Baltic States Problem - Labour Market; Analysis Employment, Unemployment and Vacancies of Estonia; Improved Beveridge Curve

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Abstract

Before and after the economic crisis, the economic growths of Estonia, Latvia and Lithuania were one of the highest in the European Union (EU). Hence these countries were called Baltic Tigers. In addition, Estonian state budget is one of the most balanced and the government debt one of the smallest. After the crisis, the economic growth factors of Estonia have again been one of the biggest in the union. In 2011, the real GDP growth in Estonia was 7.6%. However, the employment rate and wages in Estonia are one of the lowest in the EU. A thorough analysis of the development of a small economy such as Estonia will also help make more general conclusions, at least on the European level. The problem is the large number of vacancies in the situation of high unemployment rate. One of the priorities of „Europe 2020 strategy" is the EU economy with a high employment rate for the next decade. Therefore, the purpose of the current article is to analyse the labour market in Estonia general, its unemployment rate and vacancies, the problems within the labour market, and compare this data with Estonian key partner countries in the EU. The problem with the cyclical nature of economy is the large number of vacancies even in the situation of unemployment. This article presents a novel approach to the analysis of the relation of vacancies and unemployment (improved Beveridge curve), their mathematical models and suggestions for improving the situation in the labour market.

Keywords: Estonia, labour market, employment, unemployment, vacancy, Beveridge curve.

1. Introduction

The population of Europe will be ageing and the number of people included in the labour market is going to decrease. During the economic crisis, however, one of the most critical issues in Europe, including Estonia, was unemployment. With a purpose of leading the EU out of crisis and preparing the economy of the EU for the next decade, an action plan for the European Union, „Europe 2020" strategy, was developed. The strategy presents a vision for European social market economy, which stands on the following intertwining and mutually supporting pillars – developing an economy based on knowledge and innovation; enhancing the sustainable development of a competitive, resource efficient and less CO_2-emitting economy; supporting an economy of high employment rates and social and regional cohesion. The success achieved within these priorities is measured by 5 main goals in the EU, of which the countries have to consider when setting their goals.

In order to achieve these goals, „Europe 2020" strategy, that covers many large scale projects, was created. The project „Action Plan for creating new jobs and skills" aims to modernise the labour market in order to raise employment rates and secure the sustainability of European society models after the baby boom generation is going to retire from the labour market. One of the most important goals is to implement efficient employment reforms for creating more and better jobs that should help to increase the inclusion of certain groups in the labour market and improve its overall efficiency. The main goal for the labour market of the EU is to reach the employment rate of 75% among people aged 20 – 64. The crisis has considerably increased unemployment and the demographic changes ahead are to decrease the labour force even more. Therefore, increasing the employment rate would have a considerable effect on the future economic growth of Europe. (European Council 2010)

Estonia is one of the least-populous members of the European Union, Eurozone, NATO, IMF and OECD. The United Nations lists Estonia as a developed country with a Human Development Index of "Very High" (Rank - 34th, 2011). An important element in Estonia's post-independence reorientation has been closer ties with the Nordic countries, especially Finland and Sweden. Estonia has had a market economy since the end of 1990s and one of the highest per capita income levels in Eastern Europe. The current government has pursued relatively sound fiscal policies, resulting in balanced budgets and low public debt. A balanced budget, almost non-existent public debt, flat-rate income tax, free trade regime, competitive commercial banking sector, innovative e-Services and even mobile-based services are all hallmarks of Estonia's market economy. In addition, Estonian state budget is one of the most balanced and the government debt one of the smallest. Estonia has the lowest ratio of government debt to GDP among EU countries as 6.3% at the end of 2011.

Before the economic crisis, the economic growths of Estonia, Latvia and Lithuania were one of the highest in the European Union. Hence these countries were called Baltic Tigers. The crisis, however, took the three countries to a completely different edge – the fall of their GDPs was one of the biggest in the EU. After the crisis, the economic growth factors of Estonia have again been one of the biggest in the union. In 2011, the real GDP growth in Estonia was 7.6%. (Table code: tsieb 020, 2012)

However, the employment rate and wages in Estonia are one of the lowest in the EU. A thorough analysis of the development of a small economy such as Estonia will also help make more general conclusions, at least on the European level. The most acute topics after the economic crisis have been the decline of people included in the labour market and unemployment. The problem is the large number of vacancies in the situation of high unemployment rate. Due to the free movement of people within the EU, the problem in Eastern European countries, including Estonia, is the migration of younger labour force abroad, where the wages are higher. In Sweden and Finland, for example, net salary is 4 times higher than in Estonia.

When looking at the future, the solutions depend on the efficiency of producing, raising of labour productivity and on the other hand, on enhancing the motivation of the employees. In order to develop measures that increase the efficiency of the functioning of the labour market, a thorough and complex analysis of the labour market needs to be conducted. Therefore, there is a need to research the relations of the aforementioned factors. As a rule, analysis conducted so far mainly focus on observing the situation of unemployment, not concentrating enough on the analysis of other components of the labour market.

The current labour market analysis is mainly guided by the directions given in the „Europe 2020" strategy, other framework documents and the works of other authors having analysed this topic. We will be looking at how Estonia and its most important partner countries have followed directions given in this directive and what are the prospects of fulfilling them? What are the options for enhancing the efficiency of the labour market and decreasing unemployment?

Therefore, the *purpose* of the current article is to analyse the labour market in Estonia, more specifically, the main problems of employment, unemployment and vacancies and compare the data with our next countries Finland, Sweden, Latvia, Lithuania and Germany, the leading industrial country in the EU, and with the EU labour market as a whole. The main focus will, however, be on Estonia and its closest partners, but according to the purpose of this article, the global nature of economy and the need for theoretical generalisations, the EU as a whole is at times included in the analysis. This analysis enables to develop more effective means for raising the efficiency of the labour market.

2. Theories of labour market analysis

The theoretical basis for the current article stems from the statements of recognized scholars in the field of economics, the analysis of labour markets conducted by international organizations, recently published academic works dealing with economies in Europe, Nordic and Baltic countries and the views expressed in the authors´ recent publications.

According to the research on labour markets by the scholars Dale T. Mortensen, Peter A. Diamond and Christopher A. Pissarides, the laureates of the 2010 Nobel Memorial Prize in Economic Sciences, in the situation of considerable unemployment, a large number or people are unable to find work, because their skills and the jobs offered by enterprises do not match. This conclusion was derived from their research on the links between unemployment and economic policies. The prize was awarded to them for the analysis of markets with search frictions (Markets with… 2010)

The works of all the three Nobel laureates help find answers to the following questions: „Why are a large number of people unemployed in the situation where there are lots of vacancies in the labour market?", „How can the management of economy influence unemployment?"

Dale T. Mortensen (Northwestern University, USA) has researched the dynamic processes of economy that could not be fully explained by theory before. He developed formal job search models in labour economics and searched for ways to implement them in the dynamics of unemployment, wages and earned income. In his labour market theory, *friction* stands for oppositions or hindrances in the labour market which cause job vacancies in the situation of unemployment. Some of the possible reasons frictions occur, for example, are job changes and the geographic reallocation or detachment from families related to this. *Frictional unemployment* is caused by constantly happening job changes. It is always short-term and involves only a certain number of existent jobs. *Unemployment caused by frictions* is inexorable. The occurrence of this kind of unemployment has caused transactional costs. Works concentrating on this topic have also analyzed the dependence of vacancies on unemployment (Beveridge curve), labour productivity and other problems of labour market, offering solutions for increasing employment rates (Lentz et al 2005, 731 – 749; Lentz et al 2008, 1317 - 1373). The abovementioned statements are referred to in this article and in other works focusing on labour market analysis on a broader perspective.

Dale T. Mortensen and **Eva Nagypal** (Northwestern University, USA) have researched the cyclical fluctuations of unemployment and vacancies. Less than 10% of the fluctuations of unemployment and vacancies derive from productivity shock. The rigidity of wages causes fluctuations of labour market. The model proposed in their article explains the empirical relations between job vacancies-unemployment rate and labour productivity and wages (Mortensen et al 2007b, 327- 347). The same authors have also researched the model of business behaviour adaption in the labour market of the USA, showing that the shocks of overall productivity have a bigger effect on vacancies-unemployment rate than exogenic factors. The labour productivity of the employee may rise stochastically (due to the better organization of work process) even without the improvement of quantitative factors (Mortensen et al 2007a, 645 - 665).

Dale T. Mortensen postulated natural unemployment in his models: the function of the number of jobs and employers fit to enterprises is in accordance with the Beveridge curve and also with the linear relation of quickness of finding a job and vacancies-unemployment rate (Mortensen 2009, 2336 - 2353).

Peter A. Diamond (Massachussets Institute of Technology, USA) has researched the topics of market failure, unemployment, vacancies, wages and Beveridge curve – all these concepts are also dealt with in the current article (Diamond 1989, 5 – 74).

Christopher Pissarides (London School of Economics, UK) has researched the relations of labour market and macroeconomics, especially unemployment, labour market policies, vacancies, economic growths and structural changes. He developed the conception of linkages between unemployment and economy (Pissarides 1985, 676 – 688; Pissarides 1986, 501 – 550; Pissarides et al 1994, 400 - 413).

Paul R. Krugman (Princeton University, USA) focuses on the laws of the labour market – on the Beveridge curve, where in the situation of rising unemployment, even the offered jobs vacancies are not fulfilled. He claims that productivity is not the most important factor, although in the long run, it becomes extremely important. The ability of the state to raise its living standard almost entirely depends on its ability to increase productivity per employee (Krugman 2010; Krugman et al 2008; Krugman at al 2010). In his works, he has also dealt with problems of the low-paid workers and the regulation of labour market (Krugman 1999). The above mentioned views are also dealt with in the current article and the following publications.

Joseph Eugene Stiglitz (Columbia University, USA, Nobel 2001) has researched asymmetrical information of market economics and his works have enabled to find out how and how much should a state interfere in the economy of different markets in order to help enhance the development of the country. His works have also dealt with the problems of labour market. (Stiglitz 2002).

