FOREIGN AID, FOREIGN DIRECT INVESTMENT, AND DOMESTIC INVESTMENT NEXUS IN LANDLOCKED ECONOMIES OF CENTRAL ASIA

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Abstract

This paper investigates the relationship between foreign aid (ODA) and foreign direct investment (FDI), as well as their effects on domestic investment in five landlocked and emerging economies of Central Asia-Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan-for the period 1992–2009. It is important for donor countries to understand whether or not their aid is helping to bring in private capital essential in the transition period for developing countries. If it does, it creates a ground for public-private partnership that could restore conditions for economic growth in transition economies. If it does not, then it is necessary to reassess the mechanisms of "aid architecture". As aggregate time series are expected to affect each other, we employ a multivariate system of "seemingly unrelated regression" (SUR) equations. We test the ODA-FDI link on two levels: by region and country. On the regional level, the results indicate that (1) aid has a significantly positive complementing effect on FDI inflows, and (2) FDI complements domestic investment, while ODA decreases it. However, on a country level, foreign aid catalyzes FDI inflows only in Kyrgyzstan and Tajikistan. Our evidence suggests that the ODA-FDI nexus is present in countries with substantial aid inflows and faltering economic performance.

Keywords: Central Asia, Transition Economies, Foreign Direct Investment, Official Development Assistance, Gross Fixed Capital Formation

JEL classification: F21, F30, P33, O11

1. Introduction

What are the effects of external financial inflows to transition economies? This is the current question in the economic growth and development literature, especially since financial resources in developed economies are becoming more limited. Every year, the Organization for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC)[1] donors give enormous amounts of financial resources to five landlocked post-communist Central Asian economies (CA (5))[2] in terms of official development assistance (ODA).[3] The total foreign aid increased more than 10-fold from $117 million to $1.251 billion (or in capita terms from 13 to 154$) between 1992 and 2009.[4] On the other side, multinational enterprises (MNEs) from DAC donor countries launch their projects via foreign direct investment (FDI) in search of more profits. The huge private capital inflows are documented for the region: $188 million (or 8.14$ per head) in 1992, which soared to $18.6 billion (or 1.710.42$ per capita) in 2009. Both of these transfers are crucial to transition economies. At least on a conceptual level, both flows extend common features to recipient countries. FDI is supposed to help recipient countries to encourage specialization in trade to and create jobs, as well as raise the incomes of domestic workers. ODA aims to improve social welfare, decrease inequality, and develop a skilled worker pool through technical assistance.

In a historically important International Conference for Development (2002) document, *The Monterey Consensus*,[5] and in a follow-up Doha Declaration on Financing for Development Outcome report, FDI is viewed as an addition to ODA.[6] The United Nations Conference on Trade and Development (UNCTAD) also stresses this point in advising local governments to channel "some ODA into

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[1] The DAC decides on the disbursal of financial aid. It has four categories: (1) Least-Developed Countries; (2) Other Low-Income Countries (per capita GNI < $935 in 2007): Kyrgyzstan, Tajikistan, Uzbekistan; (3) Lower-Middle-Income Countries and Territories, with per capita GNI of $936–$3.705: Turkmenistan; and (4) countries with per capita GNI of $3.706–11.455: Kazakhstan. Every three years, DAC reviews GNI per capita reported by the World Bank and makes a list of potential recipients. (OECD Website: www.oecd.com)

[2] The Central Asian economies are Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. Among them, Kazakhstan, Turkmenistan, and Uzbekistan are oil and gas exporters, and Kyrgyzstan and Tajikistan are oil and gas importers. Source: International Monetary Fund (IMF).

[3] To gain a detailed understanding of the principal mechanisms of the ODA and to review opinions on its effects on developing countries, see Hansen and Tarp (2000), Dalgaard *et al.* (2004), Lahiri (2006), Bourguignon and Sundberg (2007), Easterly (2007), Mavrotas and Nunnenkamp (2007), and Selaya and Sunesen (2008). We interchangeably use the terms "ODA" and "foreign aid" in this paper.

[4] ODA is administered by the DAC, which consists of 24 developed countries, including: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom (U.K.), the United States (U.S.), and the European Commission (EC). The World Bank, the International Monetary Fund (IMF), and the United Nations Development Programme (UNDP) participate as permanent observers. Source: OECD, Inside the DAC, A Guide to the OECD Development Assistance Committee, 2009–2010.

[5] The United Nations-sponsored summit-level meeting was held in Monterrey, Mexico, 18–22 March 2002.

[6] The Doha Declaration on Financing for Development is the outcome document of the Follow-up International Conference on Financing for Development to Review the Implementation of the Monterrey Consensus. (http://www.un.org/esa/ffd/doha/documents/Doha_Declaration_FFD.pdf; United Nations, 2009).

investment projects financed jointly with domestic financial institutions…".[7] Therefore, it is important for donor countries to understand whether their investments induce FDI.
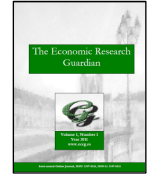
At first, it seems that FDI and ODA are two different flows with no link. For example, one of the ways that the link arises is when donors who give assistance are also the ones who conduct FDI, which has been called the "*vanguard effect*" by Kimura and Todo (2010). Why should ODA be important for attracting FDI? Private capital is crucial to financially restricted transition economies in the initial phases, but it needs to be attracted. Private investors are more selective and attentive since the cost of investment in developing countries is high due to insecure governments, weak legal systems, and underdeveloped infrastructure. If there is insufficient improvement in the business environment in a recipient county from inside, then one viable option is for the foreign aid to tackle this issue from the outside. In this sense, the role of foreign aid in enhancing the local conditions to attract FDI is imperative. If so, this increases the role of international organizations such as the World Bank to intervene and assist countries in developing "*new market thinking*" to deal with donors and foreign private investors. If there is in fact a positive effect of aid on FDI, then it could, given certain sufficient conditions, (1) alleviate taxation of workers for domestic public investments, (2) create new job opportunities, (3) help in the design of domestic modern market mechanisms to better secure foreign investment, and (4) create grounds for public-private partnership, such as tying aid to domestic private-sector investments.[8] This "*cooperation*" would be a contribution to long-term economic development and would help recipient economies to position themselves in the international arena. If there is no connection, then it calls attention to the need to reassess the mechanisms of "*aid architecture*" for long-term civil society building goals.

