Determinants of Foreign Direct Investment in Transition Economies: a case study of Kazakhstan and Uzbekistan

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Abstract

Foreign direct investment (FDI) is one of the main sources of capital inflows and driving factors of economic growth in many countries. Particularly, developing countries, emerging economies and countries in transition have come increasingly to see FDI as an important factor of their economic development. This paper investigates the determinants of FDI in two Central Asian countries: Kazakhstan and Uzbekistan. The paper uses the data sets from 1996 to 2010 and applies two different econometric methodologies, an ordinary least squares (OLS) and seemingly unrelated regressions (SUR) methodologies to analyze the factors that influence FDI inflows in selected countries. The chosen empirical models are based on FDI theories and previous empirical studies on this subject. Due to availability of data, the paper mainly focuses on location-specific factors to investigate FDI determinants. The results indicate that market size, economic stability and reliability are significant factors for FDI inflows in both, Kazakhstan and Uzbekistan. Additionally to those factors, trade openness found to be crucial factor for FDI inflows in Uzbekistan.
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1. Introduction

It is widely accepted that foreign direct investment (FDI) is one of the main sources of capital inflow and driving factors of economic growth in many countries. FDI helps to improve trade, creates employment opportunities, aids in transfer of technology and knowledge in the host countries. Therefore, developing countries, emerging economies and countries in transition have come increasingly to see FDI as a key factor of modernization and economic development (OECD, 2002).

Since the late 1980s, global flows of FDI have been increasing significantly. For many past decades the main fractions of FDI flows have gone to developed economies. However, during the recent years the share of FDI flows which has been going to developing and transition economies has increased (Johnson, 2006). In 2010, developing and transition economies absorbed more than half of global FDI flows for the first time (UNCTAD, 2011) (see Figure A1 in the Appendix A).

Multinational enterprises (MNEs) are often concerned to be the primary influencers of the globalization process. They integrate production processes across national boundaries by transferring capital and technology (Frawsen, Josefsson, 2004). MNEs expand their activities to different foreign economies for a number of reasons such as exploitation of economies of scale, the use of specific advantage or just because their competitors are engaged in similar activities. On the other hand, different economies are also engaged in a policy competition by altering their major economic policies such as corporate taxes, labor market conditions, subsides, tariff boundaries and privatization policies in order to improve their economic conditions for attracting foreign investment (Demirhan, Masca, 2008). However, attracting and promoting FDI is a complex process. In general, most developing countries in the world are competing for similar types of FDI. However, some of these countries, mainly due to the size of their economies, have more natural advantages or other factors which enable them to attract more FDI (UN, 2003).

The objective of this study is to investigate the main determinants of FDI inflows in Central Asia’s two transition economies, namely, Kazakhstan and Uzbekistan (my home country) for the period of 1996 to 2010. The choice of these countries is mainly based on their location and economy size, which are briefly discussed in the next section.
The reminder of the paper is organized as follows: Section 2 presents a brief discussion of FDI inflows in Central Asia. Section 3 introduces to the relevant theory. In Section 4, the review of the relevant empirical literature is provided. Further, Section 5 describes a chosen empirical methodology. Section 6 presents and discusses the empirical results. The final Section concludes.
2. FDI inflows in Central Asia

Most of the countries of the former Soviet Union including the countries in Central Asia went through very important reforms in their economic systems after the collapse of the Soviet Union. These reforms involved some major restructuring of their economies, for which large amounts of financing were needed (Dhakal, Mixon, Upadhyaya, 2007). Thus, in the 1990s, FDI attraction sharply increased among the transition countries along with the integration of these countries with the global economy. As a result, transition countries altered their economic policies by reducing the barriers to investment and trade (Zeqiri et al., 2011).

The Central Asian countries possess some of the largest energy supplies in the world, which represent a powerful basis for economic growth. On the other hand, Central Asia has increasingly become the recipient of FDI from OECD countries, as well as Russia and China (OECD, 2011), which serves as an additional power for their economic development.

In two decades of independence, the Central Asian countries have seen a massive infusion of FDI. According to the OSCE (Organization for Security and Cooperation in Europe), FDI inflows into Central Asia between 2005 and 2009 increased from $3 billion to $19 billion (Sholk, 2011). However, FDI inflows are very unequally distributed among the Central Asian countries, as it can be seen in Figure 1.

![Figure 1. Average annual FDI inflows into five Central Asian countries (1996-2010)](source: UNCTAD database)

The largest receiver of FDI is Kazakhstan, the largest economy in Central Asia. Kazakhstan is more than twice as large as the four other Central Asian countries put together. On the other hand, Uzbekistan is most populous and one of the most rapidly expanding economies in this region. Uzbekistan is the second largest economy after Kazakhstan in this region. However,
after their independence until 2010, average annual growth rate of gross domestic product (GDP) was higher in Uzbekistan compared to Kazakhstan as it can be seen in Figure 2.

![Graph: Annual Growth Rate of GDP (1991-2010)](source: The World Bank Database)

**Figure 2. Annual Growth Rate of GDP (1991-2010)**

Kazakhstan and Uzbekistan experienced sharp decline in their output in the first years of transition. However, after few years their economy started to recover due to the impact of policy reforms. Consequently, global financial crisis effected significantly on the economy of Kazakhstan. However, Kazakhstan recovered strongly in 2010 by reaching GDP growth rate over 7 percent, but FDI inflows remained low compared to 2008 level. On the other hand, economy of Uzbekistan appears to be unaffected by the global financial crisis, with an official GDP growth rate above 8 percent in 2009 and 2010. Additionally, FDI inflows in 2009 and 2010 were higher compared to 2008 level.

In general, the Central Asian countries, especially Kazakhstan and Uzbekistan have great potential to attract more FDI. These countries have advantages of strategic location, abundance of natural resources, rapidly expanding economy and many more. Therefore, understanding the main determinants of FDI and thus implementing right policies would increase the attractiveness of these economies for MNEs.
3. Theories of FDI

This section provides with the discussion of several theories which are commonly accepted to be the main theories of FDI. The empirical part of my thesis closely relies on some of these theories.

