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Analyzing the Relationship between Foreign Direct Investment and Privatization in the European Union Founder Nations by Using Panel Data Approach

Summary: Foreign direct investment (FDI) and privatization are two of the most important components in liberalization World. The aim of this study is to analyze whether there exist a statistically significant relationship between FDI and privatization, or not. To do so, a panel data sample of fourteen European Union (EU) Founder Nations in 1998-2012 was used to estimate various panel data models. The special feature of panel data is that it allows researchers to construct and test more realistic behavioral models that could not be identified using cross-section or time series data alone. Based on the sample results, between privatization as the primary independent variable and FDI was found a statistically significant positive relationship. Although other explanatory variables such as growth, trade openness, and corruption perceptions index, were found to have statistically significant effects on FDI, budget deficit was found to be statistically insignificant. Moreover, statistically significant parameters' signs showed that all of the economic expectations were satisfied.

Key words: Privatization, Foreign direct investment, European Union, Panel data.

JEL: F21, G28, L33, O52, P45.

Globalization and liberalization have increased the importance of two concepts: foreign direct investment (FDI) and privatization. FDI concept is at the core of liberalization phenomena. FDI is seen as a tool to measure the extent of globalization and it has various economic and political determinants such as political instability, inefficient legal system, profit rate, production costs and market size. Also, FDI has been increasingly considered as an important instrument for sustainable economic growth and international competitiveness for countries all over the world. On the other side, privatization concept is a key to many countries' economic reforms. It should be stressed that the main target of privatization is providing FDI inflows for many countries (World Bank 2003). Oscar Amerighi and Giuseppe De Feo (2010) claimed that in recent years, however, parallel to the massive increase in FDI, privatizations have become an important tool of industrial restructuring in all parts of the world.

Vintila Denisia (2010) underlined that today FDI issue is being paid more attention, both at national and international level. Capital inflows to a country usually accrue in the forms of foreign portfolio investment and FDI. Considering the World Bank (2003) data that shows FDI has become the largest form of capital flow, the importance of FDI becomes non-negligible. It is important particularly for the developing economies because some researchers such as Magnus Blomstrom, Robert E. Lipsey, and Mario Zegan (1994), Eduardo Borensztein, Jose De Gregorio, and Jong W. Lee (1998), Blomstrom and Ari Kokko (2003), Lipsey and Fredrik Sjöholm (2004), Laura Alfaro et al. (2006), Narjess Boubakri et al. (2013) and Leonid Melnyk, Oleksandr Kubatko, and Serhiy Pysarenko (2014) stated that FDI is an engine for future economic growth and institutional developments in those countries. Besides the positive effects of FDI on economy, there are some researchers such as Holger Gorg and David Greenaway (2003) and Denisia (2010) who consider that FDI have a negative impact on economic development due to crowd out national enterprises. Moreover, some researchers such as Alfaro (2003) argued that the effects of FDI on growth are ambiguous.

Due to mentioned importance of FDI and privatization above, the focus of this study was gathered particularly around the relationship between FDI and privatization. With this paper, it is contributed to the debate on the relationship between FDI and privatization, displaying interactions in two following distinct ways: (i) by estimating empirically whether the privatization affects FDI in the selected countries having similar homogeneous levels of economic development or not because there exist a few studies on the relationship between FDI and privatization; (ii) by using the developed country sample because most previous theoretical literature on the relationship between FDI and privatization focused on developing and transition economies (e.g. Arijit Mukherjee and Kullapat Suetrong 2009; Rania I. Naguib 2012). Few studies are based on the relationship between FDI and privatization in developed countries. This paper aims to close described gap in the literature. The rest of the paper is organized as follows: Section 1 presents studies of FDI and privatization relationships in the literature. Section 2 presents an overview of FDI and privatization in the EU. Section 3 briefly explains the panel data methodology. Section 4 covers the application and the final section covers the conclusions.

1. Review of Literature

In the literature, there are several theories of FDI. The first comprehensive theory on FDI was the “OLI” or “eclectic” theory developed by John Dunning. OLI refers for Ownership, Location, and Internalization, three types of advantage that may underlie a firm’s decision to become a multinational. There are three different ownership advantages which allow it to overcome the costs of operating in a foreign country: monopoly advantages, technology, knowledge and innovation activities and advantages of economies of large size. Location advantages address the economic benefits, political and social advantages of each country. Internalization focus on that the company finds its powers from the sale of goods and services to various agreements under license, franchise (John Dunning 1973, 1999). The empirical literature has addressed different approaches that include general equilibrium trade theory and the theory of

the firm. For instance, James R. Markusen and Keith E. Maskus (2001) referenced real trade theory to understand theoretical aspects of FDI and the location of production and sales by firms as the “real” side of FDI. Aristidis Bitzenis (2009) offered FDI theory based on a company’s strategic market seeking, resource seeking and internalization behavior. However, the empirical result in this study finds it difficult to distinguish between market seeking, resource seeking and internalization (Barbara M. Roberts, Steve Thompson, and Katarzyna Mikolajczyk 2008). Markusen and Maskus (2001) claimed efficiency seeking (vertical) and market seeking (horizontal) motives for FDI. Although efficiency seeking may provide reduced overall costs, market seeking creates new opportunities for joint investment in the use of some inputs. Len J. Trevino et al. (2010) claimed that countries may increase their FDI inflows by market reforms such as through trade liberalization and privatization. Based on these theories, it can be elaborated that FDI provides contributions to both host and source countries *via* several channels:

(a) FDI has tangible benefits - the transfer of new technologies and skills, and new employment opportunities that increase competitiveness and new services that are not available from the host country but are needed for exports. FDI also has intangible benefits - brand names, patents, restructuring of domestic industry and better management structure. These benefits bring higher productivity to host countries. Most empirical studies conclude that FDI contributes to both productivity and income growth factors in host countries (Organisation for Economic Co-operation and Development 2002; United Nations 2003). Based on a UK sample, Sourofel Girma, David Greenaway, and Katharine Wakelin (2001) indicated that foreign firms have higher productivity and that these firms pay higher wages;

(b) FDI enhances transnational corporations’ access to world markets for goods and services produced in the host country (Lutger Odenthal 2001). Transnational corporations prefer FDI rather than exporting to avoid tariff impositions and to obtain lower labor costs. Foreign investors want access to the inexpensive labor in host countries to make their products more competitive in the international market (Shiyong Zhao 2013);

(c) Production in different locations may generate benefits from better access to foreign markets. That the cost-advantage factor has been considered less important than market access is shown by the results of a survey (Roberts, Thompson, and Mikolajczyk 2008). For example, Dawn Holland et al. (2000) concluded that market size and growth potential have been the driving forces behind investment in Central and Eastern Europe;

(d) From a macroeconomic point of view, FDI has positive effect on balance payments (Denisia 2010);

(e) FDI may be the speed of structural change. Structural change means a shift to higher value added, higher technology products which increase earnings (Gábor Hunya 2000).

As is declared that privatization concept is a key to many countries’ economic reforms. Even if it is quite difficult to evaluate the macroeconomic effects of a privatization program, the interaction between privatization and macro variables such as

economic growth, employment, efficiency, profitability and revenues has been examined by many researchers such as Richard A. Yoder, Philip L. Borkholder, and Brian D. Friesen (1991), Frank Sader (1995), Sunita Kikeri (1998), Bernardo Bortolotti, Marcella Fantini, and Carlo Scarpa (2002) and Eytan Shenshinski and Luis F. López-Calva (2003). In a study by Boubakri et al. (2013), it has been suggested that privatization can create an opportunity to improve the investment climate. And in a recent study by Adnan Filipovic (2015) it is been claimed that the success of privatization largely depends on legal and regulatory reforms, especially incentives policy.

In the literature, it is been observed that there exist a few studies on the relationship between FDI and privatization. For instance, Sader (1995) examined the privatization and FDI relationship in developing countries. Researcher showed that privatization not only directly increases FDI inflows into developing countries, but also has an indirect effect by attracting additional investments. Daniel Chudnovsky, Andres Lopez, and Fernando Porta (1997) mentioned that FDI is dominated by privatization in Argentina. Melanie Lansbury, Nigel Pain, and Katerina Smidkova (1996) found that privatization in Central Europe has a positive effect on inward FDI, even in a recession period. In the study of William L. Megginson and Natalie L. Sutter (2006), privatization reasons to become more efficient, more profitable for firms and increase their capital investment spending, and become for both transition and non-transition economies. Trevino, John Daniels, and Arbelaez Harvey (2002) claimed that potential investors see privatization as an indication of a country's positive attitude towards private enterprise and a country's likely economic improvement. Thus, a country may continue to attract substantial FDI even after there is little left to privatize because transnational corporations view the country's lack of a large government sector positively in Latin America. Kani Carstensen and Farid Toubal (2004) suggested that the level of privatization has considerable positive effects on the decision to invest in Central and Eastern European countries. Bruno Merlevede and Koen Schoors (2009) claimed that the relationship between FDI and the privatization process is complex. Researchers divided it into two: non-direct privatization and direct privatization strategies. The direct privatization strategies positively affected the equilibrium level of FDI. Using data from the 500 largest Polish manufacturing companies in 1993-1998, Roberts, Thompson, and Mikolajczyk (2008) found that FDI *via* privatization dominated greenfield FDI, with lower costs and direct access to existing distribution channels. Mukherjee and Suetrong (2009) explored causalities between privatization and FDI inflows. According to their results, privatization increases the incentive for FDI. Christopher Reece and Abdoul G. Sam (2012) explored the causal effect of pension privatization on FDI inflows using a panel of 17 countries in 1991-2006. Their econometric results indicate that privatization triggers a significant increase in net FDI inflow.

1.1 Some Recent Empirical Studies of the FDI and Privatization Relationship in the Literature

It has been observed in the literature that researchers usually focused on the following three situations in previous empirical studies: (1) the significant effects of the variables on the other variables; (2) the direction of the causal relationship between variables and (3) the outcomes of privatization.

