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## Impact of foreign direct investment on unemployment development in selected regions of Slovak Republic

**Abstract.** Foreign direct investment (FDI) was an important factor which ensured to Slovakia greater competitiveness, as it has introduced new technologies, created jobs, brought know-how as well as managerial and entrepreneurial culture. The paper presents an empirical analysis of an impact of foreign direct investment on selected regions between 1998 and 2013. The analysis was first conducted as a correlation analysis, examining an impact of the FDI inflow on unemployment development in selected regions of the Slovak Republic (Bratislava, Zilina, Presov and Kosice). Subsequently, interdependencies between the aforementioned variables were examined by means of a regression analysis. As a result, the indirect dependence between the examined variables has been confirmed. Moderate indirect dependence was recorded in the region of Bratislava, and a significant one in the regions of Trenčin and Presov.

**Keywords:** Foreign Direct Investment; Economic Growth; Employment; Correlation Analysis; Slovakia; Regional Development

**JEL Classification:** E22; F21; F43

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### Вплив прямих іноземних інвестицій на динаміку безробіття в окремих регіонах Словачької Республіки

**Анотація.** Прямі іноземні інвестиції стали важливим фактором, який сприяв підвищенню конкурентоспроможності Словаччини, оскільки завдяки ним було залучено нові технології, створено робочі місця, забезпечено доступ до ноу-хау, а також вироблено управлінську та підприємницьку культуру. У статті представлено емпіричний аналіз впливу прямих іноземних інвестицій на окремі регіони в період між 1998 і 2013 роками. На першому етапі дослідження було проведено з використанням кореляційного аналізу для вивчення впливу прямих іноземних інвестицій на динаміку безробіття в окремих регіонах Словачької Республіки. Далі взаємозалежність між вищезазначеними змінними було досліджено за допомогою регресійного аналізу.

**Ключові слова:** прямі іноземні інвестиції; економічне зростання; зайнятість; кореляційний аналіз.

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### Влияние прямых иностранных инвестиций на динамику безработицы в отдельных регионах Словацкой Республики

**Аннотация.** Прямые иностранные инвестиции стали важным фактором, который способствовал повышению конкурентоспособности Словакии, поскольку благодаря им были внедрены новые технологии, созданы рабочие места, получен доступ к ноу-хау, а также выработаны управленческая и предпринимательская культуры. В статье представлен эмпирический анализ влияния прямых иностранных инвестиций на отдельные регионы в период между 1998 и 2013 гг. Изначально исследование было проведено методом использования корреляционного анализа с целью изучения влияния прямых иностранных инвестиций на динамику безработицы в отдельных регионах Словацкой Республики. Впоследствии взаимозависимость между вышеупомянутыми переменными были исследованы с помощью регрессионного анализа.

**Ключевые слова:** прямые иностранные инвестиции; экономический рост; занятость; корреляционный анализ.

**1. Introduction.** Foreign direct investment represents one of the key characteristics of the modern globalised world. The importance of FDI lies especially in long-term investment capital. It participates in job creation, introduces new technologies, contributes to the growth of economy's export performance and enables an access to both European and global markets. It has already participated in the establishment of a number of multinational companies since they appeared in the second half of the 1960s. Its importance was especially observed over the last decades of the 20<sup>th</sup> century. FDI represents the key factor in economic development and growth of Slovakia. There are numerous possibilities how to increase the country's attractiveness to foreign investors, yet many of such possibilities have both positive and negative effects. The paper is focused on the development of FDI inflow to Slovak economy and its condition from the viewpoint of sector structure, origin of investment and how it affects individual spheres. Between 1993 and 1998, Slovakia was recording a low investment inflow. It only gained USD 1.9 billion (in total for the years 1993-1998), which ranked it the lowest among the V4 states. The country's insufficient political and economic stability of that time, which was thoroughly monitored by investors, was the key factor causing the

lagging performance. Governmental activities, especially between 1994 and 1998, caused Slovakia to start lagging behind in the processes of transatlantic and European integration. The situation started to change between 1999 and 2003, predominantly due to the programme of the newly elected government, which was focused on FDI inflow improvement. However, the visible growth occurred no sooner than in 2000, when the FDI inflow reached USD 1.9 billion, which ranked Slovakia among the states with the greatest FDI inflow in the region. According to the UNCTAD Global Investment Trade Monitor (2015), Slovakia's FDI Inward Flow was 2.982 billion USD in 2012, 591 million USD in 2013, and 479 million USD in 2014. Main greenfield investors were companies from Germany and France.

