

## Foreign direct investment outflow as a determinant of exports from Central and Eastern Europe – evidence from Poland

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**Abstract.** For Poland, as well as for other Central and Eastern European countries, export is an important factor for economic development. Particular importance of exports in these countries is attributed to FDI inflows. However, both theory and empirical research indicate that FDI outflows (even though their values are smaller than the values of inflows) may also affect exports from these countries. After 2004 there was a sharp increase in Polish investments in Europe, which was also the main destination of Polish exports, raising the question of how this would affect exports. The purpose of this paper is to prove that FDI outflow affects exports more than its inflow. Granger causality test was used to examine the causality between the accumulated FDI flows and exports in selected manufacturing industries. The study showed that FDI outflow was determining exports in three industries, whereas FDI inflow was dictating exports in two industries. Additionally, there was causality from FDI outflow to exports at the macroeconomic level and from exports to FDI inflow at the sector level (manufacturing). The conclusion is that more emphasis should be put on examining the consequences of FDI outflow from the countries of Central and Eastern Europe.

**Received:**  
November, 2020

**1st Revision:**  
August, 2021

**Accepted:**  
December, 2021

DOI:  
10.14254/2071-  
8330.2021/14-4/2

**Keywords:** FDI outflows, export, Central and Eastern Europe, Granger causality

**JEL Classification:** F14, F21, F41

### 1. INTRODUCTION

Over the past decades, economic cooperation has become a key factor of economic development that allows countries to become part of the global market. Especially in the case of Central and Eastern European (CEE) countries after the demise of communism, joining the international market was an important goal of

economic policy, thanks to which these countries could gain access to the capital necessary to ensure conditions for modernizing the economy.

Foreign direct investment (FDI) is the most desirable form of capital flow, especially for developing countries. In research by most economists FDI is not only a part of financial capital flow, which is actually a minor part of capital flows (Lipsey, 2007). FDI provides the host economy with production equipment as well as technological, organizational and business knowledge (Lipsey, 2007; Mody, 2004). Therefore, FDI is treated as an important factor of economic development.

With regards to the role of capital flows in developing countries, the literature on FDI inflow is more voluminous than the literature focusing on the effects of FDI outflow. The dominance of research on the impact of capital inflows on the economy (notably visible in the case of the CEE countries) results from two main facts:

- FDI outflows from developing countries are marginal – considerable values of FDI appear at a higher level of economic development. In the case of Poland, the first significant FDI outflow was recorded in 2004,
- developing countries are more focused on attracting foreign investment due to scarcity of capital. It was evident in the case of the CEE countries that attracted FDI which, to a certain extent, facilitated the modernization of the economy after the 1990s. Therefore, researchers focus on investigating the influence of FDI inflows on the host economy (especially on the labour market and local firms).

According to the World Bank, in 2018 exports in Central Europe and the Baltics accounted for 65,5% of GDP in these countries, while the EU average was 44,8%. Moreover, exports is considered to be a particularly important component of the GDP growth rate of the CEE countries, especially after the accession to the European Union (Hagemeyer & Mućk, 2018). When it comes to FDI outflows from Poland, their values are growing at a faster pace than the values of exports and imports (UNCTAD, 2018; GUS, 2018), therefore they are becoming an increasingly important form of serving foreign markets.

In the case of growing importance of export and increasing flows (especially outflows) of FDI, identifying relationship between export and FDI may be a source of significant knowledge that will enable the CEE countries to shape the volume of FDI flows and exports in such a way that makes it possible to meet the objectives of macroeconomic policy.

The aim of this article is to test causality between FDI flows and exports in selected manufacturing industries. The main research hypothesis is that after 2004 (when the first significant investments from Poland took place) FDI outflows from Poland had a greater impact on exports than FDI inflows. The choice of the direction of impact was chosen based on a literature review – empirical research until mid-1980s proved causality from export to FDI, but after this period the relationship between the aforementioned forms of serving foreign markets has reversed (Fontagné, 1999).

Positive verification of the main hypothesis requires co-occurrence of two conditions:

- FDI outflows are causing exports,
- FDI outflows affects exports in more industries than FDI inflows.

The research involves annual data on FDI inflows, outflows and export by industries published by the National Bank of Poland and the World Bank. The latest data come from 2019, and the first considerable FDI outflow took place in 2004, therefore the research covers the years 2004-2019.

The remainder of the paper is organised as follows: the second section presents the links between FDI and exports resulting from the FDI theory and previous empirical studies, the third section provides some facts on Polish exports and FDI flows, in section four the empirical methodology is explained and the paper ends with the summary of the main findings of the study.

## 2. LITERATURE REVIEW

In this section similar studies concerning causality between FDI outflows and export in Europe are presented. Before that, however, it should be explained how FDI outflow and export can interact. This step is necessary in the case of testing for Granger causality because “drawing conclusions whether a causal relation exists between investigated time series and about its direction is possible only if theoretical knowledge of mechanisms connecting the time series is accessible” (Maziarz, 2015). Therefore, the following part outlines the theory of FDI motives by Dunning and Lundan (2008). In the description we emphasize the linkages between FDI outflows and exports stemming from these motives.

