ANALYSIS OF FOREIGN DIRECT INVESTMENT DETERMINANTS IN THE SELECTED COUNTRY

Veronika Linhartová
University of Pardubice, Czech Republic
veronika.linhartova@upce.cz

Evans Owusu
University of Pardubice, Czech Republic
evans.owusu@student.upce.cz

ABSTRACT
In the host country, foreign direct investment opens new work opportunities, positively influences workforce productivity, introduces the latest findings and technological know-how, and positively influences the balance of payments – thus also increasing the rate of economic growth. Viewed through a long-term perspective that takes indirect effects into consideration, foreign direct investment is nonetheless accompanied by many negative effects.
Foreign direct investment is claimed to not necessarily support economic growth and employment especially in cases when foreign direct investment largely crowds out existing investments. Investors are claimed to also, not form ties with domestic companies, production also tends to be focused on technologically less complicated phases of the production chain, and transnational companies in the country are also believed to implement unfriendly strategies.
Each country has certain factors that are important for investor decision-making. Many of these factors can influence the host economy and encourage interest from foreign investors. Some factors such as the position of the state, on the other hand, cannot influence the host economy. Investors generally prefer countries that are attractive for some reason. A unified definition of factors that are decisive for investors is quite difficult, however, Countries wishing to support the flow of foreign investment use variety of tools to attract investors, including host country promotion, investment incentives, or aftercare services.
The aim of the paper is to identify, based on the available literature, the possible factors influencing the inflow of foreign direct investment into the country in general and using statistical methods to identify specific factors influencing foreign direct investment in the selected country.
Using multiple regression analysis, the Gross domestic product, Corporation tax, Science and research expenditures and the Corruption perception index were identified as significant factors influencing foreign direct investment in the Czech Republic.

Keywords: *Determinants of Foreign direct investment (FDI), inflows of FDI, regression analysis.*

1 INTRODUCTION

The issue of foreign direct investment is becoming an increasingly discussed topic in terms of possibilities of influencing their volume and their benefits for the national economy.
Foreign direct investment can be defined as an investment in another country that serves to obtain a share of common stock and decision-making powers of at least 10% or a share giving the foreign investor the decision-making power (Liebscher, 2007). Host countries have an

interest in foreign investment mainly because of their positive effects. Professional literature states that new investments can influence the labor market, increase competitiveness and complement the lack of domestic capital. Foreign direct investment can also bring new management practices, know-how, innovation or interconnection of national economies. Investments may also have negative impacts, such as crowding out domestic businesses or inequality of investment inflows into different industries. It is therefore necessary for the host country to consider the possible consequences of the inflow of foreign direct investment.

Each country has certain factors that are important for investor decision-making. Many of these factors can influence the host economy and encourage interest from foreign investors. Some factors such as the position of the state, on the other hand, cannot influence the host economy. Investors generally prefer countries that are attractive for some reason. A unified definition of factors that are decisive for investors is quite difficult, however, Countries wishing to support the flow of foreign investment use variety of tools to attract investors, including host country promotion, investment incentives, or aftercare services.

In the Czech Republic, there was a turning point in 1995, when a new Foreign Exchange Act No. 219/1995 was introduced, allowing the convertibility of the Czech currency and the free movement of capital. Another important milestone was Government Resolution No. 298 in 1998, which launched investment support through investment incentives. At that time, the government's approach has also changed, which has been aimed at improving and clarifying the legislative environment, improving support for small and medium-sized enterprises and supporting research and development. These changes led to an increase in the number of foreign partners in the Czech Republic and significantly affected the current situation in foreign direct investment.

The aim of the paper is to identify, based on the available literature, the possible factors influencing the inflow of foreign direct investment into the country and, using statistical methods, to identify specific factors influencing the inflow of foreign direct investment into the Czech Republic.

