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THE EFFECT OF WTO ACCESSION ON GROSS CAPITAL FLOWS TO KAZAKHSTAN

Abduali Dinara
Kazakh-British Technical University
Almaty, Kazakhstan

Abstract

The aim of the work is to determine the effects of WTO on FDI as a result of membership for Kazakhstan. The research will be based on FDI flows, GDP and distance factors between host and source countries. More specifically to determine the real change the considered countries will comprise both new members and long run partners as Post-Soviet and OECD, respectively.

In research, we will be applying gravity model, the one being able to capture the varying factors affecting the trade. The contribution of WTO accession on FDI will be investigated using five variations, at three-dimensional level, of Gravity model, under 15-year time lapse.

The results found would suggest the significant positive relationship existence after entry in WTO on both old and new ascending countries’ absolute FDI values.

Introduction

World Trade Organization, hereafter WTO, the largest trade agreement organization, that maintains smooth relationship for bargaining between states and nations at fairly distinct levels. As of purpose, it aims to ensure the increasing welfare, output, income, provide new potential sources for growth given the beneficial opportunities for trade conditions. The initial establishment took place in Geneva, Switzerland as of 1st January 1995. The initiatives were due to Uruguay Round and GATT negotiation between 1986 and 1994. Currently WTO composes form 162 member countries.

The actions Kazakhstan made toward WTO accession took place for two decades. Great efforts were made due to WTO’s substantial contribution for higher net trade trough establishing better negotiating agreements between countries. In other words, it allows for negotiation between trade partners through elimination of the barriers to international bargaining, widening the market opportunities and further increasing the interactions providing possibilities for outstanding areas to counteract.

Another distinguishing specification WTO is responsible for is the set of rules. It builds the ground for main basis of trade since globalization nowadays is the huge determinant of future growth of the country. In order to be up-to-date and maintain competitiveness in outside world

countries should seek new opportunities through growing relationships with the rest of the world. WTO in turn one of the keys to achieve such high standards, playing role of intermediary.

The working tools employed were the implementation of quotas, lowering tariffs, increasing subsidies, support for developing countries, maintain the shipping orders and overall standards. The possible trade includes goods durable and non-durable. Before final acceptation, the negotiation takes place between trading partners at a ministry level. The agreed four main responsibilities WTO carries and control at an international level agreed to be are, first is the trade negotiations, that smooth out the requirements between parties, connect the matching ones etc.; seconds is monitoring on agreed conditions and rules for trade; third related to dispute settlement, usually arising due to misunderstandings or uncertainty of the right of each trade party; forth is the widening the trade barriers, allowing for poorer countries to be part of the organization, trough educational and support schemes.

Thereby, the purpose of our work will be to determine whether the accession into WTO alters any of the economic outcomes over some certain time period, as it is fairly impossible to account for longer run outcomes. In the following work, the implementation of macroeconomic indicators will be used to identify the relationship two parties may hold, although one should note that relationship would not imply causation. For this purpose, we would look at the gross capital flows before and after accession. In our case the gross capital flows can be viewed as the bilateral foreign direct investments outflow and inflow. We chose such measure since in era of globalization capital flows are main incentives for stronger internationalization of production, higher temps of economic growth and further aspects as employment level. If it really the case, then it should be anticipated that the level of integration would bring significant benefits by this membership.

Empirical part of our paper will be based on the experience of post-Soviet Union countries alongside with the OECD country members of WTO. Reason choosing this set of countries underlines former holding similar features reflecting our country of interest and latter possessing long run experience membership in WTO. As for OECD members we want to seek for any differences or discrepancies and to investigate on whether some proliferation could be associated with one of those features. So the use of OECD countries in our sample will allow us to compare its outcomes with ones of Post-Soviet union countries and show the bilateral trade flows and capital flows between them.

Literature Review

The executive power WTO possesses is believed to have a huge impact on the overall state’s welfare. However, the studies done were primary based on countries with specific and common

characteristics. The base feature of major investigations was focused on the distinct area/working sector and often state-owned industry countries. Therefore, the great interest and further researches were devoted to find the real effect of WTO accession under proliferated circumstances.

As of result, some new findings toward the current issue was presented by Rose’s 2002 work “Do we really know that WTO increases the Trade?” being based on gravity model, which we will employ as well, suggested results to be in favor of the WTO’s positive effect, given he holds constant the country-varying characteristic. Not much change in his later works of 2006 and 2007. Going further the partially similar view was hold by Goldstein (2007) who distinguished the benefits and discouragement of WTO accession based on country features, such that no distinct conclusion could have been drawn. However, further works supported the idea of country specific characteristics being main factors, which should be taken into account when agreeing on inclusion. One of those were presented by A. Subramanianand, S.J.Wei (2007), implying that unless country is developed enough in industrial manner or both trading partners are similar in their bargaining volumes, power, they will suffer rather than benefit. Such none fully reliable data gave the rise for further investigation.

Another interesting finding were presented by Goldstein, River and Tomz (2007) stating that under gravity model with more dispersed time frame and larger country samples, the results support the accession on WTO, but with distinguishable fact that informal trading partners of those formal ones are indirectly benefit from such trade, furthermore in higher magnitude than former counterpart.

Apart from all the misunderstandings and due to the failure of some works toward understanding the real values and matters, the alternative approach was suggested by Lukancic (2016) who presented more in-depth alternative view to look at WTO/GATT, from the perspectives of capital flows and foreign indirect investments indexes.

Similar “upgrade” was offered by Buch, Kokta, Piazolo (2003). Using gravity model, taking OECD countries specific characteristics adjusted for match with emerging countries, as GDP per capita and for degree of integration thought as bilateral trade, suggested no clear approach on whether to think of FDI and trade as worth substitute measures.

Since then new approaches were considered with major emphasize now in FDI and capital flow changes. The idea behind was that if after WTO accession country experiences positive growth tendencies, then it circumstantially lets the GDP grow respectively and marginally provide bigger trade circulation due to greater cross-openness (Lucancic 2016).

Huge contribution toward FDI identification was drawn from the work of Frenkel, Funke, Stadtmann (2004), who adjusted the developed country’s characteristics for their developing

counterparts. One thing they proposed to take into consideration as well, apart from distance and economic size, were the medium rum growth opportunities alongside with the risk market holds.

The same thinking was seen in the work of John Bluedorn, Rupa Duttagupta, Jaime Guajardo, and Petia Topalova, who identified the importance of inclusion of specific indicators for emerging countries as a requirement to distinguish between developed and developing countries. However, stating that all major flows of loans, banks and debts should be a matter of a time lapses and business cycles of no less extent. Such that the only possible solution was a personal policy application towards gaps rising afterwards.

For more precise knowledge, we would like to mention the work of David Tarr and Jesper Jensen (2007) who studied the Kazakhstani’s economy sectors, presenting some evidence toward WTO's positive effect on tax valorem (FDI reciprocal) for Kazakhstan. According to their work, such results would be due outstanding gains of foreign actions over the losses made within country. Despite net varieties, overall country will benefit in its main sectors of exports (metal and fuel). For more econometric and statistical investigation, we would rely on the same approach as Arastou Khatibi (2008) who already provided some proves on capital flows to Kazakhstan based on standard gravity model of bilateral trade, being subject to real exports from one country to another as dependent variable of interest and indexes of trade policy, foreign investments, financial services, corruption alongside with GDP levels all being represented by Index of economic freedom.