The link between ODA and FDI has been studied by only a few scholars, whom we present in Section 2, and no specific consensus has been reached yet. To give an immediate example, Kosak and Tobin (2006) state in their panel study of 90 countries from 1970 to 2001 that FDI and ODA are unrelated, as each has specific effects on economic growth. Caselli and Feyrer (2007), who study groups of developed and developing countries, also emphasize that foreign investment and foreign aid are more like substitutes than complements. However, these and previous studies left out Central Asian economies.

The central focus of this paper is to explore the possible link between aggregate ODA and FDI in the five landlocked Central Asian economies mentioned above (hereinafter referred to as the CA (5)). In this regard, we specifically would like to verify the finding by Harms and Lutz (2006), who studied 76 developing countries before 2000, excluding the CA (5) economies, and found a strictly positive effect of aid on FDI, especially in countries with unfavorable institutional environments. Additionally, we aim to analyze the effects of aid and FDI inflows on domestic investment (DOM).

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[7] "Trade and Development Report 2008", United Nations Conference on Trade and Development (UNCTAD): http://www.unctad.org/Templates/Page.asp?intItemID=4580&lang=1 (Accessed 15 December 2011).

[8] According to studies by Globerman and Shapiro (2002) for U.S. FDI and Davies (2011) for developing countries in Sub-Saharan Africa, private capital is favored more when certain infrastructure business conditions in host countries are met, such as macroeconomic stability, infrastructure, regulation, and the viability of the financial system. For a good treatment of FDI theory and world patterns of private capital flows, see Navaretti and Venables (2004) and references therein.

We are interested in seeing whether these foreign inflows finance domestic spending on infrastructure-e.g., complement or substitute for it.

To quantify our research questions, we build a simple model with three equations for each aggregate time series (ODA, FDI, and DOM) and do estimates by simultaneous equation modeling called "*seemingly unrelated regressions*" (SUR) proposed by Zellner (1962) to account for simultaneity and cross-section error correlation. The advantage of SUR is that it helps us to explore the possible ODA-FDI link regarding a particular country in the framework of a multivariate system of equations when a response variable can appear as an explanatory variable in another equation. Our methodological approach is an alternative way to vector auto-regressive (VAR) and co-integration methods for modeling capital flows' interactions, given a small sample. This method helps us to obtain answers on regional and individual country levels.

Our result on the regional (pooled) regression level supported Harms and Lutz's (2006) conclusions, and we found a positive influence of ODA on FDI inflows in the CA (5). The same complementary effect of ODA is also corroborated in studies by Hien (2008), Selaya and Sunasen (2008), Asiedy *et al.* (2009), and Bhavan (2011). Moreover, we also found a reverse positive effect-that FDI also attracts foreign aid (ODA). However, the relation of these flows to domestic investment is different: FDI complements, but aid substitutes for domestic expenditures. In other words, FDI augments, but ODA finances domestic spending on the regional CA (5) level.

However, on country (individual) regressions, we see an interesting and compelling picture. There is no unilateral effect anymore, but rather a fragmented one. Only two countries out of the five-namely, Kyrgyzstan and Tajikistan-display consistent positive correlations of ODA to FDI and vice versa. Given that we do control for domestic environment reforms and capital flows in our modeling with a globalization variable and do not observe this relation in Kazakhstan, Turkmenistan, and Uzbekistan, we attach this finding to particular socioeconomic conditions of these nations that are characterized by (1) low GDP per capita and economic growth, and (2) high inflows of foreign aid. If true, this finding underlines the important role of national output and aid magnitude: GDP per capita levels as low as 461$ (Kyrgyzstan) and 295$ (Tajikistan) compared with 2.869$ (Kazakhstan), 1.364$ (Turkmenistan), and 633$ (Uzbekistan) on average for the period. The striking difference is observed for foreign aid inflows: Kyrgyzstan (47$/capita) and Tajikistan (25$/capita), while Kazakhstan (11$/capita) and Turkmenistan and Uzbekistan (6$/capita). In addition, the latter two economies are the energy-dependent ones. Furthermore, Kyrgyzstan went through dramatic political changes that are not the case with Tajikistan. Considering this, and based on our statistical exercise, this tentative result suggests that aid has a positive effect in stimulating FDI at certain income levels. After that turning point, the effect of aid regarding FDI gradually diminishes.

We contribute to the empirical literature stream on the ODA-FDI link by offering new insights about the foreign aid effects in transition Central Asian economies that could be helpful for international donor organizations, so that they may better devise their programs and do "*aid architecture",* as well as possibly make better predictions of future aid packages. This study could also provide thoughts on re-assessing public-private collaboration. Our understanding is that the present paper is the first to study foreign transfer inflows' links in five remote economies of Central Asia.

The structure of the paper is as follows. Section 2 covers related past literature, and Section 3 discusses ODA-FDI trends in the Central Asian region. Section 4 covers our empirical investigation and data used, Section 5 contains a discussion of our results, and Section 6 summarizes the principal results and highlights future research prospects.

