

IMPACT OF STRUCTURAL CHANGES AND SHARP ECONOMIC GROWTH ON LABOUR DEMAND AND PRODUCTIVITY IN LATVIA

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Abstract

Since mid- and late 1990's many European economies (including Latvia) experiences structural changes that were accompanied by economic growth and increasing demand for labour, however, at the same time, new technologies and improvements of labour qualification resulted in productivity growth. In previous years, a considerable number of researches and publications has been devoted to productivity and related issues applying input-output analysis and modelling, so the paper includes an insight in recent studies in this topic.

The aim of the research is to reveal actual sectoral trends in high level of disaggregation. The research is based on analysis and computations made on the basis of Input-Output tables of Latvia. In the study, three IO tables are used – of 1998, 2004, and 2007 (at current prices, national currency), as well as annual time-series of National Accounts (NA) indicators (1997-2011). Economic activity is analysed according to level of sectoral disaggregation of NACE classification Rev.1.1. As economic performance of Latvia is frequently compared with Estonia and Lithuania, the international comparison is performed according to the methodology and data of IO tables of these countries.

In the study, main attention is paid to the following NA indicators: compensation of employees, wages and salaries, value added and output (at basic prices) by sector.

Keywords: input-output analysis, labour productivity, real GDP growth rate, labour demand

1. Introduction

Productivity issues are one of the most frequently analysed and investigated issues. Especially productivity is studied in economic conditions when there is a pressure to optimize production processes, for instance, when spending cuts in all levels – macro and micro level – are being introduced. It should be stressed that in previous years, a considerable number of researches and publications has been devoted to productivity and related issues applying input-output analysis and modelling. This paper shortly focuses on recent publications and reports (both theoretical and practical) in this field.

If the reports of recent International Input-Output conferences are examined, it is observable that close to half dozen of reports every year is devoted to productivity, directly to specific aspects or certain case. For instance, in 19th International Input-Output Conference in 2011 three reports out of 187 were devoted to productivity and related issues (on offshoring and productivity gains by Michel (2011); Belegri–Roboli, Markaki and Michaelides (2011) had investigated labour productivity and working time in one country (in Greece); Tantirigama and Leung (2011) had examined the contribution of transport to economic growth and productivity in one country (in New Zealand); Santos (2011) had studied hurricane impact on regional workforce productivity in Virginia (USA)). In 18th International Input-Output Conference in 2010 five reports out of 148 reports, but in 17th International Input-Output Conference in 2009 seven reports out of 248 reports were on productivity.

However, the authors focused on so diverse aspects (offshoring, natural disasters, and transport etc.) and it is observed that there are no reports on study that examines sharp economic development (annual real GDP growth rate above 5-7% for years), economic structural changes and impact on labour demand and productivity. But sharp economic growth, structural changes and changes in demand for labour are processes with up-most importance in many previously so-called transition economies or currently advanced and emerging economies of the European Union (EU) (according to IMF classification) due to the fact that economic crisis of 2008-2010 has hit very severely these countries.

The aim of the research is to reveal actual sectoral trends in high level of disaggregation. The research is based on analysis and computations made on the basis of Input-Output tables of Latvia. In the study, three IO tables are used – of 1998, 2004, and 2007 (at current prices, national currency), as well as annual time-series of National Accounts (NA) indicators (1997-2011) (at current prices and at constant prices (volume), euro). Economic activity is analysed according to level of sectoral disaggregation of NACE classification Rev.1.1. As economic performance of Latvia is frequently compared with Estonia and Lithuania, the international comparison is performed according to the methodology and data of IO tables of these countries.

The data source is Eurostat data base – IO tables; National Accounts aggregates and employment by 60 branch (NACE Rev1.1). Sectoral codes are given in Appendix 1 and 2.

In the study, main attention is paid to the following NA indicators: compensation of employees, wages and salaries, value added and gross output (at basic prices) by sector. All variables analysed are at current prices as ratios and coefficients are computed in order to ensure valid results. The paper neglects and does not analyse the recent economic crisis and related processes.

The paper consists of 3 sections: general statistics on Latvia's structural changes, economic growth, labour demand and productivity; methodology; results and discussion.

2. General statistics on structural changes, economic growth, labour demand and productivity

Since mid- and late 1990's many European economies (including Latvia) experiences structural changes that were accompanied by economic growth and increasing demand for labour, however, at the same time, new technologies and improvements of labour qualification resulted in productivity growth.

Since 1997 a considerable large number of European countries experienced a shorter or longer period of high or sharp economic growth. Sixteen countries that currently are the European Union member states experienced at least one year (in Cyprus (5.1% in 2007), Portugal (5.1% in 1998), and Sweden (6.1% in 2010)) to eleven years of real GDP growth rate above 5% (as Estonia and Lithuania). Average real GDP growth rates are given in Table 1.

Table 1. Average real GDP annual growth rate (%) in various time periods

Countries	1998-2011	2000-2007	1998-2007
EU (27 countries)	1,6	2,5	2,6
Estonia	4,0	8,4	7,3
Latvia	3,7	8,5	7,6
Lithuania	4,3	8,6	7,5

The time period starting from 1998 is analysed in more detail as it corresponds to the aim of the research and also it matches with IO tables statistics. It is observable that in economies with notable economic transformations and domestic structural changes in sectoral level there are lag in elaboration of IO tables and uneven publication by national statistical offices.

