THE ECONOMETRIC ANALYSIS OF THE RELATIONSHIP BETWEEN FOREIGN DIRECT INVESTMENTS AND EXPORT OF RUSSIAN FEDERATION [1]

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ABSTRACT

This study is aimed to analyze the relationship between inward foreign direct investments (FDI) and export in Russian Federation. Previous researches related to our topic have been examined broadly in terms of the theoretical input to our work and the most important were provided under the Literature Review.

For the analysis quarterly data from 1996 till 2016 for FDI, export and Gross Domestic Product (GDP), provided by National Committee of Statistics of Russian Federation and Central Bank has been used. E-Views Econometric Modeling and Analysis Package and Granger Casualty Test have been used for the research of relationship. The results of Granger Casualty Test are provided in the Empirical Results section and explained in Conclusion.

Key words: Russian Federation, Foreign Direct Investments (FDI), Export, Granger Casualty Test

RUSYA FEDERASYONU'NUN DOĞRUDAN YABANCI YATIRIMLAR VE İHRACATI ARASINDAKİ İLİŞKİNİN EKONOMETRİK ANALİZİ [2]

ÖZET

Bu çalışmada Rusya federasyonu özelinde kabul edilen doğrudan yabancı yatırımlar ile ihracat arasındaki ilişki incelenmektedir. Çalışmamıza teorik girdi oluşturması bakımından konu ile ilgili olarak daha önce yapılan çalışmalar kapsamlı olarak taranmış ve konu ile ilgili olan önemli çalışmalar Literatür Taraması başlığı altında verilmiştir.

Bu çalışma için 1996 – 2016 yılları arasında çeyrek dönemler bazında doğrudan yabancı yatırım ve ihracat istatistikleri kullanılmış, söz konusu istatistikler Rusya İstatistik Kurumu ve Merkez Bankası verilerinden derlenmiştir. Araştırılan ilişkinin analizi için E-Views ekonometri paket programı ile Granger Nedesellik testi gerçekleştirilmiştir. Granger nedensellik testi sonuçları Ampirik Bulgular başlığı altında tartışılmış ve sonuç kısmında yorumlanmıştır.

Anahtar kelimeler: Rusya Federasyonu, Doğrudan Yabancı Yatırımlar, İhracat, Granger Nedensellik

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Introduction

19th century economic nationalism called mercantilism ideology, which was based on international trade has been brought to a new agenda in 21th century under the pressure of globalization and was developed as neo-mercantilism. Ideology pointing that decrease of import and increase of export lead to economic growth has been abandoned for a long time and instead of it the ideology pointing that international trade is not a game of zero sum, but brings mutual benefit for countries has been the starting point of ideas of new century liberal economic ideologist like Paul Krugman and others. Foreign direct investments (FDI), which are one of the important forms of internationalization which is the economical reflection of the sociological phenomenon of globalization, are seen as one of the advantages of liberal approaches. But in time, developed countries' governments started adopting more and more nationalistic approach and foreign investments turned directly into one of the countries' economical weapons. New protective politics of either the new government that came in power in USA or the important European economies like UK and Germany affected the international trade and foreign investments.

Effects of direct foreign investments on economy have been the subject of many studies and some of these studies listed under the Literature review are explored in this study. Along with this, studies that explore the effects of direct foreign investments to the export are quite limited. In order to be able to test the policies in power, it is quite important to evaluate the relationship between direct foreign investment movements and the current export, which has started to be evaluated as a separate item of export of the protective policies.

It is important to research the impact of foreign direct investment on export of host country as export is considered to be a generator of economic growth. Many observations proved that FDI stimulate export in the receiving country by expanding local capital for export, giving an opportunity to enter new and bigger foreign markets, helping to renew the technology of producing exporting goods and of course increasing the local labor force and implementing new technical and administration skills (Jayakumar and Kannan, 2014). But FDI does not affect only in positive way, it can also lead to the decrease of national savings and investments, bring technology that is not applicable to the receiving country and can only have worse effect on production, focusing only on production for the domestic market, which will have no impact on export, use FDI just because the production in the receiving country is cheaper due to labor force and technology, by doing so FDI will not improve country`s competitive advantage and will just use it as a mechanism to make profit, promotes other companies to focus more on export not on the domestic market, which can lead to the shortage of goods for the local consumers (OECD, 2002).

