

## **Econometric analysis of unemployment factors in transition economies**

### **Introduction**

More than twenty years have passed since the transition from a centrally-planned towards a market-oriented economy in the countries of Central and Eastern Europe and the Former Soviet Union. Almost all Post-Soviet countries, who gained independence after the collapse of the Soviet Union, as well as Central and Eastern European countries faced a difficult task of moving their national economies into the market-oriented ones. This process includes many challenges the countries have to face, and many issues that need to be addressed. In the past twenty years, unemployment has been one of the biggest problems for countries with transitional economies, as transition to market-oriented economy means dramatic changes in labor market. Many of these countries with transitional economies have been trying to develop their economies and reduce the unemployment rate.

Unemployment rate is the percentage of the total labor force that is unemployed but who is actively searching for the employment and who is willing to work. Exist three essential reasons of unemployment: frictional, structural, and cyclical unemployment. The main problem of the structural unemployment is mismatches between the skills offered by potential employees and those who search workers. Frictional unemployment is impossibility to find each other by workers and employers. Cyclical

unemployment is caused by the economical situation of the country, during tough periods in the business cycle, the demand of workers in the company decreases and as the consequence the unemployment level is increasing. During the economic crisis, the unemployment rate may be lower than the number of people who does not have work because the rate includes only those who registers and actively looking for work. Consequently, those workers who had abandoned their work are not counted in unemployment statistics.

According to the World Bank, the unemployment rate in Kazakhstan is equal to 4,90% in 2016. It was equal to 9.70% in 2013, but with the several governmental policies, including the implementation of the Employment Roadmap 2020 programme which created several regional employment programmes, the percentage had decreased. This programme helped to employ more than 111,900 people. However, almost 5% of unemployment rate in Kazakhstan is considered also as a big number in terms of the number of population of Kazakhstan. Consequently government is continuing the policy of support of the unemployed persons by providing jobs with stable salaries and developing different supportive programmes in order to decrease the percentage of unemployment rate. It should be admitted that in Kazakhstan not all the unemployed persons registers due to the low incentives to register, because unemployment

benefits are not extremely beneficial and eligibility criteria is strict. The next table represents the decrease in unemployment rate for the last 10 years:

The aim of this paper is to find out what are the main determinants of the unemployment rate in these particular countries with transitional economies. These economies need to be studied separately, as they have their own specificities, as they are still in transitional stage. In order to hold this research, 30 countries were chosen (see list of countries in appendix), and data for 1992- 2015 was collected. The data from 2016 is not available yet.

The paper is structured as follows. The next section looks and analyzes the existing literature, and finds out the determinants, which were discussed in existing literature. Afterwards, the data and methodology will be described and presented. Next section represents the results obtained from the regression. And finally, the last section concludes the research.

There are numerous research papers analyzing factors influencing unemployment. These studies divided into two groups, first one investigates microeconomic determinants of unemployment, whereas the second group analyzes unemployment from macroeconomic view. Here the results of studies on macroeconomic factors of unemployment in some developing countries are outlined.

The study on the factors affecting the rate of unemployment in South Africa in 1970-2002 was carried out by Schoeman et al.(2008). Real exchange rate, crude oil prices, capital stock and banker's acceptance rate were indicated as macroeconomic variables. The negative relationship between investment and unemployment and the direct correlation between unemployment and unionsation, crude oil prices, appreciation of real exchange rate and strict monetary policy were found out in this study.

Dogan (2012) analyzed the impact of several macroeconomic shocks on the rate of unemployment in Turkey for the decade from 2000 to 2010. This study revealed that

increase in export and inflation has brought to the reduction of unemployment in the country. While the growth of unemployment was connected to shocks to exchange rate, interbank interest rate and money supply.

Macroeconomic variables for unemployment were also used in study for Namibia conducted by Eita and Ashipala (2010). The time frame for observation was from 1971 to 2007. Inverse relation between inflation unemployment rates was discovered and the same pattern was found for investment.

There is a similar study for Pakistan where correlation between the population foreign direct investment, gross domestic product, inflation, external debt and unemployment. (Muhammad Shahid at al., 2013). The effect of these variables on unemployment rates was considered in short and long run. There was a considerable impact of population, gross domestic product, inflation and foreign direct investment in long run. There is a strong inverse relation between inflation and unemployment. A one percent increase in inflation leads unemployment go down by 0.34 percent. In the case of Nigeria (Jonathan Ojarikre,2015) the result of study displays that GDP growth, inflation and investment have noticeable positive effect on the rate of unemployment.

