery average**
	1997/2002					1997/2002				
productivity growth	*3.7*	*2.3*	*1.7*	*2.9*	*1.2*	*3.6*	*1.4*	*1.2*	*2.7*	*1.2*
within effect	2.1	2.1	1.5	2.2	0.8	2.4	1.3	1.0	2.2	0.7
shift effect	2.1	0.3	0.2	1.2	0.9	1.8	0.2	0.2	0.9	1.1
interaction effect	-0.3	0.0	0.0	-0.4	-0.2	-0.3	0.0	0.0	-0.3	-0.4
	2003/2007					2003/2007				
productivity growth	*4.7*	*1.6*	*1.3*	*4.3*	*1.3*	*3.9*	*1.5*	*1.2*	*4.2*	*1.1*
within effect	3.6	1.4	1.1	4.1	1.0	3.2	1.4	1.1	3.9	1.2
shift effect	1.2	0.2	0.2	0.5	0.6	0.8	0.1	0.1	0.6	0.4
interaction effect	-0.1	0.0	0.0	-0.2	-0.2	-0.1	0.0	0.0	-0.1	-0.4
	2008/2015					2008/2015				
productivity growth	*0.3*	*0.4*	*0.6*	*1.7*	*1.1*	*0.5*	*0.1*	*0.2*	*1.2*	*0.8*
within effect	0.0	0.5	0.6	1.5	0.7	0.2	0.2	0.3	0.9	0.5
shift effect	0.3	-0.1	0.1	0.2	0.4	0.2	-0.1	0.0	0.2	0.3
interaction effect	0.0	0.0	0.0	-0.1	-0.2	0.0	0.0	0.0	-0.1	-0.2

Note: CEEC includes Poland, Hungary, Czech Republic and Slovak Republic. Euro periphery includes Spain, Portugal, Ireland and Greece. EU3 includes France, Germany and the United Kingdom. Due to missing values, for the 1997/2002 period the CEEC average excludes Slovak Republic and Poland and the Euro periphery excludes Ireland. Country groups are simple averages.
Source: Eurostat and OECD calculations.

V. Growth accounting

18. Growth accounting decomposes GDP growth into contributions from factors of production. Assuming Cobb-Douglas production function we calculate how much of the GDP growth comes from capital deepening, growth in the quantity of labour input, labour quality (human capital) and the residual - total factor productivity (TFP) growth.

Growth accounting methodology

19. Gross domestic product can be represented as the result of human capital and physical capital utilisation, expressed with the Cobb-Douglas function,

$$Y_t = A_t K_t^{\alpha} (q_t L_t)^{1-\alpha}$$

where *Y* is real GDP and *K* the physical capital. The human capital index *q* measures quality of the labour input, *L* represents the quantity of the labour input, and *A* denotes total factor productivity (TFP). It can be interpreted as containing any growth-enhancing factors not explained by labour and capital.

20. GDP is measured at constant PPPs. Total factor productivity growth is calculated as a residual. Physical capital is measured as productive capital stock series, which excludes the housing sector and is computed for major economies by the Statistics Directorate of the OECD based on the methodology described in OECD (2009b). For many CEEC countries including Slovenia, less information is available and perpetual inventory method with a 4% scrapping rate is applied on an estimated initial ratio of productive capital stock over GDP. Labour input is measured as total hours worked or as total employment. To construct the human capital measure *q*, we use a method suggested by Hall and Jones (1999), where human capital is defined as

$$q = e^{\theta(s)}$$

where *s* represents average years of schooling among the population with age of over 25 years and θ a piecewise linear function:

$$\theta(s) = 0.134.s \; if \; s \leq 4$$

$$\theta(s) = 0.134 * 4 + 0.101 * (s - 4) \; if \; s > 4 \; \& \; s \leq 8$$

$$\theta(s) = 0.134 * 4 + 0.101 * 4 + 0.068 * (s - 8) \; if \; s > 8$$

21. Note that only the last line is relevant for advanced economies. The shape of this function follows the assumption that there exists a log linear relationship (diminishing returns) between years of education and wages, which are considered proportional to human capital. Therefore θ'(s) is the return to schooling; one more year of schooling raises worker's efficiency (and wage) by θ'(s). Its parameters were initially estimated by Mincer (1974). Empirical studies (Caselli, 2004) confirm that there exist a concave relationship between wages and schooling across countries, pointing to diminishing returns to education.