**2. Brief Literature Review.** The issue of investment attractiveness determinants is currently a topic often dealt with in many publications of both Slovak and foreign authors. The significance of factors affecting investment attractiveness is dealt with, for instance, by A. Bevan (2000, 2004), S. Estrin (2000, 2004) and K. Meyer (2004), who divide these factors into two basic groups (political and economic factors) and differentiate between factors affecting host and domestic economies [1; 2]. S. Brakman and H. Garretsen (2008) seek the main reasons

leading companies to foreign investment inflows as well as to new market entry strategies [4]. Other authors, e.g. T. Dudas (2004, 2010) [4; 5; 6] and M. Fabus (2010, 2011, 2012, 2014) [7; 8; 9; 10] deal with individual factors and their impact on economic development, respectively economic growth, motivation of investors, economic and political conditions created in a host country. The theoretical background of investment attractiveness and the theories of creation, respectively motivation of FDI creation and movement were based on researches conducted by leading foreign authors. The best known is J. H. Dunning (1979, 2001) with his eclectic theory based on three categories of factors shaping the decision-making of investors. Dunning introduced the well-known OLI paradigm and motives which are essential in the investment decision making process, like advantages resulting from ownership and ownership rights, advantages resulting from information on human resources and new information and specific advantages resulting from a locality [11; 12]. S. A. Hymer (1976) is concerned with why companies transfer intermediate products (knowledge, technologies, etc.) between countries. He also opines that FDI can be clarified by foreign control. As far as Slovak authors are concerned, we can mention J. Tancosova (2012, 2013, 2014) [13; 14; 15; 16], S. Ferencikova (2005) [6] and K. Belanova (2014) [17], who analyse determinants and location, as well as their significance in relation to the access to FDI, and T. Dudas (2010) [5], who deals with the significance of workforce, and S. Svecova (2012) [13], who deals with the role of education in the structure of employees and their advancement to fulfil market requirements on workforce.

**3. Purpose.** This paper aims at pointing to the importance of FDI inflow in the economy of the Slovak Republic and analysing the relationship between FDI and unemployment development on the basis of the Pearson correlation coefficient.

*Methodology.* The applied methods are based on the Pearson correlation coefficient and regression analysis. The correlation coefficient is among quantitative methods, as it measures the extent of statistical dependence between two quantitative variables. The variable  $Y$  is not dependent on the variable  $X$ , however the two random variables  $X$  and  $Y$  change together. Literature most frequently uses the term «Pearson correlation coefficient» introduced in 1896, which is an extent of linear dependence of two variables. It is applied when variables are measured at an interval scale at least. This method does not depend on a measure in which variables were measured. The result is the same for the correlation coefficient. The Pearson correlation coefficient  $\rho$  (rho), estimated from a random sample, is entered as  $r_{xy}$  and is calculated using the following equation:

$$r_{xy} = \frac{\overline{xy} - \bar{x}\bar{y}}{S_x S_y}$$

A linear dependence is assumed between the statistical variables  $Y$  and  $X$ , while its course is expressed by the following function:

$$y_i = \beta_0 + \beta_1 x_i + \varepsilon_i, \text{ where } i = 1, 2, \dots, n \text{ (}\varepsilon_i \text{ – sum } i\text{)}$$

Function parameters are expressed on the grounds of data from a statistical sample. The balancing function has the following form:

$$y'_i = b_0 + b_1 x_i, \text{ where } i = 1, 2, \dots, n$$

Coefficients  $b_0$  and  $b_1$  are solved by means of the following formulas (Hindis, 2007):

$$b_0 = \frac{\sum_{t=1}^n x_t^2 \sum_{t=1}^n y_t - \sum_{t=1}^n x_t \sum_{t=1}^n x_t y_t}{n \sum_{t=1}^n x_t^2 - (\sum_{t=1}^n x_t)^2}$$

$$b_1 = \frac{n \sum_{t=1}^n x_t y_t - \sum_{t=1}^n x_t \sum_{t=1}^n y_t}{n \sum_{t=1}^n x_t^2 - (\sum_{t=1}^n x_t)^2}$$

The coefficient  $b_1$  is a regression coefficient. Its positive value suggests direct dependence, while its negative value suggests indirect dependence. This coefficient determines by how many units of measure a dependent random variable changes on average, if an independent random variable changes by one unit of measure [18].