Latvia's economy experienced sharp economic growth; the annual real GDP growth rate was 7-8% while the average EU economic growth was accounted for 3%. In the time period analysed, Latvia's economy doubled (see Figure 1). However, sectoral growth rates were various due to unequal impact of domestic and external demand on the sectors.

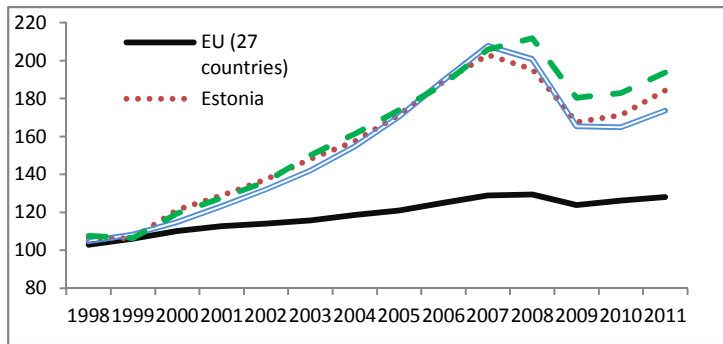


Figure 1. Economic growth in the Baltic countries and the EU-27 (1997=100)

Since 1997 real value added had grown by higher average annual growth rate than real value added per employee – in general, productivity had increased by 6% (that is very high value if compared to the EU average), but value added by 8% (see Table 2). In the study, the major attention is paid to sector with the sharpest economic growth and productivity increase – Wholesale and retail trade (G according to NACE Rev.1.1), Construction (F), Hotels and restaurants (H), and Real estate, renting and business activities (K). It should be noted that mining and quarrying sector (C) had grown seven times; but it is excluded in further more detailed disaggregated sectoral study due to size of the sector (a small sector; 0.1-0.5% of total value added in the economy) and changes in statistical and record methodology applied to this sector.

Table 2. Economic growth and productivity changes by sector

	Real value added per employee (at constant prices)					Real value added		Higher annual growth rate
	1998	2004	2007	annual growth rate (%) 1998-2007	2007/1997	annual growth rate (%) 1998-2007	2007/1997	Productivity vs. Value added
A	1,7	3,0	4,0	10%	2,6	3%	1,3	productivity
B	4,8	6,2	10,3	9%	2,3	-4%	0,7	productivity
C	8,9	10,2	15,2	13%	3,5	22%	7,0	value added
D	5,8	8,6	9,5	6%	1,7	5%	1,6	productivity
E	15,7	20,7	26,6	6%	1,8	2%	1,2	productivity
F	7,6	8,3	9,1	3%	1,3	13%	3,4	value added
G	7,3	11,5	15,1	8%	2,2	13%	3,5	value added
H	4,0	4,7	6,3	3%	1,4	12%	3,0	value added
I	12,8	18,6	21,2	5%	1,7	6%	1,8	value added
J	25,9	27,0	35,0	3%	1,3	8%	2,2	value added
K	17,1	21,6	24,3	2%	1,2	11%	2,9	value added
L	9,5	10,7	11,8	2%	1,2	3%	1,3	value added
M	4,5	5,5	6,0	4%	1,4	3%	1,3	productivity
N	4,9	5,8	6,1	2%	1,2	1%	1,1	productivity
O	6,1	7,6	9,8	6%	1,8	8%	2,1	value added
TOTAL	6,9	10,1	12,1	6%	1,8	8%	2,1	value added

On average, productivity had grown faster than value added in Agriculture etc. (A), Fishing (B), Manufacturing (D), Energy sector (E), if the economy is analysed according to NACE Rev.1.1 letter level of disaggregation. Public sector services as Education (M) and Health and social work (N) had shown this trend but value added in these sectors are mainly generated by compensation of employees; hence due to the specifics these sectors are excluded from general analysis. The economic structure and its dynamics is given in Appendix 3.

3. Methodology

In the study, six indicators are computed on the basis of NA and IO table data and analysed: gross labour productivity, ratio of productivity of unit spend for labour, value added per employed person, ratio of value added to compensation of employees, ratio of value added to wages and salaries, and labour input coefficient.

Indicator of gross labour productivity by sector is computed by the following formula:

$$p_i = \frac{x_i}{e_i} \quad (1)$$

Where p_i – gross labour productivity of sector i ;

x_i – gross output of sector i ;

e_i – number of employed persons in sector i .

The author admits that this solution is trade-off of theoretical and data endowment. For instance, Belegri-Roboli et.al (2011) analysing the labour productivity and working time changes in Greece use employment measured in hours worked. But this approach (hours worked) neither employment measured in full-time equivalents are not applicable in this case due to lack of data in appropriate level of disaggregation and length of time-series.

Ratio of productivity of unit spent on labour (gross output per unit spent on labour) p_{ui} is computed by the following formula:

$$p_{ui} = \frac{x_i}{c_i} \quad (2)$$

Where c_i – compensation of employees in sector i ;

This indicator shows how many units of output (in money terms) are generated by one unit spent on labour.

Value added per employed person is computed by the following formula:

$$pv_i = \frac{va_i}{e_i} \quad (3)$$

According to the general confidence, the higher the valued added by employee, the better for the economy.

Ratio of value added to compensation of employees pv_{ui} is computed by the following formula:

$$pv_{ui} = \frac{va_i}{c_i} \quad (4)$$

Ratio of value added to compensation of employees is important indicator that embodies the ability of one unit spent on labour to generate one unit of value added. As value added and consequently gross domestic product are major economic outcome estimation indicators, the higher value of this ratio indicated higher potential to generate larger value added. In general, the larger the value added in the economy in general and per capita, the better. Consequently, the higher value of this ratio, the better for the economy.