Firstly, it is worth to notice that most economic explanations of engaging in international production do not contain explicitly specified motives of engaging in foreign markets, but only the variables that may have an impact on the behaviour of multinationals (Dunning 2008). As Vasyechko (2012) indicates, the determinants of foreign direct investments in transition economies result from both classical and transition-specific factors.

The following part presents the most known taxonomy of FDI motives from Dunning and Lundan (2008), taking into account the relationship between FDI and exports. This classification is the starting point for the analysis of causality between FDI flows and the country's exports.

According to Dunning and Lundan (2008), foreign investments undertaken by multinationals fall into four main types:

- 1) Resource seeking,
  - 2) Market seeking,
  - 3) Efficiency seeking,
  - 4) Strategic assets seeking.
- 1) This type of investments is undertaken in order to obtain access to specific kind of resource that are not available in home country or are cheaper abroad. Resources that are in demand can be natural resources as well as semi-skilled and unskilled labour (Badayi, 2017). Most of the production of resource seeking affiliates is exported mainly to developed, industrialised countries. Firms seeking strictly physical resources can originate from both developing and developed countries, which means that this type of investments concerns also FDI from the CEE countries.
  - 2) This motive of investments is strongly linked to exports and therefore fundamental for the assumptions of this paper. According to Dunning and Lundan (2008) investments are the outcome of changes in widely understood conditions for international trade that make exports a less profitable form of foreign expansion. The basic premiss of market-seeking investments is the fact, that barriers limiting exports contribute to the creation of FDI flows. The authors claim that most of this type of investments are preceded by exports, which is also confirmed by empirical research – firms prefer to invest in countries to which they previously supplied by exports (Horst, 1971; Blomstrom, 1988). Thus, it can be inferred that in market-seeking investments exports causes FDI outflows. Most of the production is sold in the country of production, however, this does not exclude the possibility of exporting to adjacent markets, what according to Franco et al. (2008) is one of the main problem for classifying such investments. In this paper (in the case of FDI outflow) country of destination of products manufactured by a foreign subsidiary does not affect the result of the research - only the fact of increasing or decreasing domestic exports under the influence of FDI outflows is important. Nevertheless, the country of destination of export is important from the perspective of FDI inflow, because if the destination country is considered as an export-platform, FDI inflows will cause an increase in exports from the host country. Investments that do not increase exports are typical of developed countries that have large and absorptive internal markets. The authors conclude that there are two significant determinants of choosing whether to invest

in order to supply exactly the market where the investment is made or to supply the neighbouring countries: market size and market growth rate. The size of the market is more important when the host country is also an export destination, while the rate of growth becomes more important when the host country is considered as an export-platform (Franco et al. 2008). Market-seeking investments can also be undertaken when one company invests abroad and its suppliers also move their business abroad to maintain market share (Dunning & Lundan, 2008). Such investments contribute to the relocation of the production of semi-finished products, and thus can reduce exports from the home country.

- 3) The aim of efficiency-seeking investments is to exploit differences in “cultures, institutional arrangements, demand patterns, economic policies and market structures, by concentrating production in a limited number of locations to supply multiple markets” (Dunning & Lundan, 2008). Efficiency-seeking investments are typical of experienced firms, which can invest in both developed and developing countries depending on the availability of the desired inputs. These investments are related to the position of a region in the value-added chain - in countries with cheap labour, firms producing labour-intensive semi-finished products, while developed countries are chosen as host countries for subsidiaries utilising relatively more capital, information and technology in their activities. Investments of this type enable all countries (regardless of their level of economic development) to participate in international trade.
- 4) Dunning defines strategic assets-seeking investments as undertaken in order to achieve the firm’s long-term objectives, such as sustaining or achieving global competitiveness. That kind of investments can be successfully undertaken by firms from developing countries. Although the theory of strategic assets-seeking motive of FDI was developed a long time ago, empirical research on this motive has only recently been conducted (e.g. He Yong and Zhou Hong, 2012).

Conclusions from the analysis of Dunning's theory and empirical research can be presented taking into account the division into FDI inflows and outflows:

- Inflows of capital may contribute to increasing the production capacity, and thus also exports of the host country. On the other hand, FDI inflow may be caused by exports when foreign firms are seeking “to benefit from the externalities on which domestic firms base their competitiveness” Fontagné (2008). As an example of such an investment, the author presents companies investing in the Silicon Valley in order to export electronics – that kind of FDI inflows may reduce exports.
- When a firm supplying foreign market by exporting decides to invest abroad it results in a decrease of exports from the investor’s country (Fontagné, 1999). Exports can be treated as the first stage of internationalisation of the activity. If a firm plans to expand abroad, the first form of expansion may be exports, thanks to which the firm is able to get familiar with the conditions on the market, and when this firm gains a position on that foreign market, it can decide to undertake investment in this country. Then, the value of exports from the home country of FDI decreases, and the foreign market is supplied by the subsidiary. In brief, exports initially affect FDI outflow, and then FDI outflow affects exports. Investing abroad might also increase exports from the home country. The aforementioned investments made in order to supply foreign market by producing in that country instead of exporting implies that the volume of demand is constant, but foreign subsidiary might also increase market and, consequently, exports from the home country may remain unchanged or even increase despite simultaneous production abroad. Nevertheless, these considerations concerned the choice between producing in the country and producing abroad, but FDI may also affect the exports of semi-finished products necessary to create the final product. If a firm moves production to another country, for example to reduce production costs, the exports of semi-finished products from the home country might also increase (Ries, 2004).