Jaan Masso and **Kerly Krillo** (Tartu University, Estonia) focus on the impact of the economic crisis on the labour markets of the Baltic States, giving an overview of how the crisis has affected the different segments of labour markets. The authors claim that the Baltic States have used the so-called external adjustment (method), while particularly in other Central and Eastern European countries; also the fall of working hours and increase of part-time jobs can be seen. Compared to the previous crisis in other countries, a considerable flexibility of wages downward can be noticed, despite employers'´ arguments against salary cuts brought out in previous studies. The crisis has, in certain ways, stimulated the use of more flexible work forms. On the other hand, quite different adjustment strategies can be noticed at the level of individual enterprises. During the economic crisis, the expenditure on both active and passive labour market measures have grown significantly, also thanks to the use of EU funds. (Masso et al 2010).

Murat Tasci and **John Lindner** (USA) have researched the shifts in the Beveridge curve, an empirical relationship between job openings and unemployment in the labour market of the USA. Tensions are caused by skill-job mismatches, geographical mismatches, the cost of recruitment and job search, etc. These frictions are typical and some level of vacancies and unemployment can be observed even in well-functioning labour markets. The Beveridge curve represents the equilibrium of the two variables – vacancies and unemployment. The studies by Tasci and Lindner follow the movements in the curve during a certain time. The movements in this curve help to identify the changes in the efficiency of the labour market. For example, when the economy moves into recession, unemployment goes up and there are fewer vacancies available, causing the equilibrium in the labour market to move downward along the curve. On the other hand, when the economy expands, companies look for new hires to increase their production and meet demand. Shifts in the Beveridge curve indicate changes in the matching efficiency of the labour market (Tasci 2010).

Robert Shimer (University of Chicago, USA) studied the balance of the cyclical functioning of unemployment and vacant jobs in the USA. In recent years, Mortensen-Pissarides search and matching model has changed the standard theory of unemployment (Mortensen, Pissarides and Pissaries). The model is attractive for various reasons: it offers an appealing description of the functioning of the labour market; it is analytically tractable; it has rich and generally intuitive comparative statistics; it can be easily adapted to study a number of labor market policy issues, such as unemployment insurance, firing restrictions, and mandatory advanced notification of layoffs. The model does not, however, explain the two core elements of cyclical behaviour - unemployment and vacancies, which are both highly variable and strongly negatively correlated in the USA. Changes in labor productivity are most easily interpreted as technology or supply shocks. As for the costs, advertising of job vacancies makes unemployment relatively expensive. (Shimer 2005).

Charles L. Nelson (University of Washington, USA) proposed to forecast long-run trends for time series such as GDP not following a deterministic path in the long run with the help of the Beveridge curve. He showed that if the series is stationary in first differences, then the estimated trend is a random walk with drift that accounts for growth, and the cycle is stationary. During the research, the cyclical components of post-war USA economic activity were studied empirically. The trend of GDP variation during shocks changed the cycles to last for a shorter time (Nelson 2008, 203 - 205).

Rob Valletta and **Jaclyn Hodges** (USA) studied the shifts in the Beveridge curve starting from the tendencies of economic downfall in 1993. The study presented different values of vacancy series on state and regional level. The most important long-term influence has been the aging of the U.S. population.

The Beveridge curve presented by Valletta and Hodges describes the changes in the „age-adjusted" unemployment rate. This is displayed by figures about vacancies and unemployment in different time periods, also taking account regional discrepancies. If labour demand is growing in some parts of the country and shrinking in others, it may result in a large number of unemployed individuals moving across different regions in order to find vacant jobs. This kind of geographic reallocation is costly and time consuming, it slows down the job-matching process and increases the likelihood that unemployment and vacancies will both exist at high levels.

In general, the authors conclude: the inward shifts of the Beveridge curve in the last two decades support the conclusions of the improved labour market performance in the USA (Valletta et al 2006, 1-3).

Axel H. Börsch-Supan (University of Mannheim, Germany) researched whether macroeconomic relations between unemployment and vacancies exist, on the example of data collected from West(ern) Germany. In his analysis, a question of economic policy dominates: what is the cause of such unemployment? He concluded that structural unemployment results from the co-existence of unemployment and a large number of vacancies. Börsch-Supan researched whether the Beveridge curve - the relation between available jobs and unemployment rate - is appropriate for the quantification of structural unemployment. The data was collected from 9 regions of Western Germany. The analysis of this data supports the structural macroeconomic interpretation of the Beveridge curve. The rapid shifts in the Beverage curve are explained through structural changes (Börsch-Supan 1991, 280 - 295).

However, the abovementioned works usually deal with time periods before economic crisis and unfortunately the works of those renowned authors could not give real suggestions to stop the rapid growth of unemployment (in Europe). As a rule, the works deal with unemployment rate and touch considerably less upon other factors of the labour market such as employment, vacant jobs etc. At the same time, the articles present a lot of views suitable for analysing the current situation. The situation of the labour markets in different parts of the world is quite different and therefore the corrective measures and suggestions also differ from country to country. In the background of the aforementioned statements, the current article aims to analyse the labour market components of Estonia and some of the other countries in the EU.

3. Analysis of the labour market in Estonia

In a stable period, analysis are conducted annually, but in times of economic crisis, the changes in employment are extremely rapid, therefore data should be analyzed in shorter time periods – quarterly or possibly even monthly. In the years 2000 – 2008, the development of the economy in Estonia (Tanning et al 2010b, 15 - 240) and the EU was stable, in 2009 there was a rapid recession and the next year showed growth again. All this also reflects in the changes of employment rates both in Estonia and the EU: the economic growth resulted in the increase of employment rates. However, a detailed analysis conducted quarterly shows a more complex situation.

Table 1. Estonia. Labour status of population aged 15-74, 2001 -2011

	2001	2003	2004	2005	2006	2007	2008	2009	2010	2011
Labour force, thousands	660.8	660.0	659.1	659.6	686.8	687.4	694.9	690.9	686.8	695.9
- employed, thousands	577.7	594.3	595.5	607.4	646.3	655.3	656.5	595.8	570.9	609.1
- unemployed, thousands	83.1	66.2	63.6	52.2	40.5	32.0	38.4	95.1	115.9	86.8
Inactive, thousands	386.4	387.4	388.7	389.0	362.3	359.0	347.9	348.0	348.0	333.8
Employment rate, %	55.2	56.7	56.8	57.9	61.6	62.6	63.0	57.4	55.2	59.1
Unemployment rate, %	12.6	10.0	9.7	7.9	5.9	4.7	5.5	13.8	16.9	12.5

Source: Table code: ML330, 2012. Statistics Estonia

The employment rate rose till 2008 and then started to decline slowly – by 2010, the number of employed persons had fallen by 8.1 thousand compared to 2008 year. In the years 2007 – 2010, the number of active participants in labour market decreased by 84.7 thousand and the number of unemployed rose by 83.9 thousand. In the period 2008 – 2010, the respective numbers were -85.6 thousand and +77.5 thousand, the gap being 8.1 thousand; and in the years 2009 – 2010 the gap being only 4.1 thousand.

The highest number of non-active people in the last decade was registered in 2002 – 394.4 thousand; in the years 2008 – 2011, this number was smaller. The highest number of discouraged workers was registered in between 2002 – 2004: 17.7 thousand to 18.1 thousand; and the lowest in 2008 – 5.5 thousand. The largest number of old age pensioners, 148.8 to 152.8 thousand, was also recorded within this period.

The current analysis of the Estonian labour market proceeds with looking at the employment data. In Estonia, the fall in employment rate and the growth of unemployment rate was not balanced during crisis. The gap between those figures was considerable.

The reason for this is that a number of people had been working without a formal contract, and a number of people who were left unemployed abroad, started to register as unemployed in Estonia; those people, however, had not been counted amongst the employed people in Estonia and had not been the taxpayers of Estonia. Therefore we should first try to focus on the people who were left unemployed, not primarily on those who had been working unofficially. Of course, exceptions also apply here. In 2009, the number of employed persons fell by 60.7 thousand, but the number of the unemployed rose by 56.7 thousand (?), the total number of unemployed persons reaching 95.1 thousand. Employment in 2010 compared to that of 2008 had fallen by 85.6 thousand. The trend shows that in the primary and secondary sector, employment has been decreasing; in the tertiary sector, it had been rising till 2006; ratios it has been rising gradually, reaching 65.3 % in 2010 (Table code: ML 207, 2011. Statistics Estonia).

The highest number of inactive people in the labour market was registered in 2002; since then, it has been decreasing. In the last three years, the largest number of inactive people was registered in QII- 2009 – 354 thousand. The biggest group among them were students/learners – 115.1 thousand; sick or injured people QI-2008 – 54.6 thousand; people being pregnant, on maternity leave or on leave for parents QIII-2009: 37.8 thousand; those taking care of family members QI-2008 – 15.9 thousand; those having reached pension age QI-2009 – 133.6 thousand; discouraged workers QIV-2008 – 10.2 thousand. In comparison, in QII-2008, the number of discouraged workers was two times lower: 4.5 thousand. In the last six quarters, the number of inactive people has fallen in most of the groups, however, the number of learners, people taking care of family members and discouraged workers have risen (Table code: ML452, 2011. Statistics Estonia).
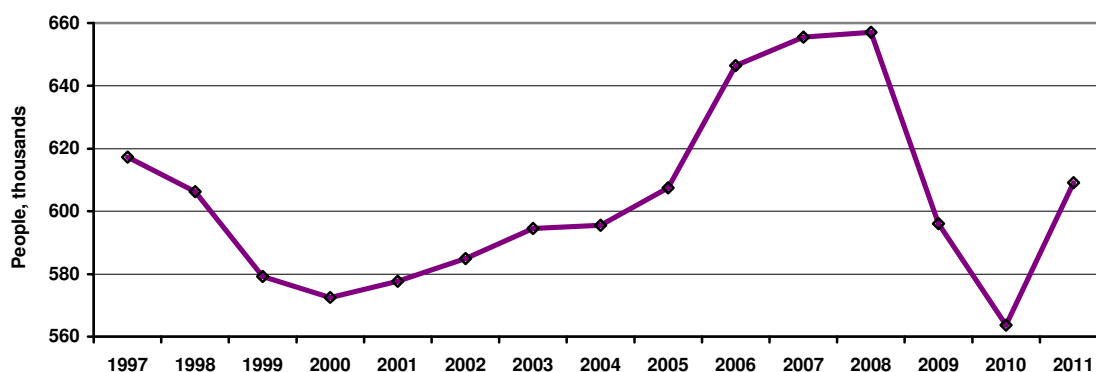

Figure 1. Estonian employment rate, guarter average, 1997-2011

Footnote: annual average since 1997 employed persons aged 15-74
Source: Table code: ML0200, 2012. Statistics Estonia. Author's illustration

The biggest number of employed persons was registered in QIII; 2007 – 662.1 thousand; and the lowest in Q1-2010 – 553.6 thousand. In the beginning of 1990s, the employment rate was even higher and it was followed by a significant migration to the East. The years 1999, 2009 and 2010 were the ones when employment rate dropped the most rapidly. Figure 1 illustrates well the economic crisis of the second half of the nineties, especially the crisis of 1999, the economic growth followed by it and the results of the last economic crisis.