In order to reveal the economic effect of labour to generate value added, the modified ratio – the ratio of value added to wages and salaries pv^*_{ui} - is computed by the following formula:

$$pv^*_{ui} = \frac{va_i}{w_i} \quad (5)$$

Labour input coefficient l_i of sector i is computed by the following formula:

$$l_i = \frac{c_i}{x_i} \quad (6)$$

Economic activity is analysed according to level of sectoral disaggregation of NACE classification Rev.1.1 regarding major (1-digit disaggregation) and more sophisticated sectoral disaggregation (3-digit disaggregation). Results of computation in sectoral level are compared with Estonia's and Lithuania's sectoral results, as well dynamics are analysed.

4. Results and discussion

The analysis of sectoral gross productivity reveals that it gradually increases from a year to year, at the same time, a significant objective dispersion is observable. Productivity level of Wholesale and retail trade (G), Construction (F), Hotels and restaurants (H), and Real estate, renting and business activities (K) are very various and unlike despite general trend of these sectors (see Table 3). As the number of employed persons is used in computation, it is one of the causes of these results since a person can work full-time, half-time or periodically over-time job. International comparison's results are presented in Appendix 4 and 5. Due to the fact that primary production and industry are various, the results of international comparison are presented in Appendix 6.

Table 3. Labour productivity (thsd.euros per employed person)

Gross labour productivity (thsd. euro)												
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL	11,6	12,9	18,0	19,5	19,9	20,3	23,0	26,4	32,2	39,3	42,7	39,1
A	3,7	4,0	6,0	6,9	6,7	7,2	8,8	10,4	11,5	16,6	20,4	18,2
B	8,3	11,5	32,7	30,8	23,9	19,5	19,7	23,6	26,2	35,6	33,7	35,9
C	19,8	12,4	12,3	17,2	18,1	20,2	24,6	28,9	39,7	54,1	52,4	49,2
D	16,3	15,8	20,7	23,0	23,3	25,3	29,1	33,2	39,8	47,1	47,6	43,4
E	26,1	29,7	39,4	41,2	48,8	50,1	49,0	54,2	77,0	104,1	125,2	138,9
F	16,5	18,1	22,0	22,0	27,8	24,9	30,3	34,9	45,0	52,3	57,4	55,5
G	11,4	13,1	16,4	17,7	17,9	17,3	19,3	21,4	26,7	30,8	29,0	23,9
H	9,4	10,1	12,0	12,3	13,2	9,7	11,1	14,3	18,4	20,3	19,4	16,0
I	21,2	21,6	31,7	32,2	31,5	30,6	36,2	39,4	40,9	48,7	55,2	48,7
J	20,6	35,2	36,0	45,4	43,0	42,1	44,5	51,8	76,5	84,6	87,1	79,1
K	20,8	23,0	27,4	33,7	30,3	31,1	36,7	47,3	55,8	66,3	66,0	64,5
L	10,5	12,1	13,7	15,8	17,5	17,9	18,0	19,0	23,1	28,9	35,9	32,3
M	4,4	5,3	7,2	7,6	8,0	8,7	8,7	9,2	10,8	13,6	16,2	15,1
N	6,1	7,0	8,6	9,5	10,0	10,1	12,0	11,7	13,7	17,1	18,9	17,1
O	8,0	9,3	15,7	16,2	16,2	15,3	19,1	19,5	22,5	26,5	31,9	29,9
Difference from average (%)												
A	-68%	-69%	-67%	-65%	-66%	-64%	-62%	-60%	-64%	-58%	-52%	-54%
B	-28%	-11%	81%	58%	20%	-4%	-15%	-10%	-19%	-9%	-21%	-8%
C	71%	-4%	-32%	-12%	-9%	0%	7%	10%	23%	38%	23%	26%
D	41%	23%	15%	17%	17%	25%	26%	26%	24%	20%	12%	11%
E	126%	130%	119%	111%	145%	147%	113%	106%	139%	165%	193%	255%
F	43%	40%	22%	13%	40%	23%	31%	32%	40%	33%	34%	42%
G	-2%	2%	-9%	-9%	-10%	-15%	-16%	-19%	-17%	-21%	-32%	-39%
H	-18%	-22%	-33%	-37%	-34%	-52%	-52%	-46%	-43%	-48%	-55%	-59%
I	83%	68%	76%	65%	58%	51%	57%	49%	27%	24%	29%	25%
J	78%	173%	100%	132%	116%	108%	93%	97%	138%	115%	104%	102%
K	80%	78%	52%	73%	52%	54%	59%	79%	73%	69%	55%	65%
L	-9%	-6%	-24%	-19%	-12%	-12%	-22%	-28%	-28%	-26%	-16%	-17%
M	-62%	-59%	-60%	-61%	-60%	-57%	-62%	-65%	-67%	-65%	-62%	-61%
N	-47%	-46%	-52%	-52%	-50%	-50%	-48%	-56%	-57%	-56%	-56%	-56%
O	-31%	-28%	-13%	-17%	-19%	-24%	-17%	-26%	-30%	-33%	-25%	-24%

The dynamics and international comparison of the ratio of output per unit spent on compensation of employees show that majority of industry demonstrate relatively close results (see Table 4). Of course, there are differences in certain industries regarding applied technologies that can be significantly different (including different labour intensity and productivity), for example energy sector (electricity production by hydropower (in Latvia), nuclear plant (in Lithuania till recently), oil shale (in Estonia).