In order to research the impact of FDI on export of host country we have chosen Russian Federation as it is the biggest country in the world by territory covering 17125191 km^2. Population of Russian Federation according to World Bank for 2016 is 144.1 mln. Russia is a member of World Trade Organization since 2000, BRICS since foundation in 2009, Shanghai Cooperation Organization (SCO) since 2001, Asian Pacific Economic Cooperation (OPEC) since 1998, Commonwealth of Independent States since 1991, Black Sea Economic Cooperation Organization, Eurasian Economic Union since 2015, etc.. (Russian Investment Agency, 2017).

Russian Federation is a leading producer of oil and natural gas. It is also the biggest exporter of steel and primary aluminum. It plays a key role in ensuring international energy security. And it intends to continue to be approved first of all at the expense of new contracts. Russia is constantly increasing the extraction of oil and gas, increasing the share of its energy carriers in the world market. Thus, it makes a significant contribution to restraining prices and solving energy problems in the world as a whole economy (CIA, Economies Overview Report, 2017).

It is worth noting that Russia recently entered the seven countries with the most dynamically developing economy. Alongside with Russia are countries such as Brazil, China, India, South Africa, Korea and Mexico (UNCTAD, 2016).

Russia is also one of the largest exporters and by the size of GDP, except for the last three years, has always been among the ten largest industrialized countries in the world (World Bank Data, 2016). Domestic

industry manages to produce competitive products; this applies to weapons, power equipment, nuclear industry and space.

After the collapse of Soviet Union Russia went through serious changes, such as moving from planned to market oriented economy (CIA, Economies Overview Report, 2017).

The period of vigorous and comprehensive economic growth that occurred in the first decade of the 2000s was replaced by a slowdown in economic growth, which began in 2012. Since then, the pace of structural reforms of the second generation has slowed. As a result of the completion of the super-cycle of rising prices for raw materials - especially the sharp drop in oil prices, as well as the impact of sanctions imposed in 2014 - the economy plunged into a prolonged recession, which entailed a period of difficult economic adjustment. Against the backdrop of limited economic diversification and significant dependence on the oil industry, Russia's vulnerability to shocks stemming from the worsening terms of foreign trade has been exposed (World Bank, 2017).

As follows from the World Bank's Comprehensive Diagnostic Study of the Russian Federation's Economy "Ways to Achieve Comprehensive Economic Growth,"(The ways of obtaining economic growth, World Bank Report 2016) Russia needs to remove the main obstacles to productivity growth, such as a weak investment climate, lack of sufficient competition, tangible and intangible barriers to connectivity, The level of innovative capabilities of enterprises and the shortage of qualified personnel, are in demand In the labor market. Improving the health of the population and providing access to quality education services are no less important. Strengthening the management system at all levels of government and ensuring budgetary and environmental sustainability should reinforce these efforts. Progress is an essential condition for restoring a stable trajectory of economic growth and ensuring the general prosperity of the population of such a vast and diverse country.

The aim of this study is to test the relationship between foreign direct investment and exports of Russian Federation, whose weight in the world economy is felt more and more every day. Findings will be evaluated under the title of the results and recommendations of the study, and brief information will be given about the studies that are considered to be carried out in the future.