Table 2. Estonia. Employed persons by Economic activity, thousands, 2005 – 2011

	2005	2006	2007	2008	2009	2010	2011
Economic activities total	607,4	646,3	655,3	656,5	595,8	570,9	609.1
Manufacturing	135,5	132,9	131,2	135,0	113,8	108,4	121.0
Construction	48,8	63,6	82,1	81,0	58,3	47,9	59.0
Wholesale and retail trade	80,0	88,1	86,9	92,5	83,2	80,0	81.3
Transportation and storage	49,2	56,5	52,9	49,9	49,7	43,6	48.3
Education	55,4	58,5	55,0	59,9	62,5	56,1	57.2

Source: Table code: ML0200, 2012. Statistics Estonia

Growth can be seen in the mining industry, water supply services, sewerage, waste and pollution management, finance and insurance services, education and health care and social welfare services. The biggest fall in 2009 compared to 2008 was in manufacturing (-21.2 thousand); followed by construction (- 22.7 thousand) and wholesale and retail trade (-9.3 thousand). In these three economic sectors, the number of employed persons fell by 53.2 thousand altogether, the overall employment in this period fell by 60.7 thousand. The highest number of employed persons in transportation and storage sector was registered in 2006, it was by 12.9 thousand higher than in 2010. The years 2008 and 2009, however, showed quite equal numbers. Therefore, the peaks and lows of employment do not always match in the main economic sectors.

In 2011 the annual average number of employed persons was 38 200 or 6.7% more compared to the previous year. The growth in employment was most of all influenced by increased number of persons employed in manufacturing, construction, transportation and storage, information and communication and agriculture. Due to the growth in employment the number of unemployed as well as economically inactive persons decreased in 2011. (News releases 14. 02. 2012, no 30. Statistics Estonia)

Table 3. Estonia. Employed persons by economic activity, quarter and year, thousands, 2009 – 2011

	2009				2010				2011			
	Q I	Q II	Q III	Q IV	Q I	Q II	Q III	Q IV	Q I	Q II	Q III	Q IV
Economic activities total	612,1	592,6	598,1	580,5	553,6	558,8	578,2	592,9	591,3	602.6	627,8	614.5
Manufacturing	113,1	116,3	116,1	109,9	96,1	100,7	113,1	124,5	117,6	113.9	122,3	129.7
Construction	63,5	55,0	59,2	55,6	40,6	41,2	55,1	54,4	49,9	52.0	70,2	63.8
Wholesale and retail trade	91,9	74,4	80,7	85,7	81,7	74,5	82,8	81,1	80,6	84.8	77,8	82.2
Transportation and storage	52,3	52,3	46,2	48,0	47,5	45,4	37,2	44,3	50,7	51.3	46,1	45.2
Education	70,8	64,4	54,4	60,5	60,7	57,9	52,1	53,6	53,5	59.1	59,7	56.5

Source: Table code: ML047, 2012. Statistics Estonia

Table 3 illustrates the year of crisis, 2009, and the following year, 2010, when employment rates in most economic sectors started to climb up again. The employment rate in manufacturing industry in QIII-2010 had almost reached the level of QIII-2009. The number of construction workers rose by 14.5 thousand in 2010; however, when considering the seasonal nature of most construction work, the employment rate in 2010 was still smaller than in 2009 and considerably lower than in the earlier years. In recent years, the employment in wholesale and retail trade has also risen slightly. The employment fell considerably in transportation and storage sector; there the number of employed persons was only 37.2 thousand in QIII-2010; the same trend can be noticed in education: the number of employed persons fell from 70.8 thousand to 52.1 thousand. However, when in 2009 there was a rapid fall in education workers of first and second level, the yearly growth of employed persons in the third level was 2900 (!).

Table 4. Estonia. Employed persons by Indicator, Major group of occupations, thousands, 2000 – 2010

|	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total	572,5	577,7	585,5	594,3	595,5	607,4	646,3	655,3	656,5	595,8	570,9
I. Legislators, senior officials and managers	72,4	68,8	69,6	69,8	73,6	76,9	83,0	83,1	79,5	72,0	65,6
II. Professionals	75,7	73,8	84,0	82,6	78,9	85,9	94,8	95,2	90,3	95,5	108,9
III. Technicians and associate professionals	80,3	78,4	74,8	71,7	78,5	80,7	79,1	83,3	84,9	83,1	70,0
IV. Clerks	27,0	29,2	30,2	30,2	25,9	29,4	32,8	31,5	35,0	32,6	34,2
V. Service workers and shop and market sales workers	62,1	67,3	67,3	76,3	71,6	73,5	81,2	77,8	83,3	75,1	70,6
VI. Skilled agricultural and fishery workers	21,3	18,3	19,2	15,0	15,4	14,4	11,7	12,4	12,0	8,8	9,4
VII. Craft and related trade workers	90,7	90,2	88,7	93,6	94,1	92,7	100,4	110,2	110,6	84,3	71,8
VIII. Plant and machine operators and assemblers	79,0	81,0	81,4	83,0	83,2	84,1	94,0	90,5	93,5	85,0	80,8
IX. Elementary occupations	62,5	68,1	67,5	68,4	71,4	65,9	65,1	67,8	64,3	56,6	56,1
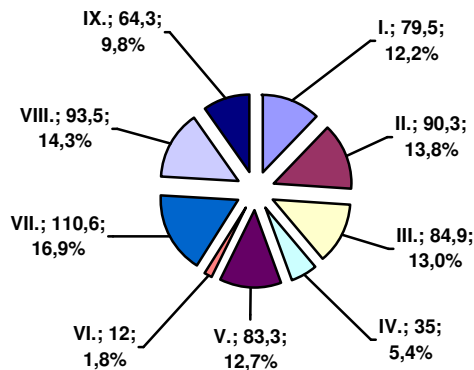
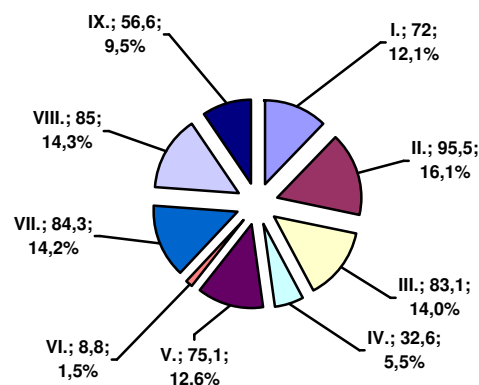**Figure 2. Estonian employment according to major groups of occupations, 2008**

Figure 3. Estonian employment according to major groups of occupations, 2009

Source: Table code: ML212, 2012. Statistics Estonia. Author's illustrations

In 2008 (figure 2), the largest group was VII – 110.6 thousand, which formed 16.9 % of all the employed persons, followed by group VIII 93.5 thousand, percentage 14.3; group II 90.3 thousand, percentage 13.8; group III 84.9 thousand, percentage 13.0; and group V 83.3 thousand, percentage 12.7. In the crisis year, 2009, the highest number of employed persons was in group II (professionals): 95.5 thousand, percentage 16.1; followed by group VIII: 85.0 thousand, percentage 14.3; VII: 84.3 thousand, percentage 14.2; group III: 83.1 thousand, percentage 14.0; and group V: 75.1 thousand, percentage 12.6.

In quarter IV 2010, the number of employed persons in Estonia was 593 000, which is 15 000 or 2.5 % more than in the previous quarter and 12 000 or 2.1 % more than in the same quarter the year before. The employment rate rose mainly due to the increase of workers in the manufacturing industry. During the last three months of 2010, the unemployment rate fell, but the number of unemployed persons in 2010 was the largest since Estonia regained its independence in 1991. In 2009, the number of the unemployed rose to 95 000 people and even surpassed the unemployment rate of 2000; in 2010, however, the number of unemployed people was even higher – 116 000. The annual average unemployment rate of 2010 was 16.9 %; in 2009, 13.8%. The number of employed people in 2010 was 571 000, which is 25 000 (4.2%) less than in 2009. The number of inactive people within the age group 15 – 74 (students, retired persons, homemakers, discouraged persons, etc.) was 348 000, which is the same as in the year before.

Table 5. Employment rate, age group 15 – 64, %, 1998 – 2010

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU 27	61.2	61.8	62.2	62.6	62.4	62.6	63.0	63.5	64.5	65.4	65.8	64.5	64.1
Germany	63.9	65.2	65.6	65.8	65.4	65.0	65.0	66.0	67.5	69.4	70.1	70.3	71.1
Estonia	64.6	61.5	60.4	61.0	62.0	62.9	63.0	64.4	68.1	69.4	69.8	63.5	61.0
Latvia	59.9	58.8	57.5	58.6	60.4	61.8	62.3	63.3	66.3	68.3	68.6	60.9	59.3
Lithuania	62.3	61.7	59.1	57.5	59.9	61.1	61.2	62.6	63.6	64.9	64.3	60.1	57.8
Finland	64.6	66.4	67.2	68.1	68.1	67.7	67.6	68.4	69.3	70.3	71.1	68.7	68.1
Sweden	70.3	71.7	73.0	74.0	73.6	72.9	72.1	72.5	73.1	74.2	74.3	72.2	72.7

Source: Table code: tsiem010, 2011. Eurostat

The smallest employment rates in the 1990s were in Southern-European countries Spain, Greece, but also in Ireland. The countries with the highest employment rate were Denmark, Sweden, Switzerland and the USA. In 1999, the employment rate in the EU-15 was 62.5%; in the USA, the employment rate was 73.9%. In order to be competitive in the global market, the EU has set a goal to reach employment rate of 75%. Here lies a deceptive contradiction: despite quite a high unemployment rate, employment should be increased. In the next decade, a similar trend continued. The highest employment rate was in Sweden in 2007 – 74.2 %; a year before, the highest employment rate had been in Finland – 72.0 %. The employment rate in Estonia has always stayed below 70%. As a general rule, the employment rate of male population has always been remarkably higher than the employment rate of female population, but data shows that the trend of female employment is growing. In Southern European countries, female employment rate is lower than in the Nordic countries. In 2010, the average employment rate of men in EU-27 was 70.1 % and of women, 58.2%. In Estonia, the respective figures were 61.5% and 60.6%. The highest employment rate of women was in Sweden in 2001 – 72.3%; in Estonia, the highest employment rate of female population was in 2008 – 66.3%.