22. Average years of schooling series are built using the Barro-Lee Educational Attainment Dataset which provides average years of schooling every five years for up to the year 2010. In-between values are estimated using a linear interpolation method, while the last couple of years are linearly extrapolated.

23. In determining the value for the labour income share (1-α) for the whole economy we follow Gollin (2002) who argues that labour income shares should be adjusted for the income of the self-employed. We then assume that labour (versus capital) has the same share of income of the self-employed as compensation of employees has in GDP. To compute the total labour income share in GDP at factor cost, for each year, we thus take the sum of compensation of employees and the relevant share of gross self-employment income by households. In the growth-accounting analysis we use the 1997-2015 average (Table 4).

Results

24. The growth accounting exercise shows that total factor productivity and physical capital were Slovenia's main sources of economic growth from 1997 to 2007 (Figure 12 and Table 5). Interestingly, it can be seen in Figure 12 how the TFP contribution started declining already in the year 2006, 2 years before the crisis, at the time of a steep rise in the contribution from the labour input. This corroborates the argument put forward in the *2009 Economic Survey* (OECD, 2009a) that the Slovenian economy was showing signs of overheating. In particular, after the euro area entry in 2007 inflation peaked at the highest level within the euro area and unemployment fell significantly below the natural rate. In 2008, on the other hand, GDP growth rate became negative, with a large drop in the TFP. The contribution from the labour input also turned negative for a couple of years. Capital services contribution to GDP growth remained positive, albeit lower than prior to 2008. In the last two years, GDP growth has turned positive again, mostly thanks to a revival in the TFP growth and a positive contribution from the labour input.

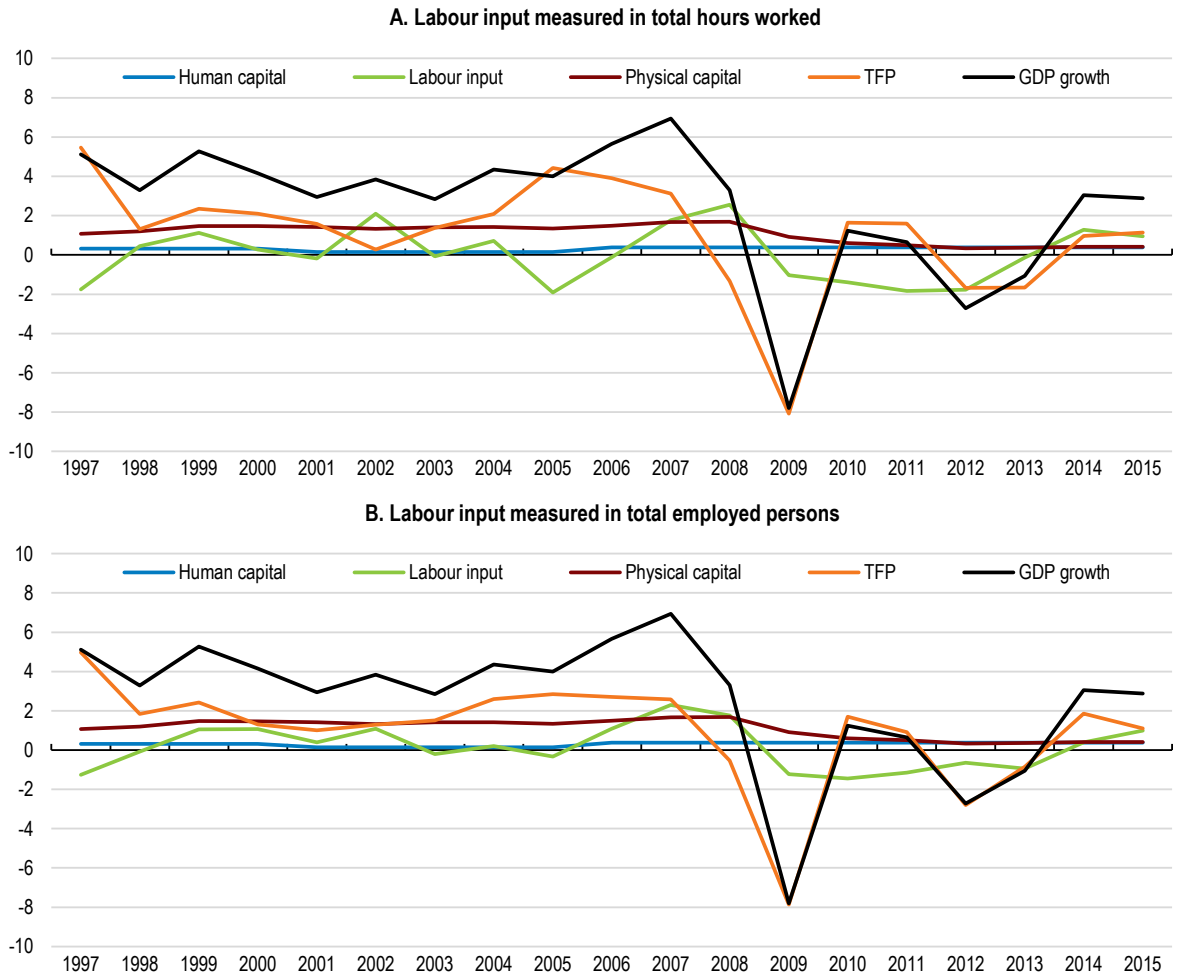
Table 4. **Values of the labour income share**