2 FACTORS INFLUENCING FDI

Factors influencing foreign capital inflows have been addressed in many empirical studies. The authors Bénassy-Quéré, Coupet and Mayer (2007) analyzed the impact of factors on FDI in OECD countries in 1985-2000. They investigated the impact of numerous factors on FDI, but also whether these factors affect FDI positively or negatively. Their results have shown that common factors such as language, GDP, labor productivity, consumer productivity, or legislation on investor protection are among the factors that have a positive impact on the flow of investment in these countries. Interesting was the discovery and influence of corruption. They have shown that countries with important levels of corruption have up to 7.9 times the influx of FDI. As negative factors that have a major impact on discouraging investors, the authors have described employment protection and a weak concentration of capital. Employers are understood to mean employment law, which regulates working hours and the conditions of remuneration of workers.

The above-mentioned authors were followed by Blonigen and Piger (2014), who identified a common language and trade openness as a significant factor. Their results assume that language affinity will affect FDI inflows in up to 85% of the countries surveyed. Trade openness, i.e. the existence of a customs union and free trade agreements, affects FDI in up to 90% of cases.

The afore mentioned studies by Bénassy-Quéré, Coupet and Mayer does not agree authors Demekas et al. (2007) who claim that corruption and tax holidays have no impact on FDI. Their work contains data from 1995-2003 from individually selected countries including the

Czech Republic. Previous studies have provided evidence to support that if the level of income of the country increases, the significance of the influence of other FDI factors decreases and the factors become crucial in a domestic market and the business environment. Unlike other studies, they also assessed environmental factor which had been shown to influence the influx of FDI.

Holland (1998) paids attention to the inflow of FDI into the transforming economies. They assumed that FDI is necessary for these states to "kick-start" their economy. Hence, they studied 8 states including the Czech Republic to verify this. The results of the study showed that the possibility of realizing privatization, proximity to Western and more developed countries, and emerging trade relations between states have a significant impact on the growth of economies. Another finding was the independence of investment in wage costs and the capabilities of workers. The authors claim they have only a marginal role in the final decision of the investor. The most principal factors were geographical proximity, trade agreements and the opening of accession negotiations with the European Union.

Carstensen and Toubal (2004) examined FDI determinants in Central and Eastern European countries. In recent years, there has been a significant increase in investment in Central Europe (Czech Republic, Hungary, Poland, Slovakia), while Eastern European countries (Bulgaria and Romania) have lagged. The classic factors mentioned in previous studies added market potential, corporate costs, business environment, investment incentives, corporate tax rates. As part of their analysis, the authors of the study divided the time series into short and long-term. The result of the study was that if the market potential of the host country increases by an average of 1%, an increase of FDI could be expected in the first year by $ 166 million. In the long run, it is up to $ 246 million. Another factor the authors dealt with was wage costs. The fall in these costs will increase the FDI inflow in the first year by $ 25 million and in the long run by up to $ 37 million. Additional significant factors identified to affect FDI were market environment, low labor costs, POs taxes and related subsidies. Likewise, a skilled workforce is crucial to the introduction of innovative manufacturing technologies. Another corporate FDI determinant is a corporation tax, with a 1% decrease in the first year averaging an inflow of $ 2.5 million. This factor, according to the authors mentioned, is not one of the most crucial factors, as well as the quality of workforce and the innovation of technologies.

Authors Bevan and Estrin (2004) investigated the FDI inflows in 1994-2000 in selected host countries, as well as the Czech Republic. In the empirical study, they used as variables GDP, inflation, exchange rate risk, institutional development indicators, and country risk for potential investor ratings. The authors of the study considered a significant factor for the inflow of FDI, especially the GDP of the host country. They also confirmed the negative relationship between FDI and wage costs, so the inflow of investment was in areas with lower labor cost per unit. The market risk was quite a surprising revelation from the analysis, as it was shown that FDI flows are not affected by this factor. The study also dealt with the impact of joining the European Union on FDI, with the authors concluding that the flow of investment will be compounded by the mere announcement by the European Union of a country's accession.