3.1. Monopolistic Advantage Theory

The monopolistic advantage theory was first introduced by Stephen H. Hymer in 1960. This theory suggests that the MNEs have monopolistic advantages which enable them to operate more profitably than locally competing firms. Hymer (1960) found that FDI takes place because MNEs choose markets or industries in which they possess higher competitive advantages, such as technological knowledge, which are not available to other operating firms in a certain country. Firm-specific (also ownership-specific) advantages are also referred as these competitive advantages (Shenkar, 2007).

According to this theory, superior knowledge and economies of scale are two main factors for monopolistic advantages. Superior knowledge refers to managerial skills, production technologies, knowledge of products and industrial organization, which are the driving forces of creating unique product differentiation for MNEs in a host country. Further, the second factor for the monopolistic advantage, which is economies of scale, occurs through either horizontal or vertical FDI. Horizontal FDI occurs when MNEs begin the same production activities in different countries. On the other hand, MNEs may profit from local advantages in production costs through vertical investment in which each affiliate produces those parts of the final product for which local production costs are lower.

By using Hymer’s work as a basis, Kindleberger (1969) also argued that FDI do not occur in perfectly competitive markets. He claimed that in a world of perfect competition for factors and goods, FDI cannot exist as in such conditions local firms would have advantage over foreign firms in the proximity of their operations to their decision making centers. Therefore, it would be hard to survive for foreign firms under these circumstances. Hence, there must be some imperfection in markets for factors and goods for FDI to prosper (Barclay, 2000).
3.2. Product Life-Cycle Theory

The product life-cycle theory was first developed by Raymond Vernon in 1966, to explain certain types of FDI made by US MNEs in the manufacturing industry in Western Europe after the Second World War. Vernon identified three stages in his theory: the new product stage, the maturing product stage and the product standardization stage.

In the new product stage, production occurs at home country and the prices are inelastic due to the high demand (Severn, 2007). Thus, companies create new innovative products for domestic consumption and to serve the foreign markets they export the surplus (Denisia, 2010).

In the maturing product stage, production cost becomes the main factor of production because of the entrance of new firms into the domestic markets. Hence, overseas investment will become more beneficial. Thus, to achieve economies of scale and decrease production costs, firms are induced to invest and produce in other advanced countries (Zhu, 2008).

In the standardization stage, the production becomes completely standardized and firms compete with prices but not with product differentiation. Therefore, in this stage developing countries may receive high proportion of FDI and become most competitive destinations for production due to lower labor costs (Frawsen, Josefsson, 2004).

Since the differences among many countries have been disappearing, and the geographical reach of most enterprises has been increasing, Vernon (1979) has noted that some of the starting assumptions of his original theory are clearly in question. Nevertheless, he has argued that his product life-cycle theory may still be applied to smaller firms, which have not created yet an international network of foreign manufacturing subsidiaries (Baronchelli, Cassia, 2008).

3.3. Internalization Theory

The theory of internalization was developed by Buckley and Casson in 1976, based on the pioneering study of Ronald Coase (1937), who developed transaction cost theory of the firm. Transaction cost theory of Coase (1937) is one of the first theoretically attempts to define a firm to the market.

Internalization theory explains that the available external market cannot provide efficient conditions in which a firm can benefit by exploiting its technology or production resources.
Hence, the firm tends to produce an internal market through investment in multiple countries and thus develops the required market to attain its objectives (Shenkar, 2007).

Buckley and Casson (1976) have mentioned that in certain markets such as markets for knowledge, there is an especially strong incentive to internalize. The authors consider knowledge as a public good within a company as so it can be utilize at no extra cost in several corporate divisions. Additionally, it is not difficult to transfer it from country to country (Assuncao, Forte, Teixeira, 2011).

3.4. Eclectic (OLI Paradigm) Theory

The eclectic theory was introduced by John H. Dunning in 1981. It presents a general framework for explaining international production. It cover the mainstream theories such as the factor endowment theory of Heckscher (1919) and Ohlin (1933), the monopolistic advantage theory of Hymer (1960), the transaction cost theory of Coase (1937), the internalization theory of Buckley and Casson (1976) and location advantage ideas of Dunning. The eclectic theory provides broad explanation of MNEs’ motives for FDI and different internationalization movements, such as location selection, market preference and so on. Thus, this theory is considered as the representative of classical theories to explain internationalization activities of MNEs (Zhu, 2008).

The eclectic theory consists of three sets of interdependent variables: ownership-specific advantages, location-specific advantages and internalization advantages. Therefore, it is also called OLI paradigm.

Ownership-specific advantages (also firm-specific advantages) refer to intangible assets, such as technology, information, brand name, managerial skills and so on. These assets are exclusive possessions and can be transferred within a MNE at low cost.

Location-specific advantages (also country-specific advantages) refer to location-bound endowments which are offered by host countries to investing companies. They also refer to market structure, political stability, cultural endowments and several other factors that increase competitive advantage of a host country (Baibekova, Hoang, 2010). Thus, location-specific advantages of host countries are very important factors for MNEs’ investment decisions.
Internalization advantages refer to abilities of MNEs to efficiently internalize their ownership specific advantages to decrease the cost of transaction during the international production (Zhu, 2008). These characteristics of OLI paradigm offer a framework for assessing alternative methods in which companies may arrange the exploitation of their main competencies, given the locational attractions of various regions and countries (Dunning, 2000).

Further, Dunning (1994), distinguishes four types of foreign investments, considering their various strategic objectives: market-seeking FDI, efficiency-seeking FDI, natural-resource-seeking FDI and strategic-assets-seeking FDI.