2. Theoretical Considerations

There are various ways in which foreign aid could affect FDI in host countries. According to Harms and Lutz (2006), if foreign aid is directed towards infrastructure projects, human capital, and complementary inputs, then it could have an "*infrastructure effect*". Enhanced domestic conditions could lure foreign investors. Inflows of foreign aid are also expected to raise the marginal product of capital (MPC) of domestic firms in recipient countries, which in turn attracts FDI. Another effect, "*rent-seeking*", might also appear, possibly arising from the fact that local firms compete for rents from foreign aid. This situation reduces MPC that would result in fewer innovation activities and less R&D spending, and it causes a reduction in efficiency (see, e.g., Svensson, 2000; Harms and Lutz, 2006). The outcome of this behaviour would be more reliance on aid, which would discourage FDI. Clearly, foreign aid could add to the "*financing effect*" that directly augments the balance of payments (BoP) of the recipient country. Arellano *et al.* (2009) argue that aid could increase the supply of tradable goods and reduce the price of non-tradable goods. They call this the "*Dutch-disease effect*", which discourages FDI. As mentioned above, Kimura and Todo (2010) claim that there is also a "*vanguard effect*" of foreign aid, meaning that countries that give aid also tend to place FDI in specific host economies. Mody *et al.* (2003) state that there is an "*information effect*" that foreign aid carries into host countries. Private information that is not accessible to the foreigner is revealed to investors via foreign aid. Aid programs help investors to collect data, build a study, and verify their assumptions regarding recipient countries.

In general, channels of foreign capital entering the CA (5) region could be outlined as follows: foreign aid is directed into social infrastructure targeting *complementary inputs*-namely, health, education, and water-related projects-and into *economic infrastructure*, including energy, communication, and transportation. FDI is primarily focused on physical capital projects, production, manufacturing, banking, and natural resource-extracting sectors. Numerous studies have been devoted to analyses of FDI, but very few studies have addressed the Central Asian region, which is located in the middle of the east and west continental trade route.[9] Among them, several studies focused on FDI effects in the CA (5) countries (e.g., Garibaldi *et al.*, 2001; Shiells, 2003; Bayulgen, 2005; Penev, 2007; Kenisarin and Andrews-Speed, 2008), but they were under the framework of the Commonwealth of Independent States (CIS)[10] or Central and Eastern Europe (CEE)[11] that included countries with

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[9] For example, on the effect of foreign direct investment agglomeration for the U.S., see Bobonis and Shatz (2007) on how economic freedom in the presence of FDI affects economies in Latin America. Also see Bengoa and Sanches-Robles (2003) and Jaumotte (2004) on the relation of market size to FDI in several Asian economies.

[10] CIS is the abbreviation for Commonwealth of Independent States that was created in December 08, 1991. It consisted of 12 countries: Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan,

different economic environments.[12] Studies focused solely on these five countries are scarce and have primarily addressed the structural changes and political structure (such as in Gleason, 2001; Dowling and Wignaraja, 2006). Some other studies have presented a narrative of economic policy developments in the region. For example, Dikkaya and Keles (2006) addressed the FDI developments in Kyrgyzstan through a case-study approach. Using general equilibrium modelling, other scholars such as Venables (2009) have shown the benefits of regional integration in Central Asia. Pomfret (2005, 2010) addressed Central Asian regional trade relations and policies, energy institutions, regionalism, and integration into the world economy. Hoen (2010) expressed his opinion on the transitional path of Central Asian countries, and Kalyuzhnova (2003, 2008) thoughtfully reflected on social and economic developments and energy-related issues.
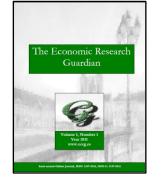
Moreover, the direct link between ODA and FDI has been studied in only a handful of papers to the best of our knowledge. For example, Karakaplan *et al.* (2005), Harms and Lutz (2006), Kosack and Tobin (2006), and Selaya and Sunesen (2008) studied broad groups of developing countries, and Kimura and Todo (2010) and Blaise (2005) focused on Japanese FDI and aid-flow interactions. Carro and Larrú (2010) looked at the ODA-FDI link in Argentina and Brazil, and Kapfer *et al.* (2007) explored infrastructure aid-FDI links for 59 countries. Asiedu and Nandwa (2009) showed that aid mitigates appropriation risk on FDI for 35 low-income and 28 Sub-Saharan African nations. Hien (2008) looked at ODA-FDI in 28 provinces of Vietnam, and Bhavan *et al.* (2011) analysed the nexus between FDI and ODA for South Asian economies. Beladi and Oladi (2006) put the ODA-FDI link into a three-goods general-equilibrium model and found that when foreign aid is directed towards public goods it can crowd out foreign investment in the recipient country when given a factor-intensity condition.

The findings on the ODA-FDI link are mixed. Karakaplan *et al.* (2005) found that aid has a *negative effect* on FDI. On the other hand, Kosack and Tobin (2006) state that FDI and ODA are *unrelated* due to the fact that aid goes to support human capital, while FDI is private and thus goes to physical capital. Carro and Larrú (2010) also *could not find any systematic relationship* between FDI and ODA flows. Caselli and Feyrer (2007) studied the marginal product of capital (MPC) and reported that MPC is roughly the same across developing countries and that the inflow of foreign aid only reduces MPC. In their study, foreign aid is *more substituted* for FDI. Further, in a study of 81 developing countries (excluding Central Asia, from 1988 to 1999) by Harms and Lutz (2006), the authors suggest that after controlling for regulation in host countries the catalysing effect of aid is stronger in countries with unfavourable institutional environments. In South Asian countries, including Bangladesh, Pakistan, Shi-Lanka, and India, foreign aid drives in the FDI according to the study by Bhavan *et al.* (2011).

Ukraine, Uzbekistan, and Georgia (the latter left the CIS on August 14, 2008). The three Baltic States (also former Soviet Republics), Estonia, Latvia, and Lithuania, did not join the CIS.