Literature Review

Iwasaki and Suganuma (2015) in the research of FDI and regional economic development in Russia by using econometric analyses, they values the Cobb-Douglas production functions for the 71 regions of Russian Federation in order to find out if FDI effects on the regional economic development. The result showed that there was a close relationship between foreign direct investment and regional total factor productivity in Russian Federation. Based on the findings, authors supported that idea that improvement of partnership between foreign companies and local R&D sector would play an important role for Russia. In addition, their estimation results offered that geographical factors as the city size, the existence of ports didn`t turn out as effective production promoter for the regions. In order to balance economic development, according to authors the policymakers have to attract FDI by market liberalization and management, also improve relationships between the R&D sector and foreign multinational companies.

Falchenko (2014) studied the role of transnational corporations and foreign direct investment on the receiving country`s economy using econometric analysis. According to the author`s research the investment inflow in to Russian Federation was stable and even positive between 2000 and 2012, except 2008. Industries that attracted most of the foreign direct investment were manufacturing industries and mineral production, which took 30% and 19% respectively of all FDI consequently. In general even, if the inflow of FDI was stable, the quantity decreased due to the financial crisis and change for the worse of Russian investment climate. In econometric model the author studied the influence of FDI on GDP and export of the receiving country offering two models: (1) the dependence of GDP on domestic investment and foreign investment of transnational corporations in the capital stock; (2) the dependence of exports of goods and services on the dynamics of domestic production and accumulated direct investment of TNCs in the host country. The econometric analysis for the first model showed that domestic investment has more positive effect on the GDP of Russia, foreign direct investment of TNC also effects positive on the economic growth

but a little bit less than domestic investments. The calculations for the second model stated that growth of real GDP has a positive effect on the rise in export, considering the accumulated foreign direct investment, they also have a positive effect on the export growth, the rise of FDI by 1% leads to the increase of export by 0,19%. Falchenko also suggest to improve investment climate and liberalize domestic market in order to attract more investment, which will have a positive effect on the economic growth in general.

Yormirzoyev (2015) in his work studied the influence of FDI on economic growth, in the case of transitional European economies and economies of CIS states. The author practiced an empirical approach using the World Bank and ERDB data for 1992-2009 period. As a result of regression analysis there was high regression between FDI and economic growth in Central and Eastern European countries and CIS states. The economic growth was slower in CIS countries as they were in the Soviet Union before and it took time for the new independent countries to recover. But after 2000 the growth rates were modest. The period from 2000 to 2008 showed a positive economic growth in both regions but financial crisis of 2008 hit the economies of both CEE and CIS. However, CIS countries has just negative growth of 2%, while CEE 7%. During the recovery period more FDI flow into CIS, which could be the reason CEE countries recovery to be more challenging.

In the study on the impact of FDI on Turkish trade with European countries Cetin and Taban (2009) research whether there is an influence of FDI from such major countries as Japan, the USA and the EU on the Turkish trade with the European countries. In order to analyze the relationship between FDI from mentioned three economies and trade of Turkey with European countries the authors built up two models of export supply and import demand. During the study both Augmented Dickey-Fuller (ADF) and Phillips-Perron tests were used to examine the order of integration of the series included in the analysis. To test if there is long-run relationship or cointegration between variables or not the researchers decided to apply the Johansen and Juseliusmultivaritecointegration approach. The evaluation results of a long run export model showed that inward foreign direct investment from the USA, Japan and the EU don`t have the same effect on Turkish export. If Japanese and the EU`s FDI increase Turkish export, FDI of the USA have the negative impact, which leads to the decrease of Turkish export to the EU market.

ThanhXuan and Xing (2008) compiled the database of FDI that were actually distributed in Vietnam from 23 countries for the period of 1990 till 2004. Using data set the impact of FDI on the export of Vietnam was analyzed using gravity models. The aim of the study was focused on the aggregate effect of the FDI on export of Vietnam. After the empirical analysis it was demonstrated that FDI significantly increased Vietnam`s export to source countries. According to analysis Vietnamese GDP rise by 1% leads to the rise of export by 3.21%. This shows that country is more export oriented. Industrial policy of a country, which promoted export sector was very successful, but the income of Vietnamese trade partners also has an impact on country`s export.