The results of the analysis of the ratios of value added to compensation of employees and value added to wages and salaries by sector are presented in Table 5 and 6.

Table 4. Ratio of output to compensation to employees by sector

Code	1998	2004	2007		
	Latvia	Latvia	Latvia	Estonia	Lithuania
01	11,5	15,0	7,3	6,4	8,5
02	4,1	7,9	11,7	7,6	3,4
05	6,3	7,5	10,5	9,2	6,8
10	2,4	4,6	5,0	:	6,8
14	3,2	5,5	5,2	5,2	6,5
15	5,7	8,4	7,0	7,2	6,9
17	3,9	5,4	4,5	4,5	5,8
18	4,9	4,7	3,9	3,4	4,6
19	3,7	5,7	4,3	3,8	5,7
20	5,5	8,6	6,4	6,9	5,7
21	8,3	8,9	6,0	7,9	5,7
22	3,9	5,3	4,5	4,0	4,6
24	4,8	5,0	4,5	10,5	9,6
25	7,1	8,8	6,8	6,0	5,4
26	5,1	10,5	6,3	6,0	5,3
27	9,6	13,8	10,3	6,6	5,5
28	6,0	6,1	6,0	6,1	4,8
29	2,7	4,7	4,5	4,1	4,6
31	4,4	6,6	5,0	6,1	6,0
34	6,6	7,4	6,7	5,7	5,4
35	2,6	4,5	4,7	4,7	4,4
36	4,6	4,8	8,3	4,5	5,0
40	4,5	7,1	10,3	9,6	6,4
41	3,8	3,5	4,9	5,2	4,5
45	5,5	9,3	5,9	4,5	3,7
50	5,4	5,8	4,4	3,3	2,9
51	7,5	6,0	4,4	3,8	3,2
52	3,8	3,0	2,7	2,9	2,6
55	4,8	4,7	3,0	3,5	2,3
60	3,2	5,2	5,3	4,6	5,3
63	5,8	9,5	8,9	8,9	8,1
64	3,9	6,4	5,8	7,3	5,6
65	3,7	5,7	4,0	4,0	4,5
66	5,7	2,8	3,1	5,3	4,4
67	6,1	1,5	4,2	6,4	2,9
70	4,6	10,6	12,6	16,3	15,7
71	5,6	4,6	9,1	7,9	6,7
72	4,0	3,4	2,6	2,5	3,1
73	1,6	2,2	3,0	1,9	2,7
74	4,2	3,9	3,3	2,9	3,0
75	2,2	2,4	2,2	1,9	2,4
80	1,5	1,4	1,4	1,6	1,3
85	2,2	2,3	1,8	1,9	1,6
90	3,6	2,8	2,8	4,4	1,7
91	2,0	5,1	3,3	2,4	4,7
92	3,1	3,6	3,0	3,3	3,2
93	3,2	5,0	3,7	5,0	3,5
Total	4,2	5,1	4,6	4,4	4,1

: no data.

Sectors 11, 12, 13, 16, 23, 30, 32, 33, 37, 61, 62 are excluded due to no data.

Table 5. Ratio of value added to compensation to employees by sector

	Latvia		Estonia	Lithuania	Difference in 2007 (%)		
	1998	2004	2007	2007	2007	from Estonia	from Lithuania
01	3,1	5,8	2,5	2,7	3,3	-9%	-24%
02	1,7	2,4	5,0	3,4	1,9	48%	159%
05	2,4	2,2	5,1	3,4	1,5	52%	242%
14	1,4	4,5	2,3	2,9	3,0	-23%	-24%
15	1,7	1,8	1,7	1,6	2,0	6%	-17%
17	1,3	1,1	1,4	1,3	2,0	4%	-31%
18	1,4	1,8	1,3	1,2	2,0	9%	-37%
19	0,7	1,4	1,5	1,1	2,0	37%	-27%
20	1,8	1,8	1,7	1,7	2,0	2%	-17%
21	3,2	2,0	1,8	2,1	2,0	-14%	-13%
22	1,5	1,8	1,6	1,5	2,0	7%	-21%
24	1,2	1,7	1,7	2,6	2,0	-34%	-17%
25	1,9	1,9	1,7	1,5	2,0	15%	-16%
26	2,0	2,1	1,8	2,4	2,0	-23%	-10%
27	1,1	3,4	2,3	1,4	2,0	56%	11%
28	1,9	1,7	2,0	1,6	2,0	28%	-2%
29	0,9	1,7	2,0	1,4	2,0	40%	-4%
31	1,1	0,7	1,8	1,5	2,0	17%	-12%
34	0,7	1,1	1,7	1,6	2,0	2%	-18%
35	1,1	1,2	1,5	1,3	2,0	16%	-27%
36	1,4	1,9	2,6	1,4	2,0	87%	26%
40	2,3	2,5	3,1	3,8	2,8	-19%	9%
41	2,8	1,4	3,4	3,3	2,8	2%	20%
45	2,1	2,2	1,3	1,7	1,8	-28%	-31%
50	2,8	3,0	2,3	1,7	1,8	35%	24%
51	3,7	3,6	2,1	2,1	2,1	1%	-1%
52	2,1	2,1	1,5	1,7	2,0	-14%	-25%
55	1,6	2,4	1,4	1,4	1,4	1%	-6%
60	1,5	1,5	2,2	1,7	3,0	29%	-25%
63	2,5	6,0	2,0	2,5	3,8	-19%	-48%
64	2,6	3,5	2,9	3,3	3,7	-13%	-22%
65	2,6	2,9	2,5	2,3	3,2	10%	-22%
66	1,5	1,2	1,6	2,3	1,9	-32%	-17%
67	4,8	1,3	2,2	3,3	1,6	-33%	40%
70	2,3	8,0	7,2	12,1	10,9	-40%	-34%
71	3,7	2,9	5,0	4,6	4,1	9%	21%
72	2,5	1,7	1,3	1,5	1,9	-8%	-28%
73	1,0	1,2	1,3	1,1	1,8	18%	-23%
74	2,4	1,8	1,5	1,6	1,8	-6%	-19%
75	1,2	1,4	1,5	1,2	1,6	23%	-7%
80	1,1	1,1	1,1	1,1	1,0	-3%	4%
85	1,3	1,2	1,2	1,2	1,0	-2%	13%
90	1,8	1,5	1,3	2,0	1,1	-34%	23%
91	1,0	1,3	1,2	1,1	1,5	10%	-18%
92	1,9	2,0	1,7	1,7	1,5	0%	13%
93	1,4	3,7	1,8	2,3	2,2	-23%	-18%
Total	1,8	2,3	1,9	1,9	2,1	-2%	-10%

