



SCHOOL OF ECONOMICS AND MANAGEMENT

Lund University

Department of Economics

Master Thesis

April 2008

Reasons Behind the Structural Unemployment in Poland

- A Cross-Country Regression Analysis

Abstract

The study focused on possible reasons behind Poland's structural unemployment. The purpose was to examine and provide a macroeconomic explanation for this phenomenon. The labour market was scrutinized by utilizing cross-country analysis that related Poland with seven other Central- and Eastern European countries; the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Slovakia and Slovenia. The study examined if structural causes might be part of the reason behind Poland's sluggish labour market, by applying three elements that might have an affect namely; human capital, employment protection legislation and spending on active labour market programmes. The study was based on the main hypothesis regarding that poor human capital is associated with the structural unemployment in Poland. Two different labour market approaches were examined in the study, initially by applying a panel regression model and subsequently by analysing the unemployment – output growth relationship, acknowledged as Okun's law. The results supports the central hypothesis concerning that inadequate human capital can be associated to the poor labour market performance in Poland.

Keywords: Poland, Unemployment, Eastern Europe, Okun's law, Human capital

Table of Contents

1. Introduction	- 4 -
1.2 Research Question and Purpose	- 6 -
1.3 Methodology	- 6 -
1.4 Delimitations	- 7 -
1.5 Disposition	- 7 -
2. Historical Background	- 8 -
2.1 The Economic Collapse	- 9 -
2.1.1 A New Poland	- 10 -
2.2 Present Economic Facts	- 11 -
3. Structural Characteristics of the Polish Labour Market	- 15 -
3.1 Categories of Unemployment	- 15 -
3.2 Labour Market Institutions	- 16 -
3.2.1 Employment Protection Legislation	- 16 -
3.2.2 Active Labour Market Policies	- 17 -
3.3 Human Capital	- 18 -
3.3.1 Unemployment in Different Educational Groups	- 21 -
3.4 Employment Structure in the Central- and Eastern European Countries	- 22 -
3.5 Other Labour Market Observations	- 23 -
4. Empirical Analysis of Unemployment	- 25 -
4.1 Panel Model	- 25 -
4.2 Results of the Cross-Country Panel Regressions	- 27 -
5. Okun's Law	- 31 -
5.1 Okun's Coefficient	- 32 -
6. Empirical Analysis of Okun's Law	- 35 -
6.1 Single Country Regressions	- 35 -
6.1.1 Single Country Okun Model	- 35 -
6.1.2 Empirical Results of the Single Country Regressions	- 37 -
6.2 Okun Relationship in the Central- and Eastern European Countries	- 41 -
6.3 Unit Roots Tests	- 43 -
7. Discussion and Conclusion	- 46 -
8. References	- 49 -
Appendix A – Yearly GDP Growth Rates	- 52 -
Appendix B – Yearly Unemployment Rates	- 53 -
Appendix C – Panel Regression Results	- 54 -
Appendix D – Unit Root Tests	- 56 -

1. Introduction

Since the collapse of the iron curtain in the end of the 1980s, Poland as well as other Central- and Eastern European (CEE) countries has struggled with difficulties to sustain a low unemployment rate. Poland has been trying to cope with structural weaknesses and an unstable macroeconomic environment. Moreover, one of the difficulties has been to design a policy that would lead to low unemployment rates, as well as low inflation and high economic growth.

The current unemployment rate in Poland is 13.8 %, in comparison to the OECD European average of 7.8 % (OECD 2007a) and 8.3 % in the CEE countries¹. Employment implies a more socially secured status and enhanced livelihood for an individual, not only in monetary terms but also in social welfare. Long-term unemployment results in poverty and may cause social exclusion and deteriorating physical and mental health especially in the absence of established safety nets.

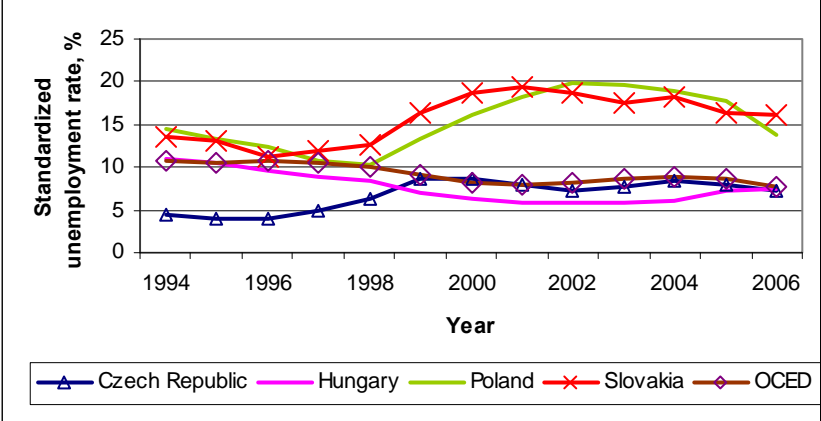
The country's economic growth has been strong over a long period and it was higher than in the other CEE from 1991 until 1997. This development is related with the level of unemployment which started to increase around 1997. The phenomenon of jobless growth might be relevant for Poland's poor labour market performance. The economic growth's positive effect on the level of unemployment has been left out. Since the developments in the labour market cannot be related to cyclical variations, one of the reasons for this inflexible labour market might be linked to structural reasons within the economy. Therefore, the characteristics of Poland's labour market are of great interest in the study. At present Poland's level of unemployment is among the highest in Europe.

The severe labour market situation has increased the incentives for the Poles to seek enhanced work opportunities abroad. Recent estimates account for 1.1 Million labour emigrants from Poland to other European Union member states. This corresponds to 6.4 % of the total labour force (World Bank 2007b). The Polish government has made attempts to minimize the labour

¹ Author's own calculations, based on data from OECD (2007) that includes; The Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia.

emigration by reducing taxes and costs of employment and also by creating improved inducements for business activity (Eurostat 2006).

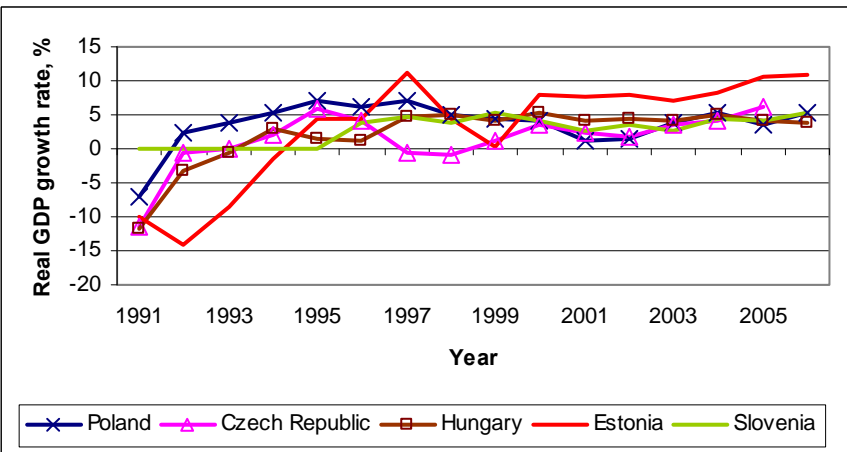
Figure 1: Standardized unemployment rates, 1994-2006



Source: OECD (2007)

Furthermore, Poland’s GDP level did not fall sharply when the communism fell, whilst in Estonia and Slovakia the GDP level declined with more than 25 % over a period of two years, implicitly this affected the standards of living. The Polish economy started expanding in 1992 and real GDP growth increased until 1997. In 2006, the country experienced a real growth rate of 5.8 %. *Figure 2* below illustrates the real GDP growth development for five Central- and Eastern European (CEE) countries since the fall of communism.

Figure 2: Real GDP growth rate for five CEE countries, 1991- 2006



Source: UNECE (2007)

The Polish labour market appears very sluggish in comparison to the other post-communist economies, this labour market slump could perhaps be explained by the lack of human capital. Educational attainment for adults is the lowest among the post-communist nations (OECD 2006b). Hence, this may convey in the vast difficulties of moving people from the agricultural

sector into other industries within the economy. A possible reason for this is that their educational level is too low or insufficient. Moreover, the level of unemployment in both educational groups; secondary- and tertiary² is almost twice as high in Poland compared with the OECD average (OECD 2007b:14).

Another Central Eastern European country that struggles with very high unemployment rates is Slovakia. The other post-communist nations have managed the transition quite well – or at least in a better way than Poland currently has done.

1.2 Research Question and Purpose

In *figure 1* it is clearly illustrated how Poland's labour market performance differs from the other CEE countries. Due to structural, economical and political differences among the CEE countries, it is a large task to explain and analyze the reasons behind the prolonged structural unemployment in Poland. The thesis objective is to examine and provide an explanation for this phenomenon. The study will focus on examining if structural causes might be part of the reason behind Poland's sluggish labour market. The study will further be based on the main hypothesis that poor human capital is associated with the structural unemployment in Poland. Two different labour market approaches are examined by applying two diverse cross-sectional regression models that relates Poland with seven³ other Central- and Eastern European countries. The main issue to be tackled is:

What are the main macroeconomic reasons behind the structural unemployment in Poland?

Researchers have not yet established a comprehensive explanation for Poland's labour market situation. Previous studies state that, there might be a combination of several variables in operation. These theories are further presented in section 2.2.

1.3 Methodology

The econometric models in the thesis, are based upon research by Gabrisch (2006) and Sögner (2002). In the first labour market approach I will employ a panel regression model, to scrutinize the relationship between the dependent variable; the level of unemployment in 14

² See table 4

³ The Czech Republic, Estonia, Hungary, Latvia, Lithuania, Slovakia and Slovenia

countries, with the five explanatory variables: the human development index (HDI), the educational attainment of the adult population (which is divided into secondary education and tertiary education), the employment protection legislation index (EPL) and the active labour market program index (ALMP). With the aim of investigate the statistical relationship between the independent variables and Poland's labour market performance. In the second labour market approach I will investigate the relation between unemployment and GDP growth by estimating Okun's law in eight Central- and Eastern European countries. Furthermore, Okun's law is also scrutinized in ten OECD countries. I have performed the regressions in the statistical software programme, Eviews.

To perform the econometric estimations, the study is based upon the methodology of ordinary least squares (OLS). This method adjusts a linear line to the real observations by minimizing the residual sum of squares (Gujarati 2006:146). This estimation technique has certain assumption that needs to be investigated in order to avoid misleading inference.

1.4 Delimitations

Empirical analysis of the Central- and Eastern European countries is difficult due to data limitations. I had to exclude two Eastern European countries; Rumania and Bulgaria, since it was unfeasible to retrieve data for these economies. Slovakia also struggles with an exceptionally high level of unemployment, however the focus of the study will be on the labour market performance in Poland.

1.5 Disposition

The structure of the thesis is the following. This introduction is followed by a historical outline and present economic facts such as income equality, immigration and average annual gross earnings in Poland. The third section presents the structural characteristics of the Polish labour market. This is followed by an empirical analysis of unemployment. Section five contains the theoretical framework around Okun's law. In the subsequent section empirical results of Okun's law is presented. The final section seven, contains a comprehensive discussion and conclusion of my work.

2. Historical Background

During the communist epoch, large government owned industries with many employees dominated the Polish economy. The market was controlled by state monopolies rather than a market based economy and this did not bode well for Poland. The largest trading partner was the Soviet Union and there was negligible trade with western countries (see *table 1* below). Throughout the late 1970s and the beginning of the 1980s the objective was to improve the economic performance according to the Soviet-Union framework. The 1970s in the Polish economy was characterized as a reform decade, and by the mid 1980s the whole economy had stagnated.

Table 1: Main trading partners, 1988 & 1993

Year	Czechoslovakia	E. Germany	Sovjet/Russia	U.K	US
1988	5 %	30 %	52 %	10 %	3%
1993	8 %	12.5 %	30.5 %	26 %	23 %

Source: Mitchell (1998:636)

In the beginning of the 1980s, a trade union named Solidarity was founded and it was lead by Lech Wałęsa. Later in history, this trade union developed into a large political movement with nearly 10 Million members. Solidarity's objective was to liberalize the regulated economy in Poland. By the end of 1989 the Polish government agreed with Solidarity to rapidly transform the centrally planed economy into a free-market. Later on in history, Lech Wałęsa became known as the person who commenced the revolution of freedom in Poland (Sachs 2005:112-113, 118).

The economic shortage that Poland experienced during this period could clearly be seen in local supermarkets, for example there were many empty shelves and long queues. The economy was moving towards hyperinflation (Nordlöf-Lagerkranz 1993:36). When inflation rises rapidly within a country, a re-distribution of income commences and it is accompanied by an uncertainty in the investment market. Furthermore, the lack of commodities and long queues at official markets gave inhabitants an incentive to purchase goods on the black market causing prices to increase to even higher levels. The Polish hyperinflation consisted of a combination of rapidly increasing black market prices, which led to a large amount of illegal trade and exchange during this period (Sachs 1994:54).