Concerning the research of the influence of FDI on the economic growth in Nigeria, Akinlo (2004) also used empirical analysis, applying Augmented Dickey-Fuller test and the Johansen–Juselius techniques. After examining the links between mentioned variables, result showed that FDI increased the economic growth after a considerable lag, and FDI made into the mining sectors, specifically oil may not be as effective as FDI made into manufacturing industries. In order to increase the economic growth, government of Nigeria has to provide favorable investment climate for the manufacturing fields, which were closed to the investors before. Country could also be benefited from the FDI into the oil sector, but it is separated from the main economy. According to the researchers government should let some sectors to be privatized by domestic and foreign companies. Export has a positive effect on the economic growth and in order to increase it, FDI has to be attracted, because there are directly connected.

For Chinese economy, which is considered one of the leading economies in the world nowadays, many researches on the impact of FDI on trade, economic growth have been made. In their study Liu and Burridge et al (2002) were the first to analyze the influence of inward FDI into China on export. Previous studies included the research on impact of FDI on economic growth, FDI and trade on economic growth etc. After implementation of multivariate Granger casualty test in a cointegration framework the result showed

that there was two-way causal connection between FDI, export and economic growth and failure to explain cooperation between reviewed factors could lead to false results in the analysis of the relationships between mentioned variables.

Concerning the relationships between GDP, export and investment in the case of Iran, Morfad (2012) by comparing long and short-term relationship between mentioned variables for the period of 1991-2008 used Johnson`s cointegrations test to determine the long term relationship between variables. According to the results for the long-term relationships FDI and export influence GDP at 95% confidence level, but FDI does not influence export. In order to test short-term relationship authors used vector error correction model. The results came out to be the same but for short-term relationship the amount of FDI and export variables is over the long-term equilibrium values. In short-term, FDI and export have a positive effect on GDP, domestic production has positive effect on investment, but negative on export. Export, in its turn has negative effect on investment, but investment has positive effect on export.

The same relationships also can be found in Szkorupova`s (2014) research for Slovakia in the period of 2001-2010. Quarterly data was tested by cointegration method and vector error correction morel. Johanson test indicated positive long-run relationship between FDI and GDP and between export and GDP. Unfortunately, author did not study export and FDI relationship.

In the case of Croatia research made by Dritsaki and Stiakakis (2014) revealed no effect of FDI on growth of Croatian economy but there was a strong bidirectional causal relationship between growth and export for both long and short term. In the study author used Auto Regressive Distibuted Lag (ARDL) developed by Pasaranet al. for long-term relationships and vector error correction model (VECM) for causal relationships. For unit root analysis ADF, PP KPSS DF-GLS and ERS-Point Optimal Tests were used.

For Least Developed countries, namely Angola, Benin, Burkina Faso, Central African Republic, Chad, Gambia, Haiti, Liberia, Madagascar, Malawi, Mauritania, Nijer, Rwanda, Senegal, Sierra Leone, Togo, Yemen and Zambia Tekin (2012) investigated potential Granger causality amount real GDP, real export and inward FDI for the mentioned economies. Panel-data way established in Konya (2006), which is based on SUR systems and Wald test were used in the study. Findings of export and growth link showed that both export effects growth and growth effects export, but not for all countries. In countries, which are rich in oil or other natural resources, growth led export. Only Haiti and Rwanda, which are manufacturing and services exporters were also in the same group of countries. Only in couple of countries FDI has an effect on GDP, because LDC countries do not attract too much FDI, as they are concentrated in resource-rich, mineral or oil exporting countries. For such countries as Benin, Haiti, Mauritania, Niger and Togo results showed a positive influence of FDI on export rise and vice versa.