Market-seeking foreign investors focus on servicing the markets of host countries. On the other hand, efficiency-seeking foreign investors are concentrated on low-cost production factors, because the production mainly exported to home country of FDI and other target markets. Further, natural-resource-seeking foreign investments are focused on extracting or refining natural resources of host countries. And finally, strategic-asset-seeking investments are focused on acquiring resources and capabilities that an investing company believes will sustain or advance its core competencies in regional or global markets (Reiljan et al., 2001).

In general, the OLI theory provides a more comprehensive explanation of FDI than other mainstream theories such as the monopolistic advantage theory, the product life-cycle theory or the internalization theory. To provide the logic and benefits of international production the theory combines ownership-specific, location-specific and internalization factors. Despite the difference of the modern MNE behavior and international business environment from what they were in several decades ago, the eclectic theory is still able to explain the patterns of FDI (Shenkar, 2007).

Since OLI paradigm is the most recent and covers all the mainstream theories of FDI, the empirical part of the paper mainly relies on this theory. Particularly, the location-specific advantages of this theory are mainly used to choose and arrange the variables for the empirical analysis (which are particularly discussed in Section 5).
4. Empirical Literature Review

There have been numerous empirical studies on determinants of FDI for various countries. However, in this section, I mainly focus on the empirical studies related to developing and transition economies.

Campos and Kinoshita (2003) investigated the determinants of FDI inflows into 25 transition economies by using panel data for the period 1990-1998. Their findings suggest that the main determinants of FDI in transition are institutions, agglomeration and trade openness. Further, Johnson (2006) analyzed the FDI determinants in transition economies by separating the chosen countries into two groups: CEE (Central and Eastern Europe) and CIS (Commonwealth of Independent States). The CEE group consists with higher GDP per capita countries compared to the CIS group. Author suggested that FDI flows to the CEE are mainly driven by a market-seeking motive. And on the other hand, flows of FDI to the CIS economies are mainly caused by a resource-seeking factor. Moreover, Azizov (2007) studied the determinant of FDI in transition economies (CIS countries) for the period of 1992 to 2005. His findings suggest that natural resource, market size and inflation rate are important factors for FDI inflows.

Akhtar (2000) investigated the determinants of FDI in Pakistan through multivariate regression analysis. His findings suggest that market size, exchange rates and relative interest rates are one of the main important factors for FDI inflows in Pakistan. Further, Sahoo (2006) examined the determinants of FDI in five South Asian countries, namely, India, Pakistan, Bangladesh, Sri Lanka and Nepal. He used panel co-integration estimation and found that market size, labor force growth, infrastructure index and trade openness to be the main determinants of FDI. Further, Singhania and Gupta (2011) examined the determinants of FDI in India for the period of 1991 to 2008. They used autoregressive integrated moving average (ARIMA) econometric methodology and found that GDP, inflation rate and FDI policy changes during years 1995-1997 have had a significant effect on FDI inflows in India.

Asiedu (2006) investigated the determinants of FDI in 22 countries in Sub-Saharan Africa (SSA) by using panel data for the period of 1984 to 2000. Her findings suggest that natural resource endowments, large local markets, low inflation and good infrastructure are important factors for FDI. Moreover, author suggested that political instability and corruption are detrimental factors for foreign investors. She argued that small countries and countries
without abundance of natural resources can attract FDI by improving their institutions and policy environment.

Cleeve (2008) used cross-sectional time series data on 16 SSA countries. He found that large market size, good infrastructural development, high skills level and labor costs are significant determinants of FDI inflows. Author also emphasized that political and macroeconomic stability, property rights protection and other investment-supporting regulations are important factors for attracting FDI in SSA countries. Further, Indopu and Talla (2010) studied the determinants of FDI by using cross-sectional data for 41 African countries for the period 2002-2007. Their findings suggest that market size and natural resources are the main determinants of FDI in selected countries.

Demirhan and Masca (2008) investigated the determinant of FDI in 38 developing countries using cross-sectional data for the period 2000-2004. Their findings suggest that GDP per capita, degree of openness, inflation and tax rates are important factors for FDI inflows.

In summary, previous empirical studies on determinant of FDI focused on developing and transition economies obtained different results which are tend to depend on studied countries and time periods. However, the factors, such as natural resources, market size and economic stability (in terms of inflation) are generally suggested to be one of the main determinants of FDI inflows in developing and transition economies.
5. Empirical Methodology

In this section, the econometric methods used in the analysis are presented. I begin by presenting a specification of the variables which are tested for the determinants of FDI in the selected Central Asian countries and describe the data sources. Then I proceed with a description of the model used to analyze the determinants of FDI and discuss some empirical limitations.

5.1. Specification of the Variables and Data Collection

The variables which are used to analyze the main (mainly location-specific) determinants of FDI in the selected countries are chosen based on the previous theoretical (OLI paradigm being the main theory) and empirical studies on this subject. The following variables in the empirical analysis are considered:

1. **Market size (MSZ).** It is widely accepted that market size of host countries is one of the main determinants of market-seeking FDI. GDP is the main factor of a market size of a country, because GDP is a market value of total goods and services produced in a certain year within the borders of a country. Therefore, GDP (in billions of USD, constant (2000)) is considered as a proxy for market size in this study. If one thinks that a greater market size refers to a higher demand for goods and services and thus attracts more FDI, I expect a sign of a coefficient of this variable to be positive. The data for GDP are obtained from the International Monetary Fund (IMF) and World Economic Outlook (WEO) databases.

2. **Economic stability (ECS).** Stable economy of a country is another important factor for FDI. Economic stability prevents excessive fluctuations in the economy. In most cases, an economy with low and stable inflation is considered as stable. Therefore, I consider inflation as a proxy for economic stability. Since high inflation represents greater instability in many countries, a sign of a coefficient of this variable is expected to be negative. The data for inflation (consumer price index 2000=100) are obtained from the International Monetary Fund (IMF), World Economic Outlook (WEO) databases.