Another direct consequence of this rising inflation issue, which became of great concern, was the strain on foreign direct investments. Among the Central Eastern European nations, Poland was the least attractive in terms of foreign investments (Slay 1994:171). Investments play an important role for the whole economy since a reduced amount of investments turns into less domestic jobs, lower incomes and increased pressure on workers to locate employment elsewhere.

One final problem that Polish economy struggled with concerned the breakdown of the current account. Imports rapidly exceeded exports, draining the central bank's foreign exchange reserves (Sachs 1994:54).

2.1 The Economic Collapse

In the middle of 1989, the first free election in over 40 years took place in Eastern Europe. The political party - Solidarity won almost all the seats in the sejm⁴, and by the end of August, Tadeusz Mazowiecki became the prime minister of the first non-communistic government since the Second World War (Nordlöf-Lagerkranz 1993:37).

Since the fall of the iron curtain in the late 1980s, the inhabitants experienced a decade of a huge economic transformation. During the era of communism capital markets and market based financial institutions did not exist. By the end of year 1990, Lech Wałęsa was elected president for a five-year term. During the same time, Tadeusz Mazowiecki consulted with the minister of finance – Leszek Balcerowicz as well as other economic advisers about introducing a new economic scheme (Slay 1994:86-101). This strategy became recognized as the Balcerowicz Plan, and it turned out to be of crucial importance for the financial structure in Poland. The scheme had five comprehensive objectives: implementation of macroeconomic stability, liberalization and deregulation, privatization, establishment of a social safety net, creation of new and legitimate financial markets (Sachs 1994:59). The Balcerowicz Plan became a shock therapy for the Polish economy and society. Moreover, the government made many attempts in order to achieve democracy and stable institutions. Poland suffered from many severe crises such as poor creditworthiness, double digit unemployment, rising inflation, deteriorating living standards and industrial collapses. These crises were side effects that emerged when the economic shock therapy was implemented in Poland.

⁴ Sejm is the name of the Polish parliament

Another issue of importance was the implementation of a tax system, which was designed similarly to that of the western countries. Individual income taxes, value-added taxes on commodities and services, as well as company taxation were introduced (Johnsson 2005:286-87). During the two first years after the economic collapse, Poland experienced a negative growth. The country's GDP level approximately decreased by 20 % in these years. However, this destructive path reversed in 1993 and Poland started a new economic epoch (UNECE 2007).

2.1.1 A New Poland

It takes a long term perspective in order to recover from such a huge transformation as Poland had been subject to. Privatization and commercialization of companies and banks has broadly expanded since communism was dissolved. Despite these advances, the country was now free from communalism and the large structural weaknesses from that era revealed to have a far-reaching effect. The large old industries were forced to reduce their workforce, and some closed down permanently. Many middle-aged workers were fired at this point (Sachs 2005:124). This development can be seen as another side effect from the economic shock therapy. The rapid transformation that occurred brought along deeper and more prolonged corruption within the political and economical sphere (Johnsson 2005:294). Poland needed to create new stable foundations in many areas in order to cope with the inadequate institutions.

In the presidential election of 1995, the presidential post was taken over by Aleksander Kwasniewski, who represented the political party named – SDL (the Democratic Left). Leszek Miller was the leader of the SDL and they won the majority of seats in the Sejm. When Aleksander Kwasniewski started his mandate as president, dilemmas on the labour market began to get severe. The private sector was not able to cope with the large transitional shock that included a large fraction of dismissed workers in the economy (Gabrisch 2006). From this time forth, the level of unemployment started to rise rapidly in 1998, while at the same time GDP growth began to decrease. Aleksander Kwasniewski remained in office for ten years and during his presidency the Polish economy experienced its highest unemployment level of 19.8 % (OECD 2007a).

The political establishment associated with the Solidarity that pushed Poland out of communism had become a minority in the Polish political sphere at the beginning of 2000 (Johnsson 2005:334-35).

Fifteen years after the implementation of democracy, Poland entered the European Union (Sachs 2005:127). This membership facilitated the cross-boarder migration within the EU member nations.

The current president, Lech Kaczyński, leader of the conservative party, Prawo i Sprawiedliwość (PIS) (Law and Justice) was elected to represent Poland at the end of 2005. Lech Kaczyński’s brother - Jarosław Kaczyński were elected to be prime minister of Poland (Economist 2005). In September 2007, the Polish parliament announced that they have voted in favour of dissolve the parliament. After several corruption allegations on the members of the parliament, Jarosław Kaczyński’s alliance found itself unable to remain in power (BBC 2007). A new parliament election took place in the end of October 2007. The centre-right party – Platforma Obywatelska (Civic Platform), lead by Donald Tusk won the parliament election. Mr. Tusk is officially the new prime minister since the beginning of November 2007 (Economist 2007a).

2.2 Present Economic Facts

In the country outlook below the income inequality in terms of GDP per capita is evidently illustrated. Eastern Poland, which shares a border with Ukraine and Belarus, is the poorest regions in the nation. A common measure of inequality and dispersion is the Gini coefficient;



it stretches from 0 – perfect equality to 1 – perfect inequality. In table 2 below, a comparison of the Gini coefficients over three Central Eastern European countries is illustrated. The income inequality between these nations can be clearly observed. Poland experiences the highest income inequality among these countries, although a distinguishing feature is that Poland has experienced a larger decrease in inequality as compared to the Czech Republic and Hungary over a period of five years.

Source: The Economist (2006)

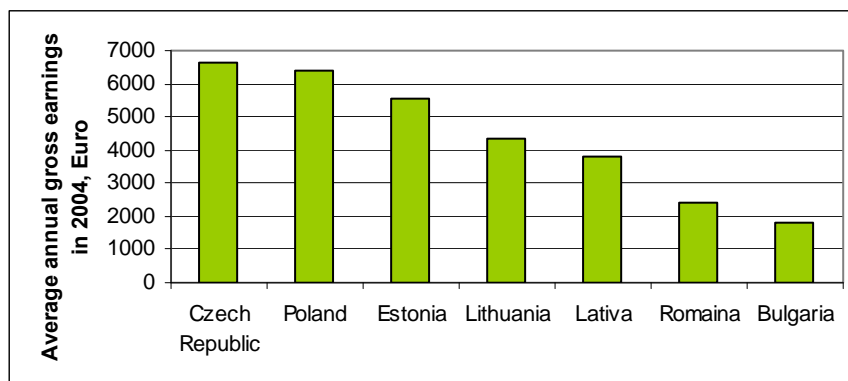
Table 2: Gini coefficients in three CEE countries

	<u>Czech Rep.</u>	<u>Hungary</u>	<u>Poland</u>
2000	0,260	0,293	0,367
1995	0,257	0,294	0,389

Source: OECD (2007a)

Average annual gross earnings in the Central- and Eastern European region (see *figure 4*) varies between 1812 Euro (Bulgaria) to 6632 Euro (The Czech Republic). According to Eurostat (2007) figures, Poland's average annual gross income was estimated to 6394 Euro in 2004. The country's unemployment rate has been rising during several years and, thus the incentives of looking for a better paid job in Western European countries have increased. Due to better wage prospects in other EU nations, the labour emigrants are prone to take on jobs which are not equivalent to their level of education. Nonetheless, these jobs are better paid, than employment in Poland. Recently the level of unemployment has been decreasing, however as for 2005 the youth unemployment rate was estimated to an extremely high percentage of 41 % (OECD 2005). As a result of these high unemployment issues the young generation has a high propensity to migrate or to improve their future by obtaining a university degree. Therefore, search for enhanced work opportunities abroad is increasing.

Figure 4: Average annual gross earnings in seven CEE countries, Euro



(Source: Eurostat 2007)

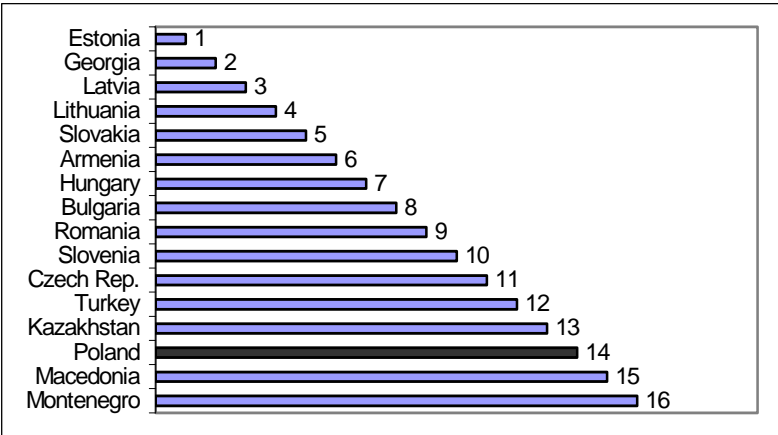
Poland's entry into the European Union (EU) in 2004 has facilitated people's labour mobility and increased the incentives for immigration to other, better paid countries. Unfortunately, the Polish Central Statistical Office has not kept records of the country's labour migration outflow. Data from 2006 estimated that 200,000 Polish citizens are legally working within the EU member countries (CSO 2006:577). The actual number of persons who have left the country differs, although the latest approximation is 1.1 Million. This corresponds to three % of the total Polish population. However, some estimates accounts for 2 Million Polish labour migrants to nations such as Germany, Ireland, Holland and the United Kingdom (Eurostat

2006). Viewed from a long-run perspective, migration might be a constructive contributor to Poland’s economic development. Later, when the migrants return home, Poland may utilize this new skilled labour force.

Another optimistic aspect of EU membership concerns output growth, trade, agricultural income and infrastructure investments. In 2006, Poland’s GDP level grew by 5.8 %, which was primarily driven by a net increase in exports (EBRD 2007).

The Central- and Eastern European countries exhibit significant differences in economical, social and political legacies. The ease of doing business index is a general measure of the business climate in various countries. The CEE countries are ranked on their simplicity of doing business from 0 – 28, with first position being the best. A high ranking indicates the regulatory environment is advantageous to the operation of enterprises. ”This index averages the country’s percentile rankings on 10 topics⁵, made up of variety of indicators, giving equal weight to each topic” (World Bank 2007c).

Figure 5: Business climate index over 16 CEE, 2006



Source: World Bank (2007c)

The ease of doing business index reveals that the Polish administration for starting a business is much more bureaucratic and complex in comparison to the other CEE countries. Poland’s poor labour market performance is clearly a large task to scrutinize. The objective of the thesis is to analyze what kind of macroeconomic reasons that lie behind the structural unemployment in Poland. Previous studies state that, there might be a combination of several variables in operation. In a regional country survey by Estevão (2003), the author argues that

⁵ Starting a business, dealing with licences, employing workers, registering a property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts, closing a business

the high level of unemployment in Poland might originate from interaction of structural adjustment shocks and institutions.

The OECD economic survey (2006a:30-31) discusses that possible sources of Poland's poor labour market performance is related to "aspects of the social security and benefit system that have a particularly negative impact on work incentives – disability pensions and benefits, and early retirement schemes". The labour force in Poland contains a large number of middle-aged workers who lacks sufficient training. It is a challenging task to re-employ these workers into new expanding sectors within the Polish economy. The OECD economic survey (2006a) discusses that Poland needs to enhance labour quality in all levels, through improvements in training and formal education.

Section three provides a description of the structural characteristics of the Polish labour market.

3. Structural Characteristics of the Polish Labour Market

Numerous studies have examined how labour market institutions interact with unemployment. In a study by Nickell (2003), the author tries to explain labour market institutions and unemployment patterns by applying cross-sectional analysis in OECD countries. In the study, the author investigates whether the replacement rate, benefit duration and strictness, active labour market policies, union coverage, union density, employment protection regulations and labour taxes can explain how structural adjustments in the different labour markets are interacting with unemployment.

In those areas where it is feasible to obtain data concerning my analysis, the study will utilize some of these mentioned factors and apply them into an Eastern European cross-country analysis with main focus on the Polish labour market.

3.1 Categories of Unemployment

When unemployment is discussed, there are often four different types that are mentioned. Initially, I will present a short outline of these different unemployment structures.

Frictional unemployment occurs due to short-run matching skill problems that last for a few weeks. The frictional unemployment rate is changing all the time, since the individuals in the labour force continuously are altering their skills, hence searching for appropriate employment within the different sectors in the economy. *Structural unemployment* denotes long-run problems that have a tendency to last for several years in the unemployment sector. Structural unemployment is caused by two aspects; demographic patterns and the turnover on the labour market combined with average time in unemployment (Fregert 2005:180-181). Poland's labour market has been subjected to large structural reforms since fall of communism. Thus, many jobs have gone lost within the agricultural sector and new vacancies have arisen in other sectors. These institutional reforms imply a large in- and outflow in the Polish labour market, hence high structural unemployment. The unemployment that arises as a regular part of the economy is often denoted as the *natural rate of unemployment (NAIRU)*. At this level of unemployment there is no proclivity for inflation to rise or fall. Nonetheless,

this unemployment type can be seen as a combined rate of the frictional and structural unemployment rate. The *cyclical unemployment* is caused by recessions and depressions.