[11] CEE or CEES stands for Central and Eastern Europe former communist countries: *Baltic states*—Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Hungary, Romania, Bulgaria, and Albania; *states of former Yugoslavia*—Slovenia, Croatia, Bosnia-Herzegovina, Serbia, Kosovo, Montenegro, and Macedonia.

[12] For more on the mechanism of FDI in post-communist economies, see Lansbury *et al.* (1996), Bengoa and Sanches-Robles (2003), Campos and Kinoshita (2003), Johnson (2006), and Kenisarin (2008), among many others.

3. Foreign Transfer Trends in Central Asia

Starting in 1991, all five countries declared their independence and started building their economies. Kazakhstan is the largest and by territory is half the size of Europe.[13] Central Asia is subject to an energy-related political game between the U.S., Russia, and China, according to the *Financial Times* Special Report, *Investing in Central Asia 2008*. The importance of studying capital flows into these countries is justified by their strategic geographical location, which gives European Union economies, the U.S., Japan, and China a trading route to Afghanistan and further to the Middle East. Prospective growth and stability in the region could stimulate international trade, capital movements, and intra-Central Asian collaboration that could favor foreign investors. The region is rich in natural resources, especially oil and natural gas, minerals, and metals, all of which are of interest to multinational enterprises (MNEs) as input factors. For the European Union, Central Asia is the potential source of future energy, especially natural gas. The industrial structure of the Central Asian region is characterized by oligopolistic markets in the main industrial sectors affiliated with mineral resources and energy, and by monopolistic domestic competition with numerous small-to-medium entrepreneurs elsewhere.

The importance of attracting FDI inflows to the CA (5) is that local firms have constraints with regard to funding opportunities. However, local governments possess enough liquidity in "structural funds" that they are willing to contribute, in collaboration with foreign private capital, to state-related investment projects. The availability of external financing via FDI inflows (stock, portfolios, and loans) is an alternative opportunity to revive the landlocked region's economic development and create competitive advantages.[14] The major type of FDI in Central Asia is Greenfield investment.[15] This is when MNEs create their foreign operation units overseas and integrate vertically, thus reducing the transfer costs and financial risks. Also, FDI inflows are mostly export-oriented and not directed to serve local markets according to an Asian Development Bank report (ADB, 2009). Foreign capital lands in the oil and energy sector, while the service sector is almost untouched. Major investors are firms from the U.S., Japan, China, and developing Asia. These conditions and weak domestic competition essentially give a competitive advantage to multinational firms. In practice, MNEs enter the markets with political stability in the region as the only concern.

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[13] According to reports from the World Bank and the IMF, the former Soviet Union (FSU) economies classified as *Energy Exporters* are Azerbaijan, Kazakhstan, Turkmenistan, Uzbekistan, and Russia, and the *Energy Importers* are Armenia, Belarus, Georgia, Kyrgyzstan, Moldova, Moldavia, Tajikistan, and Ukraine.

[14] For a more detailed analysis of FDI effects on recipient countries, see Navaretti and Venables (2004), Mody (2004), Krkoska (2001), Kirkpatrick (2006), Tondel (2001), Carstensen (2004), Mileva (2008), Dobrinsky (2007), and, more recently, Hanousek *et al.* (2011).

[15] FDI is classified as "Greenfield investment" when the MNEs invest by building new factories, plants, offices, entities, and buildings in the host country. These new economic units all have their own accounting systems.

Table 1- Inward FDI, ODA, Domestic Investment, and GDP for the Period 1992–2009

Country↓	FDI		ODA		GFCF		GDP	
	Average FDI Flows ($)	Annual Average Growth (%)	Average ODA Flows ($)	Annual Average Growth (%)	Average GFCF Flows ($)	Annual Average Growth (%)	Annual Average GDP ($)	Annual Average Growth (%)
KAZ	245.73	98.57	11.32	29.84	747.61	12.34	2.869.23	10.60
KYR	17.83	79.92	46.92	29.30	90.96	11.73	461.39	4.81
TAJ	13.96	95.53	25.41	29.59	48.68	18.45	294.66	6.67
TKM	105.34	36.92	6.49	25.01	216.86	7.57	1.364.01	10.72
UZB	7.71	17.84	5.79	13.47	159.04	4.07	633.32	5.12

Note: KAZ-Kazakhstan, KYR-Kyrgyzstan, TAJ-Tajikistan, TKM-Turkmenistan, and UZB-Uzbekistan. All data for FDI (inward foreign direct investment), ODA (total official development assistance net), GFCF (gross fixed capital formation), and GDP (gross domestic product) are measured in per capita current U.S. dollars in thousands. For example, GDP for Kazakhstan should be read: 2.869.23$, which means two thousand eight hundred sixty-nine U.S. dollars and 23 cents, and ODA for UZB is 5.79$, which is five dollars and seventy-nine cents per head. Source: UNCTAD, UNCTADstat (online database, 2011, http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx).

Table 1 shows that on average for 1992–2009 the Central Asian economies are different in terms of attracting FDI per capita. Huge foreign capital inflows are documented for the region: $188 million (or 8.14$ per head) in 1992, which soared to $18.6 billion (or 1.710.42$ per capita) in 2009. We observe a sharp upward rise in total FDI from 2005 on because of influences from Asia, including Chinese investors (Asia Economic Institute, 2012).[16] The first two countries in the ranking of the most attractive destinations for foreign capital inflows are the energy exporters of the region, Kazakhstan (245.73$ per head) and Turkmenistan (105.34$ per head), which could be explained by investments in the oil and gas industries. In third place is Kyrgyzstan (17.83$ per head). All nations' annual average FDI growth was positive, with exceptional performances by Kazakhstan (99%), Kyrgyzstan (80%), and Tajikistan (96%). Even though the latter two counties are considered as energy importers, Kyrgyzstan has huge mineral resources of non-ferrous metals (mercury ores and antimony) and substantial coal reserves and gold, while Tajikistan is very rich in mineral deposits such as metallic ores (zinc, iron, mercury, gold, tin, and lead) and common salts (such as carbonates and fluorites).

