DYNAMICS OF REAL LABOUR PRODUCTIVITY AND REAL COMPENSATION IN LATVIA

Rita Freimane, University of Latvia
Janis Priede, University of Latvia
Roberts Skapars, University of Latvia

Abstract. Relationship between labour productivity and wages is an important issue not only for economists, but also for policy makers. In the last decades, we have witnessed that in the EU15 wage growth has been lagging productivity growth. At the same time in Latvia, also in some other central and eastern European member states, wages increased more than productivity, rising concerns about disbalance in the economy. However, comparison of wage level and productivity level in Latvia and respective levels in the EU15 shows that wage level in Latvia is much below the EU15 average value in absolute terms, but also in relation to productivity level. To understand whether dissimilarities in wage and productivity development are dangerous for Latvia's economy, it is worth looking at the situation in different economic sectors, as well as make comparisons with other EU countries.

The aim of the paper is to investigate the dynamics of real labour productivity and real compensation in Latvia in different economic sectors and compare with the other EU member states. The empirical analysis was conducted with comparative analysis and panel data regressions for the period from 2000 until 2017. For robustness checks, different alternative specifications compared.

Our results confirm significant linkage between real labour productivity and real compensation, but not one-to-one, and the gap persists. The gap between these two variables depends on cyclical conditions, the different economic sector with their specifics, the Russian sanctions and labour market structure. The finding of the study is a necessary input for the further microanalysis of the industry which would lead to better policy-making regarding productivity improvements in Latvia.

Key words: *Labour productivity, Wages, Panel data models, Employee Compensation*

JEL code: J24, J30, C23

Introduction

Distribution of income between production factors is one of the classical problems in the economic policy. Assumption that dynamics in labour compensation should be closely correlated to productivity developments is tested in many research papers, and conclusions are different. Employee's compensation includes wages, salaries in cash and in kind, and employers' social security contributions and changes in compensation should reflect changes in productivity. Are these two indicators related or decoupled? – Answer is not clear. Compagnucci et.al. (2018) analysed advanced countries and they found that decoupling between productivity from one hand and labour compensation and utilisation from the other is evident, and reasons are technological progress and knowledge intensity differences in different sectors. Feldstein (2008) has an opposite view –he calculated average growth in both variables and argued that the gap in US is not significant and all is about calculation process (choice of deflators for instance).

Standard economic theory suggests that compensation's dynamics should reflect productivity's developments; the two should therefore grow together. Arguing that growth in real compensation should mirror growth in real productivity means that nominal unit labour costs should be driven just by the inflation rate, and therefore real unit labour costs should remain constant. However, given that real unit labour costs are another way to express the overall share of income accruing to labour, this condition implies that the labour income share in the economy should remain constant. This was in fact one of the so-called "Kaldor's fact", the idea that the shares of national income received by labour and capital were constant over the long run. The observation of the trends in the labour income share over the past half century suggests that this assumption was wrong: in nearly all advanced economies the functional distribution of income, in fact, has substantially changed, leading to a declining labour share since the 1970's and in particular since the beginning of this millennium. This stylised fact is corroborated by the observation of the long-term trends in real compensation and real productivity: although they have both grown over time, productivity has done it faster, leading in some cases to a considerable divergence. The discussion on whether increases in productivity translate into increases in compensations or are instead decoupled has become prominent for economic policy making today. A first key question is to understand to what extent the dynamics of compensations and productivity are linked, if there is a relation between the two and how strong this relation is. If there is any divergence, we should also try to understand how significant it is. (Meager & Speckesser, 2011; Pasimeni, 2018)

Prenner (2018) analysed EU countries starting from 1960-2018, concluded that the linkage between real net productivity and real average compensation has weakened, and rises concerns about sustainable development in future. Pasimeni (2018) used a set of 34 advanced economies and conclusion was the same – there are important factors (labour market structure, cyclic conditions) that weaken the link between productivity and compensation; and that is crucial for the conduction of macroeconomic policies. Last two paper conclusions are based on panel-data analysis, what allows us to compare our estimates theirs.