(i) *The significant effects of the variables on the other variables.* Melissa H. Birch and Garrett Halton (2001) underlined the importance of privatization as an important variable attracting to FDI in Latin America countries. Toshihiro Matsumura, Norioki Matsushima, and Ikuo Ishibashi (2009) investigated the relationship between the welfare effects of privatization and the degree of FDI in China and Central and Eastern Europe. They reached two different results in terms of time. Although privatization increases welfare when the country depends on foreign capital in the private sector in long-term, the opposite tendency exists in the short-term. Additionally, if all private firms are foreign, privatization *always* improves welfare. Selen S. Guerin and Stefano Manzcocchi (2009) used privatization as a control variable to measure the effect of political regime on bilateral FDI flows from advanced to emerging countries in 1992-2004. They found that privatization was an important factor in preventing the effect of political regime on FDI. Chio Chi Wang and Jiunn Rong Chiou (2010) analyzed the interaction among privatization, tariffs and FDI. Their result suggests that a higher degree of privatization may increase FDI. Using a time-series model in Argentina for 1971-2000, Naguib (2012) showed the effects of privatization and FDI on economic growth. According to the results, FDI had no effect on either short- or long-term economic growth in Argentina, whereas privatization had negative significant effects on economic growth in the long-term. Zhao (2013) explained the role of privatization and FDI inflow to promote economic growth, using panel data covering 31 provinces of the Chinese mainland in 1978-2008. This period is important for China's economic growth. The study found evidence that further economic growth depends on further privatization and FDI. Bouwe R. Dijkstra, Anuj Joshua Mathew, and Mukherjee (2015) analyzed the interaction between privatization and FDI and found that privatization by the domestic country increases a foreign firm's incentive for FDI.

(ii) *The direction of the causal relationship between variables.* A two-way causality between privatization and FDI was determined in an empirical study conducted by Mukherjee and Suetrong (2009) for developing countries and transition countries. They suggested that reforms allowing FDI and increasing privatization can help to increase welfare by complementing one another. Additionally, using a model, they showed that partial privatization is the optimal strategy of a host country to maximize welfare. Nassima Debab (2011) examined the bi-directional causality relationship between privatization and globalization measured by FDI, trade, portfolio investment, and technology as the indicator of globalization for developed and developing economies. The findings showed that privatization has significant positive effects on globalization. Boubakri et al. (2013) found a bi-directional positive relationship between privatization and FDI as a measure of globalization for some 55 developing countries, using a panel causality test.

(iii) *The outcomes of privatization.* Previous firm-level studies have examined the link between foreign participation and post-privatization firm performance (e.g. Juliet D'souza and Megginson 1999; Boubakri, Jean C. Cosset, and Omrane Guedhami (2005a, b). According to results, privatized firms have experienced significant performance improvements after being privatized. Nandini Gupta (2005) found that privatization has a positive impact on profitability, productivity, and investment by using Indian state-owned enterprises data. Megginson and Jeffrey M. Netter (2001)

surveyed empirical studies that examine privatization's effect on developing countries. Researchers declared that most of these studies found that privatization yields improvements in operating and financial performance of firms. Galyna Grygorenko and Stefan Lutz (2007) found for the Ukrainian enterprises that privatization positively influences labor productivity, sales and profitability. Roberts, Thompson, and Mikolajczyk (2008), using data from the 500 largest Polish manufacturing companies in 1993-1998, found that privatization *via* the firms acquired by foreign investors resulted in significantly larger and more profitable firms than were those that remained state owned. Saul Estrin et al. (2009) found that privatization performed through FDI entry into an economy leads to much better firm efficiency and a higher growth rate of profitability. Jan Hagemeyer and Joanna Tyrowicz (2011) found for Poland that privatization through FDI increases access to foreign trading networks. In addition, researchers stated that foreign-owned privatized companies have some advantages such as higher profits, increased efficiency and export orientations.

2. Overview of FDI and Privatization in the EU

In this section, at first the collective view (country groups) and then the EU view (EU countries) of FDI and privatization were overviewed by using quantitative data.

Following tables, Table 1 and Table 2 present the collective view. Table 1 shows the evolution of FDI inflows into country groups in the period 1990-2013.

Table 1 Percentage Share of FDI Inflows for Country Groups (1990-2013)

Country groups	Years												
	1990	1993	1995	1998	2000	2003	2005	2007	2008	2010	2011	2012	2013
Developed economies	75.2	73.4	74.8	78.0	75.6	76.6	73.6	70.8	69.2	64.0	63.0	62.3	63.0
EU (28)	36.6	32.9	34.5	32.8	31.3	41.6	40.7	41.8	42.7	35.9	35.4	34.4	33.7
Developing economies	24.7	26.4	24.8	21.3	23.5	21.8	24.1	25.6	28.2	32.3	32.8	34.0	33.3
Transition economies	0.07	0.08	0.32	0.54	0.77	1.51	2.21	3.49	2.54	3.59	3.54	3.53	3.64

Source: United Nations Conference on Trade and Development (UNCTAD 2014)¹.

As is seen from the table above, the developed economies have the largest share of FDI inflows for the period 1990-2013 (see dark colored numbers in the line of developing economies). The reason is that they have completed infrastructures, mature legal systems and political stability. EU (28) countries seem to be ranked as in the middle with the values followed at the average percentage of 33. While developing economies were seen at the average percentage of 25 for the period 1990-2008, their percentage share of FDI seem to be decreased up to average percentage of 33. On the other side, transition economies have the lowest share of FDI inflows for the period 1990-2013 (see numbers in the line of transition economies).

¹ United Nations Conference on Trade and Development (UNCTAD). 2014. Data Center. <http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=96740> (accessed June 17, 2014).

Developing economies and transition economies attracted more FDI than did the developed economies after 2005. Among the transition economies, privatization remains a policy issue. Transition countries encouraged privatization to attract FDI (Merlevede and Schoors 2005). In this framework, the performance of foreign-owned firms, particularly in transition economies, is usually believed to be higher than that of domestic firms due to technological spillovers and expertise transfer (Hagemeyer and Tyrowicz 2011). Table 2 shows FDI from within privatizations in millions of US \$ and in percentages of total FDI for the period 1988-1993.