Moreover, the average growth of ODA per capita was positive and roughly homogeneous (29–30%) for all economies except Uzbekistan (13%). The total foreign aid increased more than 10-fold from

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[16] The presence of China in Central Asia was felt from the beginning of transition in 1991. Chinese investors placed a huge amount of money in infrastructure projects in Kyrgyzstan and Tajikistan. The main goal was to satisfy the large demand for input factors and raw material that Central Asia possesses. Source: article "China is investing in Central Asia" http://www.asiaecon.org/special_articles/read_sp/12835

$117 million to $1.251 billion (or in capita terms from 13 to 154$) between the sample period. Kyrgyzstan (47$/capita) and Tajikistan (25$/capita) are favorite destinations of donors.

Domestic investment (GFCF) per capita had risen 3-fold from $12 billion to $41 billion on average. Kazakhstan, Turkmenistan, and Uzbekistan's per capita real gross fixed investments surged. Overall, average annual growth was around 11%. The lowest per capita GDP nations are Kyrgyzstan and Tajikistan, at 461$ and 294$, respectively. We observe the pattern of greater increase in FDI growth compared with ODA, which raises a question about demand for foreign aid. It seems that these economies are prospering by the help of FDI-but we should ask: does this mean that FDI is substituting for ODA? Does foreign aid serve to finance domestic investment in the region because we observe the superior growth over domestic spending? We address these issues later in the paper.

4. Econometric Methodology

4.1. Empirical Model

We build a model with three equations-one for foreign direct investment (FDI), one for foreign aid (ODA), and one for domestic investment (DOM)-to explore the link between aid, FDI, and domestic investment in the CA (5) nations between 1992 and 2009. The reason is that each foreign flow has its own mechanism. FDI is administered through a private channel, and aid is through a public one. Both of these flows are part of the balance of payments, and thus we would assume some reverse association between them. In addition, we would like to test external flows' effect on investments by local economies (DOM). This carries a crucial point: if the foreign flows reduce domestic investment-e.g., by financing it-this means that the economies of the CA (5) are less concerned with long-term growth prospects. If they complement domestic flows, then we consider it to be a positive event that meliorates the process of transition. Since we deal with capital movements, we also include the KOF globalization index (Glob) to account for globalization rigidities in recipient economies (e.g., Dreher, 2006). This index is aimed at capturing domestic institutional environment conditions and aspects related to capital mobility (see Appendix for more details). The year variable (Year) is included due to the need to control for individual country effects and because our sample is in long form (Cameron and Trivedi, 2009). Allowing for reverse causality or simultaneity-meaning that FDI, ODA, and DOM are defined simultaneously-we estimate our model using the SUR technique. In this way, we are better able to reveal the possible link between these investment flows. Thus, our empirical model is set up as follows:

$$ln(FDI)_{i,t} = \gamma_0 + \gamma_1 ln(ODA)_{i,t} + \gamma_2 ln(DOM\text{-}FDI)_{i,t} + \gamma_3 (Glob)_{i,t} + \gamma_4 (Year) + \varepsilon_{it}$$

$$ln(ODA)_{i,t} = \beta_0 + \beta_1 ln(FDI)_{i,t} + \beta_2 ln(DOM\text{-}FDI)_{i,t} + \beta_3 (Glob)_{i,t} + \beta_4 (Year) + \epsilon_{it}$$

$$ln(DOM\text{-}FDI)_{i,t} = \delta_0 + \delta_1 ln(FDI)_{i,t} + \delta_2 ln(ODA)_{i,t} + \delta_3 (Glob)_{i,t} + \delta_4 (Year) + \omega_{it}$$

$$i = 1, …N; t = 1, …T, \qquad (1)$$

where i- countries (N = 5) and t- time frame (T = 18); FDI- foreign direct investment; ODA-official development assistance; *ala*- foreign aid; and DOM- gross fixed capital formation in the host country minus FDI. Since the fixed-capital portion of external flows (e.g., FDI) is not financed by domestic residents, it should not be included in the domestic investment according to Younas (2011); and Glob- the KOF globalization index. All the data for estimation were transformed into real per capita terms. The nominal series were deflated with the help of CPI.

Given the dimensions of our sample, the estimation was implemented by employing the SUR estimation technique proposed by Zellner (1962). This method allows us to jointly estimate three equations for our sample. In particular, the SUR estimator is based on small N = 5 (countries) and large T = 18 (years) that are the features of our sample.[17] SUR requires each country to have its own coefficient vector, unlike pooled OLS or even fixed-effect (FE) estimators (Baum 2006, p. 238). Moreover, it allows cross-section error-component correlation-i.e., contemporaneous correlation. The estimator is efficient under the homoskedasticity condition, which is managed by imposing bootstrapped standard errors. SUR estimation permits us to allow for the serial correlation over panels. Conceptually, obtained estimates are equivalent to maximum-likelihood (ML) estimates due to specification of iteration over disturbance covariance matrix and parameter estimates.

The panel data advantage over cross section and time series is that we obtain a bigger sample, which increases the degrees of freedom and helps to reduce collinearity between variables. According to the literature, using SUR would improve the efficiency of our estimates over the traditional pooled OLS (POLS) methods, with which we cannot simultaneously estimate several equations. Hence, we prefer the SUR methodology.

4.2. Data

We construct long-form panel data in which the time dimension (T = 18) exceeds the number of countries (N = 5). All yearly aggregate variables are in real values[18] transformed into natural logs to reduce variability, and they are expressed in per capita terms to make feasible comparisons. We include a few explanatory variables because of our data dimensions; otherwise, we will lose degrees of freedom. The data summary, correlation matrix, variable descriptions, and sources are presented in the tables in the Appendix.