The aim of the paper is to investigate the dynamics of real labour productivity and real compensation in Latvia in different economic sectors and compare with the other EU member states. The empirical analysis was conducted with comparative analysis and panel data regressions for all 28 (current composition) European Union member states during the period from 2000 until 2017.

Estimation of balanced panel regressions is made by exploiting OLS method, so time series are measured in logs and differentiate. For correct estimation procedure, time series are tested for unit roots. The Im-Pesarin-Shin unit root test reveals that logs of both real productivity and real compensation are non-stationary, but the first order difference is stationary. Cointegration was not found, so it is not possible to take error correction form. For robustness checks, different alternative specifications were compared.

The rest of the paper is organized as follows. First section describes situation in Latvia in comparison with EU28 average. Second section is short description of productivity – compensation relationship in the sectors of Latvian economy. In the third section, we summarize results from econometric analysis, and the last section concludes.

1. Productivity and compensation in Latvia and the EU

In general, productivity is measured as output per input. There are different measurements of productivity in empirical literature. Measuring labour productivity, we prefer GVA (gross value added) per worked hour in constant prices. Real compensation is calculated from nominal compensation per hour worked, which was deflated by consumer price index. Fig.1 shows different pattern of relationship. In Latvia (and some other Central and eastern European countries) growth in compensation exceeds growth in productivity, reflecting slow convergence towards EU average income level. In EU28 average, we can see that increasing productivity is not evident in increase of compensation.

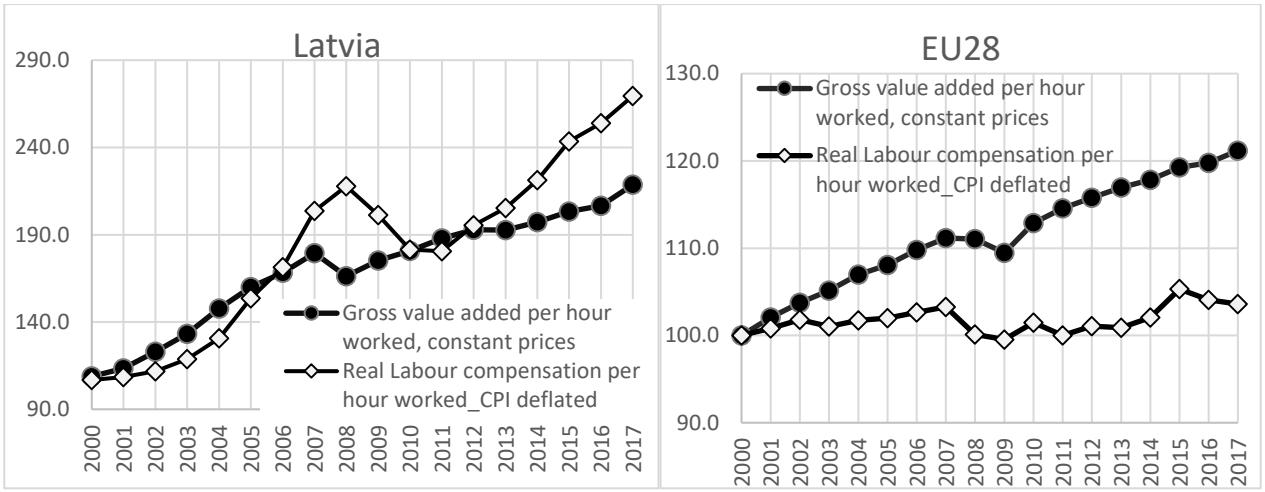


Fig. 1 **Growth in real labour compensation and productivity in Latvia and in the EU average, 2000=100.**

(Source: authors' calculation, based on AMECO and Eurostat data)

As Latvia's productivity growth is below compensation growth, it is interesting to compare results with other EU member states. Figures 2 and 3 show that both nominal labour productivity per hour worked and Compensation of employees per hour worked per hour worked are at very low levels in comparison with EU28=100.