The tightness of linear dependence between a dependent random variable and an independent random variable is expressed by the correlation coefficient. Its value is within the interval (-1, +1). The more the absolute coefficient value approaches 1, the tighter is the dependence. Its value is positive in case of direct dependence and negative in case of indirect dependence.

The point estimate of correlation coefficient ( $r_{xy}$ ), dependent random variable  $Y$  and independent random variable  $X$  is as follows:

$$r_{xy} = \frac{\sum_{t=1}^n x_t y_t - \sum_{t=1}^n x_t \sum_{t=1}^n y_t}{[n \sum_{t=1}^n x_t^2 - (\sum_{t=1}^n x_t)^2][n \sum_{t=1}^n y_t^2 - (\sum_{t=1}^n y_t)^2]}$$

**4. Results.** Foreign direct investment is defined as long-term investment of a foreign direct investor in a company which is based in the economy of a different state than the one where the foreign investor's company is based. The FDI relationship is created by a mother company and foreign branches which form multinational corporations. They can also be defined as a purchase of foreign assets with the purpose of control, while control itself represents control of the economic results of a company whose assets were purchased. The control and managerial tasks performance are the key factors differentiating foreign direct investment from portfolio investment.

The International Monetary Fund stated in the past that the ownership could be between 15% and 25%. At present, if a partner has a share in the amount of at least 10%, such an investment is included in the FDI category.

As it has been mentioned earlier, Slovakia only recorded a low investment inflow after the establishment of an independent state. Because of the situation at that time, Slovakia was not included in the first round of NATO enlargement, in which other neighbouring states participated. Relations also deteriorated with regard to the EU, which resulted in the fact that Slovakia was not included in negotiations on the EU accession. It represented a serious reason for investors not to invest in Slovakia. In the first years of the new millennium, the government managed to reverse the negative view. Slovakia managed to join both mentioned integration groups (the EU and NATO) in 2003 and 2004 respectively, which made investors perceive Slovakia as a strong potential partner.

Growing unemployment rates were recorded following the fall of centralised economic system in the central European states. It led to bankruptcies of competitive companies in the economic restructuring process, which resulted in a dramatic increase in the unemployment rates. Slovakia was among the most affected states, as unemployment reached almost 20% by 1998. Such a high unemployment rate meant a significant burden for the Slovak economy. The situation changed after the year 2000, when unemployment started to decrease. It is, therefore, a fundamental question whether FDI has an impact on employment growth, respectively unemployment reduction, as the period of employment growth overlaps with the period of increased FDI inflow.

Monitoring of the impact of FDI on employment is rather limited within Slovakia, predominantly lacking empirical research.

Therefore, we focused on this issue, while in order to examine the FDI inflow in regions and unemployment development variables, the data from the 1998-2013 time series were applied, as the 2014 data on the FDI inflow in Slovak regions was not available by the time of research. By the end of 2015, the unemployment rate in the country reduced to 10.63%.

Calculations will be made using the data of the Statistical Office of the Slovak Republic, the National Bank of Slovakia and official websites of the ministries of the Slovak Republic. Correlation analysis, respectively the Pearson correlation coefficient will be among the methods applied in order to find

out the level of intensity between the two variables, and the  $n+1$  correlation analysis will be used to examine the impact of FDI on the given variables always in the following year. The correlation coefficient can vary between  $<-1$  and  $1>$ .

The analysis will be presented on selected regions of the Slovak Republic – Bratislava, Zilina, Presov and Kosice.

In the region of Bratislava, correlation analysis showed an indirect impact of FDI on unemployment, which means that the FDI inflow participated in unemployment reduction to a certain extent, however, indirectly (the spillover effect, the need of sub-suppliers). Nonetheless, unemployment is affected by a number of factors; hence, we cannot claim that FDI is the main reason for unemployment reduction. The subsequent  $n+1$  correlation analysis, examining the relationship between the given variables in consecutive years, showed that the correlation coefficient decreased at the level of  $-0.61635$ , implying an even more indirect relationship between the FDI inflow and unemployment reduction (Figure 1).

The results of correlation between the FDI inflow and unemployment in the region of Trenčin imply a strong indirect correlation with the value of  $-0.83787$ . The subsequent  $n+1$  correlation analysis resulted in the value of  $-0.38642$ , implying a less significant indirect dependence between the variables, and the FDI inflow participated in unemployment reduction indirectly already in the year of investment.

The results of regression analysis confirm a negative or an indirect relationship between FDI inflow and unemployment in the region of Trenčin (Figure 2).