3. **Trade openness (TRO).** Export possibilities and access to other international markets determine the trade openness of a host country. This is an important factor in promoting investment climate and especially for export-oriented FDI. Therefore, a sign of a coefficient of this variable is expected to be positive. The ratio of the sum of imports and exports to GDP
1. Market Size (MSZ). The natural size of a country is an important factor for FDI inflows. The data for exports and imports are obtained from the World Bank Database.

2. Economic Stability (ECS). Economic stability is a factor that has a significant impact on FDI inflows. Economic stability is measured by the consumer price index (2000=100). The data for this variable are obtained from the World Bank Database.

3. Trade Openness (TRO). Trade openness is considered as a proxy for trade openness. The data for exports and imports are obtained from the World Bank Database.

4. Infrastructure (INS). An adequate supply of infrastructure services is an important factor for productivity and growth. An economy of a region can be operated without major distortions with a good infrastructure (Frawsen, Josefsson 2004). Therefore, infrastructure of a country is another important factor for FDI inflows. I expect a positive sign from a coefficient of this variable. Many previous studies applied fixed lines and mobile phone subscribers as a proxy for infrastructure (Baibekova, Hoang, 2010; Mhlanga et al., 2010). However, due to the lack of data for the selected countries, I use mobile cellular subscriptions as a proxy for infrastructure. The data for this variable are obtained from the World Bank Database.

5. Reliability (REL). I consider a stock of FDI (in millions of USD, constant (2000)) in a host country as a proxy for reliability, as already accumulated stocks of FDI reflects investment environment (please note that the beginning of 1990s, is a starting period of the accumulation of FDI stock for both, Kazakhstan and Uzbekistan). Potential investors will be positively affected by the investments that country already received. Hence, a hypothesis will be that a greater accumulated stock of FDI attracts more foreign investment (Frawsen, Josefsson 2004). Thus, I expect a sign of a coefficient of this variable to be positive. The data for the stock of FDI are obtained from the United Nations Conference on Trade and Development (UNCTAD) Database.

5.2. Empirical Model

I use the following econometric model in the empirical analysis:

\[ FDI = f(MSZ, ECS, TRO, INS, REL) \]  

where, \( FDI \) refers to \( FDI \) inflows (in millions of USD, constant (2000)); \( MSZ \) refers to market size (GDP in billions of USD, constant (2000)); \( ECS \) refers to economic stability (consumer price index 2000=100); \( TRO \) refers to trade openness ([((EXP+IMP)/GDP)*100 in percentages); \( INS \) refers to infrastructure (mobile cellular subscriptions, thousands); \( REL \) refers to reliability (stock of FDI in millions of USD, constant (2000)).
A small variance in the data is required to obtain more correct and consistent results from the regression model. Therefore, the issue of variance needs to be concerned first. To reduce the variance in the data over the years, some of the variables are taken into natural logarithm form. Thus, the main model takes the following form:

\[ LFDI_{it} = \alpha_0 + \alpha_1 LMSZ_{it} + \alpha_2 ECS_{it} + \alpha_3 TRO_{it} + \alpha_4 LINS_{it} + \alpha_5 LREL_{it} + \epsilon_{it} \]  

(2)

where, \( L \) denotes that the variable is taken in the natural logarithm form; \( i \) (\( i = 1, 2 \)) refers to a country; \( t \) denotes a given time period; \( \alpha_k \) (\( k = 0, 1,\ldots, 5 \)) are the unknown response coefficients of variation in the values of the dependent variable for changes in the values of the independent variables; \( \epsilon_{it} \) refers to error term (the dependent and the independent variables are discussed above).

I use two different econometric regression methodologies, namely, ordinary least squares (OLS) and seemingly unrelated regressions (SUR) to find which of the independent variables are crucial in determining the dependent variable. Then, I will compare the results to choose the most efficient estimates.

In the first stage, I use OLS to estimate the model (2). However, there are several important issues, such as autocorrelation, heteroscedasticity, multicollinearity and endogeneity, which be addressed before estimating the model (2).

Autocorrelation in time series appears if the residuals are found to be correlated with their own lagged values. Thus, it violates the regression theory standard assumption that disturbances are not correlated with each other. Therefore, in the case of autocorrelation, one of the assumptions that makes OLS best linear unbiased estimate (BLUE), does not hold. I use Durbin-Watson (Durbin and Watson (1950, 1951)) test to check for autocorrelation.

Moreover, if heteroscedasticity is present in the data set, the OLS estimates might be still unbiased and consistent, however not efficient. Therefore, it is important to analyze for the presence of heteroscedasticity. I apply the Breusch-Pagan / Cook-Weisberg test to check for heteroscedasticity (this test was developed independently by Breusch and Pagan (1979) and Cook and Weisberg (1983)).

Further, multicollinearity of independent variables may lead to less efficient outcomes when attempting to study how well individual independent variables affect dependent variable. Therefore, the independent variables should not highly correlate to each other in the model.
(however, even extreme multicollinearity does not violate OLS assumptions, OLS still can be unbiased and BLUE). To examine multicollinearity I apply variance inflation factor (VIF) test.

Further, independent variables must not be correlated with error terms in regression models. If they are correlated, a problem of endogeneity occurs and OLS estimates will be biased. Therefore, I use the Durbin-Wu-Hausman Test (after Durbin (1954), Wu (1973) and Hausman (1978) who proposed similar tests) to examine endogeneity.

Thus, I apply OLS for each selected country separately.

In the second stage, I use SUR (proposed by Zellner, (1962)) to estimate the model (2). Unlike OLS, it is possible to estimate multiple models simultaneously in SUR. The reason for using SUR lies in the fact that common factors might be present that influence all the equations at the same time and cause a correlation between the error terms of equations. For instance, in the case of this study, MNEs decisions to invest into Kazakhstan and Uzbekistan might be related. Therefore, by assuming that the error terms of the model (2) for Kazakhstan are correlated to the error terms of the same model for Uzbekistan, I use SUR methodology to obtain more efficient estimates. If the error terms are in fact uncorrelated, the results from SUR should be equivalent to OLS.