Zhang and Felmingham (2001) determining the relationship between inward direct foreign investment and China`s provincial export trade tested the presence of unit roots by using Dickey-Fuller (ADF) and Phillips-Perron (PP) tests for stationary and Engle and Granger test for bivariate cointegration. For the research Granger test was limited and to overcome limitation, Sims test was also used, which took into consideration both lags and leads, Granger in its turn failed to do it. The results of ADF and PP tests were incomplete, but the results of Engle and Granger bivariate cointegration test showed that there was no long-term equilibrium between FDI and export. As for the regions of China groped Granger and Sims causality test was used and according to the result, there was relationship between inward FDI and export but not the same for all China regions.

Sims test, specifying a vector autoregressive mode (VAR) was also used in Stamatiou and Dritsakis (2012) work in FDI, export and economic growth relationship investigation for five European countries, which have been in recession during the last year before the research was done. For panel data unit root test Breitung, LLC, W-test, ADF-Fisher, PP-Fisher testes were used. Then the Hausman test was implemented to chose between FEM and REM estimations and after the Wald test to determine the Granger causality direction was applied. The result showed no influence of FDI neither on economic growth nor export, but there was an existence of strong bidirectional causality relations between export and economic growth.

Concerning the interrelationship between growth, export and FDI in Turkey Alici and Ucal (2003) also tested unit rood using the ADF test, but having low power, Philips-Perron (PP) test was also applied. After mentioned tests were applied authors chose Toda and Yamamoto procedure (MWald test), which led to a point where the usual test statistics for Granger causality exhibit standard asymptotic distributions. As a result, used VAR methodology showed that there was no positive spillover from FDI to output. But authors offer that only with more Inflow FDI to Turkish Economy can be followed by positive effect over output.

The similar study for Eight East and Southeast Asian economies was introduces by Hsiao (2006) using Granger causality test for the period of 1986-2004. Results, as in many above mentioned works, showed the influence of FDI on GDP through export. Multidirectional causality between export and GDP.

Eryiğit (2012) investigated the long run relationships between FDI and export volume, FDI and Gross Domestic Products (GDP), and export volume and GDP through cointegration tests. 15 countreis that regulary invest into Turkish economy were selected and the data set for the period of 200-2010 was used. The results revealed a long-term relationship between FDI and export, FDI and GDP and export and GDP.

For Greece Dritsaki, et al (2004) also revealed a long-term relationship between FDI, export and GDP, which was also checked by using Granger causality test.

Data and Methodology

Quarterly data for the analysis from 1996 till 2016 has been taken from different resources, as since 2013, National Committee of Statistics of Russian Federation separated gathering statistical data with Central Bank and Central Bank of Russian Federation has been responsible for the financial market date since that time.[3] Quarterly export (EX) is taken from Russian Federation Federal State Statistic Service together with quarterly GDP, which was provided in current and stable prices. For our analysis GDP in current prices has been used. Quarterly GDP was also provided in rubles and using average quarterly dollar/ruble exchange rate the data was converted from Ruble to USD Dollar. Quarterly Foreign Direct Investment (FDI) was provided by Central Bank of Russian Federation.

At first stage of our econometric analysis we have to check if our time series stationery or non-stationary. In order to it unit root test has to be applied. Time series will have unit root or integration order one, if its first differences generate stationary series. This condition is written as $y_t \sim I(1)$if the row of first differences $\Delta y_t = y_t - y_{t-1}$ is stationery $y_t \sim I(0)$.

Using this test, we check the value of the coefficient a in the first –order auto regression equation AR(1):

$$y_t = a y_{t-1} + \varepsilon_t$$

Where: y_t – time series, ε – error.

If a=1, then the process has unit root, in this case series y_t is non-stationary and integrated time series of first order – I(1). If a<1, then series is stationary – I(0).

The reduced autoregressive equation AR(1) can rewritten in the form:

$$\Delta y_t = b y_{t-1} + \varepsilon_t$$

Where b=a-1 and Δ-operator of the difference of first order.