Table 2 FDI from within Privatizations in Millions of US \$ and in Percentages of Total FDI for Country Groups (1988-1993)

	Years					
	1988	1989	1990	1991	1992	1993
Country groups						
Europe and Central Asia						
FDI from within privatizations in millions of US \$	18,9	641,2	615	2,076	3,705	3,074
FDI from within privatizations in percentage of total FDI	0.8	18.4	13.3	29.7	44.7	35.9
Latin America and the Caribbean						
FDI from within privatizations in millions of US \$	213,7	183,3	2,461	3,264	2,414	1,107
FDI from within privatizations in percentage of total FDI	2.7	2.6	32.1	27.1	16.6	7.0
East Asia and Pacific						
FDI from within privatizations in millions of US \$	1,3	0,0	0,7	77,1	522,7	1,076
FDI from within privatizations in percentage of total FDI	0.0	0.0	0.0	0.6	2.6	3.0

Source: World Bank (2014a)².

As is seen from the table above, privatizations became an important component of FDI inflows for the Europe and Central Asia country group in 1992, with a peak of 44.7 percent (see dark colored number in the line of Europe and Central Asia country group). Particularly for Czech Republic which is leading Central European economy, mean percentage share of the foreign investors of 41 privatized organizations was 39.2 percent at the same year. Considering macroeconomic and political uncertainty and political risks in the implementation of privatization for foreign investors, Christopher W. Anderson, Tomas Jandik, and Anil K. Makhija (2001) stated that this rate is very high. In 1990, privatizations became an important component of FDI inflows for the Latin America and the Caribbean country group, with a peak of 32.1 percent (see dark colored number in the line of Latin America and the Caribbean country group). In 1990-2001, the opening of utilities to FDI through privatization programs triggered unprecedented increases in FDI in telecommunications and power generation and distribution. Additionally, privatization-related FDI in all economies occurred predominantly in the services sector (United Nations 2003). On the other hand, the numerical values for the East Asia and Pacific country group show no considerable increase. Indeed, the numeric values for the East Asia and Pacific country group are very low.

² World Bank. 2014a. Privatization Database World Bank 1988-2008.

<https://knoema.com/WBPVT2015/privatization-database-world-bank-1988-2008> (accessed May 11, 2014).

In the EU, foreign investors may help promote a more effective capital market (David Parker 2003). Following tables, Tables 3, 4 and 5 and Figure 1 present the EU view. Especially, these tables present the data related to fourteen founder EU countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden and the United Kingdom) that was analyzed in this study. Although Luxembourg was a founder country, this country has been left out because of the lack of data that was used in the panel data analysis approach. This fourteen founder EU countries selected to be analyzed because they lead privatization progress in the EU. Table 3 below shows FDI inflow percentage of GDP for 14 EU countries for the period of 1993-2012.

Table 3 FDI Inflow Percentage of GDP for 14 EU Countries (1993-2012)

Countries	Years									
	1993	1995	2000	2002	2005	2008	2010	2011	2012	
Austria	0.59	0.76	4.42	0.06	3.53	1.65	0.22	2.55	0.99	
Belgium	4.84	3.75	38.13	6.42	9.10	38.22	16.33	23.14	-6.26	
Denmark	1.21	2.37	21.12	3.81	4.99	0.53	-3.67	3.92	0.89	
Finland	1.11	0.78	7.25	5.95	2.42	-0.42	3.10	0.97	1.67	
France	1.27	1.49	3.25	3.37	3.96	2.26	1.30	1.38	0.95	
Germany	0.01	0.47	10.51	2.66	1.71	0.22	1.98	1.63	0.38	
Greece	0.94	0.80	0.87	0.03	0.25	1.31	0.11	0.39	0.69	
Ireland	2.09	2.12	26.48	23.83	-15.64	-6.23	20.44	10.41	18.18	
Italy	0.36	0.42	1.21	1.39	1.30	-0.46	0.44	1.56	0.00	
Netherlands	1.94	2.79	16.58	5.71	6.11	0.52	-0.94	2.52	1.26	
Portugal	1.53	0.57	5.65	1.36	2.04	1.85	1.15	4.68	4.24	
Spain	1.68	1.32	6.81	5.71	2.21	4.83	2.87	1.95	1.94	
Sweden	1.90	5.69	9.47	4.89	3.13	7.58	0.03	2.41	3.11	
UK	1.48	1.69	8.16	1.55	7.66	3.31	2.16	2.07	1.85	

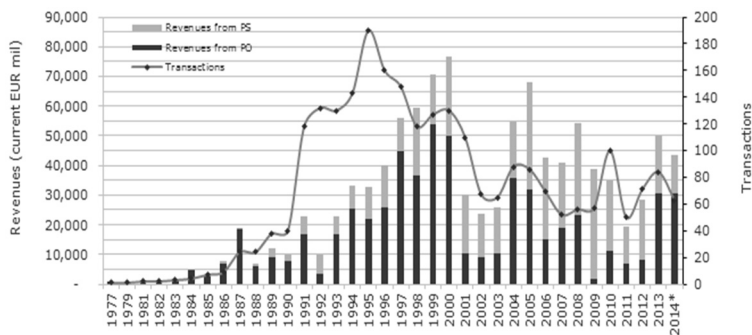
Source: UNCTAD (2014).