Country	Value
Slovenia	**0.69**
Czech Republic	0.52
Hungary	0.60
Slovak Republic	0.52
Poland	0.57
United Kingdom	0.67
France	0.69
Germany	0.64
Greece	0.52
Portugal	0.65
Ireland	0.50
Spain	0.65

Source: OECD National Accounts Data and OECD calculations.

25. In comparison to other countries (Table 5), prior to the crisis Slovenia on average recorded strong GDP growth, stemming largely from fast TFP growth. On the other hand, the contribution from human capital was low, pointing to potential weaknesses in the education and training systems. Slovenia's experience during the crisis was similar to other Euro periphery countries. In 2008-2015, GDP growth was on average negative, with negative growth in both TFP and labour input contribution. There was also a strong decline in the contribution of physical capital, reflecting persistent subdued investment. Thus, to return to faster growth, Slovenia needs to maintain its positive TFP growth, together with higher labour participation and renewed investment cycle. In the longer term, growth could also be better supported by increases in human capital.

Figure 12. **Contribution of factors[1] to GDP growth**



Source: OECD National Accounts Statistics Database and OECD calculations.

Table 5. **Growth accounting in CEECs, Euro Periphery and EU3[1]- 1997/2007**

Average annual growth in percent

	1997/2007				2008/2015			
	Slovenia	**CEEC**	**EU3**	**Euro Periphery**	**Slovenia**	**CEEC**	**EU3**	**Euro Periphery**
GDP growth	4.39	4.12	2.34	4.29	-0.12	1.50	0.73	-0.45
human capital	0.25	0.36	0.80	0.51	0.34	0.25	0.73	0.36
physical capital	1.39	1.68	0.77	2.05	0.65	1.32	0.46	0.89
labour input (hours)	0.21	0.07	0.30	1.05	-0.19	-0.17	0.21	-1.09
TFP (hours)	2.55	2.01	0.48	0.39	-0.92	0.10	-0.66	-0.61
labour input (persons)	0.48	0.16	0.63	1.34	-0.29	0.18	0.40	-0.88
TFP (persons)	2.28	1.93	0.15	0.58	-0.81	-0.25	-0.85	-0.82

1. CEECs include Poland, Hungary, Slovakia and Czech Republic. Euro Periphery includes Spain, Portugal, Greece and Ireland. EU3 includes France, Germany and United Kingdom. CEEC, EU3 and Euro Periphery aggregates are simple averages.

Source: OECD National Accounts Statistics and own calculations.

VI. Structural breaks in productivity

26. Before the crisis, Slovenia experienced continuous growth in productivity, while towards the end of 2008 the country suffered from an unprecedented productivity drop (Figure 13). Even though productivity growth reached its pre-crisis levels soon thereafter, from the end of 2011 it slowed down again, and Slovenia remained in recession for a prolonged period. Recently, productivity growth has turned positive again. The interesting question is, whether the crisis led to structural changes that undermine productivity growth in the future. If productivity growth has indeed shifted down permanently, this would have important consequences for long-term economic performance.

27. To address this question, we use time series analysis and stability diagnosis techniques to detect potential structural breaks. As the detection of structural breaks crucially depends on assumptions about the underlying dynamics of a variable and statistical methods used (Jimeno et al., 2006), we use four different productivity measures and we apply four different tests to identify potential structural breaks.