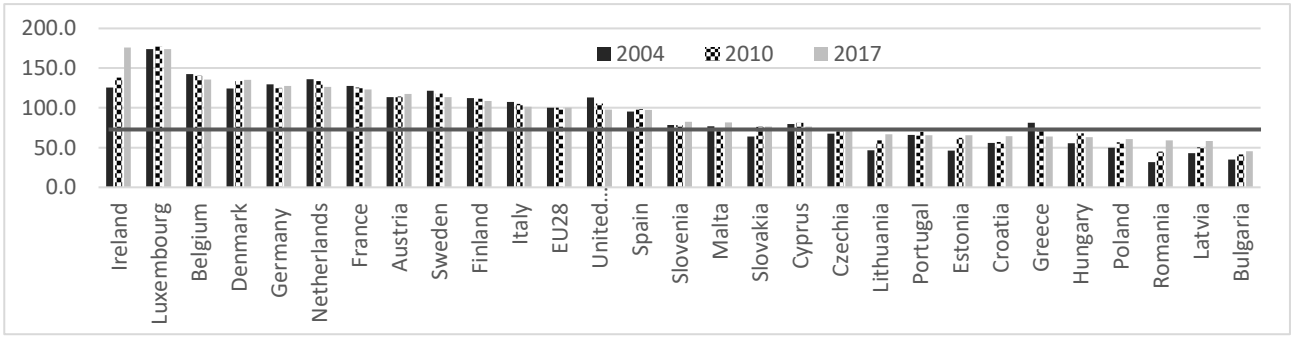


Fig. 2. **EU countries in descending order by Nominal labour productivity per hour worked as percentage of EU28 total in 2017 (based on million purchasing power standards), current prices**

(Data source: Eurostat)

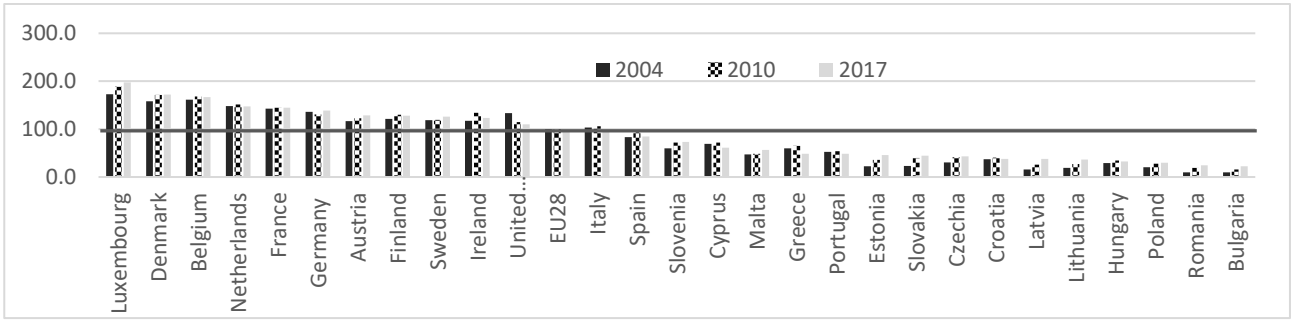


Fig.**3 EU countries in descending order by Compensation of employees per hour worked as percentage of EU28 total in 2017 (based on million purchasing power standards), current prices**

(Data source: Eurostat)

Deeper analysis of historical data allowed us to reveal that after the global financial crisis, the model of economic growth in Latvia changed, the economy has become more stable and balanced because of macroeconomic adjustments and decreasing internal and external proportions. Nevertheless, in the rankings of competitiveness which are regularly published by the World Economic Forum (WEF), Latvia significantly lags behind other EU countries (the Czech

Republic, Poland, Slovenia, Slovakia and the other Baltic States), and particularly in indicators related to the development of innovation systems (Jekabsone S., Skribāne I., 2016). This is mostly because manufacturing is a small proportion of Latvian GDP and because of the industrial sub-sector's technological structure, where low technology industries are dominating (they amount to 60% of total manufacturing added value), altogether this is why there is such low level of productivity in manufacturing and in whole national economy (see Fig. 4).