4. Analysis of unemployed persons in Estonia

Assessments in this article are based on data from the Estonian labour force survey. Estonian Statistics Board has conducted this survey since 1995; every quarter, 5000 people take part in the survey. Labour force surveys are conducted by statistics organisations following a harmonized methodology in all the EU countries (Sources and Methods. Definitions ILO).

The number of registered unemployed is acquired from the Estonian Unemployment Insurance Fund; the definition of a registered unemployed is explained in „Market Services and Benefits Act", paragraphs 2 – 3: an unemployed person is a person who is not working, has been registered as unemployed in the Estonian Unemployment Insurance Fund and is looking for work. An unemployed person is considered to be job searching when he follows an individual job-search plan and is ready to accept a matching job an start working immediately (Estonian Acts of Law I 2005, 54, 430).

Table 9. Estonia. Unemployed persons and rate. Thousands and percentages annual average, 1997 – 2011

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Thousands	65.8	66.1	80.5	89.9	83.1	67.2	66.2	63.6	52.2	40.5	32.0	38.4	95.1	115.9	86.8
%	9.6	9.8	12.2	13.6	12.6	10.3	10.0	9.7	7.9	5.9	4.7	5.5	13.8	16.9	12.5

*Source:* Table code: ML43/50, 2012. Statistics Estonia

Among the unemployed persons in 2010, 38.0 thousand people had been unemployed for less than 6 months; 25.3 thousand, 6 – 11 months; 52.6 thousand, 12 or more months; and 19.3 thousand 24 or more months. The number of people being unemployed for more than two years was twice as big as in 2009 and over three times bigger than in 2008. At the end of 2011 the unemployment slightly increased, but the annual average number of unemployed persons still decreased. In the record year for unemployment, in 2010, the unemployed persons numbered 115 900. In the previous year the number of unemployed persons decreased to 86 800 and was also smaller compared to 2009. The unemployment rate was 12.5% in 2011, which is by 4.4 percentage points smaller compared to a year earlier. This is the largest fall of unemployment during the last 20 years. (News releases 14.02.2012, no 30. Statistics Estonia)

Table 10. Estonia. Unemployed persons by Quarter. Thousands, 1997 -2011

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
I Q	65.1	68.4	78.8	96.7	92.6	72.6	68.7	66.3	62.2	43.7	36.3	28.7	79.0	136.9	99.3
II Q	64.0	64.0	75.9	85.5	81.5	60.6	70.7	66.2	54.0	42.8	35.0	27.3	92.2	127.7	92.1
III Q	67.0	64.2	82.1	85.3	79.6	60.1	63.7	66.0	46.0	37.0	28.7	43.9	102.3	105.9	77.0
IV Q	67.1	67.9	85.2	92.2	78.5	75.3	61.7	56.0	46.5	38.6	28.1	53.5	106.7	93.2	79.0

Source: Table code: ML441, 2012. Statistics Estonia

The analysis by quarters gives a more accurate overview about current situation and enables better observation of the dynamics of unemployment. In the first two quarters of 2010, for example, the number of unemployed persons was considerably higher than the annual average of unemployed of the same year. The number of unemployed people was the highest in QI-2010, and although the number of unemployed people started to decrease in 2010, the unemployment rate was still 4 – 5 times higher than in pre-crisis year 2008. Despite the fall in unemployment, the number of long-term unemployed persons was still quite high in the end of 2010.
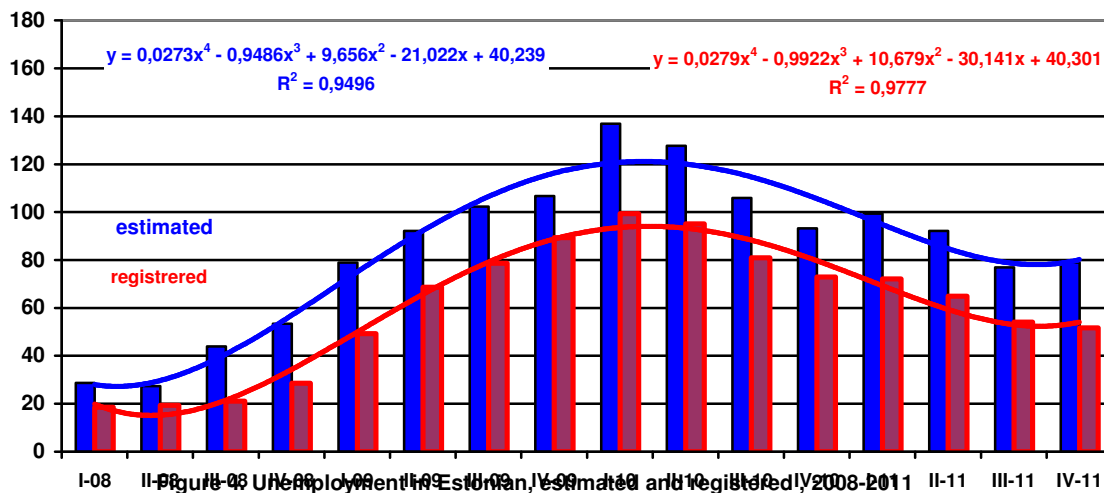
Source: Author's illustration

The changes in unemployment in Estonia (Figure 4) are well illustrated by 4 order polynomials, where estimated R^2 =0.9496 and registered R^2=0.9777. The biggest discrepancies from theoretical trend line in case of estimated unemployment fall into periods QIV-2009 and QI-10, but in case of registered unemployment, to periods QIV-2008 and QI-10. At the same time, Figure 4 shows quite big discrepancies in the two assessment methods of unemployment, especially in the first quarters (of 2010). The actual and theoretical indicators of QI-11 match quite well, which is illustrated by the high R^2 of both trend lines. All this gives an opportunity to assess the unity and discrepancies of theory and practice, and predict future trends.

The estimated number of unemployed persons rose to a record high of 136 000 in the first quarter of 2010, but decreased by 9200 persons in II quarter and by 21 800 in the III quarter. The unemployment rate fell from 18.6 % in II quarter to 15.5% in the third quarter. Compared to the III quarter of the previous year, when the number of unemployed persons was 102 300 and unemployment rate 14.6 %, unemployment in the III quarter of 2010 was still higher. But when comparing the first quarters of 2010 and 2008, we can see that the number of estimated unemployed had risen by 108 200 persons (!), but in 2010, however, it had fallen by 31 000 people. In the IV quarter of 2010, the number of unemployed persons decreased to 93 000 and unemployment rate fell to 13.6 %; in the I quarter of 2011, however, the number of unemployed persons rose to 99 000 (14.4%).

In conclusion, unemployment started to decrease in the end of 2010, and the trend has continued in 2011. Despite this, the average number of unemployed persons in 2010 was still the largest since Estonia regained its independence in 1991.

Next, the seasonal nature of unemployment in Estonia is analysed monthly (6 year).
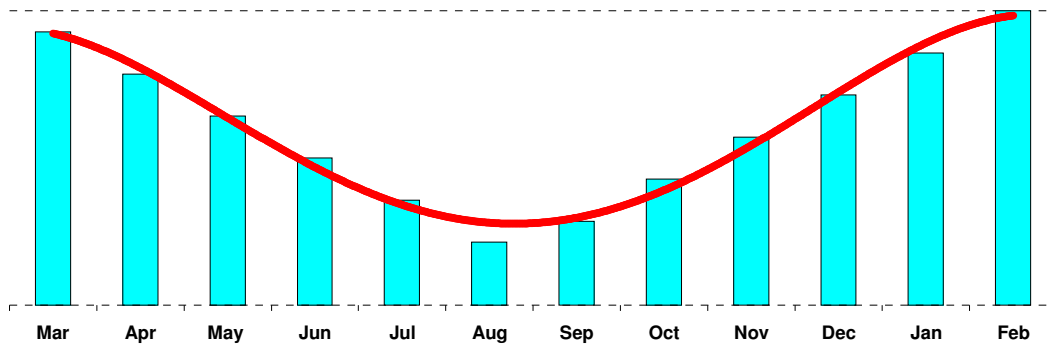
Figure 5. The months of smallest unemployment rate

Source: Author's illustration

Conclusion: August has the lowest unemployment rate, and during the next and previous months, unemployment rises. The division takes place according to the law of natural distribution (Gauss` distribution).

Table 11. Unemployment rates, %, 2010 – 2011

	2010						2011					
	M01	M03	M05	M07	M09	M12	M01	M04	M06	M09	M11	M12
EU 27	9.5	9.6	9.6	9.6	9.6	9.6	9.5	9.5	10.0	9.8	9.8	10.0
Germany	7.3	7.1	6.9	6.8	6.6	6.6	6.4	6.1	6.1	5.7	5.5	5.7
Estonia	19.0	18.7	18.0	15.9	15.9	14.3	13.6	12.7	12.8	11.3	11.7	11.7
Latvia	20.0	20.0	19.4	18.3	18.3	17.3	16.3	16.1	16.2	14.8	14.6	14.6
Lithuania	17.2	17.2	18.2	18.3	18.3	17.4	16.5	15.6	15.6	15.3	14.3	14.3
Finland	8.7	8.6	8.5	8.4	8.2	8.0	8.0	7.9	7.8	7.7	7.6	7.5
Sweden	8.9	8.5	8.7	8.5	8.2	7.8	7.8	7.4	7.4	7.3	7.5	7.5

Source: Table code: teilm020, 2011. Eurostat

In January 2011, unemployment rate in the EU had already decreased to 9.6 % and in the euro-zone countries, to 9.9%. This means, however, that in the EU-27, 23 048 million people were unemployed, including 15 775 million in the Euro zone. The lowest unemployment rate was in Holland (4.3%), Austria (4.3%), Luxembourg (4.7 %), and the highest in Spain (20.4), Latvia (18.3%, III Q 2010) and Lithuania (17.4%, IV Q 2010). The unemployment rate in Estonia was 14.3, IV Q 2010 (Estonia was fifth from the end). In the IV quarter, the biggest fall in unemployment was in Estonia (from 16.5 to 14.3%), Malta (from 7.2% to 6.1%) and Sweden (from 8.9% to 7.9%). The biggest rise of unemployment was in Greece (from 9.7% to 12.9%). The unemployment rates for men and women in the EU-27 were stable in January: 9.6% and 9.5%, respectively. The most important partner countries of the EU, USA and Japan, had unemployment rates of 9.0 and 4.7.