3.2 Labour Market Institutions

To begin with, I will shortly discuss the most commonly utilized labour market institutional measures in the OCED countries, namely the employment protection legislation and the active labour market policy. Further the human capital perspective is discussed, with key focus on Poland's situation.

3.2.1 Employment Protection Legislation

The employment protection regulations (EPL) vary widely among the European countries. The OECD has constructed an index that measures how large this employment protection is in each OECD nation. This index consists of three main components; employment protection of regular workers against individual dismissal, regulation of temporary forms of employment and specific requirements for collective dismissals. The first indicator – regular employment, measures the conditions of the difficulty for a firm to dismiss an employee. The second indicator – temporary employment, measures firms limitation and duration on their use of temporary employment. The third indicator – collective dismissals, measures “additional delays and procedures required which go *beyond* those applicable for individual dismissal” (OECD 2004:65). The countries are ranked from zero to six, with six being the most strictly regulated. The EPL's purpose is to protect the existing jobs and reduce the unemployment inflow. A notable feature of the employment protection regulations that might arise among companies is a larger reluctance to employ new workers. Hence, this might reduce the movement in the labour market, which may lead to inefficient job matching (Werdig 2006:26). In an expanding economy firms employ less new workers if the employment protection is rather high, since it is more difficult to fire employees when a recession commences. Moreover, for marginal groups in the labour market (e.g. young people, women, immigrants and long-term unemployed) facing entry problem, a strict EPL substantially aggravates their employment prospects (OECD 2006a:145).

Table 3 illustrates that the strictness of employment protection laws in Poland (2.1) is around average. Poland's EPL differs from the other CEE countries mainly because of more complex

legal procedures to dismiss workers. The collective dismissals indicator is almost twice as high in Poland, compared with the Czech Republic, France, Hungary and Slovakia (OECD 2004:113). By simplifying dismissal procedures for firms, it might reduce delay and uncertainty and, thus improve labour reallocation within an economy (OECD 2006a:146).

Empirical research between employment protection regulations and labour market performance reveals diverse results. Scarpetta's study (1996) finds that strict employment protection regulations are likely to increase long-term unemployment. Nickell's result (1997) suggests the contrary; the EPL do not have severe influence on the level of unemployment. A study by Nickell (2003) shows mixed results in how employment protection laws are affecting unemployment.

Table 3: Employment protection legislation & active labour market policy as percentage of GDP in six European countries

Year 2003	EPL ⁶	ALMP ⁷	Unemployment, %
CZE	1.9	0.26	7.8
HUN	1.7	0.31	5.8
SVK	2.0	0.46	17.5
POL	2.1	0.23	19.6
NDL	2.3	1.44	3.7
U.K	1.1	0.52	4.9
DEN	1.8	1.83	5.4

Source: EPL is obtained from OECD, (2004:117)
ALMP is obtained from OECD (2006c)
Unemployment rate is acquired from OECD (2007a)

The EPL index can be related to Okun's coefficient and, hence estimate whether a negative correlation exists among the chosen countries in the study. The theoretical framework around Okun's law is further explained in section 5.

3.2.2 Active Labour Market Policies

The objective of an active labour market policy (ALMP)⁸ is to improve the efficiency in the labour market by taking advantage of job creation programs, re-education, reallocation of families from deprived areas and enhancing the youth's introduction into the labour market (Burda 2005:423). An additional feature of this policy is to provide these individuals with

⁶ Overall EPL – version 2

⁷ Data from 2004

⁸ Public expenditure on labour market programmes as a percentage of GDP

sufficient employment search support through a public employment service agency. A common goal among different governments is to boost the motivation of the unemployed to search and take on jobs. An enhanced matching may lead to a reduction of total number of jobseekers given total vacancies in the labour market. If vacancies are being filled more quickly, it lowers the cost to firms and, thus more vacancies are opened (Calmfors 1994:13).

An active labour market policy might be of great importance for an economy that struggles with long-term unemployment. Labour supply has a tendency to decrease if unemployment persists during a long time, since jobseekers gets discouraged and leave the labour force (Calmfors 1994:15). This negative development might be largest for elderly workers and middle-aged workers which lack sufficient education to be re-employed in developing sectors within the economy.

In *table 3* it is clearly shown that the Polish public expenditure on active labour market programmes is very low. In 2001, the OCED average public spending on ALMPs was 2.8 % (OECD 2006a:74). Furthermore, the personnel of the Polish public employment service agency is not adequately educated or motivated to give support to an unemployed individual, such as counselling and monitoring job search. The incentives for the personnel to actively help the unemployed finding a job is very low (OECD 2006a:81). The government has suggested measures to develop the efficiency of the public employment service and to further improve ALMPs. The main suggestion includes improving the quality and effectiveness of the employees in the labour offices (OECD 2006a:146).

Numerous macroeconomic studies have investigated how effective the active labour market policies are on coping with unemployment challenges. Bonne (2004), Nickell (1997), and Scarpetta (1996) find in their studies that an increased amount of spending, on labour-market training may lower unemployment. In general there seems to be consensus in the empirical results; active labour market policies facilitate an unemployed individuals transition to employment.

3.3 Human Capital

Human capital can be defined as the productivity capacity embodied in individuals (World Bank 2006:89). The definition knowledge and skills concentrate on the returns to education. Access to good education is of essence for a country's social and economic welfare. The

productivity capacity is related to knowledge and skills, therefore investments in education may contribute to the economic development within a nation. Since human capital affects the economic development, a country's human capital quality is of substantial importance. Education provides an individual with knowledge and skills that most likely will enhance his or her private utilization as well as contributing to the whole society. Since it is difficult to measure human capital, it may be seen as an intangible asset.

The OECD has designed a human capital index that covers the educational attainment of the population. This indicator describes the educational attainment of the adult population (share of age group at least completed upper secondary education) as captured through formal educational qualifications. This index may perhaps be seen as proxy measure for how each nation's knowledge and skills are utilized in the society and in the domestic economy (OECD 2006b).

By comparing educational attainment data over four of the post-communist countries, the educational diversity within the different age groups, in these nations can clearly be observed in *figure 5* and *6*. By scrutinizing the data it is possible to distinguish how Poland differs from the other CEE countries.

Figure 5 illustrates the educational attainment of the adult population with at least secondary education (SED). The figure shows two different age groups, from now on referred as younger (aged 25-34) and older (aged 55-64) age group. Additionally the total adult population with at least secondary education is also presented. Poland's educational attainment for adults is the lowest in both age groups, for the older age group the overall average is only 42 % while the younger age group exhibits a mean of 60 %. The tendency in the secondary educational attainment data shows that almost 50 % of the *total* amount of adults, aged 25-64 *lacks* sufficient secondary education. Poland is an example of a nation, which suffers from labour force immobility issues. *Figure 5* shows that the country endures from poor education among a large part of the elderly population. Many of these individuals are allocated in the agricultural sector and there are great difficulties utilizing their skills and re-employ them in other sectors, because of the fact that they are lacking sufficient schooling (OECD 2006a:32). In the Czech Republic there are only about 11 % of the *total* adult population, aged 25-64 that *lacks* secondary education. Moreover, in Hungary this figure is about 25 % and 15 % in Slovakia.

Figure 5: Educational attainment of the adult population – Share of age group with at least upper secondary education, 2004

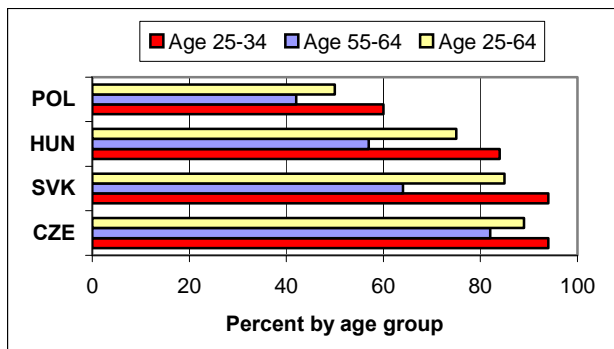
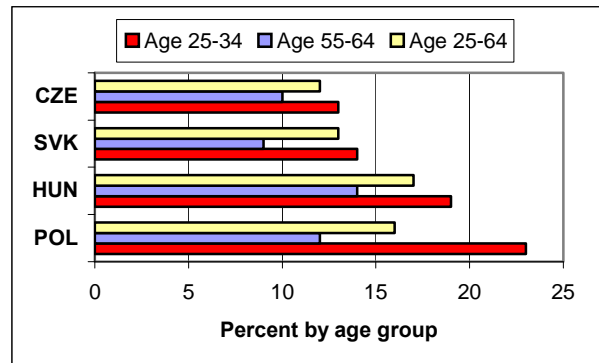


Figure 6: Educational attainment of the adult population – Share of age group with tertiary education, 2004



Source: OECD (2006b)

Figure 6 illustrates the educational attainment of the adult population with at least tertiary education (TED). Similar as in figure 5 two different age groups, from now on referred as younger (aged 25-34) and older (aged 55-64) age group are illustrated. Moreover, the total adult population with at least tertiary education is also presented. Poland's educational attainment for the older age group is the second highest (12 %) in comparison to the other CEE countries.

As previously stated in section 2.2, the youth unemployment is very high in Poland at the moment. Present data estimates that 41 % of the youth labour force (aged < 25) is unemployed (OECD 2005). A young individual in Poland is experiencing some difficulties to find a job. Hence, this severe youth unemployment situation may be an incentive for the younger individuals to attain a tertiary education diploma and in turn, improve their future.

In figure 6 it can clearly be seen that the young individuals (aged 25-34) in Poland, stand out with a high ratio of 23 % highly educated young people. The country shows a rapid expansion of higher educational institutions (HEIs) during the last 15 years. Many private schools have been launched and today there exists more than 400 higher educational institutions compared with about 90 HEIs 15 years ago. This development has created a remarkable gap in the educational attainment levels between the young- and the older working-age population (OECD 2006a:32). The tendency in the tertiary educational attainment data shows that 16 % of the total amount of adults, aged 25-64 possesses a tertiary educational diploma. Hungary has a slightly higher percentage of adults tertiary educated (17%). Both Slovakia and the Czech Republic exhibits smaller shares of the adult population that possesses a tertiary

educational diploma. In summary, Poland ranks second highest among the CEE countries. However, comparing Poland's figure with the OECD average of 25 %, then the country ranks as the fifth lowest of the adults who has attained tertiary education (OECD 2006b).

In conclusion, the tendency in the secondary educational attainment (*figure 5*) shows that Poland has the *lowest* total amount of educated adults, in comparison to Hungary, Slovakia and the Czech Republic. Moreover, the opposite trend can be seen in the tertiary educational attainment *figure 6*. Poland has the second highest percentage of highly educated adults compared to the three post-communist countries in the figure. In the long-run these tendencies might be part of the complex structural unemployment problem. Since human capital is essential for economic welfare and stability, the OECD educational attainment index may be an indication of poor human capital quality in Poland. The secondary and tertiary education variable is utilized in the in the first step of the cross-sectional panel model. The data is collected both from the World Bank's education database (2007a) as well as OECD's education database. The results are presented in section 4.2.

At present, there are not many comparable measures of human capital across different countries. Each year, the United Nations Development Programme (UNDP) creates the Human Development Index (HDI). This index contains data on three dimensions of human development such as life expectancy, education and standards of living. The education dimension in the HDI index is defined and "based on the adult literacy rate and the combined gross enrolment ratio for primary, secondary and tertiary schools" (UNDP 2007). It was not feasible to obtain previous data for simply the education dimension, therefore I chose to apply the entire HDI index into the study. The HDI variable is utilized in the first step of the cross-sectional panel model.

3.3.1 Unemployment in Different Educational Groups

The level of unemployment (13.8 %) in Poland is among the highest in Europe today. The previous section explained how Poland differs from the other post-communist countries in their secondary and tertiary educational structure among the adult population. Therefore, the level of unemployment amongst the adult population with a secondary/tertiary educational diploma is of interest for the study. *Table 4* below compares the level of unemployment in two different age groups (25-64) and (30-34) in Poland and with the OECD average. The

table illustrates clearly that the level of unemployment in both educational- and age groups are almost twice as high in Poland compared with the OECD average. Poland ranks first or second highest among the country members of the OECD in both sexes at all levels of education (OECD 2007b:14).