: no data.

Sectors 10, 11, 12, 13, 16, 23, 30, 32, 33, 37, 61, 62 are excluded due to no data.

Table 6. Ratio of value added to wages and salaries by sector

Code	Latvia	Latvia	Estonia	Lithuania	Difference (%)	
	2004	2007	2007	2007	from Estonia	from Lithuania
01	6,9	2,8	3,6	3,9	28%	41%
02	2,7	6,0	4,4	2,4	-26%	-59%
05	2,6	7,5	4,4	1,9	-41%	-75%
10	2,1	2,2	:	3,9	:	73%
14	5,4	2,5	3,9	3,9	58%	57%
15	2,2	1,9	2,1	2,6	10%	33%
17	1,4	1,6	1,8	2,6	9%	57%
18	2,1	1,5	1,6	2,6	6%	74%
19	1,6	1,7	1,4	2,6	-16%	47%
20	2,2	1,9	2,2	2,6	14%	33%
21	2,5	2,0	2,7	2,6	33%	25%
22	2,1	1,8	2,0	2,6	8%	41%
24	2,1	1,9	3,4	2,6	77%	33%
25	2,3	2,0	2,0	2,6	1%	30%
26	2,5	2,1	3,1	2,6	49%	21%
27	4,2	2,6	1,9	2,6	-28%	-3%
28	2,0	2,3	2,1	2,6	-10%	11%
29	2,1	2,3	1,9	2,6	-19%	11%
31	0,9	2,1	2,0	2,6	-3%	23%
34	1,3	1,9	2,1	2,6	11%	32%
35	1,5	1,7	1,7	2,6	0%	51%
36	2,2	3,0	1,8	2,6	-39%	-14%
40	3,1	3,8	5,0	3,7	31%	-4%
41	1,8	4,2	4,4	3,7	5%	-12%
45	2,6	1,4	2,3	2,3	67%	69%
50	3,6	2,6	2,2	2,3	-14%	-11%
51	4,2	2,4	2,7	2,7	14%	13%
52	2,5	1,7	2,2	2,4	34%	43%
55	2,9	1,5	1,7	1,8	14%	16%
60	1,9	2,6	2,1	3,7	-16%	46%
63	7,2	2,3	3,3	4,8	41%	106%
64	4,3	3,4	4,4	4,8	31%	41%
65	3,6	3,1	3,0	4,4	-3%	43%
66	1,5	1,9	3,1	2,5	64%	30%
67	1,4	2,6	4,4	2,2	69%	-16%
70	9,6	8,1	15,9	13,7	96%	68%
71	3,5	5,7	5,8	5,2	3%	-8%
72	2,1	1,5	1,9	2,3	25%	53%
73	1,4	1,7	1,5	2,2	-11%	30%
74	2,2	1,6	2,0	2,2	24%	38%
75	1,8	2,0	1,7	2,2	-14%	9%
80	1,4	1,4	1,5	1,4	3%	-6%
85	1,4	1,5	1,6	1,4	5%	-6%
90	1,8	1,5	2,6	1,6	75%	5%
91	1,6	1,5	1,5	1,9	-3%	23%
92	2,3	2,0	2,3	2,1	12%	2%
93	4,3	2,0	3,0	2,6	50%	29%
Total	2,7	2,2	2,5	2,6	14%	20%

: no data.

Sectors 11, 12, 13, 16, 23, 30, 32, 33, 37, 61, 62 are excluded due to no data.

The values of labour input coefficient by logics should and are different for various industries. However, it is worth to stress that on average in the economy the value of this coefficient is 0.22-0.25. And the evidence indicates that more intersectoral differences are observed rather than international differences. Another important point is that despite grand changes regarding the values of indicators above-analysed, labour input coefficients have not changed by such an extent. The computational results are summed and presented in Appendix 7.

The analysis of labour input coefficients and labour productivity is notable element in labour demand analysis and forecasting. During the time period when the economic growth is accompanied with corresponding productivity growth it can lead to a situation when high unemployment arises and sustains for years. As free movement of labour force is one of the EU foundations, short-term or long-term emigration and immigration gradually balance the labour market and labour supply.