Besides the theory, there are also empirical studies on the topic. Although research on FDI inflows dominates in the literature, there are also studies (concerning mainly Western countries) investigating causality between FDI outflows and exports. Chiappini (2011) studied the relationship between FDI outflows and exports in 11 Western European countries. The author found homogenous causality from FDI outflows to export for all the countries and a heterogeneity for the causality from export to OFDI among the panel. In all the countries FDI outflows caused export and in some cases export caused FDI outflows, therefore there was a strong bidirectional Granger causality in countries like Germany, Austria, Portugal and the Netherlands. It means that these countries benefited from a virtuous circle where FDI entailed higher exports and higher exports reinforced FDI. Pfaffermayr (1996) examined the interplay between FDI outflow and exports in Austria. The author proved statistically significant both-directional causality between FDI and exports in Austrian manufacturing. Bajo-Rubio and Montero-Muñoz (2001) tested Granger causality between FDI outflows and export in Spain for the period 1977-1998. Quarterly data in short and long run proved causality from FDI to exports and bilateral causality, respectively. One of the latest research focusing on Central and Eastern Europe examined the relationship between FDI and exports within the Visegrad Group countries (Albulescu & Goyeau, 2019). The authors state that bilateral FDI outflow favours both imports and exports within these countries.

In brief, the taxonomy of FDI motives and empirical studies by other authors indicate some connections between FDI outflows and exports, which is a prerequisite for conducting Granger causality test (Maziarz, 2015). The cause-effect relationship between foreign investments and exports can be unidirectional or bidirectional for both inflows and outflows of FDI.

### **3. FDI FLOWS IN POLAND**

For Poland and other countries of Central and Eastern Europe that started the process of economic transformation in the early 1990s, capital flows were an important factor determining economic development in the new economic system. Due to many years of isolation from the rest of the world, these countries were not able to compete with foreign enterprises in terms of innovation and for the creation of a modern economy it was required to enable inflows of investments (and new technologies) to these countries (Pilarska, 2017). The most desired by developing countries form of foreign investment is FDI, which not only does not show a pro-cyclical behaviour, but also provides the economy with additional capital that increases production capacity (Acaravci & Oztruk, 2012).

In the 1990s there was a dynamic increase of FDI in Central and Eastern Europe - in 1996 foreign investment accounted for nearly one-fifth of total investments in this region (UNCTAD, 1998), which shows the significance of foreign investments for these countries. The increase of FDI inflows continued up to 2004 – with a slight decline after 2000, which is considered to be the aftermath of the dot-com bubble (Kamińska & Babula, 2014) – when the investments shoot up after the accession of 10 countries of the region to the European Union. Since then, Poland has been the main host of foreign investments among the new EU entrants. Even though Poland is the biggest host country for FDI among the CEE countries, it does not mean that this country monopolizes FDI inflows in the region. Foreign investments located in Poland are considered to be a catalyst for the inflow of investments to the rest of the CEE region (Suder & Sohn, 2016).

In 2004 a substantial FDI inflow took place, which was related to Poland's accession to the European Union (Figure 1). The value of FDI at that time reached 12,1 billion of USD, which was the highest value since the beginning of the period of the economic transformation. The highest value of investments was observed in 2007, just before the global economic crisis, which (due to the uncertainty in the markets) caused a significant decrease in investments in the following years. The period preceding the global financial

crisis was for Poland, similarly as for the other CEE countries, a period of increasing FDI inflows and relatively high economic growth (Tsitouras & Nikas, 2016). FDI strongly depend on world business cycle – in the years 2009-2010 the value of investments in Poland increased. During this period, FDI inflows to developing countries were increasing at a faster pace than to the rest of the world, which was caused, inter alia, by a faster recovery from the crisis (Cywiński & Harasym, 2012). Therefore, the increase in FDI inflows to Poland indicated a good economic situation in the country. The lowest value of investments since the second half of the 1990s was noted in 2013. However, in 2014 FDI inflow returned to the previous trend and amounted to roughly 14 billion of USD. A further decrease in the value of investments was observed in 2017, when FDI in Poland plummeted to approximately 6,4 billion of USD.



Figure 1. FDI flows in Poland in 2004-2019 (in constant prices of 2004)

*Source:* own calculations based on the National Bank of Poland data.

The value of FDI inflow has always been greater than the value of its outflow from Poland. The largest difference between the flows of investments could be seen in the years 2004-2012. After that period the inflow of foreign capital to Poland significantly decreased, which resulted in a smaller difference between current flows (similar decreases were observed in other countries of the Visegrad Group). Despite this, since 2004 we can state that the values of FDI inflow dominate over the values of FDI outflow.