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[17] Since our sample is in long-panel format, we technically cannot apply traditional fixed-effects (FE) or random-effects (RE) modeling or similar estimators such as instrumental variable (IV) or generalized method of moments (GMM), which are based on assumptions of large N and small T with regard to a sample. The SUR estimator is also called a feasible generalized least squares (FGLS) model that does allow us to explore cross-equation correlation in our small-sample multivariate system of equations (Cameron and Trivedi, 2009, p. 157).
[18] We deflated by dividing each county's aggregate nominal monetary series into real terms by their Consumer Price Index (CPI) in decimal form from the IMF online statistical database.

Statistical reporting in home countries is not comprehensive, so we use aggregate data from international organizations such as UNCTAD and the IMF. First, we chose the CA (5) countries because they share similar economic, geographic, and political characteristics. The remaining 10 Former Soviet Union (FSU) republics were different in their historical and geopolitical views.[19] As mentioned, starting in 1991, all of the five republics broke away from the Soviet Union and established themselves as sovereign states.[20] Second, the so-called *initial conditions* principle appears if we look at the economic factors driving capital flows into this region (e.g., De Melo *et al.,* 1997). Not all Soviet Union countries were the same before the break; for example, the Baltic, Transcaucasus, and Eastern European countries had industrial bases, while Central Asian countries could be classified as agricultural and natural resources regions. Third, the inclusion of only these five countries avoids the problem of *sampling bias* when comparing countries with different levels of industrial development, and that is very important in empirical investigation. This is coherent with the objective of our *ex-post* study, which is to test the ODA-FDI link after 18 years of independence (1992–2009).[21]

5. Results

The results of simultaneous estimation of equation (1) at the CA (5) regional level, including all countries, are presented in Table 2. Our simple model explains the variability in the FDI and ODA equations quite well, which is inferred from R^2, at 75% and 62%, respectively. Both equations have high statistical significance (see Chi^2 and P-value). The same is true for the DOM equation, $R^2 = 0.71\%$.

The FDI equation (upper part, Table 2) displays a highly statistically significant coefficient (+0.69) for ODA at the 1% level. This means that a one-unit increase in ODA raises FDI by 0.69 units. Since our model is in log-log form, all estimates except globalization and year can be interpreted as elasticities. This means that one percent invested in foreign aid would induce an inelastic 0.69% increase in FDI.

From the ODA equation (middle part, Table 2), we infer that a 0.85% increase in foreign aid is due to a 1% increase in FDI, and this is supported statistically. As can be observed, the same but reversed link, FDI-ODA, produces a different and richer result that corroborates the outcome from the first (FDI) equation. Our elaboration on this result is that the ODA arrived earlier than the FDI because it was meant as support to assist countries at the beginning of the transition in 1991. The FDI lagged behind due to an uncertain political and economic situation in the first few years of

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[19] The Soviet Union had 15 Republics that after the break were all collectively called the Commonwealth of Independent States (CIS). The breakdown of countries by geographical markup is as follows: Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan); Baltic (Estonia, Latvia, Lithuania); Eastern Europe (Belarus, Moldova, Ukraine); Eurasia (Russia); and the Transcaucasus (Armenia, Azerbaijan, Georgia).

[20] Independence status officially declared: Kazakhstan (December 16, 1991); Kyrgyzstan (August 31, 1991); Tajikistan (September 9, 1991); Turkmenistan (October 27, 1991) and Uzbekistan (September 1, 1991).

[21] Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan were included in the sample.

independence. Therefore we think that foreign aid assisted private investors-for example, through the "*information effect*" that was mentioned earlier (e.g., Mody et al., 2003). For that reason, we started our analysis from 1992 to give lead time for ODA to be absorbed.

The common logic of donor aid is that the aid should stimulate self-sustainable development. In other words, donors expect from aid recipients that they will initiate their own programs to stimulate economic and social progress after the aid term is finished. Agencies such as the World Bank, the IMF, ADB, the U.N., USAID, and various embassies carry out their missions and have settled offices in the CA (5). We believe that through introducing their foreign policies they have served as connections (or sources of first-hand information) for private foreign investors (from their own countries) to learn about these countries, make contacts with the right people, and ultimately invest. Private investors, who are public MNEs, have had to deal with local realities and risks, especially in the transition economies of Central Asia. Our minor positive estimate of 0.85%, we believe, may also suggest that ODA helped them to place private investment (FDI) and mitigate unsystematic (firm-related) risks to a certain degree. This fact is raised in a study by Asiedu *et al.* (2009), in which they demonstrate that foreign aid indeed reduces the adverse effect of expropriation risk on FDI in Sub-Saharan developing economies. They found that the foreign aid effect helped to mitigate host-country governments' rigidities.

In our result, domestic capital spending (DOM) drives increases in foreign direct investments by +0.75% (upper part, Table 2). This evidence supports one of the core postulates of economic development: enhanced domestic climate attracts private investors. However, we could not find a positive effect of domestic investment (DOM) on foreign aid (ODA). On the contrary, we found a statistically significant negative estimate, -0.40%. One possible explanation is that at the early stages of economic development the CA (5) transition countries were more concerned with economic growth and stabilization and less with social development. As economic growth has prospered, countries' current accounts have increased due to revenues from mineral endowments and exports, which brought increased foreign currency reserves as well as foreign debt. This process added to domestic savings, which in turn allowed tangible investments in fixed capital directed towards the building of infrastructure, plants, and facilities by local governments in later years.