5.3. Empirical Limitations

I have to mention some of the limitations of this study. Firstly, since the selected countries became independent in the beginning of 1990s, I am limited with the data sets from 1996 to 2010 for both, Kazakhstan and Uzbekistan.

Secondly, due to the same reason (i.e. data sets limitation), the paper is limited with the econometric methodologies. It would not be so efficient with the limited data sets to conduct other types of time-series analyses such as causality, co-integration and error correction.

Further, as it was noted earlier, the variables for the empirical analysis are selected based on the previous studies, in which these variables were the most commonly studied factors that showed significant results. However, due to the lack of data, many important variables are not included in this study. For instance, abundance of natural resources and corporate tax rates are among the excluded variables that could be the potential highly significant determinants of FDI in the selected Central Asian countries.
6. Empirical Results

The summary statistics of the variables are reported in the Appendix (see Table A1 and A2 in the Appendix A). Table 1 presents the results for the autocorrelation test:

Table 1. Durbin-Watson Tests Results

<table>
<thead>
<tr>
<th>Kazakhstan</th>
<th>Uzbekistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>d-statistic (6, 15) = 1.937409</td>
<td>d-statistic (6, 15) = 2.199035</td>
</tr>
</tbody>
</table>

From the results we can see that Durbin-Watson statistic for both, Kazakhstan and Uzbekistan close to 2, suggesting no autocorrelation in the time series.

Further, by using the Breusch-Pagan / Cook-Weisberg Test, I examine for the presence of heteroscedasticity in the data set. The results are presented in the following table:

Table 2. Breusch-Pagan / Cook-Weisberg Test Results

<table>
<thead>
<tr>
<th>Kazakhstan</th>
<th>Uzbekistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>chi2(1) = 0.39</td>
<td>chi2(1) = 0.68</td>
</tr>
<tr>
<td>Prob &gt; chi2 = 0.5299</td>
<td>Prob &gt; chi2 = 0.4086</td>
</tr>
</tbody>
</table>

The p-value is 0.5299 for Kazakhstan and 0.4086 for Uzbekistan, which are larger than 0.05. Therefore, the null hypothesis that there is no heteroscedasticity cannot be rejected. Thus, it can be suggested that heteroscedasticity is not a problem for the model.

I proceed by conducting the VIF test to examine the issue of multicollinearity. The results are presented in the Appendix (see Table A3 in the Appendix A). The results suggest that multicollinearity might be a problem for the model (2), since we have quite low values (i.e. 1/VIF values are close to zero) for most of the variables. Therefore I conducted several additional measures to analyze if multicollinearity indeed a problem for the model (2). For instance, I added several other variables to the model and estimated it (to see if the signs of the variables’ coefficients change or not. In general, if the signs of the coefficients change when the additional variables are added, it might indicate a multicollinearity problem), however none of the signs of the variables’ coefficients changed for both, Kazakhstan and Uzbekistan. Therefore, I suggest that multicollinearity does not highly influence for estimations.
Further, I analyze the existence of endogeneity problem in the model. One might expect that there is an endogeneity issue with treating reliability as exogenous variable. Therefore I assumed \textit{LREL}, to be potential endogenous variable (all other independent variables are assumed to be exogenous). Therefore, I apply Durbin-Wu-Hausman Test for potential endogenous variable and use instrumental variables to examine endogeneity. \textit{LFPC} (\textit{LFPC} refers to \textit{FDI stock per capita} in logs) is used as an instrumental variable for \textit{LREL} in the case of both, Kazakhstan and Uzbekistan. Table 3 presents the results for the residuals (explanation of the method and 2SLS regression results can be found in the Appendix B):

<table>
<thead>
<tr>
<th></th>
<th>Kazakhstan</th>
<th>Uzbekistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>( F = 0.30 )</td>
<td>( F = 0.61 )</td>
<td></td>
</tr>
<tr>
<td>( \text{Prob} &gt; F = 0.5988 )</td>
<td>( \text{Prob} &gt; F = 0.4580 )</td>
<td></td>
</tr>
</tbody>
</table>

The coefficients for the residuals do not show statistically significant values. Therefore the null hypothesis, that endogeneity between the instruments and the right-hand-side variables has no significant impact on the estimates, cannot be rejected. Thus, I suggest that the problem of endogeneity is not present in the model (2). Therefore, I can proceed with the empirical estimation of the model (2).

Table 4 presents the results from the estimation of the model (2) for Kazakhstan:

| Variable | Coefficient | Standard Error | t     | \( P > |t| \) |
|----------|-------------|----------------|-------|-----------|
| \textit{LMSZ} | 3.4221      | 1.9870         | 1.72  | 0.119     |
| \textit{ECS}  | -0.0098     | 0.0096         | -1.02 | 0.336     |
| \textit{TRO}  | 0.0076      | 0.0155         | 0.49  | 0.634     |
| \textit{LINS} | -0.6309     | 0.3842         | -1.64 | 0.135     |
| \textit{LREL} | 3.4640      | 2.0644         | 1.68  | 0.128     |
| \textit{constant} | -131.7362   | 79.7811        | -1.65 | 0.133     |

\( F (5, 9) = 2.84 \) \( \text{R-squared} = 0.6119 \)
\( \text{Prob} > F = 0.0827^* \) \( \text{Adj R-squared} = 0.3962 \)

Note: \(^*\) denote significance at 10% level.