Unemployment in the EU decreased in 2000 and in the next 1.5 years, grew again to 9%, stayed stable for three years, and the next three years brought a significant fall to 7%, until the recession. In the two crisis years, since QII 2008, unemployment reached its peak, the reasons of which have already been analysed within this article. The beginning of 2011, however, showed slight fall in unemployment (Eurostat news releases 18/2011 and 31/2011).

5. Job vacancies

In a situation when unemployment rate is high and there is a wish to increase employment, it is proper to look at the vacancies and the changes within vacancy rates. In 2010, the month with the highest number of vacancies was May (6606). When taking into account all the vacancies added and closed within this month, 2792 vacancies were left by the end of May. Starting from spring 2010, despite high unemployment rates, the number of vacant jobs even exceeded 6000 at times. According to data from 30.12.2010, the most number of vacancies were registered in Harju County – 715. Therefore, the figures reveal the lack of qualified labour force.

Table 12. Estonia. Number of job vacancies and rate of job vacancies, %, Quarter, 2005 – 2011

	Number of job vacancies				Rate of job vacancies, %			
	Q I	Q II	Q III	Q IV	Q I	Q II	Q III	Q IV
2005	12 663	13 373	14 395	13 035	2.3	2.4	2.6	2.4
2006	16 639	17 140	19 746	18 202	2.8	2.9	3.4	3.1
2007	20 079	20 744	22 532	18 276	3.3	3.4	3.7	3.0
2008	17 581	16 056	16 365	10 373	2.8	2.6	2.7	1.8
2009	5 735	4 075	4 920	3 890	1.0	0.8	0.9	0.8
2010	4 711	5 244	5 852	4 817	0.9	1.1	1.2	1.0
2011	5 876	6 324	7 834	6 318	1.2	1.2	1.5	1.3

Source: Table code: WSV 11.2011, 2011. Eurostat

Table 12 shows the number of job vacancies by quarters both in absolute and relative numbers. Before the economic crisis, the number of vacancies even reached 3.7% (QIII-2007), but dropped to a mere 0.8% or 3890 vacancies during recession.

The rate of job vacancies was the highest in public administration, defence and compulsory social security (2.6%), and the lowest in mining and quarrying (0.1%). Compared to the 4th quarter of 2010, the rate of job vacancies increased the fastest in accommodation and food service activities. The increase in the number of job vacancies was the biggest in transportation and storage and in accommodation and food service activities, where there were over two times more vacancies, compared to the 4th quarter of 2010. A third of the job vacancies were in the public sector and two thirds in the private sector. The rate of job vacancies was 1.4% in the public sector and 1.2% in the private sector. The public sector includes companies owned by the state or local government. (News releases 08.03.2012, no 41. Statistics Estonia)

Table 13. Estonia. Number of job vacancies. Major group of occupations. Quarter, 2008, 2010 and 2011

	Economic activities total	Manufacturing	Construction	Wholesale and retail trade;	Transportation and storage	Accommodation and food service activities	Information and communication	Professional, scientific and technical activities	Administrative and support service activities	Public administration and defence; compulsory social security	Education	Human health and social work activities
2008												
QI	17 581	3 874	1 072	1 978	946	718	538	754	659	3 098	1 203	949
QII	16 056	3 096	927	1 963	896	654	426	658	524	3 105	1 218	930
QIII	16 365	3 528	751	1 449	696	499	497	540	476	2 853	2 688	804
QIV	10 373	1 527	507	1 039	522	349	359	505	272	2 563	1 052	652
2010												
QI	4 711	497	202	684	193	..	163	214	348	870	375	224
QII	5 244	784	331	632	303	..	180	243	239	935	435	299
QIII	5 852	719	240	499	216	184	194	367	320	839	1 224	272
QIV	4 817	778	284	527	198	172	189	213	294	837	409	275
2011												
QI	5 876	968	260	918	328	210	315	245	332	949	341	349
QII	6 324	1 230	246	794	489	253	316	262	492	866	364	345
QIII	7 834	1234	420	1004	487	314	405	305	476	977	1211	346
QIV	6 318	910	311	772	493	402	339	203	553	973	417	335

Source: Table code: WSV011, 2011. Statistics Estonia

Table 13 enables to assess the number of vacancies before crisis, during the crisis and after it according to major groups of occupations.

Although there has (always) been quite a large number of vacancies in all the economic sectors, the rates of job vacancies in different occupations are quite different. Before the economic crisis, the overall number of vacancies was 17.5 thousand, but even in the peak period of unemployment, the number of vacancies was almost 5 000 and over a 100 in major groups of occupation. Therefore, problems may lie in notifying the unemployed about job vacancies or in the fact that the unemployed people do not qualify for the vacancies.

Different job vacancies were also available in almost all Estonian regions during the peak of unemployment (QI2010). In QIV, the number of vacancies among professionals, senior officials and managers was slightly smaller than in QI. We face a situation where not everyone wants to work as an unskilled worker; at the same time, employers do not see their abilities to be suitable for working on a job requiring high qualification, for example, on a job of senior official or manager.

In Harju County, which includes the city of Tallinn, 14 784 new vacancies were added in 2010. Over three thousand vacancies were found in Tartu County, Ida-Viru County and in companies operating all over Estonia or abroad. Over a thousand vacancies were registered in Lääne-Viru County, Pärnu County and Viljandi County. The smallest amount of vacancies was found in a small-population Hiiu County.

When the vacancy rate (relation of vacant jobs and employed persons) before the crisis (QI-2010) was high (2.8%), then in 2009, it had dropped to 0.8% in II and IV quarter. The rate of vacancies has been increasing slowly (2011=1.2%), but it is still lower than it was before the crisis. However, the vacancy rate today is higher than in 2010.

In Estonia, there have always been a certain number of job vacancies. Depending on the economic cycle, their numbers change continuously. At first glance, it seems that when unemployment increases, then the number of vacancies decreases and vice versa. Still, this regularities is more complex and varies from country to country. What shows the importance of this issue is the fact that even now, in Estonia and in the whole EU, there is the lack of qualified labour and at the same time, the workers are not willing to work with less suitable conditions.
The following analysis focuses on the relation of vacancies and unemployment and the rules of their distribution laws.

Figure 6. The division of vacancies and unemployment in Estonian, 2006-2011
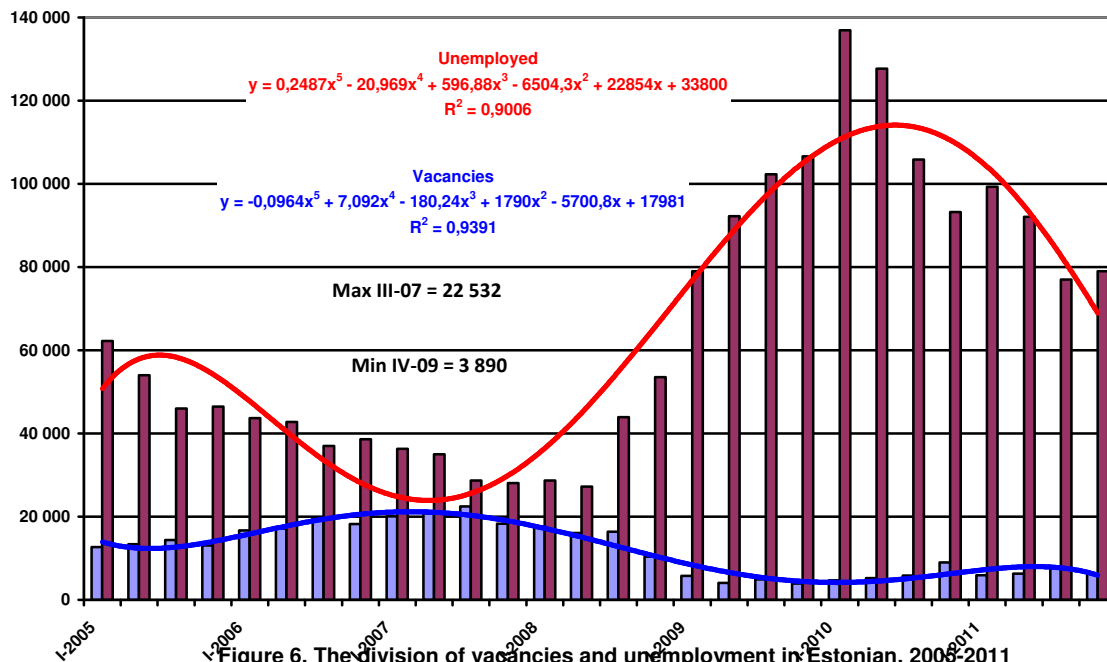
Source: Author's illustration

Two trend lines were approaching each other up until the end of 2007, then their gap was minimal (QIII-07=6168; QIV-07=9824).

Then, unemployment was decreasing and at the same time, the number of vacancies was growing. It was getting more and more difficult for employers to find labour force, especially qualified labour. This kind of developments in the labour market started to suppress the development of the enterprises. The employees, on the contrary, had quite good opportunities for choosing jobs, which enabled them to ponder carefully about the nature of the job, the pay and the working conditions, etc. In the first half of 2008, the number of the unemployed was still decreasing, but the demand for workers started to rise slowly. The employers had to agree with higher demands of employees and this led to the fall in vacancy numbers. In the end of 2008, the effects of economic crisis started to be felt in the labour market. The unemployment rate started to increase quickly and the number of vacancies started to fall. By the beginning of 2010, the unemployment rate had reached its peak and the number of vacancies its low (fell to the minimum). The gap between the two trend lines was the largest. Next, the two lines started to approach each other again – unemployment rate started to fall and the number of vacancies started to rise. Both trend lines match quite well with the curves of actual value, which shows that unemployment and vacancies in Estonia follow certain rules, because $R^2 = 1.0$.