## **Methodology**

### **Dependent Variable**

Unemployment rate is the dependent variable, which measures the percentage of unemployed people within economically active population. Unemployed people are those who are available to work and actively seeking for jobs within specific period of time. Data for countries in transition (n=31) were derived from International Labor Organization Key Indicators of the Labor Market Database. this project concerns unemployment rate in 31 transitional countries starting from 1992 to 2015 adjusted by year. Speaking about Kazakhstan, it has experienced deep depression after the collapse of Soviet Union in 1990s. However, it can be observed that unemployment rate has

been decreasing gradually since that period by jumping to around 6% in 2008-2009 during the financial crisis. There are two unemployment estimates used for the purposes of this study, the first one is the modeled ILO estimate, while the second one is national estimate provided by each country. However, it worth pointing out that definitions of unemployment rate and labor force participation may vary by country. Therefore, it is decided to utilize unemployment rate estimated by ILO.

### **Independent Variables**

#### *Government Expenditure on Education*

General Government expenditure on education is expressed in terms of percentage of GDP spent on funding education in a country. Not only national government expenditure is taken into account, but also funding transferred from international sources to general government is included. The same period and sample is used to control for education expenditure. However, it is necessary

to highlight that observations for some of the countries is lacking. Data is retrieved from United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics, which includes the same countries and identical time periods.

#### *Inflation rate*

Inflation rate is derived from International Monetary Fund, International Financial Statistics and data files. It measures the consumer price index, which is expressed by the percentage change in the cost to the average consumer of buying a basket of goods and services that may be fixed or changed at specified intervals like annual basis. The Laspeyres formula is generally used for this data set. Specifically, Laspeyres formula estimation is the most popular way of measuring consumer price index, and as a consequence it is used as the most accurate estimation for inflation rate. Sample size is the same and observations are collected for the period from 1992 to 2015.

*GDP per capita, PPP (current international \$)*

GDP per capita based on purchasing power parity is gross domestic product, which utilizes purchasing power parity rates, and it is converted to international dollars. GDP is defined as the summation of gross value added by all local producers in the country and any taxes on products subtracted by total value of subsidies not mentioned in the valued added of all products. It worth mentioning that calculations for depreciation of fake assets, degradation of natural resources is excluded from GDP per capita estimations. Data is derived from World Bank, International Comparison Program database and is expressed in current international dollars based on the 2011 ICP round. Observations for the same 31 transitional countries for 23 years were derived from this dataset.

#### *GINI Index*

GINI index (World Bank estimate), in other words equality indicator, is used to measure to what extent does the income distribution of households in a country deviates from the perfectly equal distribution. A Lorenz bend plots the total rates of household income got against the total number of recipients, beginning with the poorest individual or family unit. The Gini index measures the range between the Lorenz bend and a speculative line of supreme equity,

communicated as a rate of the maximum area under the line. In this manner a Gini value of 0 speaks to immaculate balance, while an index of 100 suggests consummate disparity. Observations of this variable are taken from World Bank, Development Research Group. Data are based on general public survey data retrieved from official government statistical agencies and country offices of World Bank for 31 countries within 23 years from 1992 to 2015.

#### *Net trade in goods and services*

Data for this variable are obtained from International Monetary Fund, Balance of Payments Statistics Yearbook and data files. Net trade in goods and services is inferred by counterbalancing imports of goods and services

against exports of goods and services. Exports and imports of goods and services include all exchanges including a change of responsibility for and benefits between occupants of one nation and the rest of the world. Information are in current U.S. dollars. Observations for some of the countries within 23 years period are missing.

### Results

*Note: ALL figures used in the methodology section were taken from the site of World Bank (<http://databank.worldbank.org/>)*

#### Kazakhstan

To estimate relationship between unemployment and our chosen independent variables, it was decided to run a linear regression. The initial plan was to focus on Kazakhstan and do a time- series regression, but for the chosen independent variables there was only data for 14 consecutive years, 1996

to 2009 (with two variables, expenditure on education and GINI index, being filled in speculatively for few years). Seeing as comparing variables with very different units of measurement is quiet pointless, the rates of change from year to year were measured, further reducing the sample size to 13. This is a much too small sample size for 5 independent variables. The regression was still conducted and results were as follows (table 1).