The impact of WTO on the Republic of Kazakhstan

For almost 2 decades the negotiations between two parties, Kazakhstan and WTO, taking place led to a mutual agreement only by the end of 2015. The biggest contribution the membership brought to the home country was associated with the expansion of trade barriers and having wider access to new trade partners. As otherwise the landlocked position in the center of Eurasia had rather detriment consequence.

The biggest impact/ change the membership altered was the FDI of service sector, which rose by 2.7% of its initial figures, whereas rest policies as tax and tariffs reduction and market openness overall accounted for 1% change on GDP. Thereby, the suggested medium run impact was up to 4%, and two times higher in the long run. (Jensen and Tarr (2007))

Alongside with that, the accession had visually decreased the discrepancy between home and OECD countries in the FDI sector, trough reduction of restrictiveness in service sectors and improvement in stock market, most experienced in media, agriculture and forest, oil and gas.

Further actions allowed for labor market improvements, in a sense of greater openness and opportunities for hiring the international employees, within the transfer of benchmark of the firm.

Similarly, the reduction in tariff, as provided by specific tariff ceiling of 6%, not only make the goods and service more attractive, rather more importantly allowed for higher future confidence and predictions. Additional arising advantage for home consumers were stimulated trough higher competitiveness with both domestic and foreign parties, indirectly reducing price levels and instead rising the average quality of production.

Kazakhstani FDI overview

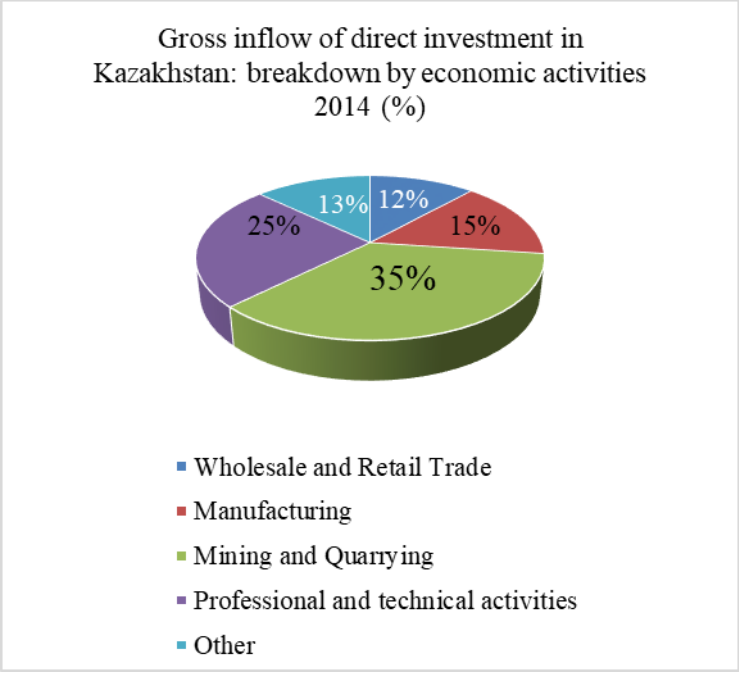
The following paragraph will contrast the FDI figures for Kazakhstan before and after its accession in WTO, distribute those according to the most demanded sectors of interest and even the areas of allocation, with the last table representing the WTO members with most investment financing amounts.

FDI by Sector

As it was stated above the mining, oil and gas dominated in both periods of observations due to their high value. Respective pie charts (Figure 1,2: Gross inflow of direct investment in Kazakhstan: breakdown by regions 2014, 2017(%)) simply demonstrate the allocation of those sectors according to the regions of the country.

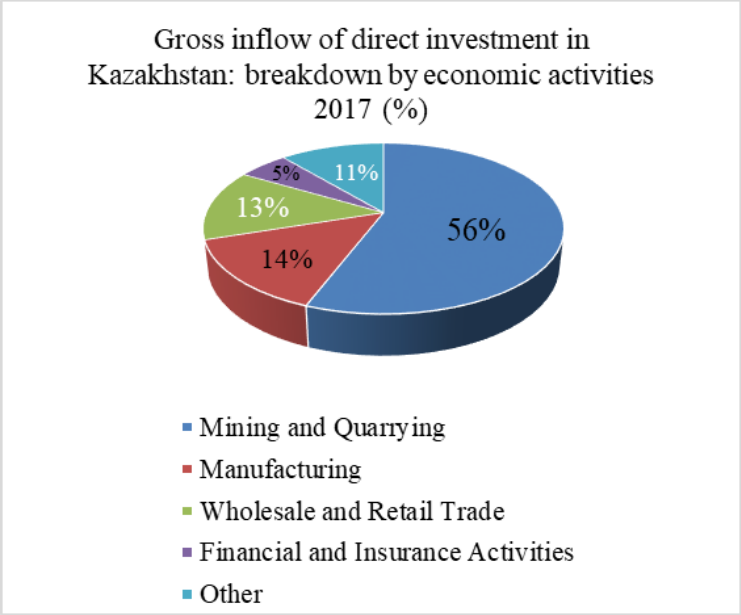
Thereby, both times the share of capital flows are at their highest in East Kazakhstan region, both times at 40%, respectively accounting for $10000M. Similarly, the former capital Almaty received two times less of the former’s investment amount, though presumably also remained the same importance at 20% of overall flows or $5000M. The latter regions comprised 40% with similar ranking as well, from Aktobe at 12% ($2300M) to West Kazakhstan region at 5% ($900M).

Figure 1. Gross inflow of direct investment in Kazakhstan: breakdown by economic activities for 2014 in percentage terms.



Source: National Bank of Kazakhstan

Figure 2. Gross inflow of direct investment in Kazakhstan: breakdown by economic activities for 2017 in percentage terms.



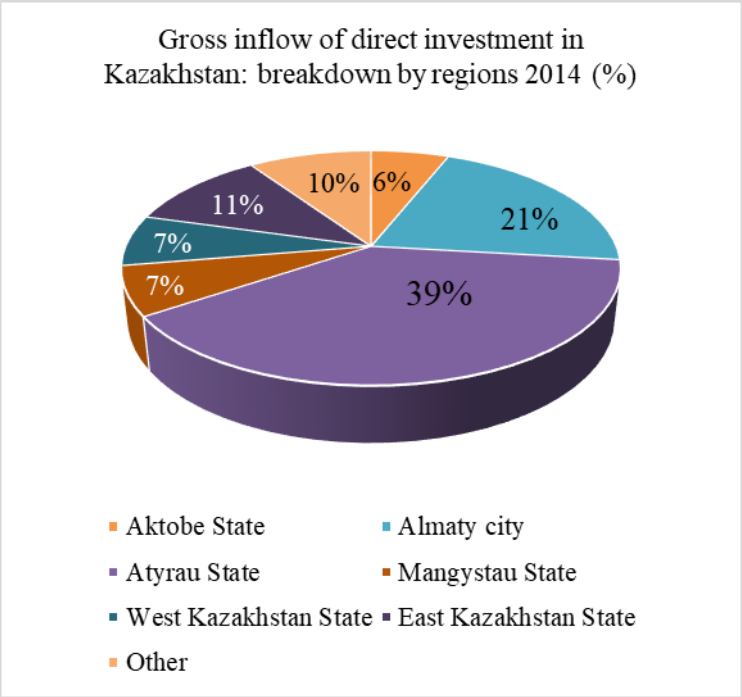
Source: National Bank of Kazakhstan

FDI by region

Kazakhstan is very rich in its natural resources, especially in the oil and gas industry. Despite the time period specification, it was the most dominated and covered area for extraction from foreigners. The detailed description on investments distribution could be viewed below, as of before (2014) and after membership (2017).