28. The four productivity series are based on quarterly data and growth is measured in terms of year-on-year growth, as shown in Figure 13. The two labour productivity measures - based on hours worked or on employed persons - are calculated from seasonally unadjusted data, but the final productivity series is seasonally adjusted, from which the growth rate is then calculated. The TFP measures – again either based on hours worked or on employed persons – are obtained from the growth accounting exercise and are residuals from the decomposition of GDP growth into human capital, labour quantity and physical capital contributions, as in the section above. All series, however, are quarterly and seasonally adjusted. The GDP series, hours and employment data are taken from the Eurostat quarterly national accounts. The growth accounting is performed using quarterly GDP (in volumes), quarterly employment and hours series from the Eurostat quarterly national accounts, and OECD quarterly series of productive capital stock (see above for a brief description of how capital series is obtained). Human capital derives from Barro-Lee 5-year values of average years of schooling, which have been linearly interpolated into quarterly series.

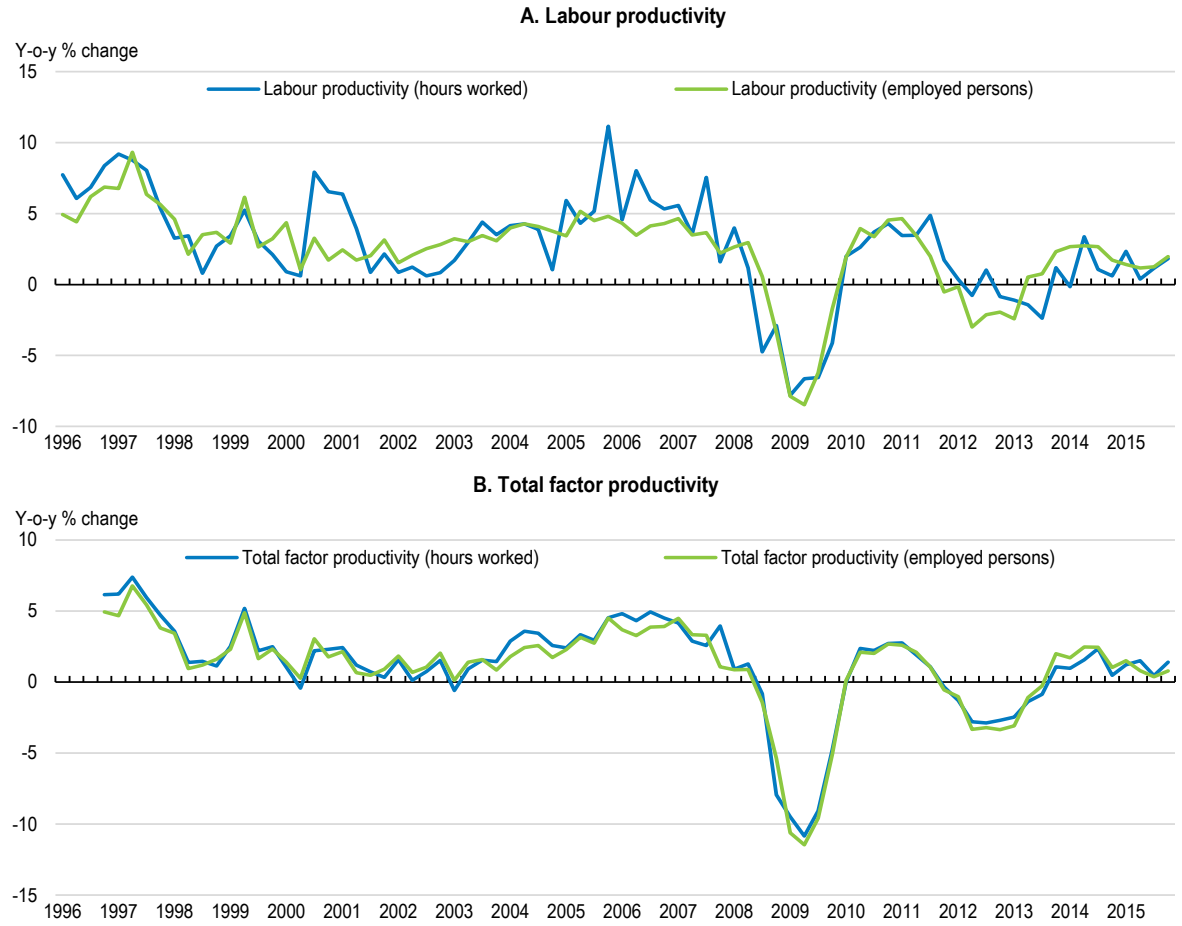
29. To test for structural breaks, we assume a simple autoregressive process AR(1) for productivity growth[8]:

$$y_t = c + \rho y_{t-1} + e_t$$

We are therefore testing whether in the sample there have been breakpoints – and when – where the intercept c and the autoregressive coefficient ρ jointly made a structural shift. For each of the four productivity measures we first estimate the simple autoregressive model, allowing for heteroskedasticity and autocorrelation in the errors by using the HAC (Newey-West) covariance method. On this model we then search for potential breakpoints.

[8] We test all series for nonstationarity. On each series we perform three different unit-root tests – Augmented Dickey Fuller, Dickey-Fuller GLS and Phillips-Perron - and they generally reject the null of the unit root at 5% confidence level.

Figure 13. **Year-on-year growth in quarterly productivity**



Source: Barro-Lee educational attainment dataset, Eurostat and OECD National Accounts Statistics; OECD calculations.

30. In Table 6 we report results from various tests for the null of no breaks against an alternative of *l* number of breaks. Bai and Perron (1998 and 2003a) provide theoretical and computational framework for tests that allow for multiple unknown breakpoints by searching for breaks that minimise the sums-of-squared residuals across all possible breakpoints. Two versions of the test are available - the equal-weighted version of the test UDmax and the weighted version WDmax - for which Bai and Perron (2003b) provide distributions and critical values. In addition, Yao (1998) and Liu, Wu, and Zidek (1997) offer alternative tests using a Schwarz criterion or a modified version of it, respectively. We report - for each measure of productivity - the number of breaks identified by each test statistic and, in cases where breakpoints are identified, their dates.

31. As seen in Table 6, results vary considerably across tests, from tests that cannot reject the null hypothesis of no breaks to tests that find five breakpoints. Finding no breaks (8 outcomes out of 16 considered) suggests that in the time period considered there have been no structural shifts in the growth of productivity. On the other hand, identifying five break points (4 outcomes out of 16, but not with identical break dates) is also not very useful, as such a large number of breakpoints in a relatively short period indicates frequently changing properties of the series. Hence, structural breaks are difficult to interpret and cannot serve as a guidance about the properties of productivity growth for the future, as these properties may well change soon again. Given the reported results, we cannot confidently conclude that there have been important structural shifts in productivity growth in the last two decades.

Table 6. **Number of structural breaks and their dates for different test statistics**

Productivity measure\Test statistic	Bai-Perron tests[1] for 0 to M globally determined breaks		Information criteria tests for 0 to M globally determined breaks	
	UDMax statistic	WDMax statistic	Schwarz criterion[2]	LWZ criterion[3]
Labour productivity (hours worked)	2 breaks (2005Q1, 2007Q4)	2 breaks (2005Q1, 2007Q4)	No breaks	No breaks
Labour productivity (employed persons)	5 breaks (1999Q3, 2003Q1, 2006Q3, 2009Q2, 2013Q2)	5 breaks (1999Q3, 2003Q1, 2006Q3, 2009Q2, 2013Q2)	No breaks	No breaks
TFP (hours worked)	No breaks	5 breaks (2000Q1, 2004Q1, 2006Q4, 2009Q3, 2012Q2)	No breaks	No breaks
TFP (employed persons)	2 breaks (2006Q3, 2009Q2)	5 breaks (2000Q1, 2003Q4, 2006Q3, 2009Q2, 2013Q2)	2 breaks (2006Q3, 2009Q2)	No breaks

1. Bai and Perron (1998 and 2003b).

2. Yao (1988).

3. Liu, Wu, and Zidek (1997).

VII. Impact of FDI and institutional setting on productivity

32. FDI is modest in Slovenia. Inward stock of FDI was just above 30% of GDP in 2013 (OECD FDI series), less than half the share in Estonia, Hungary or the Czech Republic. At a time when deleveraging in the corporate sector is dragging down investment and activity, opening up to FDI can attract needed fresh capital. There are a number of channels through which FDI can boost productivity performance. Efficiency gains can come from technology transfers through supply chains, better management practices, better integration with foreign markets, and better human capital formation (OECD, 2011). For example, Bijsterbosch and Kolasa (2009) find that foreign investment has been an important factor in productivity growth of CEECs. They also report that productivity benefits have been largest in countries with the greatest absorption capacity for new technologies, either because productivity differential vis-à-vis the euro area was not too big or because there were higher levels of human capital. Damijan, Rojec, Majcen and Knell (2013) compare cohorts of similar foreign and domestic owned firms over time, and find that foreign owned firms persistently outperform domestic firms in terms of TFP growth in the Czech Republic and Slovenia.