Table 1 – Regression results for percentage growth in variables, Kazakhstan, 1996-2009

<i>Regression statistics</i>	
R-squared	0,50
Adjusted R-squared	0,14
SE of the regression	0,05
F-statistic	1,39
Prob. F	0,3393
Sample size	13

<i>Independent variable</i>	<i>Coefficient</i>	<i>SE</i>	<i>t-statistic</i>	<i>p-value</i>
(constant term)	0,01	0,03	0,32	0,76
Government expenditure on education, total (% of GDP)	0,115	0,17	0,68	0,52
GDP per capita, PPP (current international \$)	- 0,818	0,34	- 2,38	0,05
Inflation, consumer prices (annual %)	0,017	0,05	0,37	0,72
GINI index (World Bank estimate)	- 0,525	0,66	- 0,79	0,45
Net trade in goods and services (BoP, current US\$)	0,003	0,01	0,59	0,57
Source – Authors calculations according to data of World Bank				

We can see that the F-probability of this regression is much larger than 0.05, implying that the null hypothesis of no relationship between variables is true, so there is really no need to go into other characteristics of this regression. It is worth noting, however, that GDP dynamics as an individual variable seems to be statistically significant, with the p-value of just 0.05 and an intuitively expected negative correlation with unemployment dynamics. The poor results of the regression could stem from small sample size as well as the fact that

many macroeconomic factors were fluctuating wildly in post-Soviet Kazakhstan, especially in the 1990s. Both problems can be addressed by employing a different technique: comparing relationships between unemployment and our independent variables across multiple transitional economies.

#### Transitional economies

For the purpose of this research, all 15 post-Soviet countries, 14 formerly communist countries of Eastern and Central Europe and

Mongolia (also formerly communist and a close Soviet ally) were selected. Those countries share a history of switching from a planned economy to a market one in late 1980s – early 1990s and have followed somewhat similar socio-economic patterns in the wake of the fall of communism. The regression was done as following. First, the table of 6 variables across 30 countries and 25 years (1992 to 2015) was

generated. Then, for each individual year, only the countries with data on all 6 variables in place were left to analyze. Years which had data about too few countries had to be dropped from analysis as a result of this, as well as countries that did not have consistent data for even one year. This resulted in shrinking the year base from 25 to 12 (2001 to 2012) and the country base from 30 to 25; list of the countries is as follows.

Table 2 - Transitional countries used in the analysis

Region	Country
Eastern Europe	Albania, Bulgaria, Croatia, Macedonia FYR, Romania, Serbia, Slovenia
Central Europe	Czech Republic, Hungary, Poland, Slovak Republic
Post-Soviet (Caucasus)	Armenia, Azerbaijan, Georgia
Post-Soviet (Baltics)	Estonia, Latvia, Lithuania
Post-Soviet (Eastern Europe)	Belarus, Moldova, Russian Federation, Ukraine
Post-Soviet (Central Asia)	Kazakhstan, Kyrgyz Republic, Tajikistan
Eastern Asia	Mongolia
Source: Authors calculations according to data of World Bank	

This list is not constant for all the analyzed years (2001 to 2012). In fact, not for a single year the number of countries with all data points present is more than 20. But all of those 25 countries make an appearance in our regression to the varying extent. Once again, comparing variables with different units of measurement would be meaningless. Since dynamics of change cannot be used in cross-section or panel data in comparison to time-series data, the variables were normalized for each year. This means calculating the cross-country mean and standard deviation for each of the variables (separately for any given year) and expressing the variables in terms of their resulting z-values. The regression would then show how much do deviations from the average in independent variables affect the same deviations in unemployment.

### ***Regression results***

The regression was run in accordance with all the specifications mentioned above and the results are as follows.

We can see that the F-probability of this regression is well into the rejection region, which means we can assume that there is, in fact, a correlation between our independent variables and unemployment. R-squared is low at 0.35; this simply means, however, that there are other unaccounted factors when analyzing the dynamics of unemployment. This research did not have aims as ambitious as explaining most of the variation in unemployment, especially given that a lot of this variation is caused by hard-to-account quantitative factors. This regression shows that 35% of variations in unemployment among transitional economies can be explained by variations in our chosen independent variables – government expenditure on education, GDP per capita,

inflation, GINI index and trade balance, which is already an interesting insight. Individually, all of those variables demonstrate significance as their p-values are smaller than 0.05, and their coefficients are intuitive and comply with economic theory. Education expenditure, GDP,

inflation and trade balance all have negative coefficients, showing that an increase in any of them is expected to correlate with decrease in unemployment and GINI index has a positive coefficient, showing that the more economic inequality, the more there is unemployment.