Therefore, testing the hypothesis of the unit root test in mentioned representation means checking the null hypothesis of that coefficient b is 0. Since the case of "explosive" processes is excluded, the test is one-sided, that is, the alternative hypothesis is the hypothesis that the coefficient b is less than zero. The test statistic (DF-statistics) is a common t-statistics for checking the significance of linear regression

[3] Information letter of Financial Market Service of the Bank of Russia "On bringing internal documents of financial market participants in line with Federal Law No. 251-FZ of July 23, 2013," On Amending Certain Legislative Acts of the Russian Federation in Connection with the Transfer of Authorization to the Central Bank of the Russian Federation , Control and supervision in the financial markets ".

coefficients. However, the distribution of this statistics differs from the classical distribution of t-statistics (Students`s distribution or asymptotic normal distribution). The distribution of DF statistics is expressed through a Wiener process and is called the Dickey- Fuller distribution.

There are three types of tests (test regressions):

1) Without constant and trend (none):

$$\Delta y_t = by_{t-1} + \varepsilon_t$$

2) With constant, but without trend:

$$\Delta y_t = b_0 + by_{t-1} + \varepsilon_t$$

3) With constant and linear trend:

$$\Delta y_t = b_0 + b_1 t + by_{t-1} + \varepsilon_t$$

If we add lags of the first differences in the time series to the test regressions, the distribution of the DF statistics (and hence the critical values) will not change. This test is called the Augmented Dickey-Fuller test (ADF), which is commonly used in many works for finding a unit root.

The necessity of including the lags of the first differences is due to the fact that the process can be an auto regression of not of the first but of a higher order. Let`s consider the following model AR(2):

$$y_t = a_1 y_{t-1} + a_2 y_{t-2} + \varepsilon_t$$

This model can be represented as:

$$\Delta y_t = (a_1 + a_2 - 1) y_{t-1} - a_2 \Delta y_{t-2} + \varepsilon_t$$

If the time series has one unit root, then the first differences are by definition stationary. And since yt-1 is nonstationary by assumption, then if the coefficient of it is not equal to zero, the equation is contradictory. Thus, from the assumption of first-order integration for such a series it follows that$(\mathrm{a}_1 + \mathrm{a}_2 - 1) = 0$. Thus, to check the presence of unit roots in this model, a standard DF test for the coefficient at yt-1 should be carried out, and the lag of the first difference of the dependent variable must be added to test regression.

In addition to this reason, there is also another reason as model errors may not be white noise, but rather be some stationary ARMA process, so we should check the presence of a single root for several lags. It should, however, be taken into account that an increase in the number of lags leads to a decrease in the power of the test. Usually limited to three or four lags.

Empirical Results

ADF-test if export time series have a unit root test at level, which were chosen automatically based on AIC, gave us the following results (Table 1.1).

Table 1.1 The result of ADF test for EXP

	None		Constant		Constant and linear trend	
	t-statistics	Prob.	t-statistics	Prob.	t-statistics	Prob.
EXP	-2.869788	0.0046**	-4.545930	0.0004	-4.751975	0.0004

*Meaningful on 1% level, **Meaningful on 5% level, ***Meaningful on 10% level

From the Table 1.1 we see that p-value for all types of equation is meaningful at 1%, 5% and 10% level for constant and constant and linear trend equation, and at 5% and 10% level for equation without constant and trend (none). When we have probability at 95% level we can reject the null hypothesis and say that the series is stationary. The result of the test meets requirements and it can be concluded that EXP time series is stationary.

Table 1.2 The results of ADF test for FDI

	None		Constant		Constant and linear trend	
	t-statistics	Prob.	t-statistics	Prob.	t-statistics	Prob.
FDI	-5.538622	0.0000	-5.763659	0.0000	-5.615615	0.0001

*Meaningful on 1% level, **Meaningful on 5% level, ***Meaningful on 10% level

For FDI time series the p-vaue is almost 0 for all equations and it`s meaningful at all levels. FDI time series is stationery.