33. We estimate the impact of institutional setting and foreign direct investment (FDI) on labour productivity measured by GDP per hour worked or per person employed. GDP is measured in constant 2010 PPPs. We use an unbalanced panel of 34 OECD member countries for the 1994-2014 period from the OECD National Accounts Database. We estimate a fixed-effects model in order to control for unobserved time-invariant heterogeneity across countries. We follow the methodology of Bijsterbosch and Kolasa (2009) and Box 1.3 in the *2012 Economic Survey of Finland* (OECD, 2012).

34. First, the logarithm of labour productivity is regressed on control variables: the lagged logarithm of a gap between productivity in a country and productivity in the US (controlling for any catch-up effect); expenditures on education (measured as expenditure in % of GDP, linearly interpolated for missing years); and capital intensity (measured as gross productive capital stock over total employment). The capital intensity variable controls for any variation in the industry mix. Tables 7 and 8, column (1) show that productivity is a persistent variable - countries with higher productivity gap in the previous year (hence a lower level of productivity) will still have lower productivity this year. On the other hand, both the capital intensity and the education expenditure have a positive impact on productivity levels, but the latter is not statistically significant due to low variation over time in each country.

35. To determine the impact of the institutional setting on productivity level, in column (2) we include first the OECD PMR indicator of state control. This is of particular interest, as state control is very high in Slovenia. In both models (Tables 7 and 8) state control has a statistically significant and negative effect on labour productivity. Next, in column (3), we add the OECD PMR indicators on barriers to entrepreneurship and barriers to investment and trade. As PMR indicators are updated only every couple of years, the PMR variables are kept constant for the in-between periods at and the latest available level for recent periods. We also add the measure of the inward stock of FDI as a share of GDP; given that stock of FDI is reported for end-of-year, we use its lag. The FDI intensity has a statistically significant positive effect on productivity. Results show, as predicted, that barriers to trade and invest and entrepreneurship have a strong and statistically significant negative effect on productivity. However, the effect of the state control becomes statistically insignificant when controlling for barriers to trade and entrepreneurship. It turns out that the two measures are highly correlated. With the measure of barriers to entrepreneurship excluded in column (4), state control again exerts a negative and significant impact on productivity.

Table 7. **Determinants of labour productivity – panel of OECD member countries (I)**

Dependent variable: log labour productivity (GDP per hour worked)				
	(1)	(2)	(3)	(4)
Lagged log of productivity gap	-0.704***	-0.711***	-0.691***	-0.621***
	(0.0915)	(0.0842)	(0.0553)	(0.0596)
Capital intensity	4.65e-06***	3.60e-06***	2.50e-06***	2.87e-06***
	(3.42e-07)	(5.38e-07)	(3.49e-07)	(3.82e-07)
Expenditure on education	0.0224	0.0256	0.0203	0.0178
	(0.0146)	(0.0249)	(0.0121)	(0.0145)
State control		-0.0366**	-0.0100	-0.0270***
		(0.0145)	(0.00863)	(0.00897)
Barriers to trade and invest			-0.0265***	-0.0410***
			(0.00556)	(0.00877)
Barriers to entrepreneurship			-0.0499***	
			(0.0132)	
Inward stock of FDI (lagged)			0.000766***	0.000896***
			(0.000187)	(0.000211)
Constant	3.025***	3.276***	3.515***	3.378***
	(0.0784)	(0.104)	(0.0760)	(0.0745)
Observations	483	386	378	378
R-squared	0.790	0.801	0.866	0.850
Number of countries	34	34	34	34

Note: Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1); standard errors are clustered by country. All regressions are run using country fixed effects.