Biswas (2002) described the respecting of property rights in the country as one of the most crucial factors. This is very important for investors because they prefer investing in an environment that guarantees greater certainty that their capital will be maintained. An important factor is also the democracy that protects the individual property rights. It also allows effective transmission of government policy information, which investors welcome.

There are differences in the evaluation of the authors mentioned in the area of identification of FDI inflow determinants in the host economy which can be caused by a considerable

difference of the surveyed sample of countries, the different methodology of the survey and the time period studied.

3 METHODOLOGY

To fulfill the objective of the research, a multiple regression analysis method is used, which makes it possible to assess the influence of selected determinants on the FDI inflow into the Czech Republic. It also makes it possible to determine the interdependence or independence of the chosen factors.

The least squares (OLS) estimates are used in the analysis. Multiple regression analysis seeks values of the dependent variable from a linear combination of values of two or more independent variables. The formula can be expressed as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots \quad (1)$$

where:

Y – dependent variable,

β_0 – constant,

β_1, β_2, β_3 – regression coefficients,

X_1, X_2, X_3 – values of an independent variable.

Multiple regression analysis can explain the variance of the dependent variable Y, determine the effect of each independent variable X on the dependent variable Y and predict the values for individual cases (Hebák et al., 2005)

To use the multiple regression analysis, data must meet several assumptions that ensure unbiased results of regression analysis. These assumptions include the normal distribution of variables, the occurrence of homoscedasticity, the absence of multicollinearity, the variables must be metric, and the data must not be outlying values (Víšek, 1998). All assumptions of multiple regressions were verified for the purposes of the analysis.

All modeling and testing of variables was also carried out using Gretl software, testing with a 5% level of significance.

4 ANALYSIS OF FOREIGN DIRECT INVESTMENT DETERMINANTS

The specific localization factors were selected for the regression analysis based on the literature and foreign empirical studies mentioned in the second chapter of the paper. A set of test variables is available in the 1998-2015 time series. This period was selected due to another foreign direct investment record methodology prior to 1998, which could lead to distorted results.

The following variables were chosen for the specific localization factors:

FDI inflow = f (general unemployment rate, GDP, GDP per capita, minimum wage, Corruption Perceptions Index, corporate tax rate, rating, CZE / EUR nominal exchange rate, science and research expenditure, Index of Economic Freedom, investment incentives).

The multiple regression model for identifying FDI determinants in the Czech Republic can thus be expressed according to formula (1) in the form:

$$FDI_t\, inflow = \beta_0 + \beta_1 UR_{t-1} + \beta_2 GDP_{t-1} + \beta_3 GDP/c_{t-1} + \beta_4 MW_{t-1} + \beta_5 CPI_{t-1} + \beta_6 TAX_{t-1} + \beta_7 RG_{t-1} + \beta_8 NExR_{t-1} + \beta_9 SR_{t-1} + \beta_{10} IEF_{t-1} + \beta_{11} II_{t-1}, \quad (2)$$

where are:

t	year in the range of 1 … t,
UR	general unemployment rate,
GDP	gross domestic product,
HDP/c	gross domestic product per capita,
MW	minimum wage,
CPI	Corruption Perceptions Index,
TAX	corporate tax rate,
RG	rating,
NExR	CZE / EUR nominal exchange rate,
SR	science and research expenditure,
IES	Index of Economic Freedom,
II	investment incentives.

For independent variables, a one-year delay will be taken into account. The reason for this delay could be seen from the studies from a number of authors (Blonigen, Piger, 2014, Carstensen, Toubal, 2004, CzechInvest, 2015, Holland 1998) dealing with FDI issues. According to these authors, investors are reacting to the changing situation in the host economy with a delay, as they are waiting to confirm new information even in the next period. Another reason is also the lengthy registration of starting entrepreneurs.
Prior to using multiple regression analysis, multi-collinearity has to be verified. This is due to the interaction of independent variables. From Table 1, this situation occurs among just a few variables. For this reason, some independent variables must be excluded from multiple regression analysis. Two factors were excluded from the test sample based on the largest number of multi-collinears with independent factors. Most dependencies have been demonstrated on GDP per capita which has been shown to have multi-collinearity with 6 independent factors. Another variable that will be discarded for the next analysis is the CZE / EUR exchange rate, as the dependence on 5 indicators has been demonstrated.