Table 4: Unemployment ratio and educational attainment, %⁹, 2003

Poland, Age 25-64	<i>Males</i>	<i>Females</i>	OECD¹⁰, Age 25-64	<i>Males</i>	<i>Females</i>
Secondary education	12.3	16.6	Secondary education	7.1	10.6
Tertiary education	6.6	6.7	Tertiary education	3.6	4.1

Poland, Age 30-34	<i>Males</i>	<i>Females</i>	OECD, Age 30-34	<i>Males</i>	<i>Females</i>
Secondary education	14.5	18.1	Secondary education	7.3	6.8
Tertiary education	11.3	14.3	Tertiary education	5.6	5.7

Source: OECD (2007b:139)

3.4 Employment Structure in the Central- and Eastern European Countries

The employment structure in the Central- and Eastern European countries have been subject to large changes over a time period of ten years. *Table 5* illustrates that agriculture still plays a great role for the Polish economy. Among the six countries in the table, Poland still today has the largest amount of persons employed within the agricultural sector. Under a nine year period it has been reduced from 22.1 % to 17.4 % in 2005. The Polish enterprise structure consists of large number of small and medium-sized companies. The labour market contains only a few large employers (OECD 2007b:39).

Table 5: Individuals employed in the agricultural sector, %

Year	CZE	HUN	LVA	POL	SVK	SVL
1996	6.1	8.4	17.1	22.1	8	13.6
2000	4.8	6.4	14.3	18.8	5.6	12
2005	4	4.9	11.9	17.4	3.6	10

Source: UNECE (2007)

The agricultural sector has over many years been subjected to strong productivity increases in all European countries, thus increased incentives of moving the agricultural labour force to

⁹ Share of age group who are unemployed as a percentage of the population in the specific age group

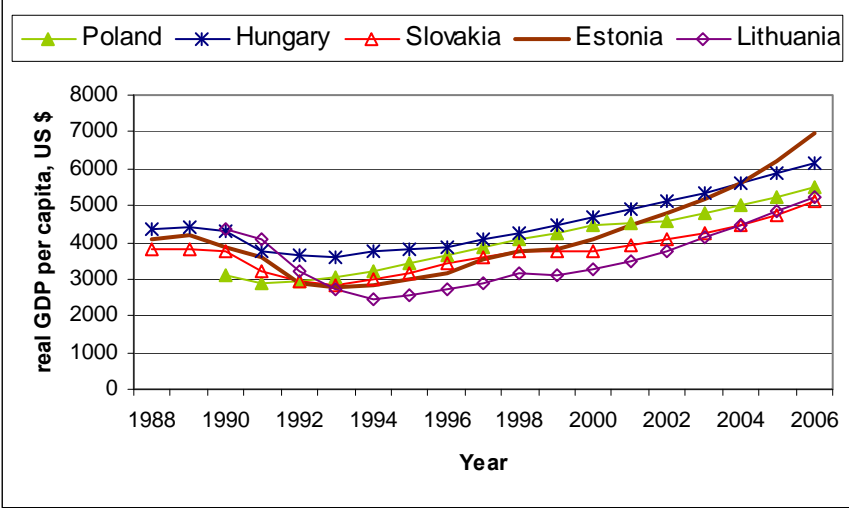
¹⁰ OECD average

other sectors within the economy. At present, approximately 23 % are working in the industry sector (UNECE 2007).

3.5 Other Labour Market Observations

Poland’s unemployment situation is most likely to originate from the huge adverse demand shock (Werding 2006:19) that occurred in the end of the 1980s when the communism was abandoned. Many of the workers in this time period belonged to the agricultural sector and their biggest market was the Soviet Union, hence many state farms deteriorated together with the iron curtain collapse. The outcome became that Poland needed to seek new markets beyond the eastern nations, and hence, face hard competition with foreign commodities.

Figure 7: Real GDP per capita, US \$ in five CEE countries, 1988- 2006



Source: World Bank (2007b)

Figure 7 illustrates the development in real GDP per capita¹¹ 1988 – 2006, in five Central- and Eastern European countries. Incomes fell in each country when the economic transition commenced. The largest drop was noted in the economies of Estonia and Lithuania, real GDP per capita decreased with approximately 35 % in each country 1990 – 1992. Slovakia experienced a decrease of roughly 26 % and Hungary a GDP per capita drop of 22 % in the same period. Poland’s downturn in real GDP per capita was not as large as in neighbouring countries. The drop was approximately 8 % in 1989 – 1991. Therefore, it might be possible to eliminate that the Polish labour market most likely does not suffer from delayed demand shocks.

¹¹ Constant 2000, US \$

It requires rather long time perspective to recover from such a transition, another side of the story might be the poor and obstinate macro policy. One explanation suggests the possibility that workers who are searching for jobs do not have the qualifications to fill the available vacancies. These middle-aged individuals are of marginal benefit as it is considered too late to commence additional training or formal education.

Some concluding observations; in Poland, the strictness of employment protection regulations is around average, but the third EPL component - collective dismissals is approximately double compared with the Czech Republic, France, Hungary and Slovakia. An overall discernment discusses that the hypothesis concerning lack of human capital contributes to high unemployment in Poland. It seems like the education perspective might be of great interest for the study. The level of unemployment is exceptionally high in both the age groups and in both sexes, with secondary- and in the tertiary education. A possible aspect to eliminate from further discussion is that the labour market most likely does not suffer from delayed demand shocks. A summary of how the different labour market characteristics in Poland differ from other Eastern European countries can be seen in *table 6*.

Table 6: Summary of how the labour market characteristics in Poland differs from other Eastern European countries

Employment protection	Medium
Active labour market programmes	Low
Tertiary education	High
Secondary education	Low
Human development index	Low
Employment structure	Low
Unemployment with TED	High
Unemployment with SED	High

4. Empirical Analysis of Unemployment

As a first step in the analysis, I applied a cross-sectional panel data model. Through this approach I will scrutinize how the institutional labour market variables are interacting with the level of unemployment in 14 selected countries.

A major concern throughout the thesis has been lack of suitable data for my analysis. I experienced great difficulties retrieving appropriate macroeconomic data over the Central- and Eastern European countries from the years after the economic collapse. However, I succeeded to find quarterly unemployment rates and GDP growth rates (year 1994-1996) for eight Eastern European countries¹² from an article written by Gabrisch (2006). From this data I calculated the yearly unemployment rates and the yearly GDP growth rates for 1994, 1995 and 1996. Additionally I complemented these figures with data from OECD (2007a) and Eurostat (2007). The first step contains cross-sectional panel regressions, however it was unfeasible to obtain data of my chosen variables for all eight Central- and Eastern European countries. An inescapable outcome of this problem turned out to be a necessary decrease of the original eight CEE countries to only four¹³. Note that the data is collected from several different sources and may not be compatible with one another, hence it may be a reason for finding insignificant results.

4.1 Panel Model

In order to investigate the statistical relationship between the chosen independent variables and the level of unemployment in 14 countries including Poland, I chose to employ a panel model containing three cross-sectional years; 1995, 2000 and 2004 into this study. The model is illustrated in the following way:

$$u_{it} = \alpha + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \beta_4 x_{4it} + \beta_5 x_{5it} + \varepsilon_{it} \quad (4.1)$$

u_t = the level of unemployment in percentage points

The equation above illustrates how the dependent variable, u_{it} , the level of the unemployment in percentage points is related to the five explanatory variables:

¹² Czech Republic =CZE, Estonia =EST, Hungary= HUN, Latvia= LVA, Lithuania= LIT, Poland= POL, Slovakia= SVK and Slovenia= SVL.

¹³ Czee Republic =CZE, Hungary= HUN, Poland= POL and Slovakia= SVK.

x_1 = Human development index (HDI)

This variable contains data on three dimensions of human development namely; life expectancy, education and standards of living. The education dimension in the HDI index is defined and "based on the adult literacy rate and the combined gross enrolment ratio for primary, secondary and tertiary schools" (UNDP 2007).

x_2 = Secondary education (SED)

This variable is defined as the percentage distribution of the adult population (aged 25-64) who have attained at least upper secondary education.

x_3 = Tertiary education (TED)

This variable is defined as the percentage distribution of the adult population (aged 25-64) who have attained tertiary education.

x_4 = Employment protection legislation (EPL)

Overall strictness of employment protection against dismisses.

x_5 = Active labour market policies (ALMP)

This variable is estimated in terms of public expenditure on labour market programmes as a percentage of GDP.

The α parameter is the intercept and the coefficients, $\beta_2, \beta_3, \beta_4, \beta_5$ are unknown parameters and the final term, ε_{it} is a random error term that represents an unobservable part of the model.

4.2 Results of the Cross-Country Panel Regressions

Dependent Variable: U_?

Method: Pooled Least Squares

Cross-sections included: 14

Total pool (balanced) observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.477996	1.172909	0.407530	0.6943
HDI_?	0.285879	1.403271	0.203724	0.8437
SED_?	-0.612346	0.738128	-0.829592	0.4308
EPL_?	-0.017681	0.027648	-0.639495	0.5404
TED_?	-2.544155	0.937494	-2.713782	0.0265
ALMP_?	0.054781	0.070930	0.772331	0.4621
Fixed Effects (Cross)				
CZE--C	-0.040415			
HUN--C	-0.134038			
POL--C	0.008665			
SVK--C	0.042805			
AUT--C	-0.012435			
BEL--C	-0.057581			
DEN--C	0.055571			
ESP--C	-0.052653			
FRA--C	-0.030827			
GER--C	0.050025			
ITA--C	-0.146090			
NDL--C	0.110101			
SWE--C	0.197962			
UK--C	0.008909			
Fixed Effects (Period)				
1995--C	-0.026006			
2004--C	0.026006			
Effects Specification				
R-squared	0.933477	Mean dependent var	0.089310	
Adjusted R-squared	0.775483	S.D. dependent var	0.041827	
S.E. of regression	0.019819	Akaike info criterion	-4.828551	
Sum squared resid	0.003142	Schwarz criterion	-3.876976	
Log likelihood	87.59971	F-statistic	5.908332	
Durbin-Watson stat	3.733333	Prob(F-statistic)	0.007382	

The first panel OLS estimation contains all five explanatory variables. The coefficient of determination (R^2) is pertinent when dealing with statistical analyses. This measure gives information that reveals the goodness the model. The coefficient of tertiary education is the only coefficient which is significant. The coefficient of determination is very high (93 %).

Furthermore, the high Durbin-Watson statistic (3.73) suggests serial correlation in the residuals. As a consequence, the explanatory power in the model increases considerably.

An aspect that should be taken into consideration is the concept of multicollinearity. If two explanatory variables are highly correlated then there might exist multicollinearity, thus a necessary relationship between these variables might not exist (Gujarati 2006:363). There is a possibility that there might be other reasons behind the dependent variables development. By scrutinizing the standard errors of the estimated variables, it is possible to discover multicollinearity. Thus, if the standard errors of the coefficients in the estimated model are large and the coefficient of determination (R^2) is relatively high, then there might exist multicollinearity. The simplest remedy to this problem is to omit the suspected collinear variables (Greene 2003:57-58).

Consequently, I omitted two variables; EPL and ALMP from the original model and thereafter performed new OLS panel estimates with the level of unemployment as dependent variable. The aim was to discover if any other coefficients might be statistically significant when the model contained less explanatory variables. Again the coefficient of tertiary education is the only coefficient that is statically significant. The results are presented below.

Dependent Variable: U_?
Method: Pooled Least Squares
Cross-sections included: 14
Total pool (balanced) observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.068747	0.313911	0.219002	0.8284
HDI_?	0.041549	0.360194	0.115352	0.9091
SED_?	0.049544	0.042515	1.165347	0.2549
TED_?	-0.245935	0.123786	-1.986770	0.0480
Fixed Effects (Cross)				
CZE--C	-0.038972			
HUN--C	-0.018321			
POL--C	0.062978			
SVK--C	0.061381			
AUT--C	-0.060821			
BEL--C	0.009030			
DEN--C	-0.021437			
ESP--C	0.053691			
FRA--C	0.015410			
GER--C	-0.008681			
ITA--C	-0.048679			
NDL--C	0.020431			
SWE--C	-0.014324			
UK--C	-0.011686			
R-squared	0.847780	Mean dependent var		0.088985
Adjusted R-squared	0.750359	S.D. dependent var		0.042620
S.E. of regression	0.021295	Akaike info criterion		-4.569989
Sum squared resid	0.011337	Schwarz criterion		-3.866646
Log likelihood	112.9698	F-statistic		8.702253
Durbin-Watson stat	2.495164	Prob(F-statistic)		0.000001

U_t is negatively related to tertiary education in the second panel estimate as well. The coefficient of determination explains 84 % of the changes in the level of unemployment. The Durbin-Watson statistics (2.5) suggest serial correlation in the residuals. It is commonly stated that an individual who possesses a diploma from a high educational institution has a higher probability of not being unemployed, compared with an individual with a lower educational certificate. The empirical results confirm this statement – unemployment declines with tertiary education. The entire Polish society has undergone large structural reforms since the fall of communism. Improvements in infrastructure, welfare and lower educational levels have required a huge amount of funding. A possible reason could be that the tertiary educational institutes have been assigned limited funding. This might have affected the

quality of the education all across the country. Subsequent, this poor quality in human capital might be one of the reasons behind the negative development on the labour market. The regression coefficients of tertiary education are statistically significant at 5 % in all of the cross-country panel estimates. Due to space limitations the remaining results are presented in appendix C.