The correlation analysis in the region of Presov resulted in the value of  $-0.87289$ , implying a strong indirect relationship between the FDI inflow and unemployment. The subsequent  $n+1$  correlation analysis resulted in a lower value of  $-0.79205$ , still representing a quite significant indirect correlation between the examined variables.

The subsequent regression analysis recorded a downfall, implying an indirect relationship between FDI inflow and unemployment in the region of Presov (Figure 3).

While comparing the FDI inflow and unemployment in the region of Kosice, the correlation coefficient reached the value of  $-0.7269$ , implying quite a significant indirect correlation between the FDI inflow and unemployment. The subsequent  $n+1$  analysis implied a correlation of a lower value of  $-0.55376$ , demonstrating a moderate indirect correlation between the variables.

The subsequent regression analysis with the values  $n+1$  records a downfall, i.e. an indirect relationship between the FDI inflow and unemployment. In spite of low investment in the region of Kosice, which also reflected in GDP growth, we can say that unemployment decreased in the

region of Kosice. However, we cannot claim that the FDI invested in the given region was the only reason (Figure 4).

**5. Conclusions.** By means of correlation analysis, we have examined interdependence between the impact of FDI inflow and unemployment development in the regions of the Slovak Republic. Upon examining the impact of FDI on unemployment rate decrease in the regions, indirect dependence between the examined variables has been confirmed. Moderate indirect dependence was recorded in the region of Bratislava, where the

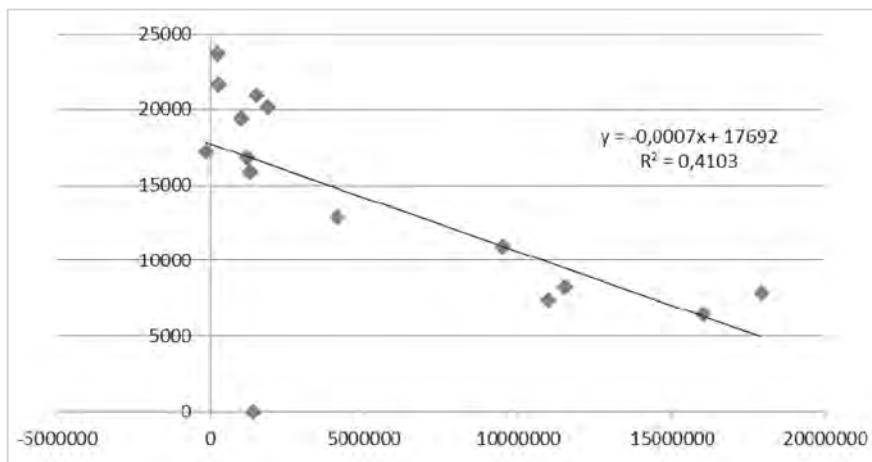


Fig. 1: Linear regression line of relative FDI inflows and unemployment, Bratislava region  
Source: Own proceeding

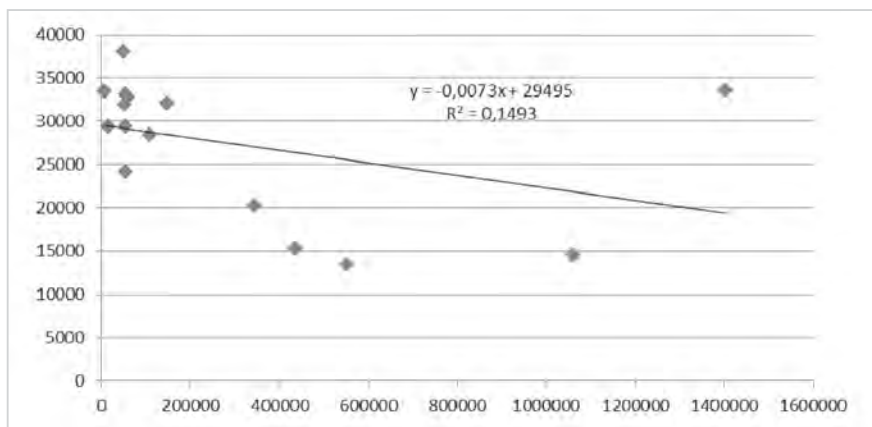


Fig. 2: Linear regression line of relative FDI inflows and unemployment, Trenčin region  
Source: Own proceeding