The results suggest that the overall model is significant at 10\% level, as it indicated by the value of F-statistics (\( F = 2.84, \text{Prob} > F = 0.0827 \)). The value of R-squared indicates that about 61\% of the total variance in FDI inflows is explained by the model. Most of the coefficients
of the variables have the expected sign. Particularly, the coefficient of \textit{LMSZ} shows the expected positive sign (which is close to 10\% significance level), suggesting that \textit{market size} of Kazakhstan has some degree of importance for \textit{FDI inflows}. Further, the coefficient of \textit{ECS} shows negative sign, however it is not statistically highly significant, suggesting that \textit{economic stability} of the country is not important factor for \textit{FDI inflows}. As I used inflation as a proxy for \textit{economic stability}, it can be concluded that high inflation is not highly detrimental factor for foreign investors. Further, despite the fact that the coefficient of \textit{TRO} shows the expected positive value, it is not statistically significant. Therefore I suggest that \textit{trade openness} has a positive effect to some extent but it is not an important factor for \textit{FDI inflows} in Kazakhstan. Moreover, the positive sign was expected from the coefficient of \textit{LINS}, however it is negative and statistically insignificant. As I used \textit{mobile cellular subscriptions} as a proxy for \textit{infrastructure}, seems like it is not a sufficient variable to represent \textit{infrastructure} of a country (many previous studies applied \textit{fixed lines and mobile phone subscribers} as a proxy for \textit{infrastructure}, as I mentioned it in subsection 5.1). Finally, the coefficient of \textit{LREL} shows the expected positive sign, however it is not statistically highly significant. Therefore I may suggest that \textit{reliability} has a positive effects but it is not one of the main determinants of \textit{FDI inflows} in Kazakhstan.

Next, I present the results from the estimation of the model (2) for Uzbekistan:

\begin{table}[h]
\centering
\begin{tabular}{lcccc}
\hline
Variable & Coefficient & Standard Error & t & P > |t| \\
\hline
\textit{LMSZ} & 8.3001 & 5.5182 & 1.50 & 0.167 \\
\textit{ECS} & -0.0208 & 0.0093 & -2.23** & 0.053 \\
\textit{TRO} & 0.0375 & 0.0086 & 4.34*** & 0.002 \\
\textit{LINS} & -0.2089 & 0.3213 & -0.65 & 0.532 \\
\textit{LREL} & 2.5034 & 0.6383 & 3.95*** & 0.003 \\
\textit{constant} & -223.5517 & 114.832 & -1.95 & 0.532 \\
\hline
\end{tabular}

F (5, 9) = 21.47*** \hspace{2cm} R-squared = 0.9226

Prob > F = 0.0001 \hspace{2cm} Adj R-squared = 0.8797

Note: *** and ** denote significance at 1\% and 5\% level respectively.

The results suggest that the overall model is highly significant (F = 21.47, Prob>F = 0.0001) at 1\% level. Most of the estimated coefficients of the variables have the expected signs. Moreover, the value of R-squared indicates that about 92\% of the total variance in FDI inflows is explained by the model. The coefficient of \textit{LMSZ} shows positive sign, however not statistically significant. Therefore I may suggest that \textit{market size} is not highly important factor
for FDI inflows in Uzbekistan. Further, the coefficient of ECS shows statistically significant negative sign, suggesting that weak economic stability (associated with high inflation) has significant negative effect on FDI inflows. Moreover, the coefficient of TRO shows statistically highly significant positive sign, suggesting that trade openness of Uzbekistan is one of the main determinants of FDI inflows. Again, the positive sign was expected from the coefficient of LINS, however it is negative, despite the fact that it is not statistically significant. Thus, it can be repeatedly suggested that mobile cellular subscriptions is not a sufficient variable to represent infrastructure of a country (as in the case of Kazakhstan). Finally, the coefficient of LREL shows the statistically significant positive sign. Therefore I may suggest that reliability is another important factor for FDI inflows in Uzbekistan.

Further, I use SUR methodology to estimate the model (2) simultaneously for both, Kazakhstan and Uzbekistan. The results are presented in the following table:

Table 6. SUR Results of the Regression Model (2)
(Dependent variable: LFDI)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Kazakhstan</th>
<th>Uzbekistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMSZ</td>
<td>3.8233**</td>
<td>7.2845*</td>
</tr>
<tr>
<td></td>
<td>1.5261</td>
<td>4.2301</td>
</tr>
<tr>
<td></td>
<td>2.51</td>
<td>1.72</td>
</tr>
<tr>
<td></td>
<td>0.012</td>
<td>0.085</td>
</tr>
<tr>
<td>Z</td>
<td>-0.0127*</td>
<td>-0.0212***</td>
</tr>
<tr>
<td></td>
<td>0.0074</td>
<td>0.0071</td>
</tr>
<tr>
<td></td>
<td>-1.72</td>
<td>-2.97</td>
</tr>
<tr>
<td></td>
<td>0.085</td>
<td>0.003</td>
</tr>
<tr>
<td>TRO</td>
<td>0.0044</td>
<td>0.0372***</td>
</tr>
<tr>
<td></td>
<td>0.0118</td>
<td>0.0066</td>
</tr>
<tr>
<td></td>
<td>0.37</td>
<td>5.60</td>
</tr>
<tr>
<td></td>
<td>0.708</td>
<td>0.000</td>
</tr>
<tr>
<td>LINS</td>
<td>-0.6576**</td>
<td>-0.0945</td>
</tr>
<tr>
<td></td>
<td>0.2938</td>
<td>0.2451</td>
</tr>
<tr>
<td></td>
<td>-2.24</td>
<td>-0.39</td>
</tr>
<tr>
<td></td>
<td>0.025</td>
<td>0.700</td>
</tr>
<tr>
<td>LREL</td>
<td>3.7077**</td>
<td>2.631***</td>
</tr>
<tr>
<td></td>
<td>1.5787</td>
<td>0.4872</td>
</tr>
<tr>
<td></td>
<td>2.35</td>
<td>5.40</td>
</tr>
<tr>
<td></td>
<td>0.019</td>
<td>0.000</td>
</tr>
<tr>
<td>constant</td>
<td>-145.981</td>
<td>-203.6565</td>
</tr>
<tr>
<td></td>
<td>61.079</td>
<td>88.0228</td>
</tr>
<tr>
<td></td>
<td>-2.39</td>
<td>-2.31</td>
</tr>
<tr>
<td></td>
<td>0.017</td>
<td>0.021</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.6043</td>
<td>0.9213</td>
</tr>
<tr>
<td>Chi2</td>
<td>25.67***</td>
<td>184.86***</td>
</tr>
<tr>
<td>P</td>
<td>0.0001</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Note: ***, ** and * denote significance at 1%, 5% and 10% level respectively.
From the results it can be seen that the signs of the coefficients do not differ when compared to OLS results, however, in current results the variables have higher level of significance. Particularly, the coefficient of \textit{LMSZ} shows statistically significant value for both, Kazakhstan and Uzbekistan, suggesting that \textit{market size} is important factor for \textit{FDI inflows} in these countries. Further, the coefficient of \textit{ECS} shows statistically significant value for both Kazakhstan and Uzbekistan, suggesting that \textit{economic stability} is another important factor for \textit{FDI inflows} in these countries. As in OLS results, the coefficient of \textit{TRO} shows statistically highly significant value for Uzbekistan, suggesting that \textit{trade openness} is one of the highly important factors for \textit{FDI inflows} in Uzbekistan. On the other hand, in the case of Kazakhstan, the results suggest that \textit{trade openness} is not highly important factor for \textit{FDI inflows} in this country. Further, since the coefficient of \textit{LINS} for both, Kazakhstan and Uzbekistan, (as in OLS) shows negative value, I again suggest that the variable (i.e. \textit{mobile cellular subscriptions}) which is used as a proxy for \textit{infrastructure} is not sufficient variable to represent \textit{infrastructure} of a country. Finally, the coefficient of \textit{LREL} shows statistically significant positive value for both, Kazakhstan and Uzbekistan, suggesting that \textit{reliability} is significant factor for \textit{FDI inflows} in these countries.