Table 1: Multicolinearity test (Own processing based on CNB, CSO, CzechInvest, TI)

UR	**GDP/c**	**GDP**	**MW**	**SR**	**II**	**CPI**	**TAX**	**NExR**	**IEF**	**RG**	
1	-0,28	-0,27	-0,12	-0,24	-0,25	-0,69	0,17	0,20	-0,30	0,23	**UR**
	1	0,99	0,96	0,92	0,99	0,67	-0,97	-0,93	0,45	-0,81	**GDP/c**
		1	0,97	0,91	0,99	0,66	-0,97	-0,93	0,42	-0,80	**GDP**
			1	0,84	0,96	0,49	-0,95	-0,93	0,25	-0,68	**MW**
				1	0,93	0,66	-0,88	-0,77	0,66	-0,94	**SR**
					1	0,63	-0,98	-0,93	0,47	-0,83	**II**
						1	-0,55	-0,47	0,45	-0,57	**CPI**
							1	0,94	-0,42	0,78	**TAX**
								1	-0,24	0,70	**NExR**

									1	-0,74	**IEF**
										1	**RG**

After excluding the above factors, the regression model can be written according to the formula (1):

$$FDI_t\ inflow = \beta_0 + \beta_1 UR_{t-1} + \beta_2 GDP_{t-1} + \beta_3 MW_{t-1} + \beta_4 CPI_{t-1} + \beta_5 TAX_{t-1} + \beta_6 RG_{t-1} + \beta_7 SR_{t-1} + \beta_8 IEF_{t-1} + \beta_9 II_{t-1} \quad (3)$$

The next step is modeling of determinants that influence the inflow of FDI into the Czech Republic using the regression analysis mentioned above. The aim is to find a solution that will appear to be the most appropriate for the choice of model using the adjusted determinant coefficient (R2adj), which is considered a comparative quality variable.
A better model can be identified from the value of the information criteria, while the lower the value of the information criteria, the better the model. In order to test the best selected regression analysis model, information criteria were used, including the Schwarz information criterion (BIC), the AIK and the Hannan-Quinn information criterion (HIC) (Bill, Němec, Pospiš, 2009).

For multiple regression analysis, the following hypotheses apply:
H0: parameters are insignificant,
H1: Parameters are significant.

Rejection the zero hypothesis will occur when the p-value is lower than alpha (i.e. 0.05). For this reason, the results of the original model shown in Table 2 are unsatisfactory, and re-modeling has been used to remove factors with the highest p-value. In this case, factor IES, RG, IP, MZ and OMZ were excluded.
The resulting model after adjustments only includes significant variables that meet the assumptions to reject the zero hypothesis.

Table 2: Multiple regression analysis (own processing)

	Original model		**Resulting model**	
	Coefficient ß	**p-value**	**Coefficient ß**	**p-value**
Const	906,8620	0,6400	1800,2500	0,0396**
UR	-32,5781	0,2525		
GDP	0,6516	0,2512	0,4315	0,0096***
MW	-0,0652	0,5759		
CPI	-20,7404	0,2214	-15,0402	0,0507*
TAX	-30,3660	0,1510	-40,5311	0,0123**
RG	20,1198	0,8210		
SR	10,6922	0,2110	12,0960	$8{,}90e^{-5}$***
IEF	-1,7700	0,9150		
II	0,0009	0,8007		
$\mathbf{R^2}$	0,9934		0,9947	
$\mathbf{R^2_{adj.}}$	0,9902		0,9925	

p-value (F)	0,0008	0,00001
AIC	213,8221	208,1861
BIC	222,7258	213,5283
HIC	215,0498	208,9227