As is seen from the table above, FDI inflow has increased in the sample countries. There was slow progress in FDI inflow in the 1990s (see columns for the years 1993 and 1995). After the mid-1990s, all countries included in the analysis faced increasing FDI inflows. There has been more FDI progress for these countries in the 2000s (see dark colored numbers in column for the year 2000). Although some EU members (Finland, France, Denmark, Germany, Ireland, Italy, Portugal, Spain, Sweden and the United Kingdom) did not experience an effect on FDI from the economic and financial crisis, FDI inflow in remaining countries (Austria, Belgium, Greece and the Netherlands) decreased after 2010 (see dark colored numbers in column for the year 2012). FDI in Belgium has reached a higher level than in most EU countries in 2008 with a peak of 38.22 percent (see dark colored number in column for the year 2008).

The process of privatization began in the 1980s with UK. Similarly, other European countries embarked on their privatization programs before the 1990s. The reasons of implemented privatization programs in EU countries carry out common features (Judith Clifton, Francisco Comín, and Daniel Díaz Fuentes 2006). Nowadays the global privatization total exceeds 1.2 billion \$ (Privatization Barometer 2014). The rationale for privatization in the EU is based on four arguments (Parker 2003):

- (a) State industries are inefficient, and it is thought that privatization will ensure economic efficiency;
- (b) Privatization can contribute to developing domestic capital markets;
- (c) With privatization, government debt will be reduced; also, privatization removes the risk of future public capital injections into loss-making enterprises;
- (d) Privatization is an important step to comply with criteria within the EU aimed at liberalizing markets.

The EU privatization program has increased in the 2000s. The figure below shows the total privatization revenues and transactions in million Euros at the enlarged Europe.



Source: Privatization Barometer (2014)³.

Figure 1 Privatization in Million Euros at the Enlarged Europe (1977-2014)

The economic aspects of privatization became important in the second half of the 1990s in EU countries. Privatization revenue in 27 countries of the European Union reached its highest level in 2000. Despite of the fact that this level sharply decreased in 2001-2003, privatization revenues raised by EU governments represented 34.8 percent and 36.6 percent of the worldwide totals in 2013 and 2014, respectively (Privatization Barometer Report 2013/2014). Table 4 below provides a brief review of 14 EU countries' privatization experience for the period 1993-2012.

Although the economic significance of privatization has changed from country to country (Parker 2003), privatization in the 14 EU countries has been increased in the 2000s (Table 4). The trend of privatization in the 14 EU countries is generally the same as the trend of FDI. The highest rate of privatization of countries such as Australia, Belgium, France, Italy, Spain, the Netherlands, Greece and the United Kingdom began in the mid-2000s. During 1993-2012, France did the most privatization within 14 EU countries. Italy followed it as second country.

³ **Privatization Barometer**. 2014. Statistics. <http://www.privatizationbarometer.com/atlas.php?id=6&mn=ST> (accessed June 19, 2014).

Table 4 Privatization in Millions of US \$ for 14 EU Countries (1993-2012)

Countries	Years									
	1993	1995	2000	2002	2005	2008	2010	2011	2012	
Austria	238,98	1270,3	2028,4	0,0	475,5	0,5	0,0	13,7	0,0	
Belgium	1422,02	282,3	0,0	0,0	1437,7	0,0	0,0	19,7	0,0	
Denmark	103,98	0,0	98,6	0,0	289,4	434,8	524,2	162,8	75,9	
Finland	1094,45	1296,7	4593,2	999,3	1769,1	0,0	305,9	0,0	194,7	
France	6451,61	5315,6	2173,8	4229,2	37847,6	28841,3	13963,9	2621,2	565,9	
Germany	563,62	1302,9	19373,2	420,9	3632,2	10177,6	5543,7	0,0	2465,9	
Greece	43,56	0,0	1161,3	1405,3	2465,9	4984	0,0	280,3	0,0	
Ireland	267,87	160,5	0,0	146,6	113,7	706,7	0,0	6889,2	9231,4	
Italy	2251,48	7240,0	11906,7	5560,9	21631,7	1881,2	3434,5	517,9	5103,4	
Netherlands	248,52	4134,3	6562,6	455,6	4212,2	483,5	1188,1	0,0	40,2	
Portugal	1502,56	2455,07	4413,9	5,7	103,9	3370,1	1183,4	3515	11035,3	
Spain	3253,84	4979,3	1229,8	109,2	715,7	0,0	1325,3	844,5	17,4	
Sweden	158,18	1001,7	9089,8	19,2	697,0	20673,2	299,2	3025,9	888	
UK	8263,19	9437,9	11,8	10,9	303,6	1787,4	6786,9	1095,1	3964,5	

Source: Privatization Barometer (2014).

Table 5 shows total FDI and PRI data in 14 sample EU countries in 1998-2012, including mini-graphs of these data.

Table 5 Total FDI and Privatization Indicators in Millions of US \$ for EU14 (1998-2012)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PRI	61686	68613,5	62643,7	22190,99	13363,3	26115,7	61987,7	75785,1	46434,55	51576,4	73340,73	53019,3	34555,5	18985,6	33583
FDI	265087	482558	677084	363393,9	283544	262522	181345	444920	486449,9	811538	463112,5	309251	310203	426796	165626

Notes: PRI indicates privatization.

Source: Privatization Barometer (2014) and UNCTAD (2014).