Table 3 - Regression results for normalized variables across 25 transitional economies, 2001-2012

<i>Regression statistics</i>	
R-squared	0,35
Adjusted R-squared	0,33
SE of the regression	0,79
F-statistic	21,63
Prob. F	0,000000000000000003
Sample size	208

<i>Independent variable</i>	<i>Coefficient</i>	<i>SE</i>	<i>t-statistic</i>	<i>p-value</i>
(constant term)	- 0,00	0,06	- 0,00	1,00
Government expenditure on education, total (% of GDP)	- 0,367	0,06	- 6,33	0,00
GDP per capita, PPP (current international \$)	- 0,273	0,07	- 4,16	0,00
Inflation, consumer prices (annual %)	- 0,345	0,06	- 5,51	0,00
GINI index (World Bank estimate)	0,147	0,06	2,41	0,02
Net trade in goods and services (BoP, current US\$)	- 0,124	0,06	- 2,04	0,04

Source – Authors calculations according to data of World Bank

### Discussion

We can refer to scatter plots of unemployment graphed against every independent variable (all normalized) for a better and deeper understanding of the underlying patterns. In every of the following scatter plots, unemployment is along the Y axis and the other variable is along the X axis. In the graph below we can see the relationship between unemployment and government expenditure on education as a share of GDP. The scatter plot resembles a triangle, with variation reducing as we move from left to right. This could imply that when a country spends little on education, the expectations of unemployment are unclear and could be high

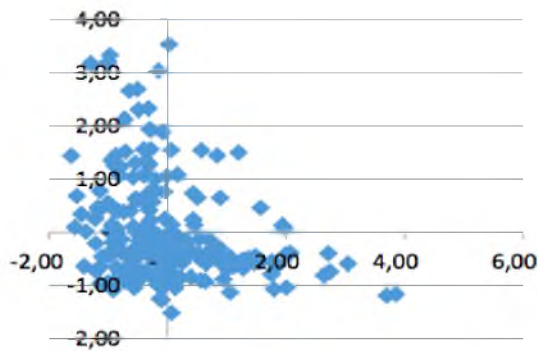
or low, but as more and more is spent, this uncertainty is reduced and we are much more likely to have reduced unemployment rates.

The following two graphs are for GDP per capita and inflation. The patterns are quite similar to the above one. Implications are thus also similar, but this time there are more theoretical, lacking the policy recommending dimension – we can encourage governments to spend more on education, but we cannot encourage them to aim at higher inflation (inflation-unemployment tradeoff is just an inevitable unfortunate reality) and increasing GDP is an obvious ultimate goal that every country is seeking anyway.



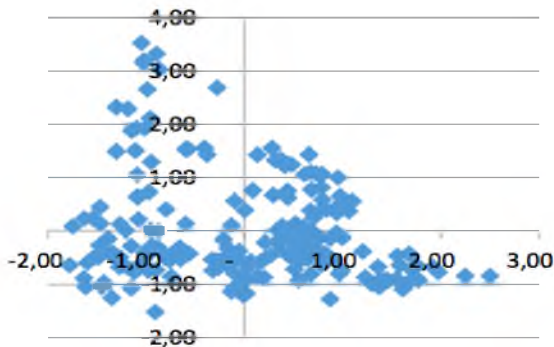
**Figure 1 - Unemployment against government expenditure on education, normalized (Unemployment, total (% of total labor force) (modeled ILO estimate))**