Much of the literature put emphasis on the fact that the opening of the market to foreign capital in the case of Poland was necessary due to the need to replace the outdated, adapted to central planning machinery. Therefore, large discrepancies between the outflow and inflow of capital need not necessarily be perceived negatively. Other authors highlight that for the host country (especially developing countries) the inflow of FDI has a positive impact on GDP by increasing the resources of factors of production, and also, after some time, by increasing exports.

The appearance of FDI outflow from a country shows that it is at such a level of economic development that allows to compete on foreign markets. Less developed post-communist economies thanks to the progressing industrialization and the increasing accumulation of capital in the country now are able to generate larger capital outflows in the form of FDI. As Bojnec and Fertő (2017) state, the increase in the globalization rate in OECD countries entails an increase in the value of FDI outflow, hence the progressive integration of the region with the world economy fosters greater FDI outflows.

Small outflows of FDI from Poland after the period of economic transformation were caused, inter alia, by the large and growing size of the internal market, low savings rate and low degree of openness of the economy (Rosati and Wilinski, 2003). Undoubtedly, accession to the European Union had a significant impact on the value of foreign investments made by Polish firms. Access to the markets of the member states of the European Union has contributed to the increase of FDI originating from Poland - before 2004 the outflow of capital from Poland was scarce. Compared to 2000, in 2007 FDI outflow from Poland increased almost 320 times (Andreff and Balcet, 2013), which was the highest increase in the CEE region. Since the accession to the EU, the value of FDI outflow was fluctuating. In the first phase of the last economic crisis (i.e. in 2007-2009) the outflow of FDI from Poland was stable and hovered around 1,8 billion of USD. The changes in the geographical and industrial structure observed during this period are considered to be one-off fluctuations, probably resulting from individual larger investment projects (Klyszik-Uryszek, 2013). Then, a significant increase was observed after the first phase of the crisis, when the FDI outflow was 6,1 billion of USD. Foreign investments of Polish firms reached the highest value, slightly above 8 billion of USD, in 2016. Nevertheless, Poland generates the most foreign investments among the countries of the region, which is associated with the size of the internal market and large FDI inflows that favour FDI outflows (Stoian, 2013).

Polish FDI in manufacturing is located mostly in less developed countries with low labour costs. Interestingly, small European countries attracted relatively fewer industrial enterprises compared to countries with larger markets. In the case of adjacent to Poland Lithuania, Slovakia and Czech Republic the share of manufacturing entities from Poland did not exceed 40%, which indicates that – apart from labour costs – the size of the market is also a decisive factor for the location of manufacturing enterprises (Klyszik-Uryszek & Kuna-Marszalek, 2015). However, not every Polish manufacturing entity located abroad is involved in producing in host country. In Russia, Ukraine and Germany approximately 60%-70% of Polish manufacturing entities were engaged in producing manufacturing goods in these countries (Klyszik-Uryszek & Kuna-Marszalek, 2015). It means that these investments do not have an impact on exports because production is not moved abroad.

To sum up, with the opening of the Polish economy to foreign capital, the inflows of FDI definitely dominated over its outflows, which appeared in considerable values only after joining the European Union. The overwhelming dominance of inflows, however, allowed the country to accumulate capital and enabled the replacement of outdated machinery and technologies, which was a decisive factor paving the way for outflows of FDI from the country.

From the appearance of the first FDI outflows, the main destination of Polish investments are European Union countries (Figure 2). In 2004, only 50.2% of Polish FDI was undertaken in EU countries, but from then on, FDI accumulation in the EU has been gradually increasing. In 2007 it was 67.5%, while in 2017 it was 74% (in the years 2010-2017 accumulation fluctuated between 73% and 79% of total Polish FDI).

It is worth to notice that there is a clear division of relative importance of FDI and exports between the old and the new Union - EU-15 countries are preferred more as a destination of exports, and EU-10 countries are relatively more often a location of Polish FDI. Interestingly, although the countries of the new Union are mainly the destination for FDI, the Visegrad Group countries are rather trade partners than hosts for Polish investments.

Until the accession of 10 CEE countries to the European Union in 2004 the traditional division of foreign direct investment undertaken in Europe showed differences in motives for undertaking investments depending on the region - Western European countries were hosts for market-seeking investments, while in Eastern Europe foreign investors were interested in efficiency-seeking investments (because of lower costs of production). Over time, as a result of economic changes in the new member states, the determinants

of making investments in Eastern and Western Europe began to converge (Jimenez et al., 2017). Therefore, we cannot explicitly link the geographical direction of FDI with the motive for undertaking FDI in these regions. For example, the motive for undertaking FDI in Romania (but also eastern countries like Ukraine and Russia) is market seeking, while investments in Germany and the Czech Republic are described as seeking technology and qualified workforce (Przybylska, 2016). Hence, we cannot infer the direction of the causal link between FDI and exports from just Figure 2.