5. Okun's Law

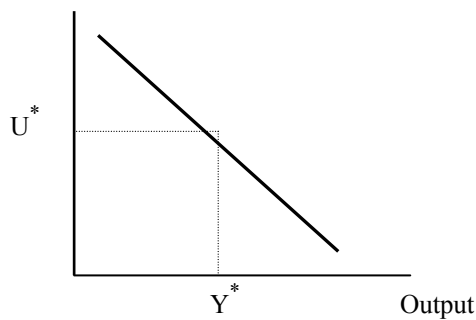
This section contains a presentation of the theoretical framework around Okun's law. This economic hypothesis illustrates a negative relationship between output and unemployment, acknowledged as Okun's law. The US economist, Arthur Okun established this relationship in the 1960s. Okun's law postulates an inverse linkage between cyclical output and cyclical unemployment (Moosa 1997).

As stated previously in section 1.3, the econometric models in the thesis, is based upon research by Gabrisch (2006) and Sögner (2002). Gabrisch investigates Okun's law in eight Central- and Eastern European countries and examines how robust this relationship is. Sögner scrutinizes Okun's law in 15 OECD countries and further examines the structural stability.

From a macroeconomic policy perspective, this empirical relationship is of considerable interest. The Okun relationship change is either generated by labour supply or demand side effects. A country's labour force is defined as the sum of employment and the number of people unemployed. Unemployment is determined by aggregate demand and, as output rises in expanding economy, more unemployed workers are hired, hence output increases. Conversely, as an economy enters a recession, some workers are redundant and they lose their job, thus unemployment rises and output falls. Changes in the level of unemployment are also associated to changes in a variety of aspect that have an influence on output growth. Reductions in both, hours per worker and labour force participation are closely linked with an increase of the level of unemployment (Altig 1997). The question that is of interest is by how much a country's growth rate might reduce unemployment.

Figure 8: Okun's Law

Δ Unemployment



When output decreases, it tends to raise unemployment. On the contrary, when output increases unemployment starts to decrease.

Okun's law is expressed as: $\Delta u_t = U_t - U^* = -\beta(Y_t - Y^*)$ (5.1)

Source: Burda (2005:284)

The change of the observed unemployment rate, U_t is denoted, Δu_t . The capital letter, Y_t denotes the real GDP growth and Y^* is the GDP trend growth rate. The coefficient β , measures the effect on the unemployment rate of deviations of the output development from its ordinary rate (Blanchard 2003:185). This equation states that present growth rate should be equal to the long-term growth rate in order to keep unemployment constant. Average annual GDP growth rate in Poland has approximately been 4 % since 1994. Combining this fact with Okun's law, it implies that annual GDP growth has to be at least 4 % to prevent the unemployment rate from rising. Assume that the labour force in Poland grows with 1 % per year. The employment rate needs to increase by the same amount as labour force growth otherwise a tendency for rising unemployment may develop.

Besides these previously explained aspects, two other fundamental factors are of essence, the size of the labour force and the productivity of labour. An economy exhibits productivity growth, which exists due to efficiency reforms of different factors of production. Further assume that labour productivity grows at 3 % per year. Adding the size of the labour force together with the productivity of labour, it would suggest that output growth must grow at 4 % per year. Briefly summing up, to avoid an unemployment increase, the annual growth rate must balance with the total factor productivity growth and the employment rate (Blanchard 2003:183-84).

5.1 Okun's Coefficient

Presume that Okun's coefficient, β is 0.4, this implies that output growth 1 percent above the normal output growth rate for one year reduces the unemployment rate by only 0.4 percentage

points. There are two main reasons for the response to be less than proportional to output. Firstly some employees are always needed in a firm, regardless of the actual output level. Furthermore, firing workers when output is low and, thus hiring and training new personnel in an upturning economy is costly. The second reason concerns the employment rate. A 0.6 % increase of a country's employment rate leads to only a 0.4 % decrease in the unemployment rate. The reason behind this development is that overall labour force participation rises within an expanding economy. In this situation not all new vacancies are filled by the unemployed, some available jobs go to people who have been out of the labour force (Blanchard 2003:184-185).

The β coefficient in Okun's law is generally determined by two aspects; it is influenced by how companies alter employment, when their production output is varying over a business cycle. This alteration process of employment is hence, determined by the existence of legal and social constraints such as hiring and firing employees in a firm. β is expected to be low in countries that provide a high degree of employment protection for their employees (Blanchard 2003:185). Furthermore, the Okun coefficient might be unstable in a country that struggles with a high level of unemployment and an inflexible labour market (Izyumoy 2002:318).

There are two empirical methods of estimating the Okun coefficient. The gap model, estimates the fluctuations of output between the observed and potential GDP growth. The unemployment rate, in this model is measured in terms of deviations from the natural rate (Burda 2005:284). In the first difference model, the changes in the observed unemployment rate are regressed on first differences of the logarithm of actual output (i.e the growth rate) (Gabrish 2005). Errors in output and unemployment measurements are common for transitional economies. Therefore, there are no reliable estimates of potential GDP growth and natural unemployment in the Central- and Eastern European countries.

Improvements in technology have facilitated firms' capacity to produce more efficiently and quicker. For some countries, the development in output growth "has not necessarily contributed to lower unemployment rates, since many unskilled workers have lost their jobs to new technology" (Farzad 2003:3). The author further argues that an increase in structural unemployment might be caused by improvements in labour productivity. An individual's productivity capacity is related to knowledge and skills. A person who possesses a higher educational degree is more likely to alter jobs between different sectors within the economy,

compared to a low educated person. This job rotation implies an increase in the individual's productivity capacity. Furthermore, since an individual's productivity capacity is measured in terms of human capital, this variable might be of great interest for the structural unemployment phenomenon in Poland.

By scrutinizing the GDP growth rate and the unemployment rate statistics for Poland, Slovakia and the Czech Republic in *table 7*, it is possible to see that the relationship between output growth – unemployment contains a delayed reaction. The Czech Republic experienced a growth rate of 1.9 % in 2002, the delayed reaction on unemployment began around one year later in 2003. During 1999 Slovakia experienced a very low output growth of 0.3 %, however the reaction on the unemployment commenced about one year later in 2000. A similar delayed reaction can be seen in Poland, the country experienced a rather low growth in 2001, and hence the delayed reaction on the level of unemployment can clearly be seen about one year later in 2002. These delayed unemployment effects are illustrated in the Okun relationship figures in section 6.2.

Table 7: Output growth and unemployment development in three E.E countries, 1999-2005

	1999	2000	2001	2002	2003	2004	2005
Czech Republic							
GDP growth	1,3	3,6	2,5	1,9	3,6	4,2	6,1
Unemployment	8,6	8,6	8	7,3	7,8	8,3	7,9
Slovakia							
GDP growth	0,3	0,7	3,2	4,1	4,2	5,4	6
Unemployment	16,33	18,76	19,3	18,67	17,56	18,21	16,25
Poland							
GDP growth	4,5	4,2	1,1	1,4	3,8	5,3	3,5
Unemployment	13,39	16,1	18,23	19,91	19,63	18,97	17,72

Source: OECD (2007a)

6. Empirical Analysis of Okun's Law

The aim of this section is to study the dynamics of the unemployment – output growth relationship in the Central- and Eastern European countries, though focus is mainly on Poland's dynamic. In addition I will estimate the Okun relationship for ten OECD countries as well. The data utilized in the CEE country regressions are obtained from an article written by Gabrisch (2006) as well as data from the OECD (2007a) and Eurostat (2007).

6.1 Single Country Regressions

The Okun analysis commences with eight single country regressions that has the aim to investigate the Okun relationship individually for each chosen Central- and Eastern European nation. The objective of these single country regressions is to discover a statistically significant relationship between the unemployment and the output growth rates.

I will perform several diagnostic tests in Eviews, in order to investigate if the model is appropriate, hence the statistical inference can be analyzed accurate. I will check for stability by applying the RESET-test, autocorrelation by using the Q-statistics, normality with the JB-test, Heteroskedasticity by applying the White-test. Moreover, I test for unit roots in the residuals by applying the Augmented Dickey-Fuller test to scrutinize if the two variables; GDP growth and the unemployment rate are stationary or non-stationary.

6.1.1 Single Country Okun Model

There might be significant time lags involved in this relationship, due to this reason I will use a model that allows for delayed reaction of unemployment on output changes. The following model is applied to investigate the Okun relationship:

$$\Delta U_t = \alpha + \beta_1 y_t + \beta_2 y_{t-1} + \varepsilon_t \quad (6.1)$$

Assume: $y_t = y_{t-1} = y$

$$\Delta U_t = \Delta u_{t-1} = u$$

$$\Delta U = \alpha + (\beta_1 + \beta_2)y + \varepsilon_t$$

$$\frac{d\Delta U}{dy} = \beta_1 + \beta_2 = \hat{\beta} \quad \Longrightarrow \quad \text{Okun's coefficient}$$

The level of unemployment is U_t , α is the intercept term, β_1 is the coefficient to the growth rate of output, y_t , and ε_t is the random error term. Assume a constant growth rate and thereafter applying derivatives we find the long-run relationship, Okun's coefficient, denoted, $\hat{\beta}$.

Initially, I performed the OLS regressions with quarterly data. I studied the desirable OLS properties of each single country regression, to check if the estimates are appropriate. To begin with, I tested each single country model for no misspecification by using the RESET-test. The second OLS statements is the assumption of no heteroskedasticity, this implies that the variance of the residual term is constant (Gujarati 2006:169). In Eviews it is possible to raise the estimated equation and scrutinize the variances with White's covariance estimator. Hence, heteroskedasticity is unlikely to occur with this procedure.

A problem that is often associated with time-series data is autocorrelation. No autocorrelation implies that the error terms, ε_t are random, this is the third OLS assumption (Gujarati 2006:170). In Eviews, it is possible to detect autocorrelation by interpreting the Q-statistics of each single country regression. The Q-statistics estimates of the entire period, 1994:1 – 2004:4, indicated problems with autocorrelation, in all eight Central- and Eastern European countries. Since autocorrelation existed with one lag, I performed several tests different lag structures to investigate if the serial correlation would remain. Despite several attempts with different lag values, the autocorrelation persisted. In order to encounter the autocorrelation issue, I performed the single country regressions once more, though this time by utilizing yearly data. These estimates did not identify any autocorrelation in the residuals. Further along I conducted tests for normality, by applying the Jarque-Berra test. A kurtosis coefficient close to 3 and a mean close to 0 are set as a guideline for a normal distribution. Estonia, Hungary and Latvia had non-normality distributed residuals when the quarterly data was utilized in the tests. With the yearly data the diagnostic tests for Czech Republic and Slovakia, had skewed distributions to the right respectively to the left for the latter country. The remaining countries estimates did not disclose any considerable signs of non-normality with the JB-test.

In addition, I applied the Augmented Dickey-Fuller test to check for unit roots in the residuals. Thus, it is of great important to estimate whether the variables in the regression is stationary or non-stationary, in order to avoid spurious and misleading inference (Gujarati 2006:497-99). A stationary series returns to its long run level after a shock, whereas a non-stationary series is permanently affected by a shock and hence each shock has a permanent effect (Greene 2003:847).

The regression results with quarterly data are illustrated in *table 8* and the results of the yearly data is represented in *table 9*. In *table 10*, the regression results for 10 OCED countries are presented. The results of the unit root tests for two countries are presented in *table 11* and *12*, the remaining countries test results are presented in appendix D.

6.1.2 Empirical Results of the Single Country Regressions

Assuming that the productivity and the labour force grow constantly over time, it is possible to calculate the potential growth rate for each country from equation (6.1)
$$: \frac{\alpha}{(\beta_1 + \beta_2)}$$

Further, is it possible to calculate how much the present growth rate must exceed the potential growth rate, in order to reduce the level of unemployment with one percent, acknowledged as

Okun's Law:
$$\frac{1}{-(\beta_1 + \beta_2)}$$

Table 8: Regression results with quarterly data
Time period: 1994:1 - 2004:4

	Constant	β_1	β_2	$\hat{\beta}$ Okun's coefficient	$\alpha/(\beta_1+\beta_2)$ Potential Growth, %	$1/(\beta_1+\beta_2)$ Okun's Law	R ²
CZE	0,0610 ^{a)}	-4,3704 ^{a)}	2,9264 ^{b)}	-1,444	-0,042	0,69	0,261
p-value	0,0008	0,0047	0,0439				
N	43						
EST	0,0193	-0,4342	0,3404	-0,094	-0,206	10,66	0,006
p-value	0,6099	0,6195	0,697				
N	44						
HUN	-0,0054	0,9460	-1,1006	-0,155	0,035	6,47	0,024
p-value	0,81	0,4025	0,3311				
N	43						
LVA	0,0277	-0,2521	-0,0654	-0,317	-0,087	3,15	0,030
p-value	0,1425	0,54	0,8742				
N	43						
LIT	0,07412 ^{c)}	-1,07703 ^{c)}	0,31099	-0,766	-0,097	1,31	0,080
p-value	0,0572	0,0792	0,6063				
N	43						
POL	0,02944 ^{c)}	-0,06707	-0,54150	-0,609	-0,048	1,64	0,076
p-value	0,1018	0,8721	0,1983				
N	43						
SVK	0,02578	-0,53035	0,07294	-0,457	-0,056	2,19	0,024
p-value	0,3657	0,4731	0,9209				
N	34						
SVL	-0,00308	-0,31346	0,18851	-0,125	0,025	8,00	0,023
p-value	0,8421	0,3714	0,5657				
N	40						

a) Significant at 1%, b) Significant at 5%, c) Significant at 10%

Okun's coefficient¹⁴ varies between 0.094 (Estonia) and 1.44 (the Czech Republic). In Estonia and Slovakia the lowest response of unemployment on GDP growth was found, and in the Czech Republic the strongest response was found. Many of the coefficients are not statistically significant in most cases, as a result Okun's law can only be confirmed in the Czech Republic. In a study by Gabrish (2006) the author estimates Okun's law by applying quarterly data. The Okun's coefficient estimates alter between 0.85 (Hungary) and 2.3 (Latvia). The Okun's coefficients are statistically significant, except in Poland and Slovakia.