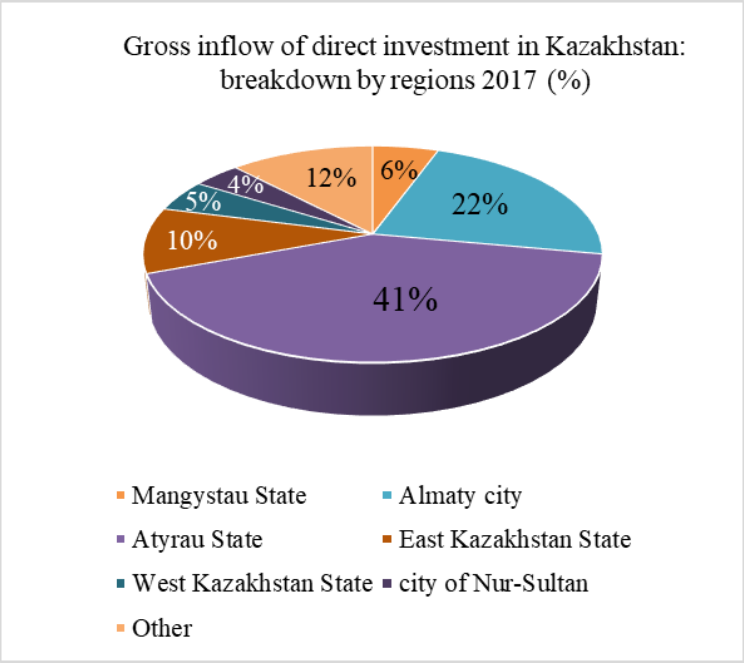
(Figures 3, 4: Gross inflow of direct investment in Kazakhstan: breakdown by economic activities 2014, 2017 (%)). The data for 2014, year before accession, states that the biggest share of capital flows were infused in mining and quarrying activities at one third of the overall investments amount, with absolute value of $8417M. Further substantial sector represented modern and developing area of professional and technical activities at 25% or $5835M. Rest two responsible for production of everyday human needs, as wholesale, retail and manufacturing were about 14% on average, accounting for $3200M; the other 12% ($2800M) comprises the combination of all other small industries of personally interested specified companies and investors. Final amount of investments infused accounted for $23809M.

Figure 3. Gross inflow of direct investment in Kazakhstan: breakdown by regions for 2014 in percentage terms.



Source: National Bank of Kazakhstan

Figure 4. Gross inflow of direct investment in Kazakhstan: breakdown by regions for 2017 in percentage terms.



Source: National Bank of Kazakhstan

For no surprise, nowadays, mining and quarrying activities compose and dominate nearly more than a half of overall investment figures in 2018, with current share corresponding for 56% of overall $24706M ($13562M) of all inward FDI flows to Kazakhstan, the majority of which is directed at extraction of crude petroleum and natural gas. The biggest oil and gas global parties have their entities in Kazakhstan, like Exxon, Royal Dutch Shell, Chevron and etc. Overall, concentration of FDI in the gas and oil sector influenced the trade composition, so Kazakhstan’s export above all is fuel, which goes to EU in the amount of 40 billion dollars each year. Therefore, historically foreign direct investments are attracted to those sectors in large amounts. Manufacturing accounts for 14% ($3300M), which is the second largest proportion of FDI, where about 86% goes to manufacture of basic metals and fabricated metal products, except machinery and equipment.

FDI flows by country

Following two tables summarizes the shares of total FDI injections to Kazakhstani’s economy by individual countries as before and after accession to WTO, as 2014 and 2017 respectively. Based on that information one can be clearly seen that despite Kazakhstan being or not the member of WTO the biggest share of injections were made by Netherlands, accounting for almost a third of the whole FDI injections accounting for 28.4% and 28.3%, though their absolute values differ with the former dominating the latter, as $6763M and $5935M, in 2014 and 2017 year respectively. Moreover, it is worth to mention that those investments are majorly driven by special purpose entities. That result in some uncertainty of invested origins, one however cannot distinguish yet.

Another distinct proportion of FDI held by USA at 17% was almost twice higher than those of Switzerland, at 14% of the overall proportion before accession constituting to $4153M and $2366M, accordingly. More preferred that after membership right received Kazakhstan smoothed its FDI inflow from two previously mentioned countries, maintaining distinctively smaller discrepancy of only 3% or otherwise $700M.

Rest of the group of countries, as Russia, China, Belgium and France, UK and latter 10 represents have decreasing representative shares from 6% to 1%, overall covering 35% of inward investments for both before and after accession periods observed.

Table 1. Inward FDI flows in Kazakhstan by countries, 2014

Country	**Share in mln USD**	**Share of total %**	**Rank**
Netherlands	6 763,3	28.4%	1
United States Of America	4 153,4	17.4%	2
Switzerland	2 366,4	9%	3

China	1 807,5	7.5%	4
Russia	1 583,8	6%	5
Belgium	859,8	3.6%	6
France	836,4	3.5%	7
United Kingdom	776,3	3.2%	8
South Korea	578,0	2.4%	9
Germany	487,2	2%	10
Italy	471,7	1.9%	11
Japan	299,6	1.25%	12
Turkey	240,9	1%	13
Cyprus	221,6	0.9%	14
Belarus	202,0	0.8%	15

Source: National bank of Kazakhstan.

Table 2. Inward FDI flows in Kazakhstan by countries, 2017

Country	**Share in mln USD**	**Share of total %**	**Rank**
Netherlands	5 935,2	28,30%	1
United States Of America	3 693,2	17,60%	2
Switzerland	2 964,5	14,10%	3
Russia	1 226,6	5,90%	4
China	1 082,5	5,20%	5
Belgium	1 068,9	5,10%	6
France	802,8	3,80%	7
United Kingdom	533,8	2,50%	8
South Korea	495,5	2,40%	9
Bermuda	448,3	2,10%	10
Germany	391,3	1,90%	11
Japan	357,3	1,70%	12
Romania	343,7	1,60%	13
Turkey	294,0	1,40%	14
Luxembourg	272,4	1,30%	15

Source: National bank of Kazakhstan.

Following tables (Table 3 and 4) contain the information of the FDI outflow percentage rate given the ranking for the subsequent countries of invested amounts.