The rate of vacancies in the EU, especially in the Euro zone, rose even up to 2.4% in 2007, but 2.5 years later, the economic crisis took it to 1.4%. In 2010, vacancy rate rose to 1.7 %. This trend in the EU is quite similar to the job vacancy trends observed in Estonia. In the III quarter of 2010, the rate of vacancies in the EU countries fluctuated between 3.0% - 0.3%. The highest vacancy rates were in Malta (3.0%), Norway (2.6%) and Germany (2.5%), the lowest in Lithuania (0.3%). Despite the Estonian vacancy rate rising in the II and III quarter of 2010, it is still lower (1.2%) than the European average (1.5%).

When the number of unemployed persons in Estonia was 25 – 50 thousand, the number of vacant jobs was in between 23 -13 thousand. Since the number of unemployed reached 80 thousand, the number of vacancies has been stable, around 5 000. When the number of unemployed persons reached 60 thousand, the number of vacancies decreased almost twofold. However, the unemployment rate has risen much more quickly than the number of job vacancies has decreased. When the number of unemployed persons reached 80 thousand, the number of vacancies stayed stable despite of the rapid growth in unemployment.

6. The improved Beveridge Curves

The following chart shows the correlative relation of vacancies and unemployment (Job vacancies … 2012). We will take a look at the improved Beveridge Curves describing Estonia and other countries.

Figure 7. Estonia. Vakancy=f(Unemployed), 2005Q1-2011Q4
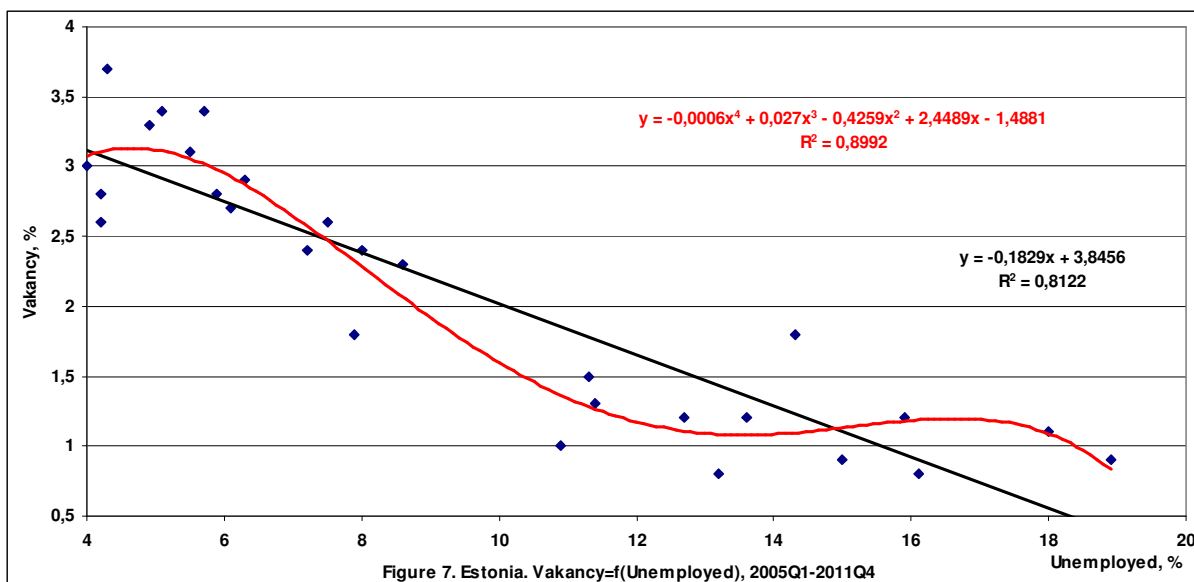
Source: Author's illustration

The changes in vacant jobs (Figure 7) are in strong correlation with the rate of unemployment, which is illustrated by the high value of R^2. In the period since QI-2005, the value of 4 order polynomial $R^2 = 0.8992$.

When we look at this relation starting from the beginning of the economic crisis, since QII-2008, we get an even stronger correlation, where $R^2=0.9685$. Figure 7, where we can see rates by quarters, shows that when unemployment rate exceeds 11%, the number of job vacancies stays stable, fluctuating within 1 percentage point; in case of very high unemployment rates, however, it may even rise, and in the end, fall a little again.
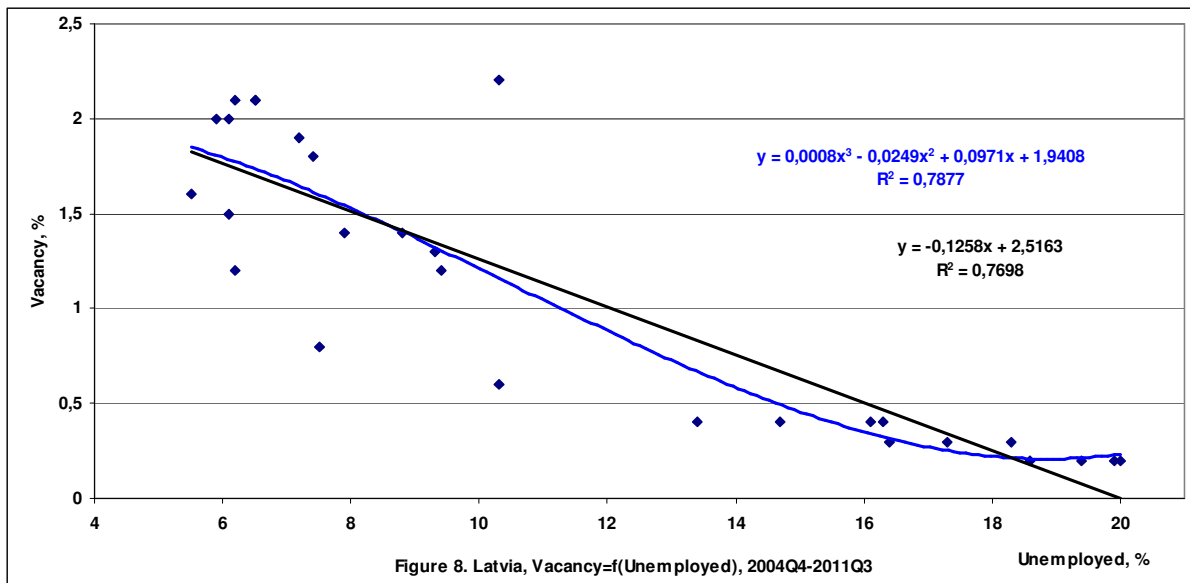
The right line in Figure 7 may be interpreted in a way that in case of high unemployment, some people are working unofficially, or have temporary or part-time jobs. They have lost hope to find an official job and prefer working unofficially instead of having a low-paid job or a job with unsatisfactory working conditions or microclimate. At the same time, some of them might be registered as unemployed, but are actually working abroad, in Finland, for example. What the employers see in this situation is this: there is not enough qualified and disciplined labour force, but not everyone can be hired or is able to work even after having received proper training. The abilities of people and their motivation for working vary a lot (Tanning et al 2010a, 81 - 83). Therefore, even in the peak of unemployment, there are those who do not accept all kind of jobs or working conditions. On the other hand, the employers also do not wish to give the job to „anyone".

However, when we focus on 3 order polynomial as a trend line, where $R^2=0.8554$ or on a 2 order polynomial, where $R^2=0.8476$, we get a more simplified view/picture. The vacancy rate decreases until the level of unemployment reaches 16%, and then starts to rise slowly. A linear correlation leads to an even simpler answer: when the number of unemployed persons rises, the number of vacancies decreases. Therefore, the more complex mathematical model enables a more exact explanation of the interrelated changes and gives a stronger correlative dependence.

When compared to the classical Beverage curve described in the theoretical part of the current article, the model created by the authors of this article is more complex, offering a more specific explanation of the correlation between the rates of vacancy and unemployment in a real economic situation. Although the 2nd-order polynomial or simple parabola practically coincides with the classical Beveridge curve, the latter does not present the calculations of the strength of correlation. It may be, of course, claimed that correlation is strong enough without calculating R^2. In most cases, the classical Beveridge curve is referred to, which does not present concrete calculations.
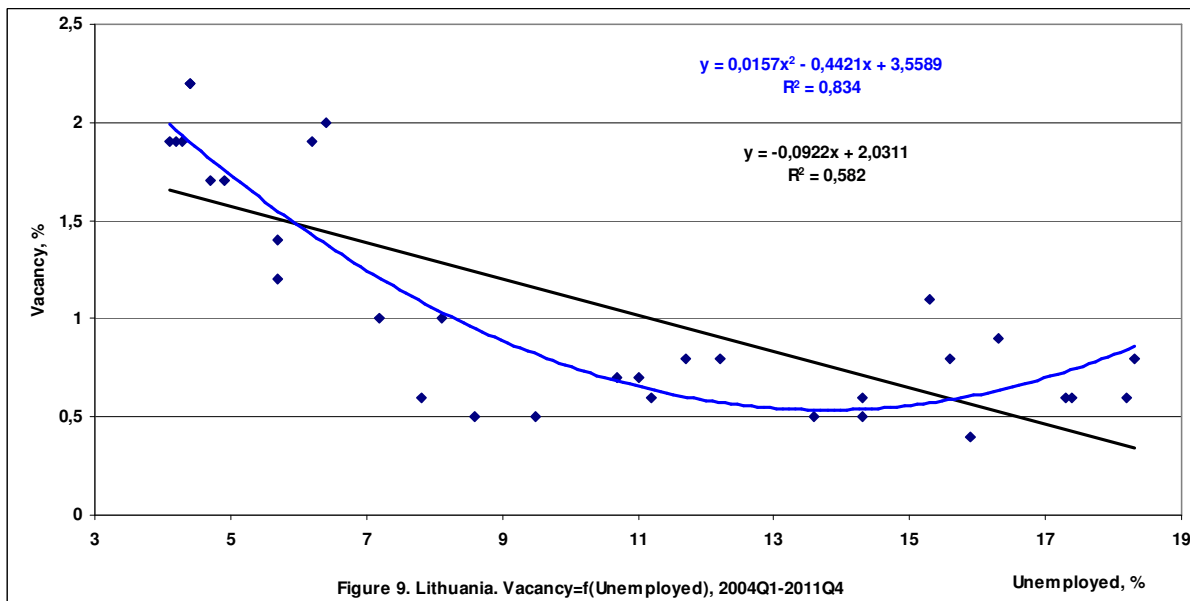
The curve developed by the authors of the current article is considerably more detailed, therefore more suitable labour force analysis, explanations and forecasts. What is especially important is the analysis of pre-crisis, crisis and after-crisis data by quarters, not years, as changes in the labour market have occurred in a very fast pace. Up to now, conclusions in this article have been done on the example of Estonia only. The question is, how do these complex correlations apply to other countries?