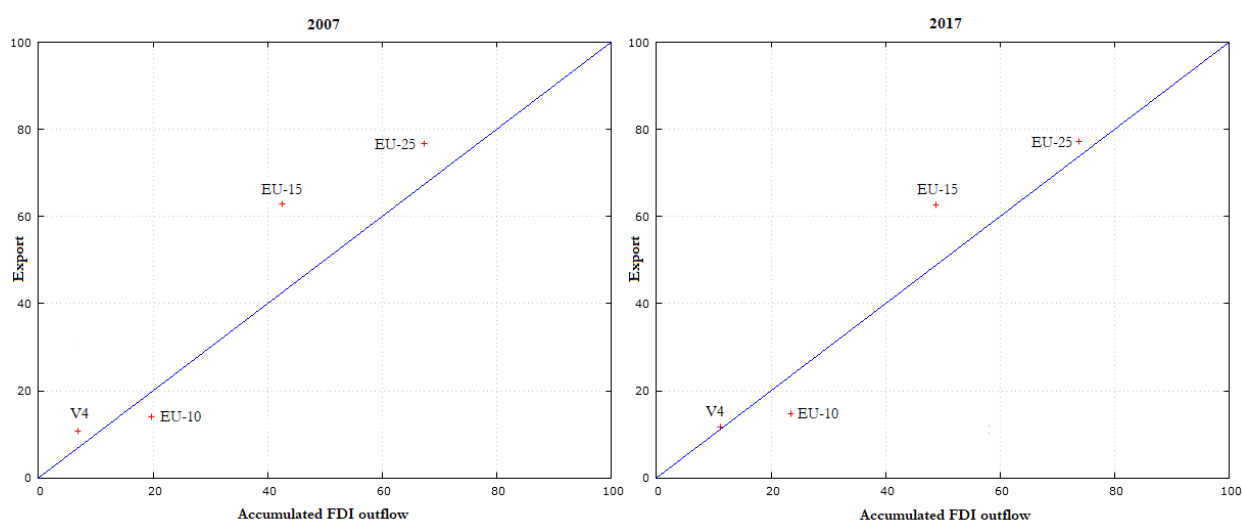


Figure 2. Exports and accumulated FDI outflow to European regions in 2007 and 2017  
(as % of total values)

Source: own calculations based on NBP and GUS data.

Equally important is the fact that the percentage structure of exports destination has not changed significantly between the compared periods, in contrast to the structure of accumulated FDI outflows. Over the last 10 years, the share of FDI accumulated in the European Union (in both Eastern and Western countries) has increased significantly.

The question arises whether the gradual increase in the share of FDI accumulation in the European Union countries was caused by the dominance of this region as export destination or it was FDI that affected exports. The latter would mean that the growing accumulation of investments in the EU countries may affect Polish exports in the future.

#### 4. METHODOLOGY

Most empirical research on the impact of FDI outflow on export focus mainly on the analysis of the correlation between both forms of entering foreign markets. These studies concentrate on investigating which form of serving foreign market is more preferred by firms and how it affects the other form. However, correlation between two variables does not indicate that one is the cause and the other is the effect. In this study, the causality between FDI flows and export is tested. Although Granger causality has already been used to investigate the links between FDI and exports (also in the CEE region), this study is conducted on other type of data. Most research focuses on total exports and FDI stocks, while in this paper accumulated FDI flows and exports by industries are analysed. For all we know, this is the first paper examining the impact of FDI flows on exports in the CEE countries using the following methodology.

The study was conducted in the following order:



- extracting the trend from the time series,
- performing unit root test (Augmented Dickey-Fuller test),
- conducting Granger causality test between the residuals.

First, the linear trend was extracted from the time series so as to use the residuals for further calculations. A popular method of estimating the cyclical component used in modern econometrics is the Hodrick-Prescott filtering (HP filtering), which allows the extraction of the cyclical component by removing the obtained trend from the original time series. However, Hamilton's analysis (2017) shows that the Hodrick-Prescott filter is not the most optimal - as previously thought - method of the time series decomposition. The trend estimated using the HP filter is calculated by "adding the low frequency component (the long-term periodic fluctuation) of the linearly detrended series to the linear trend" (Yamada, 2018) which makes the HP trend looking more plausible than the linear trend estimated by ordinary least squares (OLS). Unfortunately, the filter proposed by Hamilton (2017) for annual data would require the calculation of residuals based on four lagged values of variables back-shifted by two, which would significantly reduce the time span of the study (because of eliminating six initial observations). Hence, the decomposition of the original time series was conducted by eliminating the linear trend estimated by ordinary least squares (OLS) and calculating first differences of times series where necessary.

The second stage of the study stems from the use of time series. Stationarity was tested using the Augmented Dickey-Fuller test (ADF test) with null hypothesis: "a unit root is present in a time series sample". The null hypothesis is rejected at 10% significance level.