As given by the data of 2014 the dominating share for outward FDI was due to UK covering almost half of all figures, as 45% accounting for $1514M. The further two positions were

distributed between Singapore and Netherlands, former being of higher interest to us rather than later, at 18.8% and 12.9% or $632M and $433M. Rest countries have similar proportions of home FDI injected at 4% and less for UAE, British Virgin Islands, China, US, Germany and others.

Surprisingly that after WTO accession that the first place was occupied by Bahamas, accounting for one-third (34%), next followed by Russia being twice less (18%) as of 2017. Third position of outward FDI index was given by partner with highest inward investment locally, Netherlands, at approximately 8%. Moderate rate of outflows were seen to be projected into Luxembourg and Caiman islands at almost 7%. Latter 10 countries divided their shares between 4% to 2%, overall accounting for about 20%. Among them, we can see China, US, UK, Italy, Ukraine and others.

The major distinct one should draw from this entry is the total rearrangement of priorities of capital investment from UK and Singapore to Bahamas and Russia. No exact causation can be depicted as rather more preferable conditions for investments.

Table 3. Outward FDI flows in Kazakhstan by countries, 2014

Country	**Share in mln USD**	**Share of total %**	**Rank**
United Kingdom	1 514,6	45,15%	1
Singapore	632,4	18,85%	2
Netherlands	433,4	12,92%	3
United Arab Emirates	162,0	4,83%	4
Russia	118,2	3,52%	5
British Virgin Islands	115,7	3,45%	6
China	76,4	2,28%	7
United States Of America	57,5	1,71%	8
Isle Of Man	46,8	1,40%	9
Germany	37,6	1,12%	10
Ireland	21,8	0,65%	11
Caiman Islands	20,1	0,60%	12
Georgia	17,5	0,52%	13
Kyrgyzstan	15,7	0,47%	14
Tadjikistan	13,2	0,39%	15

Source: National bank of Kazakhstan.

Table 4. Outward FDI flows in Kazakhstan by countries, 2017

Country	**Share in mln USD**	**Share of total %**	**Rank**

Bahamas	690,46	34,70%	1
Russia	373,91371	18,80%	2
Netherlands	149,73956	7,50%	3
Caiman Islands	133,39139	6,70%	4
Luxembourg	127,761	6,40%	5
Ukraine	80,80738	4,10%	6
Georgia	61,78192	3,10%	7
Kyrgyzstan	49,764445	2,50%	8
China	38,59913	1,90%	9
United Kingdom	38,48888	1,90%	10
Singapore	27,61119	1,40%	11
United States Of America	24,7723	1,30%	12
Cyprus	23,973	1,20%	13
Turkey	23,56256	1,20%	14
Italy	21,454	1,10%	15

Source: National bank of Kazakhstan.

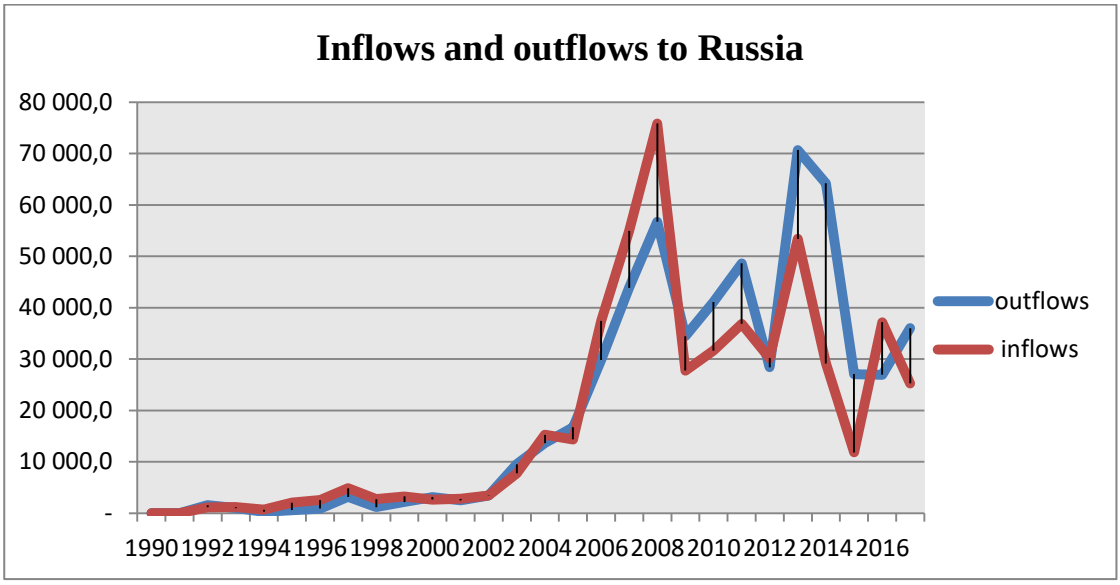
Russia’s experience in WTO

The accession to WTO Russia began in 1993, though final acceptation took place in 2012. Russia’s initial intention could be explained as of opportunity of huge contribution trough expanding the trading partners and areas of exporting. In turn the interest in Russia was due to its emerging yet one of the largest markets with increasing opportunities for growth maintenance.

More specifically, entry allowed Russia to have trade agreements on particular goods previously unattainable with areas as European Union, countries of Netherland and China. Thereby it not allowed the host country to broaden its trade activities on wider areas but also the variety of goods traded.

Not less important the fact that the rules and restrictions alongside with the opportunities the entry provides the country with beneficially affected the sanctions; in a way than otherwise, the country would be subject to them at higher extent.

Figure 4. Gross capital flows in Russia for 25 years.



Source: Central Bank of the Russian Federation.

Moving onto the FDI investigation, (Figure 5) one should note up to 21st century the flows trend remained plateau at 5000. The expansion was experienced from 2002 to 2007, with the highest rate of injection made in 2007, almost on the verge of 80000, followed by severe collapse of financial market in housing sector down to 29000, which is two and a half times less. Further seven years were described trough fluctuations with the lowest figure for inflows accounting for 10000 in 2014, where one way to think of that is the ruble depreciation, and respective substantial rise in outflows at 70000. Afterwards at year of 2017 the gap accounted for 10000, with preponderance of outflows over inflows.

Data

Our analysis is based upon data drawn and available for 4 years: 2000, 2005, 2010 and 2015. We have used bilateral data on FDI flows between countries. Data on the movement of capital in all countries were found on the website of each country’s National Bank and UNCTAD.

The data set includes 15 Post-Soviet Union countries, among which are Russia, Kazakhstan, Moldova, Belarus, Uzbekistan, Azerbaijan, Turkmenistan, Ukraine, Georgia, Kyrgyzstan, Latvia, Lithuania, Armenia, Tajikistan, and Estonia. In addition, our data set includes all 36 OECD countries, to which we will compare our results. Estonia, Latvia, and Lithuania are included in both groups, so overall there are 48 countries. Comprehensive approach done in order to depict any inconsistencies given fixed effects.

For dependent variable we chose bilateral FDI inflows into Former Soviet Union and OECD countries. All data for FDI we got from the UNCTAD database in the section “Bilateral FDI Statistics”. In contrary the independent variables are: GDP as a proxy for market size, membership

in WTO organization, similar language, culture and border, access to sea, being in colony(now or before), involvement in the same free trade area or currency union, distance between countries, OECD membership and Post-Soviet Union country dummies. Those dummies were used as we want to distinguish countries and their attachment to various groups like Post-Soviet Union countries and OECD members in order to find out the certain effect of WTO membership.