¹⁴ defined in absolute values

Table 9: Regression results with yearly data
Time period: 1994 - 2005

	Constant	β_1	β_2	$\hat{\beta}$ Okun's coefficient	$\alpha/(\beta_1+\beta_2)$ Potential Growth, %	$1/-(\beta_1+\beta_2)$ Okun's Law	R^2
CZE	0,172188 ^{b)}	-6,805853 ^{a)}	3,022869	-3,783	-0,046	0,26	0,627
p-value	0,0208	0,0069	0,1521				
N	11						
EST	0,372668 ^{b)}	-4,261496 ^{b)}	-0,939418	-5,201	-0,072	0,19	0,483
p-value	0,0369	0,028	0,4874				
N	11						
HUN	-0,032374	0,182886	0,025763	0,209	-0,155	-4,79	0,002
p-value	0,6786	0,9276	0,9898				
N	10						
LVA	0,219674	1,597338	-5,066479	-3,469	-0,063	0,29	0,181
p-value	0,3931	0,6526	0,222				
N	11						
LIT	0,143152	0,281913	-1,89025	-1,608	-0,089	0,62	0,020
p-value	0,7245	0,9534	0,6952				
N	11						
POL	0,001111	-2,532633	2,285615	-0,247	-0,004	4,05	0,137
p-value	0,994	0,4133	0,3345				
N	11						
SVK	0,075271	-6,440582 ^{b)}	4,826385 ^{c)}	-1,614	-0,047	0,62	0,484
p-value	0,3812	0,0257	0,0725				
N	11						
SVL	0,357892 ^{c)}	-1,323227	-8,670752 ^{b)}	-9,994	-0,036	0,10	0,442
p-value	0,1225	0,7463	0,0384				
N	11						

a) Significant at 1%, b) Significant at 5%, c) Significant at 10%

With yearly data estimates Okun's coefficient varies between 0.209 (Hungary) and 9.9 (Slovakia). In Hungary and Poland the lowest response of unemployment on GDP growth was found, and in the Czech Republic and Slovenia the strongest response was found. Likewise as in the quarterly regression results many of the coefficients are insignificant. Okun's law is confirmed in the Czech Republic, Estonia, Slovakia and Slovenia. One explanation for the cross-country differences in Okun's coefficient may be due to differences in the labour force structure or employment. Despite several attempts with different lag values and regressions with quarterly and yearly data, an unemployment – growth relationship could not be statistically identified in Poland's regression models.

Table 10: Regression results for 10 OECD countries with yearly data
Time period: 1994-2005

	Constant	β_1	β_2	$\hat{\beta}$ Okun's coefficient	$\alpha/(\beta_1+\beta_2)$ Potential Growth, %	$1/(\beta_1+\beta_2)$ Okun's Law	R^2
AUT	0,16399 ^{b)}	-7,62806 ^{b)}	1,77263	-5,855	-0,028	0,17	0,638
p-value	0,0261	0,0106	0,4457				
N	10						
BEL	-0,00711	-0,20169	0,09856	-0,103	0,069	9,70	0,004
p-value	0,9304	0,8971	0,9497				
N	10						
DEN	0,07508	-5,53372	0,59195	-4,942	-0,015	0,20	0,315
p-value	0,3353	0,1439	0,8165				
N	10						
FRA	0,07973 ^{c)}	-4,49425 ^{b)}	0,00486	-4,489	-0,018	0,22	0,506
p-value	0,1163	0,0418	0,7946				
N	10						
GER	0,0280	-3,8944	3,0429	-0,852	-0,033	1,17	0,290
p-value	0,572	0,1689	0,2452				
N	10						
ITA	-0,04296	-1,78963	1,53551	-0,254	0,169	3,94	0,377
p-value	0,2588	0,2215	0,2832				
N	10						
NDL	0,25787 ^{a)}	-15,47209 ^{a)}	4,28558 ^{c)}	-11,187	-0,023	0,09	0,902
p-value	0,0011	0,0004	0,1263				
N	10						
ESP	-0,01879	-6,85652 ^{b)}	5,66810 ^{b)}	-1,188	0,016	0,84	0,545
p-value	0,8099	0,0285	0,0453				
N	10						
SWE	0,0907	-5,7855 ^{c)}	1,1897	-4,596	-0,020	0,22	0,301
p-value	0,4955	0,126	0,7191				
N	10						
U.K	-0,01429	-1,98211	0,55094	-1,431	0,010	0,70	0,057
p-value	0,9045	0,5526	0,8285				
N	10						

a) Significant at 1%, b) Significant at 5%, c) Significant at 10%

The results from the ten OECD countries display Okun's coefficient between 0.1 (Belgium) and 11.1 (Netherlands). Okun's Law could be confirmed in Austria, France, Netherlands and Spain. In a study by Sögner (2002) he analyzes Okun's coefficient in 15 OECD countries. The

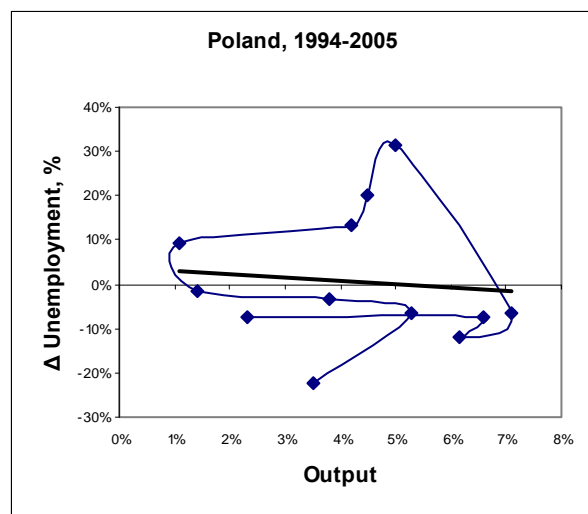
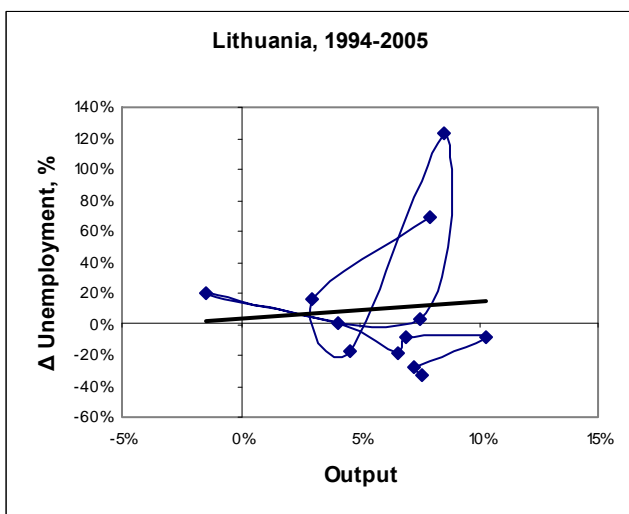
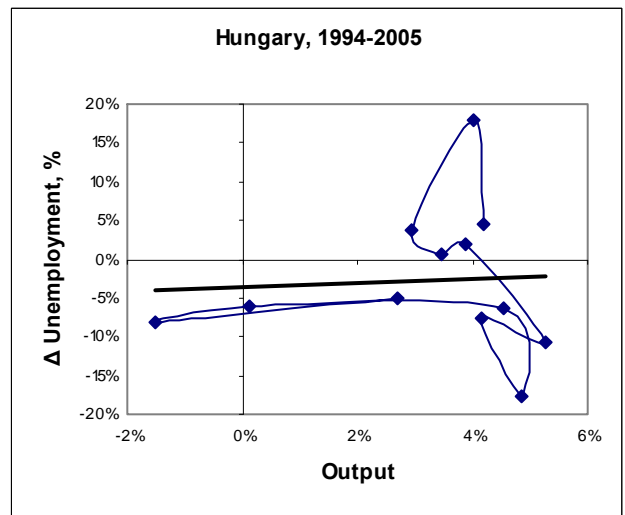
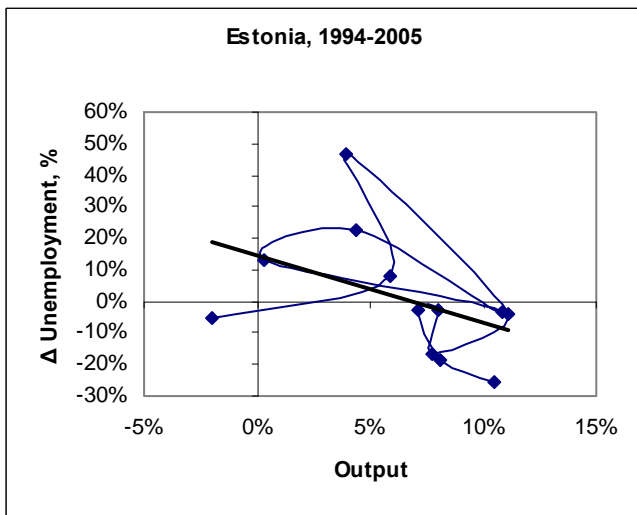
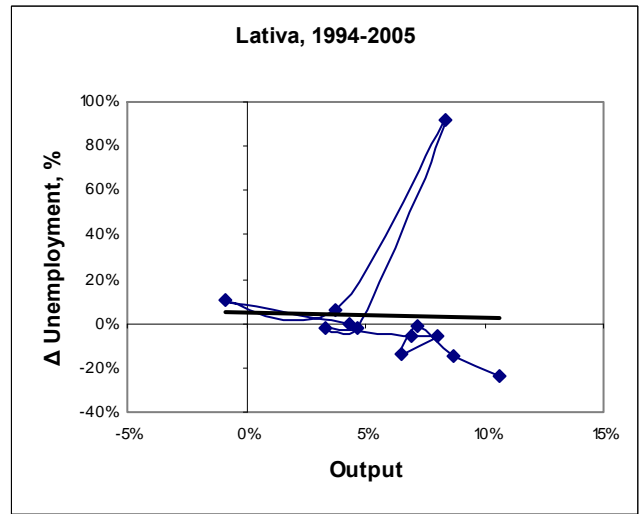
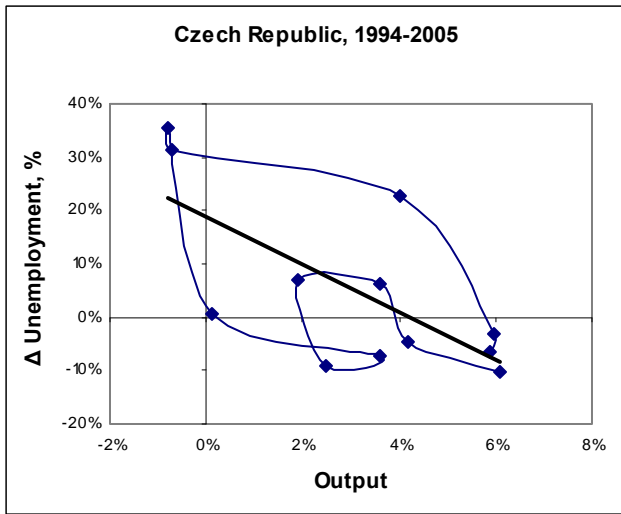
coefficients alter between 0.012 (Japan) and 0.82 (Netherlands). The coefficients are statistically significant, except in four countries; Austria, Italy, Belgium and Switzerland. The author's estimation period was 1960 – 1999, this might be a reason of the differences in our results.