Table 1.3 The results of ADF test for GDP

	None		Constant		Constant and linear trend	
	t-statistics	Prob.	t-statistics	Prob.	t-statistics	Prob.
GDP	-1.355499	0.1610	-3.770198	0.0048	-2.400029	0.3763

As for GDP results, time series is stationery only in constant equation, as p-values is below 0.05 and meaningful at 1%,5% and 10% level. As for none and constant/linear trend equation, the result showed that row is non-stationery and not meaningful at 1%, 5% and 10% level. But stationarity at in constant equation is enough to process to Granger casualty test.

Later, in order to determine lag length for VAR models we implied (LR) Sequential modified, LR test statistic ,(FPE) Final prediction error, (AIC) Akaike information criterion, (SC) Schwarz information criterion, (HQ) Hannan-Quinn information criterion and the results can be seen in Table 1.4.

Table 1.4 Lag length for EXP-FDI

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-180.8233	NA	0.479706	4.941169	5.003441	4.966010
1	-179.9762	1.625400	0.522421	5.026385	5.213201	5.100908
2	-176.1043	7.220621	0.524402	5.029846	5.341206	5.154051
3	-170.7136	9.761580	0.505422	4.992259	5.428163	5.166146
4	-149.3064	37.60713	0.316150	4.521796	5.082244	4.745365
5	-136.3374	22.08245*	0.248596*	4.279389*	4.964381*	4.552641*
6	-133.2742	5.050111	0.255718	4.304708	5.114245	4.627642
7	-132.0658	1.926858	0.276869	4.380158	5.314238	4.752774

* indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final predictionerror; AIC: Akaikein formation criterion; SC: Schwarzin formation criterion; HQ: Hannan-Quinnin formation criterion

Table 1.5 Lag length for GDP-FDI

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-188.7045	NA	0.593584	5.154175	5.216447	5.179016
1	-187.5229	2.267320	0.640622	5.230349	5.417165	5.304872
2	-178.8045	16.25864	0.564104	5.102824	5.414185	5.227030
3	-172.8393	10.80179	0.535311	5.049712	5.485616	5.223599
4	-147.4813	44.54794	0.300933	4.472467	5.032915	4.696037
5	-135.1915	20.92588*	0.241015*	4.248418*	4.933410*	4.521670*
6	-132.8201	3.909492	0.252599	4.292436	5.101973	4.615370
7	-130.0489	4.418975	0.262181	4.325646	5.259727	4.698263

* indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final predictionerror; AIC: Akaikein formation criterion; SC: Schwarzin formation criterion; HQ: Hannan-Quinnin formation criterion

Table 1.6 Lag length for GDP-EXP

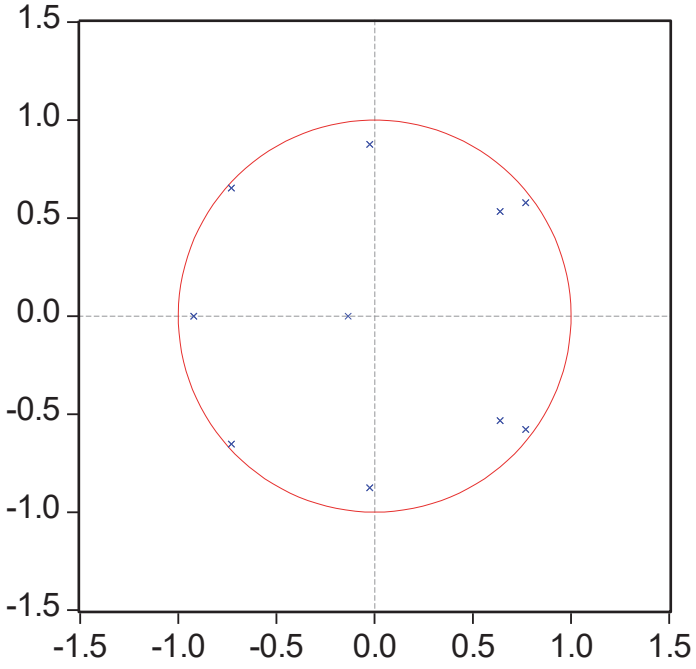
Lag	LogL	LR	FPE	AIC	SC	HQ
0	110.0132	NA	0.000185	-2.919277	-2.857004*	-2.894435
1	113.3453	6.394035	0.000188	-2.901225	-2.714409	-2.826702
2	118.0818	8.832829	0.000185	-2.921129	-2.609769	-2.796924
3	124.5388	11.69236	0.000173	-2.987534	-2.551630	-2.813646
4	136.4128	20.85975	0.000140	-3.200345	-2.639897	-2.976775
5	144.8329	14.33703*	0.000125*	-3.319809*	-2.634816	-3.046557*
6	148.1017	5.389111	0.000127	-3.300047	-2.490510	-2.977113
7	150.5003	3.824740	0.000134	-3.256765	-2.322684	-2.884148

* indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final predictionerror; AIC: Akaikein formation criterion; SC: Schwarzin formation criterion; HQ: Hannan-Quinnin formation criterion

From Tables 1.4, 1.5, 1.6 it can be seen that lag length is 5 almost for all variables. Only for GDP-EXP lag length Schwarzin formation criterion gives lag 1, but as Akaikein formation criterion gives lag 5, we will rely on it and continue analysis with VAR(5) models.

VAR models for EXP-FDI, EXP-GDP and FDI-GDP will be implied in order to establish relationship between mentioned variables.

And AR roots are inside the circle means that as we proved before the time series is stationary and stable.



Graph 1. Inverse roots of AR Characteristic Polynominal

In addition, Table 1.7, it is seen that the autocorrelation-LM test results do not include error terms in all equations with 5 percent significance level.

Table 1.7 Autocorrelation-LM test results.

Lags	LM-Stat	Prob
1	4.897494	0.2980
2	4.686164	0.3210
3	3.053519	0.5489
4	10.29909	0.0657
5	0.746644	0.9455
6	5.664184	0.2257
7	2.278491	0.6847
8	1.951960	0.7446
9	2.046018	0.7273
10	1.876317	0.7585
11	1.050859	0.9020
12	5.765421	0.2174
Probs from chi-square with 4 df.		

After applying Walt test for Granger Causality for FDI-EXP relations, the results indicated in Table 1.8 were obtained.

Table 1.8 Wald test for Granger Causality

VAR Granger Causality/Block Exogeneity Wald Tests			
Dependent variable: EXP			
Excluded	Chi-sq	df	Prob.
FDI	16.46010	5	0.0056
All	16.46010	5	0.0056
Dependent variable: FDI			
Excluded	Chi-sq	df	Prob.
EXP	0.359855	5	0.9964
All	0.359855	5	0.9964

Table 1.8 shows that FDI effects EXP at the level around 99% in 5 lags, that mean that foreign direct investment will affect export in five quarters and export will change on sixth quarter. Regarding EXP-FDI relationship, EXP doesn`t affect FDI as probability is more than 5%.

EXP = 0.027234 + 0.01558809072*FDI(-5) + 0.02723373213

Conclusion

In order to study the relationship between inward foreign direct investments and export of Russian Federation, serial of empiric analysis has been fulfilled. According to results after the implementation of Granger Causality Test, there is a unilateral causal relationship between inward foreign direct investments and export of Russia. The research showed that FDI influence export, but export does not have any effect on FDI. Again, according to Granger Causality Test, export influence FDI only after the five quarters period. That means that it is possible for FDI to turn into export after one year and three month. The result is also compatible with the nature of the investments as it is necessary to pass through a certain period of time as investment establishment, production and marketing before turning to products to be exported.

Appendix. Supporting information

Supplementary data associated with the research can be found online on:

https://www.gsk.ru

https://www.cbr.ru

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