From Table 2, the resulting functional form of the regression model according to formula (1) can be constructed:
FDI inflow = 1800, 25 + 0, 4315*GDP – 15, 0402*CPI – 40, 5311*TAX + 12, 0960*SR (4)

The most significant factor influencing the inflow of FDI into the Czech Republic has been proved by a multiple regression analysis of the expenditure on science and research. The analysis has shown that if science and research expenditure rise by CZK 1 billion, FDI will increase by CZK 12 billion.
Another important determinant of FDI is GDP in the Czech Republic. The analysis showed that with an increase in GDP of CZK 1 billion, there will be an investment inflow of CZK 0.4 billion in the Czech Republic.
On the other hand, the negative impact on the inflow of FDI was corporation tax. The increase in the income of corporation tax by 1% led to a decrease in the inflow of FDI by CZK 40 billion in the monitored period.
The last factor that appears to be significant is the Corruption Perceptions Index. The analysis has shown that if the Index increases by one point (i.e the level of corruption in the Czech Republic will decrease), the FDI inflow will be reduced by CZK 15 billion. It is important to emphasize that this indicator appears to be of least importance from the selected ones.

5 CONCLUSION

Foreign direct investment, which is an integral part of the economies of the vast majority of countries, brings many positive impacts on the host economy. However, they are not always associated only with positive consequences for the host economy. One of the main negatives of foreign direct investment is, in particular, the displacement of domestic enterprises. It is therefore necessary to consider each investment individually in the specific time and local conditions of the given economy.
Individual countries are interested in positive consequences resulting from inflows of investment. They use various tools to attract investors, and the location factors they naturally have are their own. Each country is unique and unique to them.
In the Czech Republic, geographical location, membership in the EU, NATO, educated population, lower labor costs, attractive investment incentives and stable economic growth can be identified as locating factors for potential investors.
The paper aimed to define the determinants of the FDI inflow into the Czech Republic. From the results of the regression model, science and research expenditures, GDP, corporation tax income and the Corruption Perceptions Index have emerged as significant factors. While spending on science and research or GDP seem to have a positive effect on FDI. Corporation tax and Corruption Perceptions Index appear to be negative in the results.

Acknowledgement

This contribution was supported by SGS_2018_21.

References

1 Bénassy-Quéré, A., Coupet, M., Mayer, T. (2007). Institutional determinants of foreign direct investment. The World Economy, 30(5), 764-782. ISSN 1467-9701.

2 Bevan, A. A., Estrin, S. (2004). The determinants of foreign direct investment into European transition economies. Journal of comparative economics, 32(4), 775-787. ISSN 0147-5967.

3 Bill, J., Pospiš, M. (2009). Gretl – uživatelská příručka. Brno, [online]. [vid. 10th November 2017]. Available from: http://www.thunova.cz/wp-content/uploads/CZU/Manual_gretl.pdf

4 Biswas, R. (2002). Determinants of foreign direct investment. Review of development economics, 6(3), 492-504. ISSN 1467-9361.

5 Blonigen, B. A., Piger, J. (2014). Determinants of foreign direct investment. Canadian Journal of Economics/Revue canadienne d'économique, 47(3), 775-812. ISSN 1540-5982.

6 Carstensen, K., Toubal, F. (2004). Foreign direct investment in Central and Eastern European countries: a dynamic panel analysis. Journal of comparative economics, 32(1), 3-22. ISSN 0147-59.