We took information about GDP from IMF (section: “economic outlook”). Whereas information for dummy variables as similar language, common border, same culture, access to sea, membership in the same free trade area, common currency, involvement of countries to colonies, taken from CEPII.COM, section –gravity. WTO members list was downloaded from official cite of WTO, OECD counties list we took from official cite of OECD.

In the following step, we will introduce dummy variable for WTO membership, so value of 1will be attributed to the year of membership establishment and consequently 0 for none membership. Second dummy will be presented by factor as common language in the same free trade area, as value of 1will be attributed to the areas speaking in one language and 0 for differing areas, final dummy will be applied for determination of the membership, 1 for the being in the FTA and 0 to not being in FTA.

Firstly, we prepared our data by transforming it to the logarithmic model. As original form of the gravity equation in multiplicative, we toke logarithm from both sides and transform it to the linear one.

Concerning the panel data analysis, one is chosen due to its favorable features and abilities such as the control of unobserved heterogeneity, decipher dynamics and asymptotic properties
However, despite its pros, we should also mention its weaknesses of which the analysis can still suffer and be subject to disturbances. Those are heterogeneity issue (failure to gather some vitally important factor which is outside the model), then because of usage of a large set of information, we cannot determine with accuracy which of the varieties is more influential, some uncertainty presence issue. Another bias we can face is selective bias, since we analyzed only several post-soviet union countries, meaning that we cannot conclude that WTO membership is actually affect or not affect the flows to the countries.

Regression analysis

The following section will address the more empirical part of our research. For that we employed the regression analysis to test the underlying hypothesis, as of that WTO has a positive contribution on capital and trade flows.

For this purpose, we start with basic methodology introduction which is used to test the hypothesis. Once after, we name our variables and present our foreheads toward their upcoming

possible impact. Finally, the econometrical part using the regression analysis will be employed for capital and trade flows with their results’ interpretation and their significance.

$$Y_{ijt}=\alpha+\beta*F_{it}+\beta*F_{jt}+\beta*X_{ijt}+\varepsilon_{ijt},$$

where F_{it} is a country i specific fixed variables.

As reference variables we have source and host dummies for being in WTO and being a post-soviet and OECD.

The first model is a benchmark model with no fixed effects. We employed ordinary least squares estimation techniques allowing standard errors to be robust. OLS estimators are unbiased and consistent if all assumptions are satisfied, such as no autocorrelation, error term is distributed independently of each observations.

As we have bilateral data on capital flows between countries we are suffer from multilateral resistance. According to work of Anderson and van Wincoop (2003) traditional gravity equations take into account only bilateral trade costs on trade flows (barriers to trade between a pair of countries) and ignore the fact that we operate in a multilateral world, so there are barriers to trade that each country faces with all its trading partners. Thus, without right modeling of multilateral resistance our estimates will be inconsistent. The solution to this can be the direct inclusion of (importer-time and exporter-time) fixed effects, because it will control for some potentially observable and unobservable characteristics that vary over time for each exporter and each importer. The second model use host-country and source-country time fixed effects directly.

However, this model offer just a part of solution of correctly modelling multilateral resistance. The third model takes into account not only country specific time-variant characterestics but also country-pair time-invariant specific characteristics, such as distance, border, colony, language as firstly mentioned by Baier and Bergstrang (2007) . They found that country-pair fixed effects can be used to account for endogeneity of regional trade agreements, providing a flexible and comprehensive account of the effects of all time-invariant bilateral trade costs.

After that, we employed poison pseudo-maximum likelihood estimation technique, as the original gravity equation is in multiplicative form, the PPML allow us to fir gravity model in the original state without transforming it into logarithmic model. There are several advantages over OLS estimator. Firstly, OLS drops observations with zero FDI, while PML is not. Moreover, OLS estimator is inconsistent in the presence of heteroscedasticity problem; in contrast, poison PML estimator will be still consistent in such situation. Lastly, PPML coefficients are easy to interpret as they are straightforward. Another nonlinear estimation method, which is similar to PPML, is a gamma pseudo maximum likelihood, but where the conditional variance of the dependent variable

is proportional to its conditional mean. According to Martínez Zarzoso et al. (2007) GPML estimator coefficients are adequate even in the presence of heteroscedasticity too.

Methodology

The following empirical part of the work will provide evidence toward the presence of positive relationship between the foreign direct investment (as a proxy for capital flows) and trade flows in accordance with the growth of GDP. The practical approach will be based upon Gravity model which depicts the bilateral trade flows between the two economically desirable points of observation or simply saying the trade partners.

The basic concept of Gravity model underlies two factors upon which are based; these are the size of the proposed units and the proportionately negatively related distance between destinations. In the current paper the size of the countries will be viewed through GDP values and the distance as costs associated with the going trade activities. The standard form of this model can be represented by transforming (1) equation into (2):

$$ln(FDI\_i)_{ijt}=\beta_0 +\beta_1*ln(gdp1)_{it}+\beta_2 ln(gdp2)_{jt-}+\beta_3*ln(dist)ij+\beta_4 lang_{ij}+ \beta_5 fta+ \beta_6 cu+\beta_7 h\_wto_{ijt}+ \beta_8 s\_wto_{ijt} + \beta_9 colony_{jt}+ \beta_{10jt} comcol+ \beta_{11ijt} curcol+\beta_{12} one\_in+\beta_{13} both\_in+ \beta_{14ijt}\ border+ \beta_{15ijt}\ s\_wto\_ps\_noecd + \beta_{16ijt} h\_wto\_nps\_oecd+ \beta_{17ijt} s\_nwto\_ps\_noecd + \beta_{18ijt} h\_wto\_ps\_noecd + \beta_{19ijt} s\_nwto\_nps\_oecd + \beta_{20ijt} s\_wto\_nps\_oecd+ \beta_{21ijt} h\_nwto\_nps\_oecd+ \beta_{22ijt} h\_nwto\_ps\_noecd+ \beta_{23} both\_in + \beta_{24} landl+ \beta_{25} lngdppc1+ \beta_{26} lngdppc2\ u_{ijt}$$