Conclusions

The findings about the Latvia's economic activity and over all real productivity show that real value added per employee and real value added have doubled in 1998-2007. It is considerably higher than the average level of the EU and it is one of the highest growth within the EU, therefore it demands more detailed and disaggregated sectoral research.

The evidence of sectoral data analysis on basis of IO tables and NA data show that relative indicators (ratios) more correctly represent the sectoral specifics and latest trends. On the basis of international comparison with Estonia and Lithuania, it is concluded that a convergence is observable to Estonia's level. Analysis of compensation of employees and wages and salaries indicates that, in Latvia, one unit spent on wages and salaries generates a larger value added, but one unit spent on compensation of employees (including taxes etc.) generates smaller value added than in Estonia and Lithuania. It is also concluded that despite notable changes regarding the values of indicators above-analysed, labour input coefficients have not changed by such an extent and difference from the level in neighbouring countries is relatively low.

Productivity represents efficiency of used technologies and labour in the economy. The growth of productivity is observed and, from theoretical point of view, it is welcome in the economy. However, it is worth to analyse in sectoral level in order to obtain more accurate and truthful results.

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Appendices

Appendix 1. Notation of sectors according to NACE 1.1.Rev.

Code	Description
A	Agriculture, hunting and forestry
B	Fishing
C	Mining and quarrying
D	Manufacturing
E	Electricity, gas and water supply
F	Construction
G	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
H	Hotels and restaurants
I	Transport, storage and communication
J	Financial intermediation
K	Real estate, renting and business activities
L	Public administration and defence; compulsory social security
M	Education
N	Health and social work
O	Other community, social and personal service activities

Appendix 2. Notation of sectors according to NACE 1.1.Rev. (disaggregated)

No	Code	Description
01	A01	Agriculture, hunting and related service activities
02	A02	Forestry, logging and related service activities
05	B	Fishing
10	CA10	Mining of coal and lignite; extraction of peat
11	CA11	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying
12	CA12	Mining of uranium and thorium ores
13	CB13	Mining of metal ores
14	CB14	Other mining and quarrying
15	DA15	Manufacture of food products and beverages
16	DA16	Manufacture of tobacco products
17	DB17	Manufacture of textiles
18	DB18	Manufacture of wearing apparel; dressing; dyeing of fur
19	DC	Manufacture of leather and leather products
20	DD	Manufacture of wood and wood products
21	DE21	Manufacture of pulp, paper and paper products
22	DE22	Publishing, printing and reproduction of recorded media
23	DF	Manufacture of coke, refined petroleum products and nuclear fuel
24	DG	Manufacture of chemicals, chemical products and man-made fibres
25	DH	Manufacture of rubber and plastic products
26	DI	Manufacture of other non-metallic mineral products
27	DJ27	Manufacture of basic metals
28	DJ28	Manufacture of fabricated metal products, except machinery and equipment

29	DK	Manufacture of machinery and equipment n.e.c.
30	DL30	Manufacture of office machinery and computers
31	DL31	Manufacture of electrical machinery and apparatus n.e.c.
32	DL32	Manufacture of radio, television and communication equipment and apparatus
33	DL33	Manufacture of medical, precision and optical instruments, watches and clocks
34	DM34	Manufacture of motor vehicles, trailers and semi-trailers
35	DM35	Manufacture of other transport equipment
36	DN36	Manufacture of furniture; manufacturing n.e.c.
37	DN37	Recycling
40	E40	Electricity, gas, steam and hot water supply
41	E41	Collection, purification and distribution of water
45	F	Construction
50	G50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
51	G51	Wholesale trade and commission trade, except of motor vehicles and motorcycles
52	G52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods
55	H	Hotels and restaurants
60	I60	Land transport; transport via pipelines
61	I61	Water transport
62	I62	Air transport
63	I63	Supporting and auxiliary transport activities; activities of travel agencies
64	I64	Post and telecommunications
65	J65	Financial intermediation, except insurance and pension funding
66	J66	Insurance and pension funding, except compulsory social security
67	J67	Activities auxiliary to financial intermediation
70	K70	Real estate activities
71	K71	Renting of machinery and equipment without operator and of personal and household goods
72	K72	Computer and related activities
73	K73	Research and development
74	K74	Other business activities
75	L	Public administration and defence; compulsory social security
80	M	Education
85	N	Health and social work
90	O90	Sewage and refuse disposal, sanitation and similar activities
91	O91	Activities of membership organization n.e.c.
92	O92	Recreational, cultural and sporting activities
93	O93	Other service activities
95	P	Activities of households
	Q	Extra-territorial organizations and bodies

Appendix 3. Structure of Latvia's economy (%)