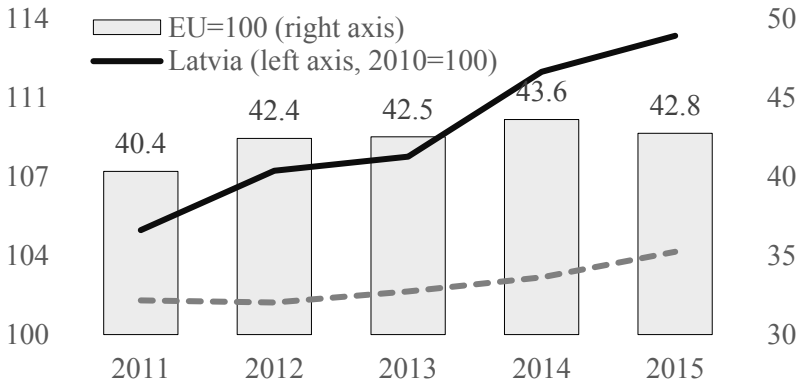


Fig 4. **Productivity (GDP per person employed) in Latvia and EU**

Source: author's construction based on. Eurostat databases.

From 2010 to 2015, Latvia is lagging behind in terms of productivity index in the national economy fell by 6 percentage points in total, but in the industry – by 1.5 percentage points. At the same time, we can observe rapid growth of labour cost (see Fig.5). It is mainly related to low cost level (in 2015, labour costs per employed in the economy of Latvia were 39% of the EU average in total, whereas in the manufacturing industry – 29.8%). From 2010 until 2015, average growth of wages in Latvia reached 6.4% that is three times larger than in EU average (Eurostat Database, 2017).

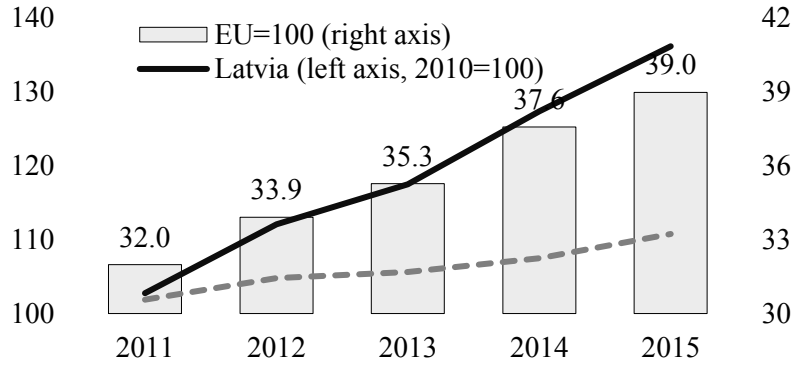


Fig.5. **Labour cost in Latvia and EU**

Source: author's construction based on. Eurostat databases.

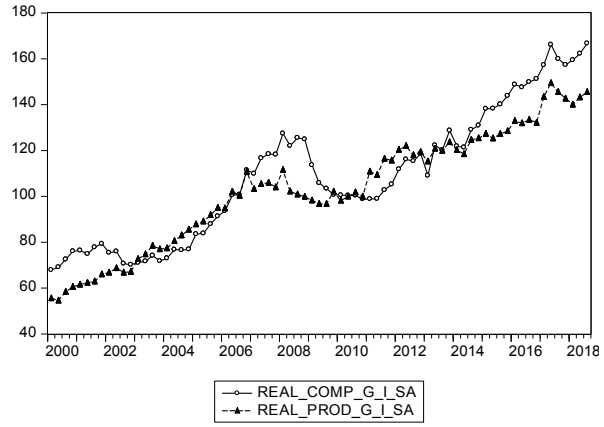
In recent years, the dynamics of labour costs and productivity were largely determined by factors of structural nature. With the economic growth resuming, wage growth is becoming more rapid, substantially due to the growing competition in the EU labour market and the low competitiveness of Latvia in the said market. By contrast, growth of productivity has been more moderate. It means that the advantages of cheap labour cost competitiveness are being gradually lost.