In the final step, Granger causality is applied as the method of testing causality between variables. The matrix form of the test can be expressed as:

$$\begin{bmatrix} EX_{I_t} \\ KO_{I_t} \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} EX_{I_{t-1}} \\ KO_{I_{t-1}} \end{bmatrix} + \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix} \begin{bmatrix} EX_{I_{t-2}} \\ KO_{I_{t-2}} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix},$$

and

$$\begin{bmatrix} EX_{I_t} \\ KI_{I_t} \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} EX_{I_{t-1}} \\ KI_{I_{t-1}} \end{bmatrix} + \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix} \begin{bmatrix} EX_{I_{t-2}} \\ KI_{I_{t-2}} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix},$$

where:

- $EX_{I_t}$  – export of  $I$  industry,
- $KO_{I_t}$  – FDI outflow from  $I$  industry,
- $KI_{I_t}$  – FDI inflow to  $I$  industry,
- $a, b$  – parameters of the model,
- $\varepsilon_{1t}, \varepsilon_{2t}$  – random elements.

According to Granger's concept, X is the cause of Y when the past values of the variable X are useful in explaining the volatility of the current values of the variable Y (Granger 1980). It should be emphasized that the occurrence of causality in Granger's sense does not mean "causality" in colloquial sense, Granger causality does not necessarily mean that there is a cause and effect relationship between the variables (Granger, 2003).

At each stage of the research test statistics were calculated. Each test includes p-value and  $t$  statistic. It was assumed that for each test at 10% level of significance null hypothesis is rejected. Due to the relatively

small number of observations the maximum delay value is 2, which was selected using Akaike Information Criterion (AIC).

One of the problems in studying the relationship between FDI and foreign trade is the lack of the same nomenclature for both phenomena. In the case of foreign trade, the NBP uses the SITC (Standard Classification of International Trade), CN (Combined Nomenclature), and PKWiU (Polish Classification of Products and Services) nomenclatures. The World Bank also uses its own nomenclature. Classifications used for trade only partially overlap with the breakdown of foreign direct investment used by the NBP, which makes it impossible to examine the links between FDI and exports in some industries.

The research includes the following manufacturing industries: “food products, beverages and tobacco products”, “textiles and wearing apparel”, “wood, paper & their products”, “chemicals and chemical products”, “rubber and plastic products” and “motor vehicles and other transport equipment” (see Appendix 1). These industries were selected due to the availability of data. The time range also depended on the availability of data (16 years). Unfortunately, the lack of sufficient time series makes it impossible to examine short- and long-run causality in the case of the CEE region (Tsitouras and Nikas, 2016), hence there is only one result of the causality for the aforementioned time range.

The research on the relationship between FDI and export is dominated by research on FDI stocks (Albulescu and Goyeau, 2019). The authors avoid using current flows due to their greater volatility compared with stocks (Chiappini, 2011). In this paper, the problem of volatility was eliminated by accumulating current flows, which were converted into constant prices of 2004. Therefore, the impact of the value of FDI at the time of undertaking investment on the value of exports is examined. Doing research on flows would be recommended in the case of investigating complementarity and substitutability between FDI and export in order to indicate which form of serving foreign markets is preferred by domestic firms. In the case of testing the value of accumulated current flows, the value of exports is influenced by both the value of the current outflow and the value of the previously accumulated Polish FDI abroad. This methodology seems to be equivalent to using FDI stock, but there are some substantial differences. First of all, FDI stock does not equal to the sum of former flows, which is the consequence of currency fluctuation, revaluations, and other factors (Bruno et al., 2017). Secondly, FDI stock would require more computations to calculate the initial value of FDI for the periods included in the study.

Most studies use total values of FDI and export. However, there are also some papers investigating links between FDI and export by industries (Lipsey and Weiss, 1981; Blomstrom et al., 1987). The data show that nowadays FDI in services is the most important part of global FDI flows which reflects the growing importance of services in the value added chain among OECD countries (Wölfl, 2005). Nonetheless, there are some aspects that make it unreliable to investigate causality between export and FDI in services. Growing importance of intangible assets is affecting the possibility to define the location of the production of services, because such assets have no clear geographical location (Lipsey, 2007). Additionally, investments in non-tradeable industries may have no influence on export. Hence, services are not included in this study.

#### 4. EMPIRICAL RESULTS AND DISCUSSION

First, the detrended time series are tested for a unit root. The null hypothesis for the test is that “a unit root is present in a time series sample” which means, that we cannot test Granger-causality with that time series. As mentioned before, optimal value of lags was based on Akaike Info Criterion. The results of ADF test are presented in Table 1. Critical values for test statistics can be compared with Davidson and MacKinnon (1993) reference tables.

Table 1

## Augmented Dickey-Fuller test results

Export	P-value	Test statistic	FDI outflow	P-value	Test statistic	FDI inflow	P-value	Test statistic
EXP	0.003***	-3.75	OFDI	0.017**	-3.26	IFDI	0.004***	-3.71
EXP_1	0.002***	-3.87	OFDI_1	<0.001***	-5.82	IFDI_1	0.005***	-4.36
EXP_11	<0.001***	-4.47	OFDI_11	<0.001***	-5.65	IFDI_11	<0.001***	-5.69
EXP_12	<0.001***	-4.86	OFDI_12	<0.001***	-6.56	IFDI_12	0.573	-1.42
EXP_13	0.018**	-3.24	OFDI_13	0.043**	-3.18	IFDI_13	0.005***	-4.41
EXP_14	0.001***	-3.98	OFDI_14	0.015**	-3.29	IFDI_14	0.028**	-3.43
EXP_15	0.005***	-3.63	OFDI_15	0.0485**	-3.12	IFDI_15	0.074*	-2.7
EXP_16	0.029**	-3.07	OFDI_16	0.083*	-2.8	IFDI_16	0.002***	-4.92

Notes: null hypothesis: a unit root is present in a time series sample; \*\*\*, \*\*, and \* denotes significance at the 1%, 5%, and 10%, respectively; optimal lags: 1; data for years 2004-2019; N=16.