Table 5 shows FDI and PRI data in 14 sample EU countries in 1998-2012. Examining the data with the naked eye shows that these two variables generally move together. Foreign participation in privatization reached 76 percent of total proceeds in 1999, of which FDI accounted for 80 percent (Parker and Colin Kirkpatrick 2005).

3. Panel Data Approach

The term “panel data” has been defined by many researchers. Some definitions are as follows. Cheng Hsiao (1985, 1986) defined panel data as a set that follows the same sample of individuals over time. Damodar N. Gujarati (2003) defined panel data as the same cross-sectional unit (for example, a family, a firm or a state) surveyed over time. A. Colin Cameron and Pravin K. Trivedi (2005) defined panel data as data comprising repeated observations on the same cross-section, typically of individuals or firms in microeconomic applications, observed for several time periods. James H. Stock and Mark Watson (2007) defined panel data as data that consist of observations on the same n entities in two or more time periods.

If the dataset contains observations on variables X and Y , then the data is denoted (X_{it}, Y_{it}) , $i = 1, \dots, n$ and $t = 1, \dots, T$, where subscript i refers to the entity being

observed and subscript t refers to the date on which it is observed (Stock and Watson 2007, p. 350). This simply displays that the same n cross-section units are observed for T periods for each variable. The observations for the full sample can be arranged in many different ways (László Mátyás and Patrick Sevestre 1996, p. 27). Because the same periods are available for all cross-section units for each variable, such a dataset is usually called a balanced panel (Jeffrey M. Wooldridge 2002, p. 250). A panel that has some missing data for at least one period for at least one entity is called an unbalanced panel (Stock and Watson 2007, p. 351). All the data used in this study are in balanced panels.

The availability of the data in both dimensions - cross-section dimension and time dimension - offers a researcher a large number of data points, hence improving the efficiency of econometric estimates (Hsiao 1985, p. 124). Hsiao (1985) stated that the use of panel data provides major benefits for econometric estimation in at least three areas: (1) The identification of economic models and discrimination between competing economic hypotheses; (2) the elimination or reduction of estimation bias and (3) the reduction of problems of data multicollinearity. Many econometricians such as Hsiao (1985, 1986), Mátyás and Sevestre (1996) and Edward W. Frees (2004) explain the benefits of panel data in depth. In brief, panel data allow researchers to construct and test more-realistic behavioral models which could not be identified using cross-section or time series data alone (Hsiao 1985, p. 129).

Two main panel data models are of interest to researchers in this area. These are the fixed effect (FE) model and the random effect (RE) model. Fixed effect is the case in which the sample data from the cross-sectional units are not obtained by a random-sampling procedure (Haluk Erilat 1997, p. 11). Badi Hani Baltagi (2001) explains that FE models will be the appropriate specification if we are focusing on a specific set of n . Conversely, when n individuals are drawn from a large population, random specification is more appealing (Mátyás and Sevestre 1996, p. 31). In our study, FE models are more appropriate. Equation (1) is a panel data regression with individual-fixed effects:

$$Y_{it} = \alpha_i + \beta' x_{it} + u_{it}. \quad (1)$$

Here, Y_{it} is the dependent variable and x_{it} is a $k \times 1$ vector of independent variables. α_i is a 1×1 scalar constant representing the effects of those variables peculiar to the i^{th} individual in more or less the same fashion over time (Hsiao 1986, p. 29). α_i represents the unknown intercepts to be estimated, one per individual. β' is a $1 \times k$ vector of constants. For each variable, β is the same for all individuals, whereas the intercept varies from one individual to the next. Additionally, u_{it} is an independently identically distributed random variable with zero mean and variance σ_u^2 (Hsiao 1986, p. 29). The effects of those variables peculiar to the t^{th} period can be presented with Equation (2), which is a panel data regression with time-fixed effects:

$$Y_{it} = \alpha_t + \beta' x_{it} + u_{it}. \quad (2)$$

Both individual- and time-fixed effects can be presented with Equation (3), which is a panel data regression with both individual- and time-fixed effects:

$$Y_{it} = \alpha_i + \alpha_t + \beta' x_{it} + u_{it}. \quad (3)$$

The panel data models in Equations (1) and (2) are called one-way models. This is because these two models allow only one effect (individual or time) in the model specification. Conversely, the panel data model in Equation (3) is called a two-way model. Such a model allows two effects at the same time. In addition, a common intercept term (μ) can be introduced into these models. The pooled OLS (ordinary least square) model, which is a potential alternative to the above three FE models, can be presented with Equation (4):

$$Y_{it} = \alpha + \beta'x_{it} + u_{it}. \quad (4)$$

In this equation, each variable α is the same for all individuals who indicate the intercept term is common. The right choice or the appropriate model choice from among the above four panel data models is formally based on redundant fixed-effect F -tests. The null hypothesis shows that the pooled OLS model is appropriate, and the contrary hypothesis shows that the FE model is appropriate.