2. Productivity and compensation in Latvia's sectors

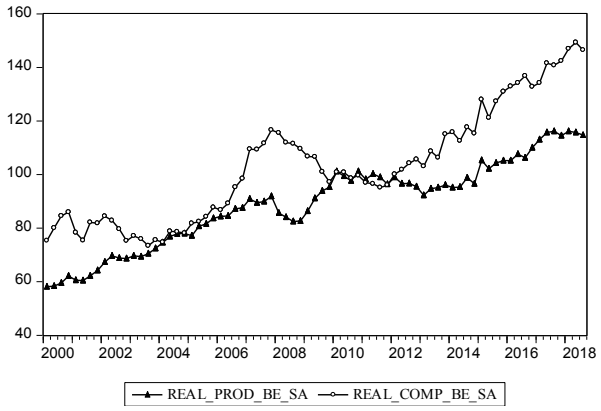
As it was indicated in the previous section, in overall increase of labour compensations in Latvia's economy is faster than respective increase in labour productivity, and that could be like signal of unbalanced development. To understand

if these concerns are well founded, it is worth looking at the relationship between compensation and productivity in individual industries. The productivity of manufacturing and agriculture has been rising over the last two years along with wage developments; moreover, their productivity growth is much stronger than that of other industries. Thus, at this stage, the development of exporting sectors is relatively balanced, and the gap between wages and productivity mostly persists in the non-tradable segment. (Rutkovska, 2018).

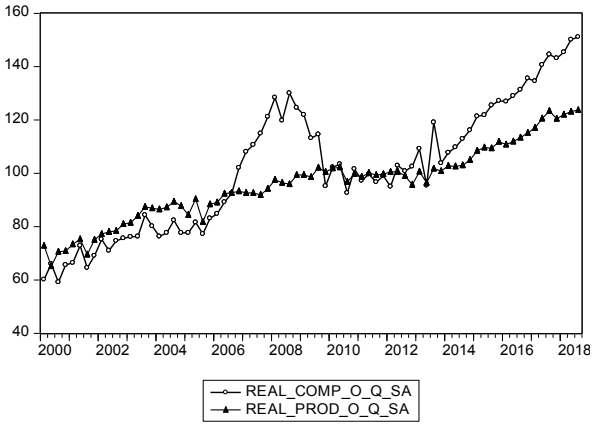
As Fig.5 shows, the dynamics and factors affecting labour productivity vary across industries. Influence of the recent crises can be seen in almost all sectors. Rapid decrease in domestic and foreign demand and respective consequences changed trend in both productivity and compensation. However, after the crisis the industries exhibit very different development trends. Last years, sectors with high share in the economy - trade and industry, and public administration – have stable productivity growth, along with increase in compensations.



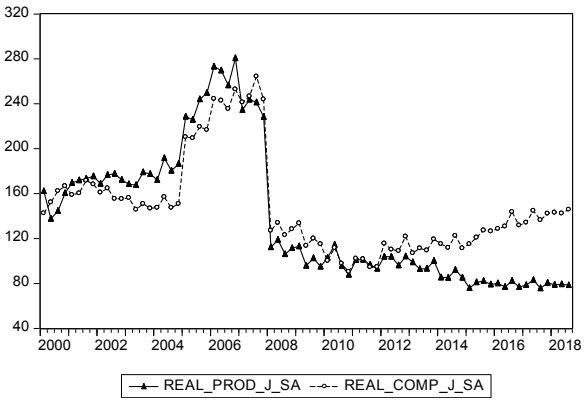
(a) Wholesale and retail trade, transport, accommodation and food service activities



(b) Industry (except construction)



(c) Public administration, defence, education, human health and social work activities



(d) Information and communication

Fig.5. **Labour productivity and compensation of employees per hour worked in selected sectors (real prices, 2010=100)**

Source: Authors' calculation, data from Eurostat and csb.gov.lv

ICT sector (Fig.5, (d)) and also financial and insurance activities, real estate activities and arts, entertainment and other services are sectors with decline in productivity, but still increase in compensations.

3. Empirical estimates: Panel data regression

The aim of this section is to estimate to what extent increases in productivity translate in increases in labour compensations. For meaningful comparisons in the model, we must use data for real labour compensation and real labour

productivity. Real labour productivity is measured as gross value added per hour worked in constant prices, and this variable is available in Eurostat. We adjusted base year to make it possible compare both indicators of interest.