In order to make generalisations, Estonian data has been compared with data collected from Lithuania and Latvia, the countries that had an equally strong economic growth, but even a harsher economic downfall. Comparisons have also been made with Estonian partner countries: the EU countries Sweden, Finland and Germany, in order to find out whether the complex correlation discovered by the authors of this article applies there also. As it is known, Estonia came out of the economic crisis considerably more successfully than Latvia and Lithuania.

y = 0,0008x³ - 0,0249x² + 0,0971x + 1,9408
R² = 0,7877

y = -0,1258x + 2,5163
R² = 0,7698

Figure 8. Latvia, Vacancy=f(Unemployed), 2004Q4-2011Q3

Source: Author's illustration

In case of Latvia (Figure 8), like in Estonia, the correlative relations for the period starting from 2008Q2 are considerably stronger than the correlative relations of the longer period, starting from 2004Q4. Therefore, in the first case, R^2 of 2nd order polynomial = 0.9624 and R^2 of linear plot = 0.891. In case of longer period, starting from 2004Q4, we get a weaker correlation (coefficient), where R^2 of 3rd order polynomial= 0.7877 and R^2 of linear plot = 0.7698. The curve of Latvian shorter period matches quite well with the classical Beveridge Curve, but in case of higher unemployment rate on longer period, the vacancy rate starts growing again.


y = 0,0157x² - 0,4421x + 3,5589
R² = 0,834

y = -0,0922x + 2,0311
R² = 0,582

Figure 9. Lithuania. Vacancy=f(Unemployed), 2004Q1-2011Q4

Source: Author's illustration

The dependence of **Lithuanian** vacancy rate on unemployment rate (Figure 9) is much more complex than that of Estonia, and especially that of Latvia. In Lithuania, like in Estonia and Latvia, the dependency in a shorter period (R^2) is considerably stronger than that of the longer period. In addition to linear correlation, the dependency is illustrated by complex 2nd order to 5th order polynomials, where R^2 is quite high. The dependency in shorter period in Lithuania, illustrated by 5th order polynomial, is almost approaching functional dependence: R^2=0.9612; the dependency of 4th order polynomial R^2=0.9059.
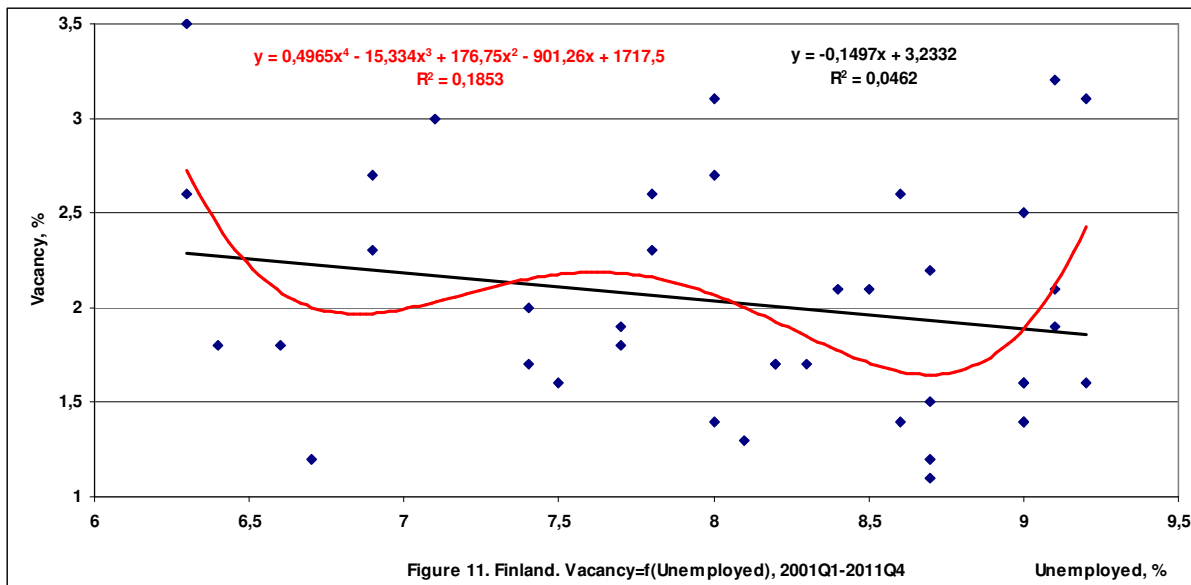
Until unemployment rate reaches 8%, the vacancy rate drops rapidly up to the level of 1.0%. When proceeding to the analysis of the more detailed mathematical model, the dependency starts to „fluctuate"; and when unemployment rate reaches 16%, the number of vacancies starts growing again. Although different polynomial curves differ from each other, a general trend can be observed: in case of very high unemployment rate, the number of vacancies starts growing again. The classical Beveridge curve is suitable only for the left part of the simpler 2nd order polynomial until unemployment rate reaches 14%, for further analysis, even the 2nd order polynomial is unsuitable.

Sweden is the country with a stable economy and high ethical standards. Despite this, Sweden was not left untouched by the economic crisis and the rise of unemployment rate. Compared to Eastern Europe, including the Baltic countries, the corruption and unofficial working in Sweden is minimal. The economic growth (GDP) of Sweden has been the highest in Europe during post-crisis years. When analysing the countries of considerable social guarantees, it must be taken into account that people savings there are remarkably higher than in the Baltic countries, therefore, people may not need to get back to work immediately after losing their job, nor are they forced to accept any job they are offered. In addition to that, the social benefits of Sweden are one of the highest in the world.

Figure 10. Sweden. Vacancy=f(Unemployed), 2001Q1-2011Q4
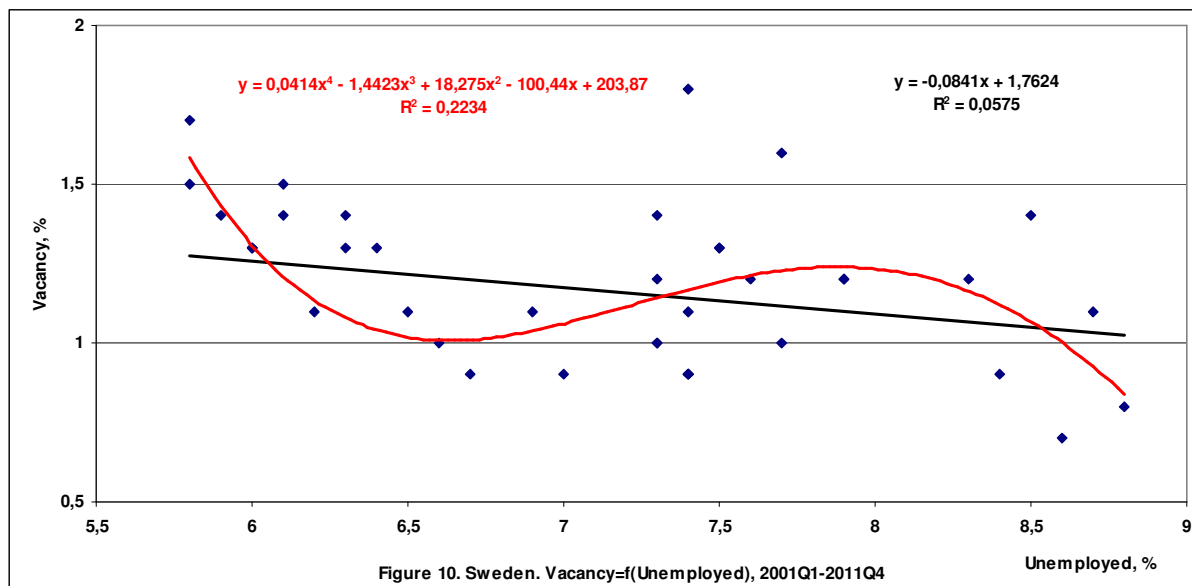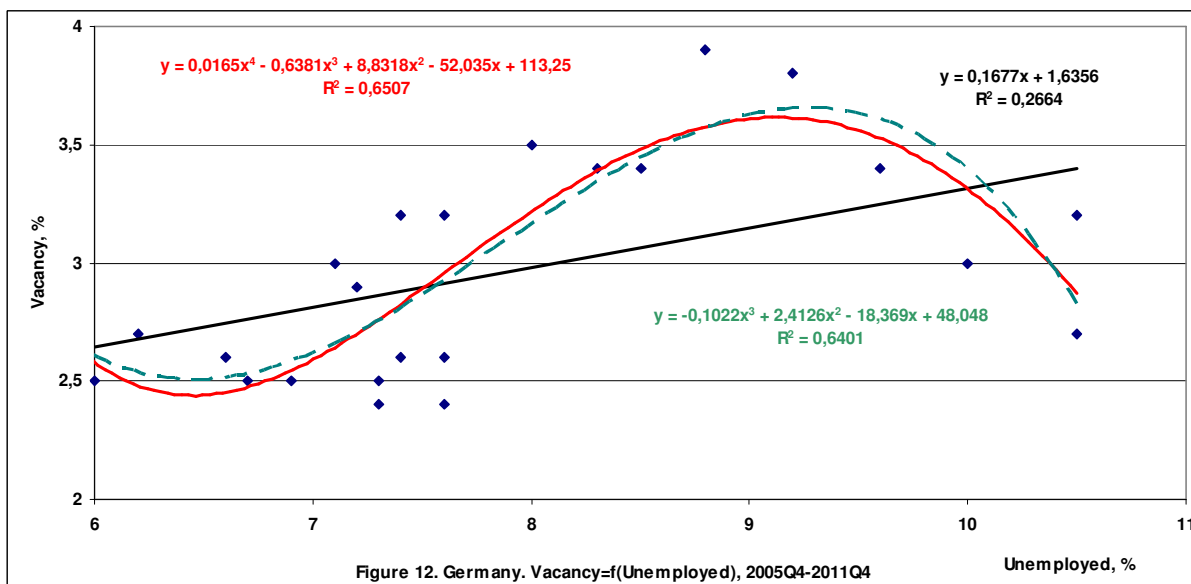
Source: Author's illustration

However, the relation of vacancies and unemployment is cyclical Sweden, too (Figure 10). In Sweden, vacancy rate starts to increase from a certain level of unemployment, in this case, 7%; but from the unemployment rate of nearly 9%, it starts to decrease again. The linear dependence of the two, like in other countries, is very weak. In Sweden, too, the dependence in a shorter period is stronger than in a longer period. Both time ranges can be best illustrated by a simple 3rd order polynomial, where $R^2=0.3909$ and $R^2=0.2234$. Compared to the Baltic countries, the correlative dependence of the two indicators is considerably weaker in Sweden.

$$y = 0{,}4965x^4 - 15{,}334x^3 + 176{,}75x^2 - 901{,}26x + 1717{,}5$$
$$R^2 = 0{,}1853$$

$$y = -0{,}1497x + 3{,}2332$$
$$R^2 = 0{,}0462$$

Figure 11. Finland. Vacancy=f(Unemployed), 2001Q1-2011Q4   Unemployed, %

Source: Author's illustration

As the vacancy rate in **Finland** (Figure 11) is twice as high as in Sweden, the amplitudes of trend line cycles are twice as small, therefore considerably more complex. The R^2 of Finland is weaker than the R^2 of Sweden; the overall tendencies, however, are similar.