Further, if the standard errors are compared between OLS and SUR results, it can be seen that all estimates which are obtained from SUR have lower standard errors. Additionally, the significance of the overall model is higher in SUR results when compared to OLS results. Thus, SUR methodology seems to be more appropriate than OLS methodology for the current study, and therefore, SUR results form the basis of economic interpretation.
7. Summary and Conclusion

In this paper, the determinants of FDI in two Central Asian countries, namely, Kazakhstan and Uzbekistan were investigated using the time period of 1996-2010. The main motivation was to analyze what factors of these transition countries are the most crucial factors in attracting foreign direct investments. The variables for the empirical analysis were selected based on the existing theories of FDI and the previous empirical studies, in which the selected variables were the most commonly studied factors that showed significant results. In this study, variables such as market size, economic stability, trade openness, infrastructure and reliability were used to analyze the main determinants of FDI in the selected countries. The ordinary least squares (OLS) and seemingly unrelated regressions (SUR) regression methodologies were used to find which of the independent variables were crucial factors in determining the dependent variable. The obtained results from SUR seemed to be more efficient when compared to OLS results. Therefore, the results from SUR were chosen as a basis for economic interpretation. Thus, according to the main results market size, economic stability and reliability were important factors for FDI inflows in both, Kazakhstan and Uzbekistan. Moreover, trade openness was highly significant factor for FDI inflows in Uzbekistan, however, this factor was not significant for FDI inflows in the case of Kazakhstan. Further, unexpected negative results were obtained for infrastructure in the case of both, Kazakhstan and Uzbekistan. Therefore, the chosen variable to represent infrastructure suggested to be insufficient.

Kazakhstan and Uzbekistan have abundance of natural resources. However due to the lack of data, it was not possible to include the factor of natural resources in this study. I suggest that this factor would be one of the highly significant determinants of FDI inflows in these countries.

In general, obtained results are consistent with the major theories of FDI. For instance, according to OLI paradigm (which is discussed in Section 3), location-specific advantages (such as market structure, political and economic stability and so on) are important factors for FDI, as some of them reflected in the results of this study. Moreover, the results are also consistent with some of the major findings of the previous empirical studies on developing and transition economies (for instance, see Asiedu (2006), Johnson (2006), Azizov (2007), Indopu and Talla (2010)).
Further, since this study found that *economic stability* had significantly negative effects on *FDI inflows* in both, Kazakhstan and Uzbekistan, one of the policy implications emerging from the current study concerns this factor. As *inflation* used as a proxy for *economic stability*, it can be suggested that managing and stabilizing inflation would enhance the attractiveness of these countries to foreign investors and thus would lead to greater inflows of FDI.

In this study I just focused on two Central Asian countries. Therefore, it was not possible to conduct a comparative analysis to better understand the patterns of FDI in Central Asia. In the future, when more data become available, the future research should consider all other Central Asian countries. This will allow conducting a broad comparison of Central Asian economies in terms of their success in attracting foreign direct investment.
References


OECD (Organization for Economic Co-operation and Development), (2002),”Foreign Direct Investment for Development: Maximizing Benefits, Minimizing Costs”, OECD.