Panel data regressions for EU28

Compensations are available as nominal labour compensation per hour worked, and we have to choose appropriate deflator to convert it in real terms. We deflated compensation with a consumer price index as ours aim is to study the actual purchasing power and welfare of workers. (Pasimeni, 2018). So, the second variable is real labour compensation per hour worked, deflated by harmonized consumer price index. Both series are taken from Eurostat. To avoid some possible miscalculations additionally we took from AMECO database real labour compensation per employee and recalculated it to worked hour. Results appeared to be similar, so we presented just first variant.

Obtained series were tested for unit roots and cointegration. As we expected these series had changing gap between, so cointegration was not found for all different specifications. As series are non-stationary and no cointegrations, we use first order differences in the regression. So, the aim of the model is to test link between growth in labour productivity (and growth in labour compensations. Model is specified as:

$$\Delta\, ln(real\ compensation) = \beta_{0,it} + \beta_{1,it}\, \Delta ln(real\ productivity) + \beta_{it}\, Control\ variables + \varepsilon_{it} \qquad (1)$$

There are discussions in empirical literature about most appropriate control variable in compensation-productivity link (see for instance (Prenner ,2018) and (Schwellnus et.al., 2017). For the standard Philips wage curve the unemployment rate and/or growth in unemployment rate is added in the regression. Table 1 summarizes estimated regressions. Because of heterogeneity in the sample, all models are estimated using White's heteroskedasticity robust standard errors.

Table 1

Regression results: panel data EU28, period 2000-2017

Dependent variable: d(ln(real compensation)	**Model**		
Factors	**(1)**	**(2)**	**(3)**
d(log(real productivity per hour)	0.342*** (0.105)	0.370*** (0.003)	0.393*** (0.104)
d(Unemployment rate)		–0.006*** (0.0018)	–0.0038 (0.0018)
Unemployment rate			–0.0030 (0.0004)
Crisis		0.018** (0.009)	
Constant	0.010*** (0.0022)	0.008** (0.004)	0.035*** (0.004)
Country fixed effects Time fixed effects Adjusted R square	Yes Yes 0.326	Yes No 0.304	Yes Yes 0.416
Notes: 1) *** ⇔ p-value < 0.01; ** ⇔0.01< p-value < 0.05; * ⇔0.05< p-value <0.10 2) values in the brackets are respective standard errors			

Source: author's calculations

Regression results in Table 1 shows that there is significant, positive relationship between productivity growth and compensation growth, but as partial regression coefficient is just about 0.35-0.4, significantly different of 1, there is no one-to-one linkage. Control variables – unemployment and growth in unemployment – both are statistically significant. As we expected the sign is negative, which means for all other factors unchanged, increase in unemployment rate will

decrease compensation. Positive coefficient next to the dummy variable indicating recent crisis shows that the gap between compensation and productivity even widened during crisis.

Panel data regressions for Latvia

Analysis for industries in Latvia was performed exploiting quarterly data since 2000Q1. For real productivity variable, we took nominal gross value added, divided by number of worked hours, and deflated by respective industries output price index. Labour compensation also we calculated from nominal values per hour worked, but for price index we used CPI. Unit root and cointegration tests allow us to estimate long run model and respective error correction form.

Table 2

Regression results: panel Latvia's industries, max period 2000Q1-2018Q3

Long term models				Error correction models			
Dependent variable: **log(real_comp)**	2000Q1-2018Q3	2004Q1-2018Q3	2010Q1-2018Q3	Dependent variable: **d(log(real_comp))**	2000Q1-2018Q3	2004Q1-2018Q3	2010Q1-2018Q3
log(real_prod)	0.636*** (0.010)	0.599*** (0.015)	0.278*** (0.020)	d(log(real_prod))	0.302*** (0.020)	0.335*** (0.020)	0.269*** (0.013)
unempl	–0.025*** (0.002)	–0.024*** (0.002)	–0.030*** (0.003)	unempl			
crisis	0.094** (0.019)	0.087** (0.022)		d(unempl)	–0.009** (0.003)	–0.01*** (0.004)	–0.001 (0.008)
				u(-1)	–0.20*** (0.024)	–0.27*** (0.029)	–0.53*** (0.029)
Constant	2.047*** (0.093)	2.231*** (0.072)	3.837*** (0.106)	Constant	0.005 (0.003)	0.005 (0.003)	0.009 (0.007)
Adjusted R^2	0.90	0.85		Adjusted R^2	0.36	0.44	0.53