Source: Authors calculations according to data of World Bank



**Figure 2 - Unemployment against GDP PP**

Source: Authors calculations according to data of World Bank

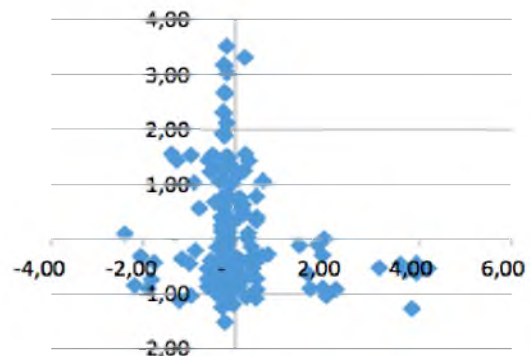


**Figure 3- Unemployment against inflation**

Source: Authors calculations according to data of World Bank

Scatter plot of unemployment against trade

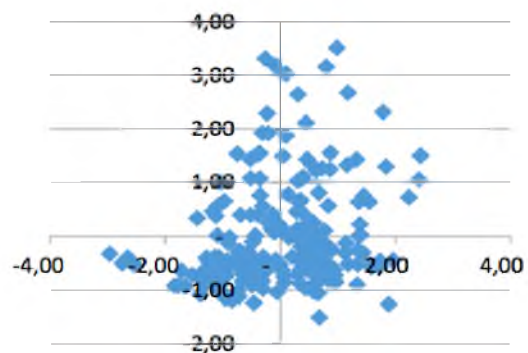
balance looks like four separate pillars, not as smooth of a triangle as the previous once. And if we refer back to regression results, we can see that it did in fact have the highest p-value, almost falling out of the rejection region (0.04). It still vaguely resembles a triangle narrowing to the right, as trade balance also has negative correlation with unemployment according to the regression results.



**Figure 4 - Unemployment against net trade in goods and services, normalized**

Source: Authors calculations according to data of World Bank

Finally, our last scatter plot is also somehow triangular, but this time it narrows to the left – as we remember, GINI index has positive correlation with unemployment. As the index of economic inequality increases, unemployment prospects become unclear, but at lower GINI values we should expect unemployment to be low.



**Figure 5: Unemployment against GINI index, normalized**

Source: Authors calculations according to data of World Bank

From the regression of 208 data points, run across 25 transitional economies and over 12 years, we can conclude that among other things, lower levels of GDP per capita, lower levels of governmental expenditure on education as a share of GDP, lower inflation levels, lower trade balance and higher GINI index are associated with higher levels of unemployment. We also observe that the decrease in “good” variables (GDP, education expenditure, trade balance) or increase in “bad” variable (GINI index) are associated with uncertainty and potential for higher unemployment levels rather than deterministic high unemployment, while increase in “good” or decrease in “bad” almost guarantee (statistically speaking) lower levels of unemployment for a country.

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#### Түйін

Соңғы 20 жылда жұмыссыздық өтпелі экономикасы бар елдер үшін ең үлкен проблемалардың бірі болды, өйткені нарыққа бағдарланған экономикаға көшу еңбек нарығындағы күрделі өзгерістерді білдіреді. Осы жұмыстың мақсаты - өтпелі экономикасы бар елдерде жұмыссыздық деңгейінің негізгі детерминанттарын анықтау. Бұл экономикаларды бөлек зерделеу қажет, себебі олардың өз ерекшеліктері бар, өйткені олар әлі өтпелі кезеңде. Осы зерттеуді өткізу үшін 30 ел таңдап алынды және 1992 - 2015 жылдарға арналған деректер жиналды. Әр жыл сайын тек 6 ауыспалы деректері бар елдер талданды. Регрессиялық талдау жүргізілгеннен кейін, халықтың жан басына шаққандағы ЖІӨ-нің төменгі деңгейлері, білімге жұмсалатын мемлекеттік шығыстардың ЖІӨ-нің үлесі ретінде төмендеуі, инфляция деңгейі, сауда балансының жағдайы және жоғары GINI индексі, жұмыссыздықтың жоғары деңгейімен байланысты деп қорытындыланды.

*Түйін сөздер:* жұмыссыздықтың, өтпелі елдердің, эконометрикалық талдаудың детерминанттары



### **Аннотация**

За последние двадцать лет безработица стала одной из самых больших проблем для стран с переходной экономикой, поскольку переход к рыночной экономике означает резкие изменения на рынке труда. Цель этого исследования – выяснить, каковы основные детерминанты уровня безработицы в странах с переходной экономикой. Для проведения исследования было выбрано 30 стран и собраны данные за 1992–2015 годы. За каждый отдельный год анализировались только страны с данными по всем 6 переменным. После проведения регрессионного анализа был сделан вывод о том, что на повышение уровня безработицы влияют следующие факторы: низкий уровень ВВП на душу населения, низкий уровень государственных расходов на образование, уровень инфляции, состояние торгового баланса и более высокий индекс GINI.

*Ключевые слова:* детерминанты безработицы, страны с переходной экономикой, эконометрический анализ.