Table 2 - SUR Regional Regression

Dep.Var: FDI		FDI equation	(B.SE)	(z)	(P-value)
ODA	γ_1	0.6931881	0.0995054	6.97	0.000
DOM	γ_2	0.7480825	0.0802279	9.32	0.000
GLOB	γ_3	0.0194746	0.022698	0.86	0.391
YEAR	γ_4	0.1845425	0.0575444	3.21	0.001
CONSTANT	γ_0	-374.0946	114.795	-3.26	0.001
Dep.Var: ODA		ODA equation	(B.SE)	(z)	(P-value)
FDI	β_1	0.8466694	0.1145693	7.39	0.000
DOM	β_2	-0.3974756	0.1458185	-2.73	0.006
GLOB	β_3	-0.0094726	0.0252811	-0.37	0.708
YEAR	β_4	-0.2020223	0.0559339	-3.61	0.000
CONSTANT	β_0	407.4895	111.6504	3.65	0.000

Dep.Var: DOM		DOM equation	(B.SE)	(z)	(P-value)
FDI	δ_1	1.060911	0.0969386	10.94	0.000
ODA	δ_2	-0.461506	0.1810261	-2.55	0.011
GLOB	δ_3	-0.0217236	0.0261163	-0.83	0.406
YEAR	δ_4	-0.1879391	0.0686111	-2.74	0.006
CONSTANT	δ_0	381.9386	136.7174	2.79	0.005

FDI		ODA		DOM	
Equation: N	75	Equation: N	75	Equation: N	75
R^2	0.7504	R^2	0.6159	R^2	0.7144
RMSE	1.349887	RMSE	1.407508	RMSE	1.521222
Chi^2	488.88	Chi^2	182.39	Chi^2	308.42
P-value	0.0000	P-value	0.0000	P-value	0.0000

Note: All variables are in natural logarithms and in per capita terms. FDI- foreign direct investment, DOM- gross fixed capital formation less FDI, ODA- official development assistance, GLOB- the KOF globalization index, N- number of observations, R²- goodness of model fit, B.SE- bootstrapped standard errors (under 400 replications), RMSE- root mean square error, Chi²/P-value- shows whether the model's coefficients are statistically significant.

The statistical data on domestic spending from Table 1 supports this proposition. We interpret this as indicating that improvements in domestic spending had reduced the need for foreign aid, but certainly there are may be other motives behind this assertion.

Next, domestic investment is complemented by FDI, as shown by a statistically significant positive sign at +1.06% (lower part, Table 2). First, this confirms our result from the FDI equation (see upper part, Table 2). This outcome is likely due to the priority that FDI receives in fulfilling the immediate needs in infrastructure projects in the CA (5) economies. Even though FDI is broadly considered as export-oriented in the region, which means that it is not oriented to serve local markets, it has rendered positive spillovers to recipient nations in that an increase in FDI inflows has stimulated local economies to spend more on infrastructure.

This happens in the form of creating market access, improving transportation facilities and roads, enhancing taxation, and amending financial regulation, among other things. Further, as we observe, foreign aid (ODA) does seem to influence domestic investment negatively: -0.46%. It shows that more aid induces less domestic investment-e.g., by financing it. We see the same substituting relationship from the ODA equation (middle part, Table 2), where the highly statistically significant estimate is also negative: -0.40%. This result seems like a support for the opponents of foreign aid, who state that aid serves as an extra financial source that is consumed and thus does not contribute to economic development. Since we are not discussing the effect of aid on economic growth and national output, we could only reflect on this result by going further on country-level regressions in the next section. A reference source to learn about arguments against foreign aid is Easterly (2007). For a view in support of this idea, see Ranis (2011).

To summarize, since FDI and ODA complement each other at the regional level according to our findings, we conclude that there is an indication of a viable positive link between aggregate foreign aid and private flows. What is more important here is that these flows are not competing (or substituting) flows: we interpret it as FDI improving industrial development and foreign aid helping

human capital development. The role of private investment, according to our estimates, seems to be pro-growth since it induces more domestic spending.

However, to gain better understanding and to test our findings on a regional level, we run Eq. (1) simultaneously for each separate country, with the results presented in Table 3 below. The outcomes are very interesting because they show a differentiated picture. We begin by looking at the FDI equation framework and later at those for ODA and DOM.

Only two countries-Kyrgyzstan and Tajikistan-display statistically significant effects of foreign aid on FDI. In addition, we observe a positive (driving in) effect with substantial magnitude in Kyrgyzstan of +5.21%, which means that 1 dollar of aid attracts 5.21 dollars of FDI. In other words, foreign aid strongly complements FDI in this country. From the social point of view, this result could be associated with changes in the political sector and social reforms in Kyrgyzstan, which went through three revolutions, and with the particular focus of DAC donors on Tajikistan, which is considered the poorest among the CA (5) economies (e.g., GDP value in Table 1). Further, both countries receive more of ODA, which is confirmed by per capita aid statistics (Table 1).