Source: own calculations.

According to the accepted significance levels, all export and FDI outflow time series are stationary at their optimal lags. As regards FDI inflow, the value of the ADF test does not allow us to reject the null hypothesis, so this series is non-stationary and we cannot perform the Granger test with IFDI\_12 variable (the “textiles and wearing apparel” industry).

The next step is to test for Granger causality. The results of the test are presented in Table 2. First of all, we can see that at the macroeconomic level there was only one statistically significant causality. Total value of FDI outflow was causing exports from Poland. It also shows that total FDI inflow did not affect exports since 2004, which at the first glance seems to be in contrast to common belief in the literature concerning the economic transformation process that foreign capital affects exports. However, these results can be affected by aggregation bias, which requires more in-depth analysis.

As regards sector level analysis we obtained different results. In this case there was causality from FDI inflows to exports, which is at variance with the macro-level analysis. This results can indicate that the common belief that foreign capital in Poland is important for exports is still valid – the role of foreign capital in shaping exports seems to be as important as at the beginning of the economic transformation, but it is visible only in the manufacturing sector.

The industry level analysis shows that FDI inflow was causing exports in two industries – foreign capital in the “chemicals and chemical products” industry and in the “motor vehicles and other transport equipment” was causing exports in the period investigated. As we know from other studies (e.g. Hoekman and Djankov, 1996), Poland and the other Visegrad Group countries have been attracting many investments in the automotive industry since the beginning of the economic transformation, and the exports of motor vehicles from this region can be associated with these FDI inflows. Our study might indicate that this pattern is still visible. As regards FDI outflow we can see that it was causing exports in three industries. Outflows of capital from the “textiles and clothing”, “chemicals and chemical products” and “plastic and rubber” industries (OFDI\_12, OFDI\_14 and OFDI\_16, respectively) were causing exports in the period investigated. It means that at the industry level FDI outflow explains exports in more industries than FDI inflow. This conclusion is in line with our main hypothesis – FDI outflow from Poland is statistically significant enough to explain exports in more industries than FDI inflow. Nevertheless, these results should be treated with caution. First of all, the small number of available industries should be treated as a limitation of the study. Secondly, the presence of Granger causality in a greater number of industries in the case of FDI outflow does not mean that changes in the value of exports caused by the outflow of capital are greater

than in the case of FDI inflow. These results indicate only the high statistical significance of the capital flow variable in the equation showing the value of exports in industries. It should also be noted that these results can only show the direct impact of FDI outflows on exports, as the available data do not distinguish between investments made by originally Polish firms and by foreign subsidiaries (Gorynia et al., 2011). It means that the outflow of FDI could be the result of investments by foreign companies that had previously invested in Poland. Hence, FDI inflow might indirectly affect exports through FDI outflow.

Table 2

## Granger causality test results

	Cause	Effect	P-value	Test statistic		Cause	Effect	P-value	Test statistic
EXP → IFDI	EXP	IFDI	0.747	0.11	EXP → OFDI	EXP	OFDI	0.876	0.02
	EXP_1	IFDI_1	0.065*	3.78		EXP_1	OFDI_1	0.258	1.35
	EXP_11	IFDI_11	0.054*	4.15		EXP_11	OFDI_11	0.418	0.68
	EXP_12	IFDI_12	-	-		EXP_12	OFDI_12	0.826	0.05
	EXP_13	IFDI_13	0.017**	6.69		EXP_13	OFDI_13	0.893	0.02
	EXP_14	IFDI_14	0.285	1.21		EXP_14	OFDI_14	0.424	0.66
	EXP_15	IFDI_15	0.141	2.34		EXP_15	OFDI_15	0.588	0.30
	EXP_16	IFDI_16	0.323	1.02		EXP_16	OFDI_16	0.540	0.39
IFDI → EXP	IFDI	EXP	0.966	<0.01	OFDI → EXP	OFDI	EXP	0.093*	3.06
	IFDI_1	EXP_1	0.138	2.36		OFDI_1	EXP_1	0.901	0.02
	IFDI_11	EXP_11	0.310	1.08		OFDI_11	EXP_11	0.984	<0.01
	IFDI_12	EXP_12	-	-		OFDI_12	EXP_12	0.050*	4.32
	IFDI_13	EXP_13	0.587	0.30		OFDI_13	EXP_13	0.341	0.95
	IFDI_14	EXP_14	0.041**	4.69		OFDI_14	EXP_14	0.018**	6.59
	IFDI_15	EXP_15	0.885	0.02		OFDI_15	EXP_15	0.070*	3.64
	IFDI_16	EXP_16	0.044**	4.55		OFDI_16	EXP_16	0.361	0.87

Notes: H(0): variable X is not causing variable Y; \*\*\*, \*\*, and \* denotes significance at the 1%, 5%, and 10%, respectively; optimal lags: 2; data for years 2004-2019; N=16.