4. Application

The primary interest of this study is to investigate whether privatization affects foreign direct investment. The secondary interest is to determine other explanatory variables that may affect foreign direct investment. To pursue both investigations, foreign direct investment (FDI) was treated as the dependent variable of the panel data regression models. Privatization (PRI), growth (GRO), trade openness (TR), corruption perceptions index (CPI) and budget deficit (BDEF) were treated as the independent variables of the panel data regression models. The proposed functional relationship can be written in the following closed form:

$$FDI = f(PRI, GRO, TR, CPI, BDEF).$$

This functional relationship can be written by using a two-way FE panel data model with the following form:

$$FDI_{it} = \beta_1 PRI_{it} + \beta_2 GRO_{it} + \beta_3 TR_{it} + \beta_4 CPI_{it} + \beta_5 BDEF_{it} + \alpha_i + \alpha_t + u_{it}. \quad (5)$$

The economic expectations for the parameters of independent variables are as follows: as privatization increases, foreign direct investment is expected to increase. Therefore, the economic expectation is positive: $\frac{\partial FDI_{it}}{\partial PRI_{it}} > 0$ or $\beta_1 > 0$. As growth increases, foreign direct investment is expected to increase. Therefore, the economic expectation is positive: $\frac{\partial FDI_{it}}{\partial GRO_{it}} > 0$ or $\beta_2 > 0$. As trade openness increases, foreign direct investment is expected to increase. Therefore, the economic expectation is positive: $\frac{\partial FDI_{it}}{\partial TR_{it}} > 0$ or $\beta_3 > 0$. As the corruption perceptions index increases, foreign direct investment is expected to decrease. Therefore, the economic expectation is negative: $\frac{\partial FDI_{it}}{\partial CPI_{it}} < 0$ or $\beta_4 < 0$. As the budget deficit increases, foreign direct investment is expected to decrease. Therefore, the economic expectation is negative: $\frac{\partial FDI_{it}}{\partial BDEF_{it}} < 0$ or $\beta_5 < 0$.

Fourteen founder states of the EU were analyzed. Sorted in alphabetical order, the countries are the following: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden and the United Kingdom. Although Luxembourg was a founder state, this state has been left out because of the lack of data. All of the data consisted of yearly data from 1998-2012. A total of 210 observations ($14 \times 15 = 210$) for each variable were used in the estimation of panel data regression analyses.

FDI data were gathered from the website of the United Nations Conference on Trade and Development (UNCTAD 2014). FDI was measured in US dollars. PRI data were compiled from the Privatization Barometer Report (2014). PRI data values were composed of US dollars. GRO was gathered from the World Bank (2014b)⁴. GRO was measured as percentage change according to the previous year. TR data were gathered from the UNCTAD (2014). TR was measured as the ratio of GDP. CPI data were gathered from the Transparency International (2014)⁵. Corruption is perceived to be rampant in countries with a score less than 2 out of 10. Conversely, very low levels of perceived corruption exist in countries with a score higher than 9 out of 10. BDEF data were gathered from the World Bank (2014c)⁶. BDEF was measured as the ratio of GDP.

OLS, one-way fixed effect with cross-section effects and one-way fixed effect with period-effects model estimation results are presented in Table 6.

Table 6 Estimation Results

	Pooled OLS (Model 1)	One-way FE with cross-section effects (Model 2)	One-way FE with period effects (Model 3)
Constant	-2106.638 (0.8891)	13216.52 (0.7729)	-100023.96 (0.5103)
Independents			
<i>PRI</i>	1.449518 (0.0019)*	0.820848 (0.0521)***	1.274049 (0.0069)*
<i>GRO</i>	1399.487 (0.1744)	1286.300 (0.1512)	-153.1386 (0.9206)
<i>TR</i>	121.7277 (0.3410)	364.997 (0.3414)	113.7075 (0.3755)
<i>CPI</i>	2175.669 (0.2538)	-838.8191 (0.8723)	3470.304 (0.0709)***
<i>BDEF</i>	-644.0522 (0.4185)	68.90123 (0.9227)	-1638.571 (0.0625)***

⁴ **World Bank.** 2014b. Data. <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?view=chart> (accessed May 24, 2014).

⁵ **Transparency International.** 2014. Corruption Perception Index. <https://www.transparency.org/research/cpi/overview> (accessed June 19, 2014).

⁶ **World Bank.** 2014c. GovData360. https://govdata360.worldbank.org/indicators/h98c97be4?indicator=28953&viz=line_chart&years=2007,2017#table-link (accessed May 08, 2014).

Statistics

R^2	0.061	0.488	0.167
\bar{R}^2	0.038	0.439	0.084
F	-	10.1223 (0.000000)	2.012208 (0.009544)
SSR	2.69E+11	1.46E+11	2.38E+11
Akaike	23.86443	23.38178	23.87781
Schwarz	23.96006	23.68461	24.19658
Hannan-Quinn	23.90309	23.50420	24.00668
DW	0.96	1.71	0.91

Notes: The dependent variable is FDI in each model. p -values are given in parentheses. SSR and DW are, respectively, the abbreviations of sum squared residuals and Durbin Watson statistics. * show that the parameter is statistically significant at the 1% significance level. ** show that the parameter is statistically significant at the 5% significance level. *** show that the parameter is statistically significant at the 10% significance level.

Source: Authors' calculations.

In this situation, one can decide which model is proper by comparing the SSR, Akaike, Schwarz and Hannan-Quinn Criteria. The model that has the lowest values indicates the most proper model. In this case, Model 2 is chosen. However, as is emphasized before, model selection is utilized with redundant fixed-effect test statistics in the panel data approach. Therefore, Table 7 shows the test results.

Table 7 Redundant Fixed Effect Test Statistics

Effect tests	F-statistics	d.f.	p -value
Cross-section	12.252267	(13,191)	0.0000
Period	1.729518	(14,190)	0.0526

Source: Authors' calculations.