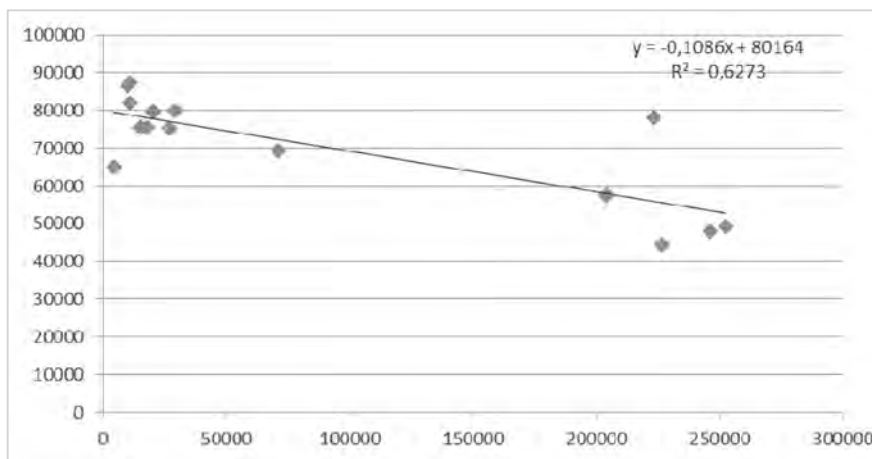


Fig. 3: Linear regression line of relative FDI inflows and unemployment, Presov region  
Source: Own proceeding

variables showed a slightly stronger indirect correlation upon conducting the  $n+1$  analysis. On the contrary, a significant indirect relationship between the FDI inflow and unemployment reduction was recorded in the regions of Trenčín and Prešov. Lower, respectively moderate indirect dependence between the examined variables was recorded in the subsequent  $n+1$  analysis, which means that an investment was already reflected in the year of investment. Regression analysis confirmed negative, i.e. indirect dependence in all the regions, which can be seen from regression lines in the provided figures.

Before the global crisis, Slovakia was among the countries achieving the greatest rates of economic growth in the European economy, which was reflected in a double-digit economic growth in 2007, which rarely occurs in countries of Central and Eastern Europe. At present, it is quite difficult to state whether the economic growth is a result of FDI with regard to a number of factors affecting it. However, based on the analysis of the current state of FDI in Slovakia, we can opine that FDI contributed to the country's development.

The reason is that unemployment is affected by a greater number of variables than economic growth. It can be explained by significant fluctuations in unemployment due to the turbulent economic development, e.g. FDI inflow with a minor effect on the reduction of unemployment rate decrease. The region of Trenčín can serve as an example, where the correlation coefficient proved a strong relationship between the

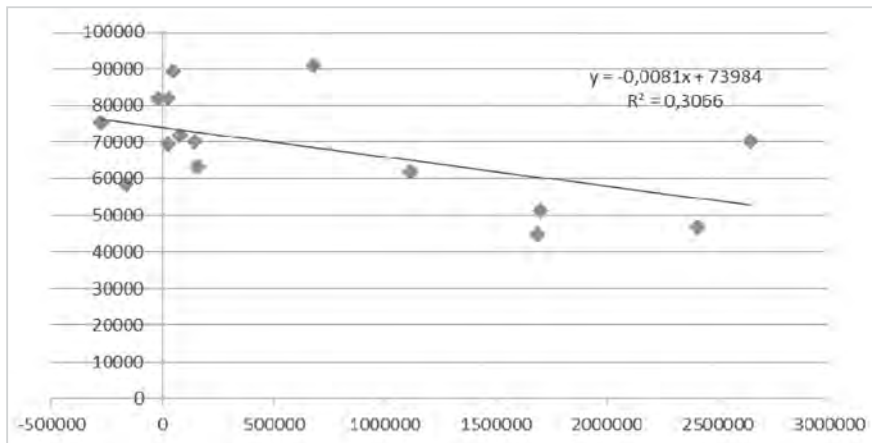


Fig. 4: Linear regression line of relative FDI inflows and unemployment, Kosice region

Source: Own proceeding

FDI inflow and unemployment. The probability of an impact of FDI on new jobs is greater in case of greenfield investments, which was also reflected in the region of Trenčín. On the other hand, however, there are also negative effects, when the number of jobs decreases due to lower demands on workforce even in spite of investments in new companies. However, it needs to be emphasised that FDI is only one of a number of factors affecting unemployment reduction. Hence, it cannot be stated that in spite of quite high correlation coefficients FDI contributed to unemployment reduction and, respectively, the creation of new jobs.

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