Source: own calculations.

Another interesting result of the study is that exports did not cause FDI outflow at any level of the study. As previously explained, throughout the period considered in this paper the accumulation of Polish FDI in the EU countries was increasing, which could suggest that it was caused by the domination of EU countries as the destination of exports. However, the results of the Granger causality test show that this hypothesis should be rejected. FDI inflow was caused by exports of the manufacturing sector (EXP\_1) and by exports of food products and wood (EXP\_11 and EXP\_13, respectively). Another interesting result is that FDI inflow was affecting exports of chemicals and motor vehicles (EXP\_14 and EXP\_16, respectively), which can be indicative of export-platform FDI located in these industries.

## 5. CONCLUSION

The main purpose of this paper was to prove that since 2004, when the first substantial investments from Poland took place, FDI outflows from Poland affect export more than FDI inflows.

The data show that the outflows of FDI from Poland (as well as from other countries of the CEE region) are increasing at a faster pace than FDI inflows. Although FDI outflows from developing countries

are marginal, both existing theory and data suggests possible ways in which FDI and export may interplay. Therefore, we should put more emphasis on studying the impact of FDI outflows in these economies.

The purpose of this paper was reached by using Granger causality test. Although this test is relatively often used to test for causality between FDI and export, a new methodology was employed in this article to achieve the goal. The test was conducted with data on the accumulation of FDI flows since 2004 and exports (all data in constant prices of 2004) at the macroeconomic, sector, and industry level.

The results of the tests showed that there is a statistically significant causality running from both FDI inflow and outflow to exports. At the macroeconomic level there was only one linkage found - FDI outflow was causing exports. At the sector level exports was causing FDI inflow in manufacturing. At the industry level there was causality from FDI inflow to exports in the chemical and automotive industries, whereas FDI outflow was causing exports from the plastic and rubber, textiles and chemical industries. Additionally, exports was causing only FDI inflow (in the manufacturing sector, but also in the food production and wood industries).

FDI outflow was causing trade in three industries, while in the case of FDI inflow in two industries. It shows that in the case of manufacturing industries in Poland, FDI outflows have impact on more industries than FDI inflows, which allows to verify the main hypothesis of the study – since 2004 FDI outflow explains exports from Poland better than FDI inflow. The main conclusion from the research is that after 2004 FDI outflows from the manufacturing industry have bigger influence on exports than FDI inflows. FDI outflows are explaining exports from more manufacturing industries than FDI inflows, thus – despite the relatively small importance of foreign investments from Central and Eastern European countries – FDI outflows can also have statistical significance in explaining international trade in the region.

Despite the fact that the geographical and time scope of the study is very limited, it may set the direction for further research for other authors. First of all, the study may be useful for other researchers studying the relations between FDI and foreign trade in the CEE countries. The trends in the convergence of investment motives between the EU-10 and EU-15 countries described in the study may indicate that the regularities presented in the empirical part of the study may be of a regional nature. Other researchers may also replicate this study for other countries. Moreover, the results of the study can be treated as an argument for incorporating the outflow of capital in models describing international trade in the CEE region.

## ACKNOWLEDGEMENT

Paper financed from the author's own funds. The research methodology was partly based on the thesis written under the supervision of prof. Marek A. Dąbrowski, Department of Macroeconomics, Cracow University of Economics.

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**APPENDIX 1**

<b>Marking</b>	<b>Industry</b>
EXP	Total exports
EXP_1	Total exports of the manufacturing sector
EXP_11	Exports of food products
EXP_12	Exports of textiles and clothing
EXP_13	Exports of wood
EXP_14	Exports of chemicals
EXP_15	Exports of rubber and plastic
EXP_16	Exports of transport equipment
OFDI	Total FDI outflows
OFDI_1	FDI outflows from the manufacturing sector
OFDI_11	FDI outflows from the “food products. beverages and tobacco products” industry
OFDI_12	FDI outflows from the “textiles and wearing apparel” industry
OFDI_13	FDI outflows from the “wood, paper & their products” industry
OFDI_14	FDI outflows from the “chemicals and chemical products” industry
OFDI_15	FDI outflows from the “rubber and plastic products” industry
OFDI_16	FDI outflows from the “motor vehicles and other transport equipment” industry
IFDI	Total FDI inflows
IFDI_1	FDI inflows to the manufacturing sector
IFDI_11	FDI inflows to the “food products. beverages and tobacco products” industry
IFDI_12	FDI inflows to the “textiles and wearing apparel” industry
IFDI_13	FDI inflows to the “wood, paper & their products” industry
IFDI_14	FDI inflows to the “chemicals and chemical products” industry
IFDI_15	FDI inflows to the “rubber and plastic products” industry
IFDI_16	FDI inflows to the “motor vehicles and other transport equipment” industry