The redundant fixed-effect test statistic's p -value ($p = 0.0000 < \alpha = 0.05$) for cross-section effect shows that cross-section effects are significant. Conversely, the p -value ($p = 0.0526 \geq \alpha = 0.05$) for period effect shows that period effects are not significant. Additionally, an estimation of the fixed-effect model with both cross-section and period effects is unnecessary. Therefore, the decision is to include only cross-section effects in the panel data regression model specification. This result also indicates that Model 2 outperforms the other potential panel data models.

In the present case, our approach is to estimate Model 2 with the proper estimation method. The estimation results are presented in Table 8.

Models 4 and 5 were estimated with the panel EGLS (cross-section SUR) method. This method enabled us to address the serial correlation problem and to obtain more-reliable estimates. The only difference between Model 4 and Model 5 is the absence of a BDEF independent variable. First, Model 4 was estimated and the BDEF parameter was found insignificant. Then, BDEF was dropped from the regression model and Model 5 was estimated.

Table 8 Estimation Results

	One-way FE with cross-section effects (Model 4)	One-way FE with cross-section effects (Model 5)
Constant	12466.76 (0.0000)*	13298.63 (0.0000)*
<i>Independents</i>		
<i>PRI</i>	0.778610 (0.0000)*	0.788238 (0.0000)*
<i>GRO</i>	1256.457 (0.0000)*	1301.137 (0.0000)*
<i>TR</i>	355.9378 (0.0000)*	348.7284 (0.0000)*
<i>CPI</i>	-666.2496 (0.0189)**	-759.3058 (0.0025)*
<i>BDEF</i>	37.44284 (0.3819)	-
<i>Statistics</i>		
R^2	0.954	0.959
\bar{R}^2	0.950	0.955
F	225.0599 (0.000000)	267.3769 (0.000000)
SSR	205.8164	206.8232
DW	2.13	2.12

Notes: The dependent variable is FDI in each model. p -values are given in parentheses. SSR and DW are, respectively, the abbreviations of sum squared resid and Durbin Watson statistics. * show that the parameter is statistically significant at the 1% significance level. ** show that the parameter is statistically significant at the 5% significance level. *** show that the parameter is statistically significant at the 10% significance level.

Source: Authors' calculations.

In Model 5, all parameters including common intercept are statistically significant at the 1% significance level (p -value = 0.0000 < α = 0.01). Moreover, the p -value of the F -statistic implies that the model fits the data well (p -value = 0.0000 < α = 0.01).

The coefficient of determination value (0.959) shows that privatization, growth trade openness, and corruption perceptions index collectively explain ninety-five percent of the total variation of foreign direct investment. DW statistics equal to 2.12 shows that there is no first-order serial correlation.

5. Conclusion

FDI is viewed as a central part of countries' economic policy. There is competition between countries to attract foreign investors. Therefore, the determinants of FDI are crucial elements. Privatization has contributed to inflows of FDI. Many studies show that attracting FDI depends not only on indicators such as trade policy and political stability but also on privatization. The econometric analysis conducted for this paper supports the main hypothesis that privatization had a statistically significant positive effect on FDI in 14 EU nations in 1998-2012. After analysis, the following findings were obtained:

(i) The primary independent variable, privatization, was found to affect the dependent variable FDI. The coefficient of privatization (β_1) was found to be statistically significant and has a positive effect on FDI ($\beta_1 > 0$); thus, as privatization increases, FDI also increases. The increase that occurred in globalization resulted in an increase in privatization in the 1990s. Because the privatized companies had potential for high profits, they became attractive investments for foreign direct investors. In particular, the privatized companies in fourteen founder states of the EU comprised infrastructural investments such as electricity, telecommunications and transportation.

(ii) Economic growth, trade openness and corruption perceptions index as the secondary independent variables were found to affect the dependent variable FDI. The coefficients of economic growth (β_2), trade openness (β_3) were found to be statistically significant and have a positive effect on FDI ($\beta_2, \beta_3 > 0$). Thus, as economic growth and trade openness increase, FDI also increases. As imposed restrictions on importation and exportation are reduced in any country, FDI inflows increase in that country. The steady growth rates of the fourteen founder states of the EU in 1998-2012 awakened foreign direct investors' interest. The steady increase in growth rates resulted in an increase in foreign direct investment. Some policies such as removing international trade barriers, and liberalization of foreign exchange regime increased trade openness thereby FDI also increased in the period of 1998-2012. The coefficient of corruption perceptions index (β_4) was found to be statistically significant and has a negative effect on FDI ($\beta_4 < 0$); thus, as the corruption perceptions index increases, FDI decreases. The average of the corruption perceptions index for the fourteen founder states of the EU in 1998-2012 is 7.46 which is close to low levels of perceived existence of corruption. This can be considered a good sign for investors who are considering investing in those countries. Additionally, the panel regression estimate supported this attraction. The increase in the corruption perceptions index resulted in a decrease in foreign direct investment for the fourteen founder states of the EU in 1998-2012.

(iii) The fourth secondary independent variable budget deficit was found not to affect the dependent variable FDI. The coefficient of budget deficit (β_5) was found to be statistically insignificant. The global financial policies that were adopted after the 1990s by the fourteen founder states of the EU resulted in low levels of budget deficits. Therefore, the importance of this indicator declined. The panel regression estimation result reflects this decline.

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