Code	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
A	4%	4%	4%	4%	4%	4%	4%	4%	3%	3%	3%	3%
B	0,3%	0,3%	0,4%	0,3%	0,2%	0,1%	0,1%	0,1%	0,1%	0,1%	0,1%	0,1%
C	0,1%	0,1%	0,1%	0,2%	0,2%	0,3%	0,3%	0,3%	0,3%	0,4%	0,4%	0,5%
D	16%	14%	14%	14%	14%	13%	13%	13%	12%	11%	11%	10%
E	5%	4%	4%	3%	3%	3%	3%	3%	2%	2%	3%	4%
F	6%	6%	6%	6%	6%	6%	6%	6%	7%	9%	9%	7%
G	16%	16%	17%	17%	18%	18%	19%	20%	21%	20%	17%	15%
H	1%	1%	1%	1%	1%	1%	2%	2%	2%	2%	2%	1%
I	15%	14%	14%	15%	15%	15%	15%	14%	11%	10%	11%	11%
J	3%	5%	5%	4%	5%	5%	5%	6%	7%	6%	6%	6%
K	12%	13%	14%	14%	14%	14%	14%	14%	15%	16%	17%	20%
L	8%	9%	8%	8%	8%	8%	7%	7%	7%	8%	8%	8%
M	5%	5%	5%	5%	5%	6%	5%	5%	4%	5%	5%	6%
N	4%	4%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
O	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	5%	5%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Appendix 4. Difference of sectoral productivity in Latvia from Estonia (%)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL	-34%	-32%	-23%	-26%	-31%	-34%	-33%	-32%	-25%	-20%	-14%	-12%
A	-69%	-66%	-62%	-63%	-63%	-67%	-65%	-63%	-62%	-56%	-53%	-48%
B	-36%	-24%	75%	64%	-5%	-15%	59%	40%	15%	47%	-44%	-63%
C	26%	-21%	-33%	-23%	-31%	-32%	16%	-6%	-6%	14%	12%	13%
D	-32%	-37%	-36%	-36%	-42%	-36%	-32%	-35%	-33%	-22%	-20%	-17%
E	14%	16%	22%	-9%	-10%	-21%	-13%	-4%	20%	3%	4%	9%
F	-22%	-12%	-8%	-19%	-15%	-22%	-14%	-21%	-5%	8%	24%	26%
G	-10%	-6%	1%	-3%	-13%	-29%	-27%	-32%	-21%	-23%	-20%	-25%
H	-21%	-27%	15%	-4%	-7%	-44%	-47%	-25%	-16%	-16%	-18%	-24%
I	-20%	-26%	-19%	-31%	-35%	-39%	-43%	-39%	-37%	-39%	-36%	-39%
J	-31%	0%	-21%	-19%	-28%	-33%	-33%	-40%	-23%	-20%	-4%	25%
K	-36%	-36%	-27%	-30%	-35%	-39%	-43%	-28%	-26%	-23%	-23%	-13%
L	-15%	-16%	-16%	-5%	-6%	-15%	-8%	-14%	-6%	0%	6%	-6%
M	-29%	-28%	-18%	-11%	-7%	-6%	-17%	-18%	-10%	-8%	4%	8%
N	-6%	-15%	-11%	-1%	-4%	-1%	7%	-17%	-11%	-12%	-28%	-26%
O	-19%	-5%	41%	26%	5%	-10%	-6%	-6%	1%	6%	12%	9%

Appendix 5. Difference of sectoral productivity in Latvia from Lithuania (%)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL	-1%	10%	20%	13%	8%	3%	5%	4%	12%	19%	9%	20%
A	-35%	-21%	12%	10%	9%	27%	26%	9%	1%	6%	-14%	7%
B	20%	133%	675%	340%	-82%	-67%	-55%	-13%	-29%	-8%	26%	15%
C	-10%	-49%	-71%	-68%	-43%	-31%	-33%	-47%	-16%	34%	-5%	21%
D	-4%	-12%	-19%	-25%	-21%	-22%	-28%	-28%	-24%	-16%	-31%	-22%
E	-3%	33%	51%	55%	-1%	-11%	-5%	-16%	15%	54%	68%	50%
F	10%	18%	36%	25%	47%	22%	41%	55%	70%	66%	60%	131%
G	12%	25%	21%	12%	3%	-2%	5%	5%	29%	31%	7%	1%
H	4%	15%	21%	0%	4%	-24%	-8%	10%	53%	29%	28%	9%
I	30%	17%	35%	11%	-6%	-11%	1%	-6%	-17%	-9%	-14%	-14%
J	26%	76%	40%	24%	18%	37%	19%	20%	38%	44%	12%	68%
K	-20%	-25%	-25%	-19%	-14%	-24%	-18%	-8%	11%	-3%	10%	35%
L	-44%	-20%	-26%	-16%	-9%	-17%	-18%	-15%	-19%	4%	5%	10%
M	0%	16%	48%	37%	19%	24%	18%	24%	15%	38%	33%	21%
N	24%	27%	32%	54%	55%	53%	64%	32%	45%	45%	23%	8%
O	14%	11%	33%	27%	18%	9%	33%	40%	37%	42%	42%	41%

Appendix 6. Labour productivity of agriculture and industry in 2007

Sector	Labour productivity (thsd. euro)			difference (%)	
	LV	EE	LT	EE	LT
Total	18,0	23,5	15,0	-0,2	0,2
01	4,7	13,1	5,2	-64%	-10%
02	14,0	24,1	9,5	-42%	48%
05	32,7	18,6	4,2	75%	675%
10	8,3	25,0	12,6	-67%	-34%
14	25,2	:	21,8	:	16%
15	24,7	31,8	26,6	-22%	-7%
17	17,9	25,1	18,6	-29%	-4%
18	15,0	16,9	12,9	-11%	16%
19	7,8	26,0	35,9	-70%	-78%
20	19,7	24,3	14,7	-19%	34%
21	40,9	26,6	19,6	54%	109%
22	18,8	55,8	24,6	-66%	-23%
24	30,3	77,0	64,5	-61%	-53%
25	26,9	44,1	70,5	-39%	-62%
26	17,1	30,2	24,0	-43%	-29%
27	69,7	:	9,9	:	608%
28	16,2	36,6	17,0	-56%	-5%
29	11,6	18,6	10,5	-38%	10%
31	20,8	:	40,4	:	-48%
32	10,4	115,2	21,9	-91%	-53%
34	25,3	:	2,9	:	774%
35	14,4	:	14,9	:	-4%
36	14,1	20,2	15,3	-30%	-8%
40	43,5	34,3	28,8	27%	51%
41	14,5	21,6	14,3	-33%	2%

: no data.