7 Czechinvest. Domestic and foreign direct investment. 2015. [online]. Retrieved 12.09.2018. Available from: http://czechinvest.org/data/files/tuzemske-a-prime-zahranicni-investice-2015-3832-cz.xls

8 CNB. International relations rating. 2016, [online]. Retrieved 12.09.2018. Available from: www.cnb.cz/en/about_cnb/international_relations/rating/

9 CNB. Foreign Direct Investments. 2017, [online]. Retrieved 12.09.2018. Available from: https://www.cnb.cz/cs/obecne/rozsirene-vyhledavani.jsp?cnb-search-area=czech-version&cnb-folder=%2Fcs%2F&cnb-search-action-block=search&cnb-search-query=p%C5%99%C3%ADm%C3%A9+zahrani%C4%8Dn%C3%AD+investice

10 CSO. Gross Domestic Product. 2017, [online]. Retrieved 12.09.2018. Available from: https://www.czso.cz/documents/10180/33199373/32020216q403.pdf/a4591368-4d0d-4f72-913d-9707b1efb4db?redirect=https%3A%2F%2Fwww.czso.cz%2Fcsu%2Fczso%2Fdomov%3Fp_p_id%3D3%26p_p_lifecycle%3D0%26p_p_state%3Dmaximized%26p_p_mode%3Dview%26_3_groupId%3D0%26_3_keywords%3DHRUB%25C3%259D%2520DOM%25C3%2581C%25C3%258D%2520PRODUKT%26_3_struts_action%3D%252Fsearch%252Fsearch%26_3_redirect%3D%252Fc%252Fportal%252Flayout%253Fp_l_id%253D20137706%2526p_v_l_s_g_id%253D0

11 CSO. Unemployment rate. 2016, [online]. Retrieved 15.09.2018. Available from: https://www.czso.cz/csu/czso/domov?p_p_id=3&p_p_lifecycle=0&p_p_state=maximized&p_p_mode=view&_3_struts_action=%2Fsearch%2Fsearch&_3_redirect=%2Fweb%2Fczso%2Fkatalog-produktu vydavame&_3_keywords=m%C3%ADra+nezam%C4%9Bstnanosti+v%C3%BDvoj&_3_groupId=0

12 CSO. GDP develepoment. 2016, [online]. Retrieved 12.09.2018. Available from: https://www.czso.cz/documents/10180/46173149/chmu020117.xlsx/f971babf-241a-4aca-8267-a4aaab9bc46e?version=1.0

13 CSO. Nominal rate CZE/EUR. 2016, [online]. Retrieved 07.09.2018. Available from: https://www.czso.cz/documents/10180/32961688/370002160834.xlsx/9764c36a-48c4-47652Fportal%252Flayout%253Fp_l_id%253D20137706%2526p_v_l_s_g_id%253D0

14 CSO. Development of research and development expenditure. 2016, [online Retrieved 15.09.2018. Available from: https://www.czso.cz/documents/10180/34193315/21100216p03.pdf/2a7fbea8-300d-4ca8-9f25-204efca9193d?version=1.0

15 Demekas, D. G. et al. (2007). Foreign direct investment in European transition economies-The role of policies. Journal of Comparative Economics, 35(2), 369-386. ISSN 0147-59.

16 Dvořáček, J. (2005). Strategická analýza vybraných faktorů podnikání v Evropské unii. Praha: Vysoká škola ekonomická, Nakladatelství Oeconomica. ISBN 80-245-0818-4.

17 Hebák, P.et al. (2005). Vícerozměrné statistické metody. Praha: Informatorium. ISBN 807333036.

18 Holland, D. (1998). The diffusion of innovations in Central and Eastern Europe: A study of the determinants and impact of foreign direct investment. London: National Institute of Economic and Social Research.

19 Liebscher, K. (2007). Foreign direct investment in Europe: a changing landscape. Northampton, MA: E. Elgar. ISBN 1847204872.

20 Transparency International (TI). Research CPI overview. (2016), [online]. Retrieved 12.09.2018. Available from:]http://www.transparency.org/research/cpi/overview

21 Víšek, J. A. (1998). Statistická analýza dat. Praha: Vydavatelství ČVUT. ISBN 8001017354.