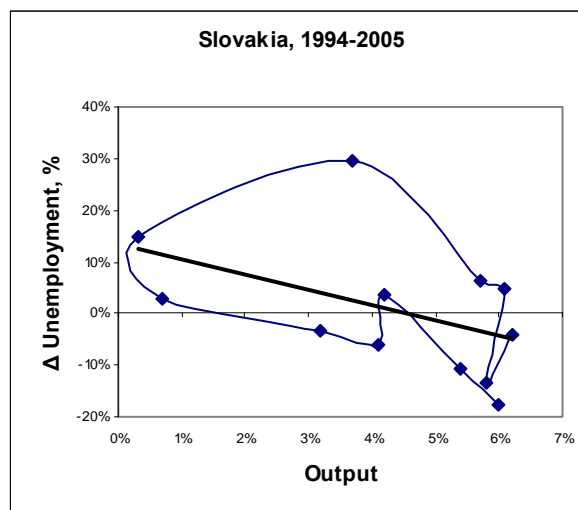
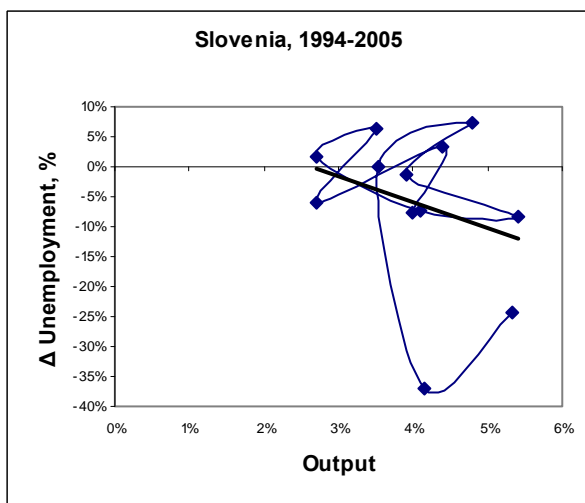
6.2 Okun Relationship in the Central- and Eastern European Countries

I have plotted the Okun relationship by utilizing yearly data in the eight Central- and Eastern European countries. A negative correlation between output growth and unemployment was detected in the Czech Republic, Estonia, Slovenia and Slovakia in the chosen period. A rather weak Okun relationship was found in Poland. The remaining three countries illustrate quite distinctive Okun relationships. One explanation for these differences might be that the economies of Poland, Hungary, Latvia and Lithuania have experienced large structural reforms, thus a clear relationship between output growth and unemployment cannot be found in the chosen period. The strongest Okun relationship was noted in the Czech Republic, Estonia and Slovakia. In summary, this implies that these three countries have not undergone large institutional reforms in the years of 1994 - 2005. Their economical structure has stayed the same over a period of eleven years. A possible explanation could lie behind their development and that the three economies, after the fall of communism, changed their economical structure more rapidly, and more in line with Western standards. In other words, the Czech Republic, Estonia and Slovakia adapted faster to the market economy ideas of the West than the remaining five Central- and Eastern European countries did.

Comparing these results with the standardized unemployment rates illustrated in *figure 1*, it can be seen that the labour markets in Poland and Slovakia are following a similar development. Nonetheless, by scrutinizing *figure 9* it can be seen that Slovakia shows a distinct Okun relationship compared with Poland who displays a weak relationship. A possible reason behind this discrepancy may perhaps be that Poland has undergone larger structural reforms in the chosen period, than Slovakia has been subjected too.

Figure 9: Okun relationship in eight CEE, 1994 – 2005, yearly





Source: OECD (2007), Eurostat (2007) & Gabrisch (2006)

6.3 Unit Roots Tests

I have utilized the Dickey-Fuller test to check for unit roots in the residuals and hence determine whether the variables are stationary or non-stationary. The collected time series data may be non-stationary due to transition shocks from the economic collapse. The standard critical values when testing for unit roots cannot be applied on this test. The explanation for this is that the probability density function (PDF) distribution for the Dickey-Fuller test has a skewness to the left. Eviews provides the new critical values with this test. It is important to always find negative critical values. A positive t-statistics value means that the H_0 cannot be rejected. If there is a unit root in the residuals, the unemployment and the GDP growth rates are not cointegrated.

Table 11: Augmented Dickey-Fuller test results
The Czech Republic

Null Hypothesis: GDP growth has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic based on SIC, MAXLAG=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.481272	0.0000
Test critical values:		
1% level	-3.568308	
5% level	-2.921175	
10% level	-2.598551	

H₀: GDP growth has a unit root
H₁: GDP growth does not have a unit root

As we can see in the table above we reject the null hypothesis, since the t-value (-6.48) is higher than the critical value at the 5 % level (-2.921175). This implies that GDP growth does not have a unit root and is therefore stationary.

Null Hypothesis: UNEM has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.778029	0.0688
Test critical values:		
1% level	-3.571310	
5% level	-2.922449	
10% level	-2.599224	

H₀: Unemployment has a unit root
H₁: Unemployment does not have a unit root

As we can see in the table above we reject the null hypothesis, since the t-value (-2.77) is higher than the critical value at the 5 % level (-2.922449). This implies that the unemployment does not have a unit root and is therefore stationary.

Table 12: Augmented Dickey-Fuller test results
Poland

Null Hypothesis: GDP growth has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.543749	0.0000
Test critical values:		
1% level	-3.568308	
5% level	-2.921175	
10% level	-2.598551	

H₀: GDP growth has a unit root
H₁: GDP growth does not have a unit root

As we can see in the table above we reject the null hypothesis, since the t-value (-7.54) is higher than the critical value at the 5 % level (-2.921175). This implies that GDP growth does not have a unit root and is therefore stationary.

Null Hypothesis: UNEM has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic based on SIC, MAXLAG=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.319337	0.0000
Test critical values:		
1% level	-3.568308	
5% level	-2.921175	
10% level	-2.598551	

H₀: Unemployment has a unit root
 H₁: Unemployment does not have a unit root

As we can see in the table above we reject the null hypothesis, since the t-value (-5.31) is higher than the critical value at the 5 % level (-2.921175). This implies that the unemployment does not have a unit root and is therefore stationary. The remaining countries unit root test results are presented in appendix D.

7. Discussion and Conclusion

The aim of the study has been to analyze and provide a macroeconomic explanation to the poor labour market performance in Poland.

Poland is subjected to remarkably high unemployment in *all* levels of education. 50 % of the total amount of adults aged 25-64 in Poland, *lacks* sufficient secondary education. A large part of these workers are allocated in the agricultural sector. There are great difficulties utilizing their skills and re-employing them into new expanding sectors within the economy, since these workers are lacking sufficient schooling. Unemployment among males and females¹⁵ who have attended secondary school is much higher in Poland, than in the other OECD countries. Moreover, an individual who has attended a tertiary education has a higher probability in finding a job, compared with an individual who only has attended secondary school. 16 % of the total amount of adults aged 25-64 in Poland possesses a tertiary educational diploma. It ranks Poland as the second highest among the CEE countries. By comparing Poland with the OECD average of 25 %, the country ranks as the fifth lowest of the adults who has attended tertiary education. Sadly, the Polish females and males that have attended a tertiary education are subjected to higher unemployment, compared with women and men in the other OECD countries.

As a result of the severe labour market situation in Poland, approximately 1 million labour emigrants have left Poland, to seek enhanced work opportunities abroad. The immigration aspect may be part of the reason behind the sharp decrease of the level of unemployment from 17.7 % in 2005 to 13.8 % in 2006.

There are several different variables that have been examined in the study, through two different labour market aspects. Initially, the labour market in Poland was analyzed through a cross-country panel model. In this model, the variables were eliminated one by one, in the end only one analyzable variable remained. An aspect that was eliminated early in the discussion concerned that the Polish labour market does not suffer from delayed demand shocks. Furthermore, the labour market strictness and the amount of spending on labour

¹⁵ Total amount of adults aged 25-64

market programmes examined in the study do not seem to have an affect on the unemployment. The human development indicator is not statistically confirmed in any of the panel estimates. All three dimensions of the HDI variable were utilized in the study, as it was unfeasible to obtain data for simply the educational dimension. It could perhaps explain the insignificance. The human capital approach was further analyzed by applying data on the secondary educational attainment level of the adult population. The regression coefficients of secondary education are not statically confirmed in any of the panel estimates. A possible reason behind this insignificance can be that the data is inconsistent, since it has been obtained from several different sources. These eliminations narrowed it down to only one analyzable variable - tertiary education. All empirical estimates of the labour market indicate that there is a correlation between the level of unemployment and the tertiary education.

The second labour market approach investigated the Okun relationship in the Central- and Eastern European countries. A negative correlation between output growth and unemployment was detected in the Czech Republic, Estonia, Slovenia and Slovakia. A relatively weak and unstable Okun relationship was found in Poland. It implicates that Poland has undergone larger structural reforms than the countries that show a distinct Okun relationship.

The structural unemployment dilemma is associated with the central hypothesis regarding that there is a large portion of human capital resource waste in Poland. As an individual is unemployed for longer periods, he or she is likely to suffer losses in human capital. Knowledge and skills tend to deteriorate over time, if not used. It affects the productivity capacity and therefore is linked to the economic development. Furthermore, the country might be subjected to structural weaknesses in the educational institutions nationwide. Poor education quality might be deeply rooted in the internal social dynamics in Poland. When communism fell in all of the Central- and Eastern European countries, an essential industrial globalization process commenced. Poland's need for a more educated workforce became a fact. The Polish society's ability to react to, deal with and adapt to these changes, may have taken a much longer time than in the other post-communist countries who displays an distinct Okun relationship. Agriculture has been, and still is a large fraction of the Polish labour force. The agricultural sector in Poland has been relaying on old technology during a long period, and with the adaptation and opening to the West, the farmers faced fierce competition on the world market. The Polish society needed to deal with these issues, thus modernise and adopt

their society according to Western standards. Ever since the communism was dissolved in the late 1980s, Poland experienced a huge demand for more an educated labour force. This demand created a rapid expansion of higher educational institutions countrywide. Nevertheless, this expansion may have occurred to hasty with limited funding, implicit this development affected the quality of the tertiary education. This hypothesis is supported by the empirical results of the study. Inadequate human capital can be associated to the poor labour market performance in Poland. The empirical results found in the study indicate a similar tendency as the authors of the OECD economic survey (2006a). The authors argue that Poland needs to enhance labour quality in all levels, primarily through improvements in the educational institutions.

The discussion can be summarized by concluding that Poland is subjected to remarkably high unemployment rates in all levels of education. The labour market appears to have difficulties re-employing and moving workers from the old sectors within the economy, into the new expanding sectors. Whilst at the same time the labour market experiences problems of devouring all of the highly educated individuals. Maybe there is a mismatch in the labour markets supply and demand for workers who possess a certain education, or it is associated with the quality in all levels of education.

These elements discussed above may perhaps be combined with the unstable governance in Poland, which plays a fundamental role for the whole economic development. The Polish government need to develop policy frameworks on how to improve the structural weaknesses in the educational institutions countrywide. This is clearly a complex and important issue for the Polish government to solve.

8. References

- Altig, D., Fitzgerald, T. & Rupert, P., 1997, "Okun's Law Revisited: Should We Worry about Low Unemployment?", *Federal Reserve Bank of Cleveland Economic Commentary*
- BBC, (2007-09-08), "Polish MPs choose early election", <http://news.bbc.co.uk>
- Blanchard, Oliver, 2003, "Macroeconomics", Pearson Education Ltd., 3rd Ed., United States
- Boone, J. & J. van Ours, 2004, "Effective Active Labour Market Policies", IZA Discussion Paper, No. 1335, Bonn
- Burda, M & Wyplosz C., 2005, "Macroeconomics", Oxford University Press Inc., 4th Ed., United States
- Central Statistical Office (CSO), 2006, "Statistical Yearbook of the Republic of Poland – 2006", www.stat.gov.pl
- Calmfors, L., 1994, "Active labour market policy and unemployment – a framework for the analysis of crucial design features", *OECD Economic Studies*, Vol. 22 pp.7-47
- European Bank for Reconstruction and Development (EBRD), 2007-04-03, "Poland strategy overview", www.ebrd.org
- Economist, (2007-10-25a), "Common sense victorious", www.economist.com
- Economist, (2007-03-29b), Country surveys - Poland, www.economist.com
- Economist, (2006-05-11), "Survey: Poland – Open for business" www.economist.com
- Economist, (2005-10-27), "Populism's victory in Poland", www.economist.com
- Estevão, M., 2003, "Structural and Cyclical Labour Market Changes in Poland", in *Republic of Poland: Selected Issues*, IMF Country Report, Washington
- Eurostat, 2007, Economy and Finance, <http://epp.eurostat.cec.eu.int>
- Eurostat, 2006, "Statistics in focus – General and regional statistics", No.1
- Farzad, F. & Quade, S., 2003, "An Empirical Analysis of the Relationship Between GDP and Unemployment", *Humanomics*, Vol.19, No.3/4, pp. 1-6,
- Fregert, K. & Jonung, L., 2005, "Makroekonomi – Teori, politik & institutioner", 2nd Ed., Studentlitteratur, Lund
- Gabrisch, H. & Buscher H., 2006, "The Relationship between Unemployment and Output in Post- communist Countries", *Post-Communist Economies*, Vol.18, No. 3, pp. 261-276