36. Based on the results from column (4) in Table 7, for example, ceteris paribus, if Slovenia were to reduce its state control from the PMR of 2.5 to the average level in the sample - 2.2 - its productivity would be improved by 0.8% in terms of GDP per hour. Furthermore, reducing state control to 1.4 - the level of best performing country, the Netherlands - productivity would be improved by 3.0%. Note further, that the impact of barriers to trade and investment is also strong. A drop of this indicator to the average level (from 0.8 to 0.5) could lead to a productivity increase of 1.2%. To give also some perspective on the effect of the FDI intensity, the inward stock of FDI in Slovenia is about 30% of GDP, while on average for countries included in the sample it is about 60%. Hence, raising the FDI stock to the average level, ceteris paribus, would raise labour productivity in Slovenia by about 2.7%.

37. Next, we explore the role of institutional factors on the FDI and determinants of R&D expenditure. High barriers to entrepreneurship and barriers to trade and investment are expected to have a deterring effect on investment. Regressing FDI intensity on the institutional factors (Table 9, column (1)),

confirms that all three institutional variables – including the state control – have a strong negative impact on the FDI intensity. Lower FDI intensity could translate into less R&D (measured as a share of GDP). The results reported in column (2) indeed suggest that lower FDI is related to less R&D, while controlling for expenditure on education. As in the analysis above, we further include in the model the institutional factors and the results in columns (3) and (4) suggest that higher regulatory barriers reduce R&D expenditure. Part of this effect stems from the fact that regulatory barriers have a strong negative impact on FDI[9].

38. To further test the effect of inward FDI on productivity we also do the analysis using Slovenian panel data across economic activities. The results are consistent with the above. We use the National Accounts data from Eurostat, NACE rev 2. decomposition that includes 21 sectors, together with sector data on annual inward FDI stocks from the Bank of Slovenia. The database covers the 1995-2014 time period. We exclude the "Public administration and defence, compulsory social security" sector in order to better capture the impact on productivity in private sectors. We also exclude activities of households and activities of extraterritorial organisations.

Table 8. **Determinants of labour productivity – panel of OECD member countries (II)**

Dependent variable: log labour productivity (GDP per person employed)				
	(1)	(2)	(3)	(4)
Lagged log of productivity gap	-0.749***	-0.784***	-0.738***	-0.684***
	(0.0970)	(0.0882)	(0.0524)	(0.0556)
Capital intensity	3.66e-06***	2.69e-06***	1.85e-06***	2.14e-06***
	(2.86e-07)	(4.15e-07)	(2.63e-07)	(2.87e-07)
Expenditure on education	0.0179	0.0172	0.0130	0.0112
	(0.0123)	(0.0193)	(0.0102)	(0.0125)
State control		-0.0269**	-0.00396	-0.0184***
		(0.0111)	(0.00641)	(0.00653)
Barriers to trade and invest			-0.0177***	-0.0297***
			(0.00604)	(0.00845)
Barriers to entrepreneurship			-0.0406***	
			(0.0113)	
Inward stock of FDI (lagged)			0.000646***	0.000758***
			(0.000170)	(0.000190)
Constant	10.70***	10.95***	11.11***	11.00***
	(0.0628)	(0.0764)	(0.0535)	(0.0541)
Observations	483	386	378	378
R-squared	0.768	0.791	0.850	0.835
Number of countries	34	34	34	34

Note: Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1); standard errors are clustered by country. All regressions are run using country fixed effects.

39. Table 10 reports the results. We measure labour productivity with either gross value added (GVA) per hour worked or GVA per employed persons. In addition to sector fixed-effects, to control for other time variant sector specificities that potentially influence GVA and productivity, we include capital intensity measured as a ratio of the consumption of fixed capital over employment in the sector. To capture any catch-up effects, we also include a measure of productivity gap between a given sector and the EU15 average. However, as this measure is missing for two sectors and is available only for a limited number of years, we report regression results for both the model with and without this variable.

40. The results in Table 10 suggest statistically significant effects of both controls – the capital intensity and the productivity gap[10]. There is also a strong positive and statistically significant impact of

[9] Note that including the FDI intensity variable together with the institutional controls in columns (3) and (4) would render the FDI coefficient statistically insignificant.

[10] As productivity across sectors in Slovenia likely exhibits similar cyclical behaviour over time, we ran the same regressions also including time dummies. The results were similar to the ones reported.

the FDI stock on sector productivity. Higher FDI results in higher productivity. This result is not sensitive to exclusion of any one sector from the model. Another interesting result emerges from Table 10; note that the FDI coefficient changes quite a lot when we include the lagged productivity gap in the model. It turns out from a separate regression of the two variables, that they are negatively correlated – bigger sector productivity gap is associated with much lower stock of FDI in the sector. This might indicate that sectors with lowest FDI are the ones that lag the most behind the EU15 average.