Notes: 1) *** ⇔ p-value < 0.01; ** ⇔0.01< p-value < 0.05; * ⇔0.05< p-value <0.10
2) values in the brackets are respective standard errors
3) In all models GLS weights: Cross-section SUR and coef. covariance method: White cross-section
4) In all models Fixed industry effects and none period effects are used

Source: author's calculations

From estimation results (Table 2) we concluded that proportion of productivity growth what turns to compensation growth is decreasing over the time in Latvia's industries. However, speed of adjustment in error correction model is increasing from about 20% for all period till about 50% for after crises period.

Conclusions, proposals, recommendations

1. Since 2010, the productivity of Latvia's economy has been at the level of 40-45% of the EU average (Eurostat Database, 2017). Although in recent years productivity growth rate was faster than the EU average, but labour costs grew almost twice the rate and this can adversely affect competitiveness of Latvia. A further increase in labour costs is inevitable in the open labour market conditions; therefore, strengthening the competitiveness of Latvian is largely determined by the ability to reduce the productivity gap with the advanced economies.
2. Descriptive analysis shows that there is no one-to-one relationship between labour productivity and compensation. Last years "Old" EU countries experienced slowdown in labour compensation in line with quite stable productivity growth, rising discussions about fair income distribution. Situation in the Baltics is different: growth in labour compensations exceeds growth in productivity, possibly indicating disbalance in economy, but it is important to emphasize that in caparisons with EU28 average both productivity and compensations are far behind mean level.
3. Latvian data shows that compensation-productivity gap became apparent in 2006 and was at maximum during recent crisis (in 2008). After that gap is still evident.

4. Deeper analysis of Latvia's data indicated that the dynamics of real compensation and labour productivity depends on the economic sector. Since 2012Q2 labour productivity, growth slowed down in ICT sector, financial and insurance activities, and in real estate activities. One of possible reasons could be change in external demand because of the crisis, difficulties in recovery period, Russian sanctions. Sectors with stronger growth in productivity are manufacturing (at least for last two years) and agriculture.
5. The results from econometric models presented in the section 3 show that in the EU countries on average there is a significant link between growth in labour productivity (measured as gross value added per hour worked, in constant prices) and growth in labour compensations (measured as Labour compensation per hour worked deflated by CPI). However, this linkage is not one-to-one relationship, and a significant gap is observable.
6. As Partial regression coefficients are significant and significantly less than 1 in all model specifications, one can conclude that productivity growth is necessary but not sufficient condition for rising labour compensations and further living standards.
7. Estimates for Latvia's industries show that short-term deviations of long run relationship between labour productivity and compensations adjusted with average speed of roughly 22% in next quarter.
8. One of the main challenges for Latvia is the creation of new competitive advantages that are associated with investments in the latest technologies, innovation, research, human capital, efficient allocation of resources and redistribution that comes with the behavioural changes of economic subjects. Increasing entrepreneurs' motivation is a major structural change in policy making. Economic structural transformation process is largely dependent on the quality of the institutional framework (legislation, state aid and economic and political institutions), which provides goods and resources market efficiency, minimizing the redistribution process costs and risks, thereby strengthening the country's competitive benefits.
9. Proposals for further research:
    a. Some of our findings about Latvia indicate possibility of a productivity trap. Analysis with firm level data in different sectors could help us to reveal this.
    b. Disaggregate analysis could help us not only find that there is a gap, but also find out factors causing that. It needs to go deeper and analyse structural conditions in the labour market. Regarding competitiveness issues it would be interesting compare wage gap difference in tradable and non-tradable sectors.
    c. We also performed Granger causality test between productivity and compensations, and we concluded that there is one-directional causality from productivity to compensation even with several lags. To investigate dynamic structure of this linkage it is necessary to use quarterly data.

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