- Greene, William H., 2003, "*Econometric Analysis*", Prentice-Hall International Inc., 3rd Ed., United States
- Gujarati, Damodar, 2006, "*Essentials of Econometrics*", McGraw hill, 3rd Ed., Singapore
- Izyumoy.A & Vahaly.J, 2002, "The unemployment-Output tradeoff in transition economies: Does Okun's law apply?" *Economics of Planning*, Vol.35, pp.317-331
- Johnsson, Peter, 2005, "*Polen i Europa*", Scandbook AB, Falun
- Mitchell, B R, 1998, "*International historical statistics: Europe 1750-1998*"
- Moosa, Imad A., 1997, "A cross-country comparison of Okun's coefficient", *Journal of Comparative Economics*, Vol.24, No 3, pp.335-356
- Nickell, Stephen J., 2003, "Labour market institutions and unemployment in OCED countries", *Cesinfo Dice Report 2/2003*, pp.13-26
- Nickell, Stephen J., 1997, "Unemployment and Labour Market Rigidities: Europe versus North America", *Journal of Economic Perspective*, Vol.11, No.3, pp.55-74
- Nordlöf-Lagerkranz, Ulla, 1993, "*Östeuropa*", 1st Ed., Grapic Systems AB, Göteborg
- OECD, 2007a, Main Economic Indicators, www.sourceoecd.org, Paris
- OECD, 2007b, Reviews of Tertiary Education-Poland, www.sourceoecd.org, Paris
- OECD, 2006a, Economic Survey: Poland, www.sourceoecd.org, Paris
- OECD, 2006b, Education at Glance, www.sourceoecd.org, Paris
- OECD, 2006c, Employment outlook, www.sourceoecd.org, Paris
- OECD, 2005, Employment Outlook, www.sourceoecd.org, Paris
- OECD, 2004, Employment outlook, www.sourceoecd.org, Paris
- Sachs, Jeffrey, 2005, "*The end of poverty*", The penguin press Inc., United States
- Sachs, Jeffrey, 1994, "*Poland's jump to the market economy*", 1st Ed., WSOY, Finland
- Scarpetta, S., 1996, "Assessing the Role of Labour Market Policies and Institutional Settings on Unemployment: A Cross-Country Study", *OECD Economic Studies*, No. 26, 1996/1, OECD, Paris
- Slay, Ben, 1994, "*The Polish Economy – Crisis, Reform, and Transformation*", United States
- Sögner, L. & Stiassny, A., 2002, "An analysis on the structural stability of Okun's law – a cross-country study", *Applied Economics*, Vol.14, pp.1775-1787

Werding, Martin, 2006, "Structural unemployment in Western Europe: reasons and remedies", CESinfo seminar series, Massachusetts Institute of Technology, United States

World Bank, 2007a, Database of education statistics,
<http://www1.worldbank.org/education/edstats>

World Bank, 2007b, World development indicators, www.worldbank.org/data

World Bank & IFC, 2007c, Economy rankings, www.doingbusiness.org/economyrankings

World Bank, 2006, "Where is the wealth of nations: Measuring capital for the 21st century", Washington D.C

United Nations Economic Commission for Europe, UNECE, (2007-04-10), Statistical Database, www.unece.org

United Nations Development Programme, UNDP, (2007-06-20),
<http://hdr.undp.org/hdr2006/statistics/>

Appendix A – Yearly GDP Growth Rates

	CZE	EST	HUN	LVA	LIT	POL	SVK	SVL
1994	5,87	-2,00	2,70	4,33	7,90	2,33	6,20	5,33
1995	5,95	5,85	-1,53	-0,85	3,00	6,58	5,80	4,15
1996	4,00	3,98	1,30	3,78	4,55	6,15	6,10	3,53
1997	-0,7	11,1	4,53	8,4	8,5	7,1	5,7	4,8
1998	-0,8	4,4	4,85	4,7	7,5	5	3,7	3,9
1999	1,3	0,3	4,15	3,3	-1,5	4,5	0,3	5,4
2000	3,6	10,8	5,28	6,9	4,1	4,2	0,7	4,1
2001	2,5	7,7	3,88	8	6,6	1,1	3,2	2,7
2002	1,9	8	3,48	6,5	6,9	1,4	4,1	3,5
2003	3,6	7,1	2,93	7,2	10,3	3,8	4,2	2,7
2004	4,2	8,1	4,0	8,7	7,3	5,3	5,4	4,4
2005	6,1	10,5	4,2	10,6	7,6	3,5	6	4

	AUS	FRA	GER	ESP	NDL	ITA	BEL	SWE
1994	2,60	1,60	2,70	2,40	2,90	2,30	3,30	4,10
1995	2,20	2,00	2,00	2,80	3,00	3,00	2,30	4,20
1996	2,40	1,10	1,00	2,40	3,00	1,00	0,80	1,30
1997	2,00	2,30	1,90	3,90	3,80	2,00	3,70	2,60
1998	3,50	3,40	1,80	4,50	4,30	1,70	1,90	3,60
1999	3,40	3,20	1,90	4,70	4,00	1,70	3,10	4,30
2000	3,50	4,10	3,50	5,00	3,50	3,20	3,70	4,40
2001	0,90	2,10	1,40	3,50	1,40	1,70	1,20	1,20
2002	1,00	1,30	0,10	2,70	0,10	0,40	1,50	2,00
2003	1,40	0,90	-0,20	3,00	-0,10	0,40	0,90	1,60
2004	2,40	2,10	1,10	3,10	1,70	1,00	2,40	3,10
2005	1,80	1,60	1,10	3,40	0,70	0,20	1,40	2,40

	DEN	U.K
1994	5,50	4,40
1995	3,10	2,90
1996	2,80	2,70
1997	3,20	3,20
1998	2,20	3,20
1999	2,60	3,00
2000	3,50	4,00
2001	0,70	2,20
2002	0,50	2,00
2003	0,60	2,50
2004	2,10	3,20
2005	3,00	1,70

Source: Eastern European countries, year 1994-1996 obtained from Gabrisch (2006), year 1997-2005 (Eurostat 2007), OECD countries data is obtained from OECD's database; Main economic indicators (2007a).

Appendix B – Yearly Unemployment Rates

	CZE	EST	HUN	LVA	LIT	POL	SVK	SVL
1994	4,35	6,4	10,98	6,35	3,62	14,44	13,66	14,45
1995	4,07	6,05	10,43	6,34	6,12	13,34	13,11	10,95
1996	3,94	6,55	9,58	7,02	7,13	12,34	11,33	6,9
1997	4,84	9,6	8,99	7,465	5,9	10,86	11,88	6,9
1998	6,36	9,2	8,43	14,3	13,2	10,17	12,62	7,4
1999	8,61	11,3	6,94	14	13,7	13,39	16,33	7,3
2000	8,67	12,8	6,42	13,7	16,4	16,10	18,76	6,7
2001	8,04	12,4	5,73	12,9	16,5	18,23	19,30	6,2
2002	7,32	10,3	5,83	12,2	13,5	19,91	18,67	6,3
2003	7,82	10	5,87	10,5	12,4	19,63	17,56	6,7
2004	8,32	9,7	6,08	10,4	11,4	18,97	18,21	6,3
2005	7,92	7,9	7,17	8,9	8,3	17,72	16,25	6,5

	AUS	FRA	GER	ESP	NDL	ITA	BEL	SWE
1994	3,8	11,7	8,3	19,5	6,8	10,6	9,8	9,4
1995	3,9	11,1	8,0	18,4	6,6	11,2	9,7	8,8
1996	4,3	11,6	8,5	17,8	6,0	11,2	9,5	9,6
1997	4,4	11,5	9,2	16,7	4,9	11,2	9,2	9,9
1998	4,5	11,1	8,8	15,0	3,8	11,3	9,3	8,2
1999	3,9	10,5	7,9	12,5	3,2	11,0	8,5	6,7
2000	3,6	9,1	7,2	11,1	2,8	10,1	6,9	5,6
2001	3,6	8,4	7,4	10,3	2,2	9,1	6,6	4,9
2002	4,2	8,9	8,2	11,1	2,8	8,6	7,5	4,9
2003	4,3	9,5	9,1	11,1	3,7	8,4	8,2	5,6
2004	4,9	9,6	9,6	10,6	4,6	8,0	8,4	6,4
2005	5,2	9,9	9,6	9,2	4,7	7,7	8,4	5,5

	DEN	U.K
1994	7,7	9,3
1995	6,8	8,5
1996	6,3	7,9
1997	5,2	6,8
1998	4,9	6,1
1999	5,1	5,9
2000	4,3	5,4
2001	4,5	5,0
2002	4,6	5,1
2003	5,4	4,9
2004	5,5	4,7
2005	4,8	4,8

Source: Eastern European countries, year 1994-1996 obtained from Gabrisch (2006), year 1997-2006 (Eurostat 2007), OECD countries data is obtained from OECD's database; Main economic indicators (2007a).

Appendix C – Panel Regression Results

Dependent Variable: U_?

Method: Pooled Least Squares

Cross-sections included: 14

Total pool (balanced) observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.708368	0.294371	2.406376	0.0395
TED_?	-2.607269	0.836383	-3.117317	0.0124
ALMP_?	0.053195	0.066641	0.798231	0.4453
SED_?	-0.519138	0.547521	-0.948162	0.3678
EPL_?	-0.018749	0.025660	-0.730662	0.4836
Fixed Effects (Cross)				
CZE--C	-0.068178			
HUN--C	-0.148630			
POL--C	-0.019833			
SVK--C	0.012879			
AUT--C	-0.017807			
BEL--C	-0.030842			
DEN--C	0.062700			
ESP--C	-0.034434			
FRA--C	-0.015619			
GER--C	0.046062			
ITA--C	-0.132469			
NDL--C	0.123239			
SWE--C	0.201773			
UK--C	0.021159			

Effects Specification			
R-squared	0.933131	Mean dependent var	0.089310
Adjusted R-squared	0.799394	S.D. dependent var	0.041827
S.E. of regression	0.018734	Akaike info criterion	-4.894805
Sum squared resid	0.003159	Schwarz criterion	-3.990809
Log likelihood	87.52727	F-statistic	6.977352
Durbin-Watson stat	3.733333	Prob(F-statistic)	0.002680

Dependent Variable: U_?
Method: Pooled Least Squares
Cross-sections included: 14
Total pool (balanced) observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.319310	0.267922	1.191802	0.2584
TED_?	-0.790106	0.291815	-2.707558	0.0204
EPL_?	-0.040080	0.025192	-1.590997	0.1399
SED_?	-0.048690	0.569543	-0.085490	0.9334
Fixed Effects (Cross)				
CZE--C	-0.068470			
HUN--C	-0.064059			
POL--C	0.013920			
SVK--C	0.033203			
AUT--C	-0.056451			
BEL--C	0.019415			
DEN--C	-0.008920			
ESP--C	0.075953			
FRA--C	0.016213			
GER--C	0.012916			
ITA--C	-0.042898			
NDL--C	0.063571			
SWE--C	0.056499			
UK--C	-0.050892			

Effects Specification			
R-squared	0.894140	Mean dependent var	0.089310
Adjusted R-squared	0.740162	S.D. dependent var	0.041827
S.E. of regression	0.021321	Akaike info criterion	-4.578276
Sum squared resid	0.005000	Schwarz criterion	-3.769438
Log likelihood	81.09587	F-statistic	5.806943
Durbin-Watson stat	3.733333	Prob(F-statistic)	0.002657

Appendix D – Unit Root Tests

Country	Variables	t-statistic	Probability
Hungary	GDP growth	-5.646625	0.0000
Hungary	Unemployment	-10.52006	0.0000
Estonia	GDP growth	-5.682592	0.0000
Estonia	Unemployment	-7.770823	0.0000
Latvia	GDP growth	-7.151076	0.0000
Latvia	Unemployment	-5.052739	0.0001
Lithuania	GDP growth	-9.490596	0.0000
Lithuania	Unemployment	-6.091705	0.0000
Slovakia	GDP growth	-10.77300	0.0000
Slovakia	Unemployment	-7.744969	0.0000
Slovenia	GDP growth	-10.02590	0.0000
Slovenia	Unemployment	-6.909295	0.0000
Test critical values:	1% level	-3.568308	
	5% level	-2.921175	
	10% level	-2.598551	

H_0 : GDP growth has a unit root

H_1 : GDP growth does not have a unit root

H_0 : Unemployment has a unit root

H_1 : Unemployment does not have a unit root

Out of the 12 series tested for stationarity, the Augmented Dickey-Fuller tests reject the null hypothesis in all cases. This implies that the GDP growth and the unemployment series does not have unit roots and is therefore stationary.