Appendix 7. Labour input coefficient

	1998	2004		2007		Average	Difference from average (%)			2007
	LV	LV	LV	EE	LT		LV	EE	LT	/1998
01	0,09	0,07	0,14	0,16	0,12	0,14	0%	13%	-14%	1,6
02	0,24	0,13	0,09	0,13	0,30	0,17	-50%	-23%	73%	0,4
05	0,16	0,13	0,09	0,11	0,15	0,12	-19%	-7%	26%	0,6
10	0,41	0,22	0,20	:	0,15	:	:	:	:	0,5
14	0,31	0,18	0,19	0,19	0,15	0,18	8%	7%	-14%	0,6
15	0,18	0,12	0,14	0,14	0,15	0,14	0%	-2%	2%	0,8
17	0,26	0,19	0,22	0,22	0,17	0,21	8%	8%	-16%	0,9
18	0,21	0,21	0,26	0,30	0,22	0,26	0%	15%	-15%	1,3
19	0,27	0,18	0,23	0,26	0,18	0,22	5%	17%	-21%	0,9
20	0,18	0,12	0,16	0,14	0,18	0,16	-1%	-9%	11%	0,9
21	0,12	0,11	0,17	0,13	0,17	0,16	7%	-19%	12%	1,4
22	0,26	0,19	0,22	0,25	0,22	0,23	-3%	9%	-6%	0,9
24	0,21	0,20	0,22	0,10	0,10	0,14	58%	-32%	-26%	1,1
25	0,14	0,11	0,15	0,17	0,18	0,17	-11%	1%	11%	1,0
26	0,20	0,10	0,16	0,17	0,19	0,17	-7%	-3%	10%	0,8
27	0,10	0,07	0,10	0,15	0,18	0,14	-33%	6%	27%	0,9
28	0,17	0,16	0,17	0,16	0,21	0,18	-7%	-9%	16%	1,0
29	0,36	0,21	0,22	0,24	0,22	0,23	-2%	7%	-5%	0,6
31	0,23	0,15	0,20	0,17	0,17	0,18	13%	-7%	-6%	0,9
34	0,15	0,14	0,15	0,18	0,19	0,17	-13%	4%	9%	1,0
35	0,39	0,22	0,21	0,21	0,23	0,22	-2%	-2%	4%	0,5
36	0,22	0,21	0,12	0,22	0,20	0,18	-33%	23%	10%	0,6
40	0,22	0,14	0,10	0,10	0,16	0,12	-19%	-12%	31%	0,4
41	0,26	0,28	0,21	0,19	0,22	0,21	0%	-7%	7%	0,8
45	0,18	0,11	0,17	0,22	0,27	0,22	-23%	1%	22%	0,9
50	0,18	0,17	0,23	0,30	0,34	0,29	-22%	4%	18%	1,2
51	0,13	0,17	0,23	0,26	0,32	0,27	-16%	-2%	18%	1,7
52	0,26	0,34	0,37	0,35	0,38	0,37	1%	-6%	4%	1,4
55	0,21	0,21	0,33	0,29	0,43	0,35	-6%	-18%	24%	1,6
60	0,31	0,19	0,19	0,22	0,19	0,20	-5%	9%	-5%	0,6
63	0,17	0,11	0,11	0,11	0,12	0,12	-3%	-3%	6%	0,7
64	0,25	0,16	0,17	0,14	0,18	0,16	6%	-16%	10%	0,7
65	0,27	0,18	0,25	0,25	0,22	0,24	5%	3%	-8%	0,9
66	0,18	0,36	0,32	0,19	0,23	0,25	31%	-23%	-7%	1,8
67	0,16	0,67	0,24	0,16	0,35	0,25	-4%	-37%	41%	1,5
70	0,22	0,09	0,08	0,06	0,06	0,07	17%	-10%	-7%	0,4
71	0,18	0,22	0,11	0,13	0,15	0,13	-15%	-1%	16%	0,6
72	0,25	0,30	0,38	0,40	0,33	0,37	4%	9%	-12%	1,5
73	0,62	0,45	0,33	0,52	0,37	0,41	-20%	28%	-9%	0,5
74	0,24	0,26	0,30	0,34	0,33	0,32	-8%	5%	3%	1,3
75	0,45	0,41	0,46	0,52	0,42	0,47	-1%	11%	-9%	1,0
80	0,65	0,74	0,71	0,62	0,75	0,69	2%	-10%	8%	1,1
85	0,45	0,43	0,56	0,52	0,64	0,57	-2%	-10%	12%	1,2
90	0,28	0,35	0,36	0,23	0,57	0,39	-7%	-42%	48%	1,3
91	0,50	0,20	0,31	0,41	0,21	0,31	-1%	32%	-31%	0,6
92	0,32	0,28	0,33	0,31	0,31	0,32	5%	-3%	-2%	1,0
93	0,31	0,20	0,27	0,20	0,29	0,25	8%	-22%	14%	0,9
Total	0,24	0,20	0,22	0,23	0,25	0,23	-5%	-1%	7%	0,9

: no data.

Sectors 11, 12, 13, 16, 23, 30, 32, 33, 37, 61, 62 are excluded due to no data.