Table 9. **Impact of policy indicators on FDI intensity and R&D intensity**

	(1)	(2)	(3)	(4)
Dependent variable:	FDI intensity	R&D intensity	R&D intensity	R&D intensity
State control	-10.43**		-0.0490	-0.122*
	(4.986)		(0.0845)	(0.0680)
Barriers to trade and invest	-5.763**		-0.0719	-0.116
	(2.203)		(0.0746)	(0.0687)
Barriers to entrepreneurship	-11.94*		-0.127	
	(5.894)		(0.0805)	
Expenditure on education		0.172***	0.213***	0.219***
		(0.0408)	(0.0538)	(0.0561)
FDI intensity (lagged)		0.00361*		
		(0.00193)		
Constant	102.6***	0.833***	1.228***	1.136***
	(12.41)	(0.168)	(0.355)	(0.370)
Observations	485	456	386	386
R-squared	0.248	0.176	0.316	0.296
Number of countries	34	34	34	34

Note: Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1); standard errors are clustered by country. All regressions are run using country fixed effects.

Table 10. **Determinants of labour productivity – panel of Slovenia's economic activities**

Dependent variable: log labour productivity	(1) (GVA per hour worked)	(2)	(3) (GVA per person employed)	(4)
Lagged log of productivity gap		-0.700***		-0.703***
		(0.0611)		(0.0659)
Capital intensity	0.00379***	0.00142***	0.00382***	0.00150***
	(0.000349)	(0.000340)	(0.000341)	(0.000358)
FDI intensity (lagged)	0.00487**	0.00246***	0.00486**	0.00217***
	(0.00176)	(0.000446)	(0.00178)	(0.000466)
Constant	2.893***	3.521***	3.398***	4.026***
	(0.0297)	(0.0518)	(0.0303)	(0.0575)
Observations	342	224	342	224
R-squared	0.300	0.668	0.315	0.695
Number of sectors	18	16	18	16

Note: Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1); standard errors are clustered by sector. All regressions are run using sector fixed effects.

VIII. Conclusion

41. This paper analyses trends in productivity and sources of productivity growth in Slovenia over the last two decades. Slovenia's living standards measured in GDP per capita are about 20% below the EU15 average and most of the gap in living standards comes from differences in labour productivity. In comparison to the EU15 average, labour productivity - measured in gross value added per labour input - is still significantly lower. It lags behind most in agriculture, mining and utilities, but also in information and communication activities, financial and insurance activities and professional services. The share of high and medium high technology manufacturing in total manufacturing value added is relatively high in Slovenia and its importance has risen in the last two decades. Further raising the importance of high technology manufacturing could boost productivity, wages and living standards.

42. The growth accounting decomposition of GDP growth shows that total factor productivity (TFP) and physical capital were the main sources of economic growth before the crisis in Slovenia, while the contribution of human capital was low. With the crisis, on the other hand, GDP growth became highly negative due to large drops in TFP and the contribution from labour. The contribution from physical capital was also reduced, reflecting subdued investment activity.

43. Using panel data analysis - a panel of OECD countries and a panel across Slovenia's economic activities - we estimate the effects foreign direct investment (FDI) and some institutional factors on productivity. The results are consistent with the notion that state control, barriers to entrepreneurship, and barriers to trade and investment have a negative effect on productivity. We also find that higher FDI significantly raises productivity. These results are particularly relevant for Slovenia where state control is very high and the level of FDI is low.

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ANNEX

DESIGNATION OF ECONOMIC SECTORS

Following the Eurostat NACE (revision 2) decomposition, we named the sectors according to the table below.

Code	Name	Short name
A	Agriculture, forestry and fishing	Agriculture
BDE	Mining and utilities	Mining and utilities
C	Manufacturing	Manufacturing
F	Construction	Construction
G-I	Wholesale and retail trade, transport, accommodation and food service activities	Wholesale, retail and transport
J	Information and communication	Information and communication
K	Financial and insurance activities	Finance and insurance
L	Real estate activities	Real estate
M-N	Professional, scientific and technical activities; administrative and support service activities	Professional services
O-Q	Public administration, defence, education, human health and social work activities	Public sector
R-U	Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies	Arts, entertainment and recreation
	TOTAL	All activities