The linear dependence does not apply for Sweden and for Finland, as the R^2 of both is close to zero. The dependence of unemployment and vacancies in Finland is considerably stronger in the shorter period than in the longer period. Thus, the 5-th order polynomial R^2 for shorter period was 0.5839 and for longer period, only 0.2199. Even with the 4th order polynomial, $R^2=0.4078$ and $R^2=0.1853$.

$$y = 0{,}0165x^4 - 0{,}6381x^3 + 8{,}8318x^2 - 52{,}035x + 113{,}25$$
$$R^2 = 0{,}6507$$

$$y = 0{,}1677x + 1{,}6356$$
$$R^2 = 0{,}2664$$

$$y = -0{,}1022x^3 + 2{,}4126x^2 - 18{,}369x + 48{,}048$$
$$R^2 = 0{,}6401$$

Figure 12. Germany. Vacancy=f(Unemployed), 2005Q4-2011Q4   Unemployed, %

Source: Author's illustration

The dependence of vacancies and unemployment in **Germany** is considerably different from and more complex than the correlative relations of these indicators in the Nordic and Baltic countries. Opposite trends can be observed in Germany. A certain peculiarity of Germany, as well as of Sweden and of the United Kingdom, is a large number of immigrant workers, especially on jobs of low qualification.

When we look at the linear correlations of shorter and longer periods, then in Germany we can observe an illogical and opposite trend compared to other countries – when there is a rise in unemployment, there is also a rise in vacancies. (!?) Even in a longer period, $R^2=0.2314$. Opposite trends can also be seen in correlation strengths of shorter and longer periods. The 4th order polynomial of shorter period had an $R^2=0.1771$ and 5th order polynomial had $R^2=0.2476$; figures from the longer period were $R^2=0.6794$ and $R^2=0.7136$ respectively. (Quite a big difference!) Why is the situation like that? It may be concluded that in Germany, unemployment does not usually cause much problems. The unemployment benefits are high. When the employee does not like the offered job, he/she will not take it. At the same time, the low-paid and low-qualified immigrant workers must accept any jobs and conditions. The opening of German labour market to foreigners in May 1st makes the problem even more acute.

The trend lines show that in Germany, when unemployment rate is (around) 7%, the vacancy rate fluctuates in the range of 2.5%. The number of vacancies continues to rise up to the unemployment level of 9%; after that, vacancy rate starts to decline, even though in comparison with Nordic countries, it is still very high (2.7% - 3.9%) – higher than in the starting period of the analysis. When we look at the absolute numbers of unemployment in Germany in between 1991 – 2007, i.e. up to the economic crisis, then with 3 million unemployed persons, the number of vacancies was around 350 000. Up to 4.2 million unemployed, the number of vacancies rose by 100 000 on average. When the number of unemployed persons reached 4.2 million, the number of vacant jobs started to fall and after 4.7 people being unemployed, the vacancy rate started to rise again. Here, too, the correlation is weak: 5th order polynomial $R^2=0.1517$.

Conclusion

When analysing the labour market, the cyclical nature of the economy, as well as the intensive periods of economic growth have to be taken into account. During the economic crisis, almost all economic indicators fell in most countries, including Estonia. In the first half of 2010, there had been a considerable progress in the EU, but unemployment rates were still lower than during better times. We have to acknowledge that Estonia cannot succeed alone in the globalizing world, but depends on what is happening in other countries, especially in those of the EU. All this applies to the labour market as well. Especially during crisis periods, it is beneficial to analyse the labour market by shorter periods than a year – by quarters or even months.

According to „Europe 2020 Strategy", one of the most important goals is achieving the rapid fall of unemployment and the implementation of efficient labour market reforms, in order to help create more and better jobs. It would be necessary to increase the participation rate of some groups in the labour market, and improve the efficiency of the labour market. Due to the economic crisis, unemployment increased significantly, and the demographic changes ahead threaten to decrease the amount of labour force even more. For sustainable development, achieving lower unemployment rates will not be enough; most member countries of the EU, including Estonia, have to take up measures to increase employment rate up to 75%. The low participation rate in the labour market is one of the long-term structural weaknesses of Europe. Before the economic crisis, the employment rate in Europe was many percentage points lower than in Japan or in the USA. What would help to solve these problems are minimizing the number of vacancies, more efficient use of part-time employees, increasing the employment rate of younger and older people and those of low qualifications; decreasing job changes in the labour market.

In the labour market analysis, all its components should be looked at according to their relations to each other. In a simpler analysis, only the most important factors will be concentrated on. However, analysing one or two factors does not allow developing the most efficient means to improve the situation in the labour market. This is also shown by the European practice where despite economic growth, the situation of the labour market is improving slowly, and the implemented means are less effective than expected. Due to the free movement of people in the EU, the analysis of labour markets should focus on the changes in employment rates, not unemployment rates. When analysing the reasons of employees´ mobility, the fact that wages differ in the old and new member states should also be taken into account. This has a direct effect on the mobility of employees. When analysing unemployment, one also has to consider that the data may not reflect the actual reality, as in the Eastern European countries, including Estonia, people may be register as unemployed, but may actually be working (part-time) abroad, for example in Finland, or they may be working without a contract in their home country.

The winners of the 2010 Nobel Memorial Prize on Economics cited in this article have also noticed that for those who do not wish to take the job they are offered, some kind of measures should be implemented. For doing that, we do not need to analyse the situation in the USA, it is enough if we assess the situation in Estonia more thoroughly. A formal retraining (of the unemployed) does not fix the situation. According to employers, a number of unemployed people should not be hired at all, as the damage they cause directly or indirectly to the employer and to the society at large considerably exceeds the costs on unemployment benefits. As for Estonia, when we do not count among the unemployed the people working unofficially, the ones who do not pay taxes to the country and the ones who have no desire to work at all, the actual unemployment rate is much lower. At the same time, the transfer unemployment connected to mobility is still inexorably there, along with the higher than normal unemployment rate, which may even be beneficial, because it helps to guarantee the necessary quality of the work and services and gives the employer a better chance to require the fulfilment of the working discipline. The new Labour Act of Estonia, which simplified the firing and lay-off procedure of the employees, has also had a positive effect on the labour market. The primitive equalizing of all employees and the wish to see an ideal employee in everyone lowers the quality of the labour market. The abilities and motivation of people vary greatly; therefore contradictions and competition are the basis for development of the labour market. Denying this would lead to economic stagnation.

After the economic crisis, the GDP of Estonia started growing again, but the fall of unemployment rate has been very slow. What are the reasons for this? In order to come out of crisis, enterprises try to minimize labour costs. First, the companies try to get rid of workers who are unqualified, not needed or have conflict personalities. At the same time, we are facing a new problem: there are not enough qualified employees to be found. Estonia is not the only one facing this problem. After the crisis, economy does not develop extensively any more, instead, it develops along an intensive path. This means that manufacturing will grow mainly due to the use of more efficient machines and devices and more efficient organization of the work process. This lessens the amount of low qualified workers and raises the demand for employees with high qualifications. This does not only concern the unskilled workers, but also those having higher education – engineers, economists and other specialists. Hence we face also the problem of the quality of higher education. The demand for knowledge capital (human resource) has grown noticeably - this is the greatest value in the information society.

It may be claimed that the classic Beveridge curve suits well for making less complicated conclusions, but for analysing real economic situations, the improved Beveridge curve is much more suitable. In general, the improved curve shows quite similar results in all the countries with certain accuracy, at the same time, it also enables to bring out differences describing the peculiarities of every country and its labour market. When unemployment rises, however, we face a situation when vacancies also start growing. These relations vary from country to country, and they are considerably different in Germany than in other EU countries. For conducting a more thorough analysis, it must be found out why does the number of vacancies in the right side of the curve grow in the situation of high unemployment? What can be done here, considering that the employment rates have to start growing in Europe and other developed countries? One of the solutions would be improving communication in all levels. It is necessary to continue improving the quality of employees, continue with in-service trainings, the wages should be in correlation with labour productivity; working conditions, motivation etc. should be improved, and those not being involved in the labour market should be pressurised to work. Another important factor is to cultivate high ethical norms among employees and employers. All these measures would help to raise employment rate to such a level that there is no need to import immigrant workers from outside the EU. Developing countries such as China, India etc., are facing other kind of problems. However, analysing those questions and presenting a more complex analysis of the labour market would not fit into the scope of this article. Therefore, this article is able to give a brief analysis of only some components of the labour market.

As a new contribution to research, the current article presents a (thorough) analysis of the Estonian labour market (Estonia being one of the tiger countries of the EU). As a new contribution to theory, the authors of the article have developed the improved Beveridge curve, which helps to explain the dynamics of vacancies in the situation of high unemployment rates, and based on this, develop measures for finding solutions to these problems.
The improved Beveridge curve is novel not only for Estonia, but for the analysis of the EU labour market as a whole. For global analysis, a more detailed research on the economies of the USA, Japan and other developed countries must be conducted.

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