Where: β_0 – intercept of the model, β_i-coefficients of independent variables

Variable	**Meaning**
lnFDI_i	log of FDI inflows
lngdp1	log of real GDP of host country at time t;
lngdp2	log of real GDP of source country at time t;
lngdppc1	log of real GDP per capita of host country at time t;
lngdppc2	log of real GDP per capita of source country at time t;
lndist	log of distance between host and source;
border	a dummy variable, which takes 1 if countries are neighbors and share a common border, 0 otherwise;
landl	a dummy variable, which is equal to 2 if both countries are landlocked 1 if only one country is landlocked and 0 if no one is

	landlocked;
curcol	a dummy variable, which is equal to 1 if one country in a pair is currently colonized by the other, 0 otherwise;
lang	a dummy variable, which is equal to 1 if a trading pair share a similar language, 0 otherwise;
comcol	a dummy variable, which takes 1 if countries were colonized by one colonizer after1945;
colony	a dummy variable, which takes 1 if a country ever colonized by the other country;
onein	a dummy variable, which is equal to 1 if only one of the trading parties in a pair is a member of WTO, 0 otherwise;
bothin	a dummy variable, which is equal to 1 if both countries are in WTO, 0 otherwise;
cu	a dummy variable, which is equal to 1 if both parties are members of common currency union;
fta	a dummy variable, which is equal to 1 if both parties are members of free trade area;
s_wto	a dummy variable, which is equal to 1 if a source country is a WTO member at time t;
h_wto	a dummy variable, which is equal to 1 if a host country is a WTO member at time t;
s_wto_ps_noecd	a dummy for source, who is a WTO member and a Post-Soviet country;
h_wto_nps_oecd	a dummy for host, who is a WTO member and an OECD member;
s_nwto_ps_noecd	a dummy for source, who is a Post-Soviet country, but not a WTO and OECD member;
s_nwto_nps_oecd	a dummy for source who is an OECD member, but not a WTO member;
h_wto_ps_noecd	a dummy for host, who is a WTO member and a Post-Soviet country;
s_wto_nps_oecd	a dummy for source who is an OECD member, and a WTO member;

h_nwto_nps_oecd	a dummy for host, who is an OECD member, but not a WTO member;
s_wto_nps_noecd	a dummy for source who is a WTO member, but not an OECD member.
h_wto_nps_noecd	a dummy for host who is a WTO member, but not an OECD member.
h_nwto_ps_noecd	a dummy for host who is a Post-Soviet country, but not an OECD or WTO member.

However, before any further investigation, it should be stated the following: the firstly presented by Newton the law could have been interpreted in our case as “the bigger sizes points attract the similar subsequent points in proportional manner, though proliferate with the rate of further distance between them”. In other words, we can conclude that countries valued more in terms of GDP tend to choose and trade with the ones which possess the similar features, and with lower probability as they are separated further away. Interestingly that despite the “mass” of the observed units are some sort of can weight more if the presented implicitly the cultural

Furthermore, despite the efficiency of the above model it still allows for some weaknesses, among which can be seen: first, nowadays the cross-borders start being matter of less importance because of easier access due to transportation, internet and communication etc.; second, the dispersion of intangible assets/services market become more dominant; third, current trade partners becomes too much fulfilled and the new interventions and fast growing economies of China and India are of higher preferences for almost all grown suppliers rather than previous ones.

Hypothesis

H_0: Capital flows did not increase due to WTO

H_a: Capital flow increase due to WTO

Expectations of gravity model main variables and reason why we used these indicators:

- GDP (lnGDP)–very important indicator for trade and capital flows, because for high values it does encourage rise in FDI and capital inflow.
- Language (CLANGUAGE) – dummy variable, which takes 1 for the common language, 0 otherwise. Partners with common language are Russia, Kyrgyz Republic, Tajikistan, and Moldova. Majority of citizens from countries such as Estonia, Ukraine, Lithuania, and Latvia speak Russian. This can affect the transaction and communication costs. As Head (2003) noted, countries which
-

have common language trade two or three times more than other countries. However, for doing business nowadays it should be not so significant for creating trade or for capital flows.

- Distance (lnD) – measured by the bilateral distance between the main economic centers in the two countries. Also can be viewed in different ways, for example: transaction costs, transportation cost, communication cost etc. Data are obtained from the Centre d´Etudes Prospectives et d’Informations Internationals (CEPII). CEPII supply different measures of bilateral distances for most countries across the world. We expect high significance of this coefficient. Meaning that, neighbor countries more often have similar habits in investment decisions.

Results

Model 1 (Benchmark)

The following result comprises the findings of the benchmark model against the main gravity model. Therefore, the regression result suggested by our first model depicts the coefficient of the main explanatory variables to predict or fairly prove those predicted based on theoretical approach.

Those variables of interest are GDPs of each observed country, which have the positive sign consistent with gravity expectations, complying the existence of strong positive relationship between FDI inflows injections in host country if one maintains high GDP level. Moreover, GDP remains significant at 1% critical level.

Second is the distance or otherwise seen as transaction costs. The following factor have consistent negative coefficient as suggested by gravity model, associating the bigger distance with higher transportation costs creating disincentives and lower probabilities for trading and thereby any capital investments. Furthermore, the distance showed to be significant at 1% critical level.

Other variables of importance are common neighborhoods and common language factors. Both are consistent with the predictions of gravity model, stating if two have common border and if two share the same common language they are highly likely to invest and cooperate with each other. Two suggest the existence of strong positive relationship toward FDI flows.

Going further, we should account to FTA factor, which is consistent with gravity assumptions and yields positive yet weakly significant results.

Last but not least, we found out that there exists controversial effect of WTO toward FDI of the source country. One being negative for Post-Soviet, yet reversely positive for OECD members.

Model 2 (OLS with Fixed Effects)

The following model takes into account country time specific characteristics (host and source time fixed effects) using ordinary least squares estimation method of linear restrictions.

The coefficients for post-soviet countries’ dummy and for OECD ones for the source country being in WTO are both positive though former being significant and latter insignificant, respectively. However one thing worth to mention is that the coefficient of all WTO source members, that also includes countries apart from OECD and Post-Soviet, is negative and significant. One logical conclusion to draw from here is that we cannot deny or be in favor of WTO effect on FDI for source counties.

The overall effect of WTO for host countries’ FDI inflows is positive and highly significant. These comprise both country types, being OECD member and Post-Soviet’s.

Lastly, as in the previous benchmark model the basic factors’ coefficients as distance, common language and border all go in line and even further significant in the current model due to controlling country-specific time variant variables as GDP of both types of countries.

Model 3 (OLS with country-pair Fixed Effects)

For pure distinction of WTO influence on FDI flows, not being subject to other external factors the third equation requires to be adjusted to county-specific factors at time varying level and more specific ones arising as of the relationship between varying match -partners not being subject to time changes. This suggests for third model to take advantage of the previous due to the consideration of country-pair specific time-invariant fixed effect. Those are distance, language, border etc.

Moreover, the current model supports the coefficients of FTA and currency union as of being positive and highly significant.

Model 4 (PPML)

The permanent presence of multiplicative error term in the original model of gravity makes the mean logarithm of error term subject to its positive varying values, meanings it will take into consideration the variance of it. That is as in the usual performance our results will be biased and inconsistent.

To overcome this problem, we applied PPML technique using fixed effects as coefficients to run the same regression in second model. The interpretation of the coefficients follows the same

pattern as one in the OLS regression approach. The results thereby driven are consistent with the predictions of the gravity model, as distance’s coefficient being negative and highly significant and the landlocked dummy variable reflecting significant and nehative results.

As in the model 2, results source countries being either Post-Soviet or OECD members and also being in WTO show up to have positive and significant relationship with FDI.

As for host countries being Post-Soviet and being in WTO yields negative result on FDI.

Model 5(GPML)

Last model has common features with the former but with the one crucial distinction in gamma and poisson PML estimations, such that PPML does not discriminate, that is views all observations as equally important thereby with same weight in each case; whereas gamma assigns larger conditional mean with respective lower weights.