Appendix A

Figure A1. Worldwide Inward FDI Flows

Table A1. Summary Statistics of the Variables Used in the Model for Kazakhstan

<table>
<thead>
<tr>
<th>Variables</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI inflows (in millions of USD, constant (2000))</td>
<td>15</td>
<td>2501.934</td>
<td>1167.784</td>
<td>1105.736</td>
<td>4730.538</td>
</tr>
<tr>
<td>Economic stability</td>
<td>15</td>
<td>133.137</td>
<td>52.18556</td>
<td>64.596</td>
<td>235.349</td>
</tr>
<tr>
<td>[(EXP+IMP)/GDP]*100</td>
<td>15</td>
<td>86.49197</td>
<td>12.07007</td>
<td>65.20419</td>
<td>105.6997</td>
</tr>
<tr>
<td>Infrastructure (mobile cellular subscriptions, thousands)</td>
<td>15</td>
<td>5573.705</td>
<td>7122.68</td>
<td>9.737057</td>
<td>19911.41</td>
</tr>
<tr>
<td>Reliability (FDI stock in millions of USD, constant (2000))</td>
<td>15</td>
<td>13780.46</td>
<td>4995.516</td>
<td>6581.983</td>
<td>22888.89</td>
</tr>
</tbody>
</table>
Table A2. Summary Statistics of the Variables Used in the Model for Uzbekistan

<table>
<thead>
<tr>
<th>Variables</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FDI inflows</strong> (in millions of USD, constant (2000))</td>
<td>15</td>
<td>163.7467</td>
<td>102.9346</td>
<td>40.31412</td>
<td>347.2107</td>
</tr>
<tr>
<td><strong>Market size</strong> (GDP in billions of USD, constant (2000))</td>
<td>15</td>
<td>17.18633</td>
<td>4.813519</td>
<td>11.58373</td>
<td>26.89641</td>
</tr>
<tr>
<td><strong>Economic stability</strong> (CPI index 2000=100)</td>
<td>15</td>
<td>182.3914</td>
<td>110.0677</td>
<td>28.117</td>
<td>377.615</td>
</tr>
<tr>
<td><strong>Trade openness</strong> (in %) [((EXP+IMP)/GDP)*100]</td>
<td>15</td>
<td>62.28548</td>
<td>12.75486</td>
<td>36.55481</td>
<td>84.30935</td>
</tr>
<tr>
<td><strong>Infrastructure</strong> (mobile cellular subscriptions, thousands)</td>
<td>15</td>
<td>4025.317</td>
<td>6904.712</td>
<td>9.4711</td>
<td>21015.72</td>
</tr>
<tr>
<td><strong>Reliability</strong> (FDI stock in millions of USD, constant (2000))</td>
<td>15</td>
<td>749.965</td>
<td>204.7367</td>
<td>514.0492</td>
<td>1219.779</td>
</tr>
</tbody>
</table>

Table A3. Variance Inflation Factor (VIF) Test Results

<table>
<thead>
<tr>
<th>L/VIF</th>
<th>Variable</th>
<th>LMSZ</th>
<th>ECS</th>
<th>TRO</th>
<th>LINS</th>
<th>LREL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kazakhstan</td>
<td>0.018509</td>
<td>0.034179</td>
<td>0.247133</td>
<td>0.007885</td>
<td>0.014306</td>
<td></td>
</tr>
<tr>
<td>Uzbekistan</td>
<td>0.002068</td>
<td>0.004273</td>
<td>0.370175</td>
<td>0.006451</td>
<td>0.171913</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B

**Durbin-Wu-Hausman Test (DWH)**

DWH test has several steps. Consider a regression:

\[ y = a0 + a1*w + a2*k3 + e \]

where \( w \) is potential endogenous variable. Suppose that \( k1 \) and \( k2 \) are instrumental variables for \( w \). One has to decide whether it is important to use an instrumental variable, i.e., whether a set of estimates obtained by OLS is consistent or not. Therefore, it can be formed an augmented regression test by including the residuals of each potential endogenous right-hand side variable as a function of all exogenous variables, in a regression of the original model. Thus, in the first step, following regression can be performed:

\[ w = b0 + b1*k1 + b2*k2 + b3*k3 + u \]

Thus the residuals, \( w_{res} \) can be obtained. In the second step, by using \( w_{res} \), following augmented regression can be performed:

\[ y = c0 + c1*w + c2*k3 + c3*w_{res} + e \]

Finally, by testing for the significance of the coefficient of the added residual, it can be found whether potential endogenous variable is (indeed) endogenous or not. If test shows significance, then it can be suggested that there is a problem of endogeneity. Additionally, by using the instrumental variables, two-stage least squares (2SLS) regression can be performed to compare the results to the original model. If the results of OLS and 2SLS do not differ significantly, one may argue that there is no endogeneity problem.
Table A4. Instrumental Variables (2SLS) Regression for Kazakhstan

(Dependent variable: LFDI)

| Variable | Coefficient | Standard Error | t     | P > |t| |
|----------|-------------|----------------|-------|-----|---|
| LREL     | 3.3266      | 2.0789         | 1.60  | 0.144 |
| LMSZ     | 3.3457      | 1.9921         | 1.68  | 0.127 |
| ECS      | -0.0094     | 0.0097         | -0.97 | 0.358 |
| TRO      | 0.0073      | 0.0156         | 0.47  | 0.651 |
| LIN5     | -0.6101     | 0.3861         | -1.58 | 0.149 |
| constant | -127.0232   | 80.22752       | -1.58 | 0.148 |

F (5, 9) = 2.79  R-squared = 0.6117
Prob > F = 0.0863  Adj R-squared = 0.3959

Table A5. Instrumental Variables (2SLS) Regression for Uzbekistan

(Dependent variable: LFDI)

| Variable | Coefficient | Standard Error | t     | P > |t| |
|----------|-------------|----------------|-------|-----|---|
| LREL     | 2.5267      | 0.6345         | 3.98*** | 0.003 |
| LMSZ     | 8.1266      | 5.5229         | 1.47  | 0.175 |
| ECS      | -0.0205     | 0.0093         | -2.20** | 0.055 |
| TRO      | 0.0375      | 0.0086         | 4.34*** | 0.002 |
| LIN5     | -0.2024     | 0.3214         | -0.63 | 0.544 |
| constant | -220.0745   | 114.9234       | -1.91 | 0.088 |

F (5, 9) = 21.52***  R-squared = 0.9226
Prob > F = 0.0001  Adj R-squared = 0.8796

Note: *** and ** denote significance at 1% and 5% level respectively.