The advantage both possess is the opportunity to deal with zero trade/capital flows, moreover being able to be consistent in the presence of Variance of Distance term being differentiated across observations.

Finally as of findings on coefficients on WTO for all groups of countries being insignificant makes us uncertain about real effect WTO possesses and provides on FDI flows.

Conclusion

The initial interest in investigation of WTO real effect was driven by discrepancy and varying opinions on either of contribution or detriment on certain economic outcomes. As stated in literature review the trade effect was not of certain confidence on deciding on intervention, therefore our work being adjusted to capital flow level determine the accession to WTO on FDI flows in Post-Soviet union countries, using OECD as initial base for relative comparison.

The empirical research was based upon gravity model which best employed for trade determination. Further three-dimensional data was employed to adjust to time varying and country relationship, as host and source. Afterwards the five different estimation techniques being applied allowed us to improve and control for any time variant and invariant factors, relative and specific characteristics.

That is starting with the simplest prove of gravity approach usage in practice we accounted for multilateral resistance alongside with relative trade frictions arising as a consequence of the relationship establishment with further consideration of time invariant effects on relative relationship and heteroscedasticity presence, allowed us to draw significant results of effect of WTO on FDI flows to Post-Soviet union countries.

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Appendices

Table 5. Main Source countries for Post-Soviet countries.

Host country	Year	Source countries		
		1	2	3
Armenia	2017	Russia	Georgia	China
Estonia	2017	Sweden	Norway	United Kingdom
Georgia	2017	Azerbaijan	Cyrpus	Luxembourg
Kazakhstan	2017	Netherlands	US	Switzerland
Kyrgyz republic	2017	Canada	China	United Kingdom
Latvia	2017	Sweden	Russia	Estonia
Lithunia	2017	Sweden	Netherlands	Cyrpus
Moldova	2017	EU partners		
Russia	2017	Cyrpus	Luxembourg	Netherlands
Tajikistan	2017	China	Russia	Kazakhstan
Ukarine	2017	Cyrpus	Netherlands	United Kingdom

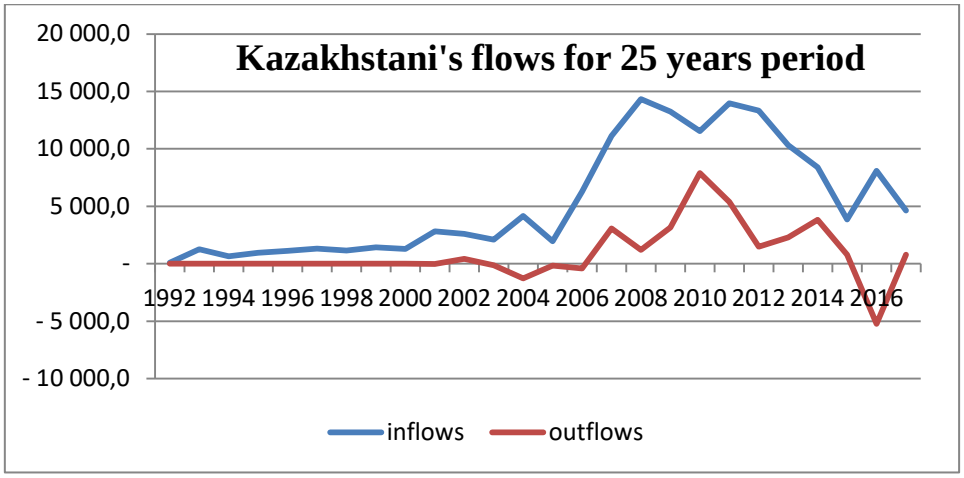
Source: Unctad

Table 6. Descriptive Statistics

Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**

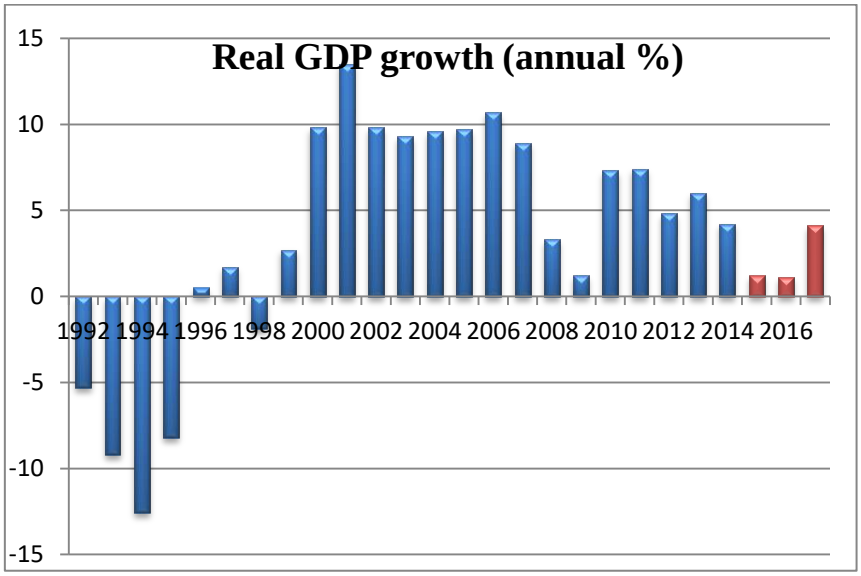
FDI_i	5,36	781.4028	4988.965	-34055	101126
FDI_o	5,579	642.0149	4081.873	-31236.15	93103.77
landl	26,139	.4487547	.5842484	0	2
lndist	26,121	8.065776	1.109068	3.087945	9.884789
onein	26,466	.257878	.4374748	0	1
bothin	26,466	.7206605	.4486831	0	1
nonein	26,466	.0214615	.1449196	0	1
lang	26,139	.0675619	.2509974	0	1
border	26,139	.0165653	.1276382	0	1
comcol	26,139	.0105972	.1023977	0	1
colony	26,139	.0208883	.1430132	0	1
cu	26,139	.0348139	.1833116	0	1
fta	26,466	.0713368	.2573915	0	1
s_wto	26,466	.8545681	.3525424	0	1
h_wto	26,466	.8441019	.3627656	0	1
lngdp1	26,384	26.02358	3.833959	15.75709	31.96777
lngdppc1	26,268	10.98229	1.281278	7.185798	13.09594
lnrgdp2	25,465	17.24882	8.616069	0	32.16129
lrgdppc2	25,434	14.92026	8.605951	0	31.9677
s_wto_ps_n~d	26,466	.0426585	.2020898	0	1
s_wto_~_oecd	26,466	.2046021	.4034182	0	1
h_wto_ps_n~d	26,458	.0968327	.2957354	0	1
h_wto_~_oecd	26,466	.7347162	.4414925	0	1
s_ps_noecd	26,466	.0862994	.280811	0	1
s_nps_oecd	26,466	.2046021	.4034182	0	1
h_ps_noecd	26,459	.2363279	.4248339	0	1
h_nps_oecd	26,466	.7347162	.4414925	0	1
s_~nps_noecd	26,466	.0092572	.0957696	0	1
h_~nps_noecd	26,466	.0272803	.162902	0	1

Figure 6. Kazakhstani's flows for 25 years period.



Source: National bank of Kazakhstan.

Figure 7. Real GDP growth (annual %)



Source: World Bank.

Table 7. Regression output

	ols		m4		m5	
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
main						
lndist	-.2463664***	.0385208				
landl	-.423484***	.0868752	-5.612694***	.2597336	-9.042187	6.650019
onein	.7279579	.6596991				
bothin	1.347149	.909345				
lang	.6592818***	.1634016	.1137809	.2635594	.7226059***	.1903215
border	1.07984***	.1773466	.0753677	.2207924	1.02612***	.141762
comcol	.2927589	.375625	1.551481*	.7018299	.6739321	.4722806
curcol	3.084222***	.3928557				
colony	.9037729***	.2217143	.2718912	.1968566	.4262333*	.208475
cu	.0994906	.1310403	.0772743	.2393185	.5990305***	.158917
fta	.231816*	.1145707	.3150459	.2545497	.2330153	.147877
s_wto	0	.				
h_wto	-.2964049	.4532567				
cpdum	-9.26e-07***	1.75e-07				
lngdp1	.0935418***	.0187653				
lngdppc1	.0994648	.0714897				
lnrgdp2	.0144894	.0077038				
lrgdppc2	-.0049082	.0082632				
s_wto_ps_n~d	-1.365802***	.339226	3.342384**	1.279044	.5957839	3.118738
s_wto_~_oecd	2.074112***	.1028219	2.088508***	.4820483	4.278452	2.773595
h_wto_ps_n~d	-.3734896	.3953066	-3.534938**	1.162056	-.0110373	3.171416
h_wto_~_oecd	1.497153***	.2987825	11.36316***	1.08072	.2203029	5.233108
s_ps_noecd	.4528609	.292321	-2.450359	1.590695	-1.135016	5.604767
s_nps_oecd	0	.	0	.	0	.
h_ps_noecd	1.511028**	.5108282	3.575171**	1.161657	-.5992207	3.981332
h_nps_oecd	0	.	0	.	0	.
s_~nps_noecd	-.8602142***	.2374402				
distc			-.0001371***	.0000215	-.0000865***	.0000122

	m2		m3	
	Coef.	SStd. err.	Coef.	Std. err.
lndist	-.6350588***	.05177		
landl	-4.758394***	.6001686		
onein	5.473713**	.866208		
bothin	11.89067***	1.543835		
nonein	0	.		
lang	.4504157*	.1854986		
border	.6090736***	.1712761		
cu	-.0860936	.1755738	.6413123***	.1793256
fta	.1884775	.1539739	.5145927**	.1738414
s_wto	-12.93232***	1.055556		
h_wto	0	.		
s_wto_ps_n~d	1.761898***		2.278571***	.5433154
s_wto_~_oecd	.6054458		.9000777	.9843299
h_wto_ps_n~d	5.278907***		-1.408614	1.099713
h_wto_~_oecd	10.04884***		8.26344***	1.4373
s_ps_noecd	-2.004479		-2.396172	1.644598
s_nps_oecd	0		0	.
h_ps_noecd	-5.641034***		1.036542	1.122305
h_nps_oecd	0		0	.
s_~nps_noecd	-2.346923*		-3.232463**	1.135363
h_~nps_noecd	-10.50415***		-8.320079***	1.24751
_cons	5.196775**	1.023681	-.122284	.9237714

t statistics in parentheses
* p<0.05 ** p<0.01 *** p<0.001

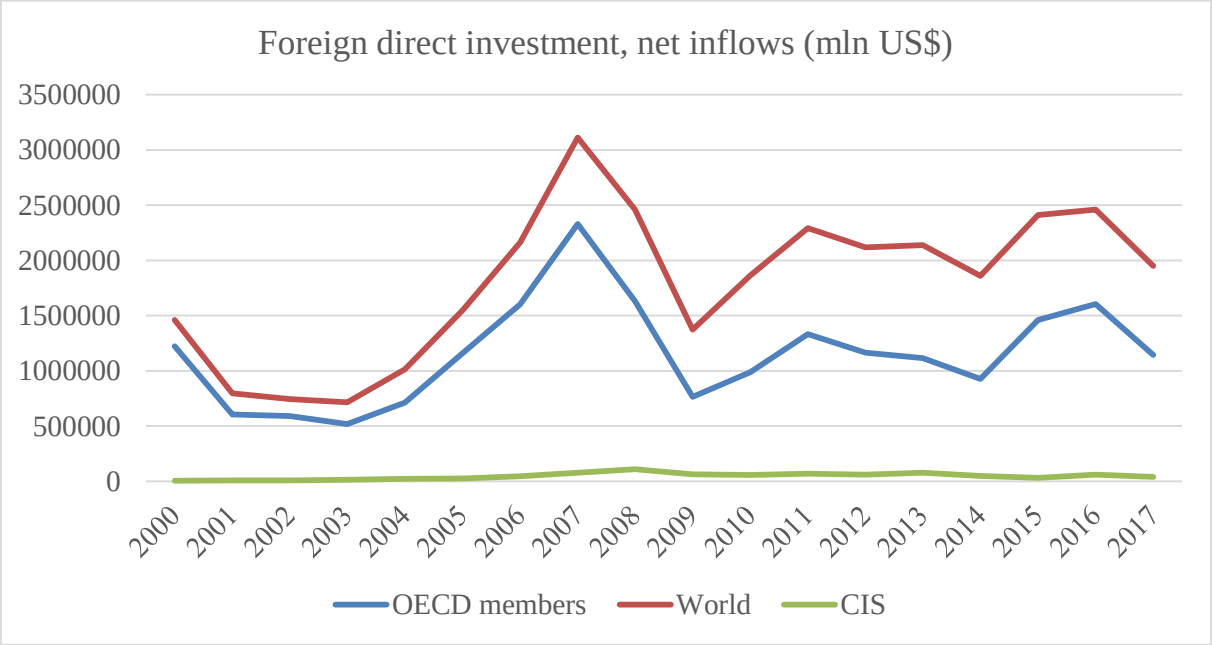
Table 8. General Information for Post-Soviets countries.

Country name	Date of application	Date of accession	Economic Freedom Index one year before accession to WTO	Economic Freedom Index in 2019
Armenia	29/11/1993	05/01/2003	68.0	67.7
Estonia	10/03/1994	13/11/1999	72.5	76.6
Georgia	03/07/1996	14/06/2000	52.5	75.9
Kazakhstan	29/01/1996	30/11/2015	63.7	65.4
Kyrgyz Republic	13/02/1996	20/12/1998	N/A	62.3
Latvia	08/11/1993	10/01/1999	63.4	70.4

Lithuania	18/01/1994	31/05/2001	61.9	74.2
Republic of Moldova	25/11/1993	26/07/2001	59.6	59.1
Russian Federation	04/06/1993	22/08/ 2012		58.9
Tajikistan	29/05/2001	02/03/2013	53.4	55.6
Ukraine	30/11/1993	16/05/2008	51.5	52.3

Source: Unctad, Heritage

Figure 8. Foreign direct investment, net inflows (mln US$)



Source: World bank

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