Table 3 - SUR Country Regressions

COUNTRY:		KAZ	KYR	TAJ	TKM	UZB
DEP.VAR/		FDI	FDI	FDI	FDI	FDI
ODA	δ_1	0.095	5.207***	1.686*	1.201	-0.636
		[0.649]	[0.967]	[0.782]	[0.804]	[0.696]
DOM	δ_2	0.576*	-1.625**	-0.131	-0.405	1.356*
		[0.308]	[0.663]	[0.525]	[1.612]	[0.523]
GLOB	δ_3	-0.007	-0.181	0.078	-0.347	-0.226
		[0.141]	[0.122]	[0.285]	[0.386]	[0.392]
YEAR	δ_4	0.043	0.719***	0.179	0.283	0.359
		[0.245]	[0.163]	[0.304]	[0.335]	[0.356]
CONSTANT	δ_0	-85.131	-1439.02***	-363.398	-550.709	-719.93
		[482.017]	[321.104]	[600.759]	[659.95]	[697.618]
N		17	15	16	11	16
R²		0.875	0.780	0.9496	0.979	0.969
RMSE		0.482	0.586	0.588	0.405	0.332
Chi²		131.71	114.58	315.65	538.41	574.83
P-value		0.000	0.0000	0.000	0.000	0.000
COUNTRY:		KAZ	KYR	TAJ	TKM	UZB
DEP.VAR/		ODA	ODA	ODA	ODA	ODA
FDI	β_1	0.058	0.186***	0.296**	0.592	-0.672
		[0.428]	[0.034]	[0.118]	[0.381]	[0.513]
DOM	β_2	0.456	0.323***	0.383***	0.609	1.483*
		[0.348]	[0.113]	[0.112]	[0.841]	[0.694]
GLOB	β_3	0.178	0.035	-0.072	0.372	0.086
		[0.126]	[0.027]	[0.113]	[0.399]	[0.305]
YEAR	β_4	-0.344	-0.138***	-0.002	-0.313	0.008
		[0.211]	[0.030]	[0.126]	[0.204]	[0.321]
CONSTANT	β_0	677.377	276.205***	5.553	609.558	-28.875
		[413.718]	[59.284]	[250.095]	[403.547]	[633.988]
N		17	15	16	11	16
R²		0.899	0.971	0.989	0.989	0.975
RMSE		0.378	0.112	0.251	0.292	0.342

Chi²		164.07	700.33	1499.83	1232.41	726.46
P-value		0.000	0.0000	0.000	0.000	0.000
COUNTRY:		KAZ	KYR	TAJ	TKM	UZB
DEP.VAR/		DOM	DOM	DOM	DOM	DOM
FDI	δ_1	0.793*	-0.536***	-0.096	-0.362	0.571***
		[0.466]	[0.200]	[0.606]	[144.53]	[0.142]
ODA	δ_2	1.023	2.977***	1.600*	1.104	0.591
		[0.832]	[0.844]	[0.873]	[121.14]	[0.398]
GLOB	δ_3	-0.192*	-0.105	0.147	-0.507	0.038
		[0.118]	[0.073]	[0.199]	[18.09]	[0.189]
YEAR	δ_4	0.345*	0.411***	-0.131	0.438	-0.116
		[0.204]	[0.116]	[0.212]	[0.584]	[0.197]
CONSTANT	δ_0	-678.139*	-822.962***	257.660	-852.846	236.818
		[401.979]	[230.793]	[419.033]	[640.971]	[387.984]
N		17	15	16	11	16
R²		0.930	0.796	0.978	0.978	0.992
RMSE		0.579	0.337	0.504	0.382	0.224
Chi²		272.28	113.81	727.56	534.01	2559.90
P-value		0.000	0.0000	0.000	0.000	0.000

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. KAZ-Kazakhstan, KYR-Kyrgyzstan, TAJ-Tajikistan, TKM-Turkmenistan, and UZB-Uzbekistan. Bootstrapped (under 400 replications) standard errors in square brackets. The variable descriptions are the same as in the note for Table 2.

This could suggest that investors were lured by these ongoing institutional changes and new market opportunities. One may think that it is especially for that reason that we see this complementing effect. The same significant crowding-in effect of ODA is observed in Tajikistan, though only of +1.69% elastic magnitude. The lesser but still positive effect compared with Kyrgyzstan could be due to similar institutional improvements. However, from an economic point of view we believe that the observed link in these nations appears due to low national output levels and economic growth, given substantial inflows of foreign aid. The latter claim comes from the fact that our globalization variable (Glob) is not significant. We should have observed a significant relationship in Kazakhstan, which is considered the hub of the donors' network and their institutions in Central Asia-but we don't.

We obtained a striking result on the ODA equation from Table 3, middle block. Here again, only Kyrgyzstan and Tajikistan report moderate inelasticity, but highly statistically significant estimates. Our results report a complementing effect for FDI in Kyrgyzstan, with a +0.19% increase in ODA; for Tajikistan's FDI, the attracting effect is +0.30 %. These estimates confirm the first FDI equation outcomes (Table 3, first block), and we could conclude that there is indeed some indication of a positive complementing correlation between ODA and FDI in these nations. The rest of the countries display no connection of FDI to foreign aid.

As for the relation of these foreign flows to domestic investment (Table 3, last block), we could observe that FDI is of high importance in three countries: Kazakhstan, Kyrgyzstan, and Uzbekistan. However, we obtain a substituting effect in Kyrgyzstan (-0.54%) and complementing effects in Kazakhstan (+0.79%) and Uzbekistan (+0.57%). This could mean that FDI finances domestic investment in Kyrgyzstan-in other words, the local economy enjoys the rent as foreign private capital allows saving on domestic expenditures. In contrast, the complementing effect in the latter two countries shows that FDI induces more spending, augmenting domestic investment. On the other hand, the relation of aid to domestic investment is important only in Kyrgyzstan (+2.98%) and

Tajikistan (+1.60%) from our estimates. In both countries, foreign aid attracts more funding from local authorities on domestic needs. This is positive and favorable from the objective of foreign aid, which is aimed at long-term sustainability in the recipient country. That is, as a first-order effect, foreign aid paves the road for private foreign investors in these two countries, and as a second-order effect it induces more domestic investment. Ideally, this process in its turn contributes to economic growth, bringing along pro-market reforms and trade facilitation. However, we don't observe a tangible increase in national output in these nations. Nominal GDP per capita in 1992 was 490$ and rose only to 869$ in Kyrgyzstan, while it rose from 363$ to 734$ in Tajikistan (UNCTAD online database, 2011).[22]

We found important results only for two countries: Kyrgyzstan and Tajikistan, which consistently report significant estimates from all three equations. We attribute this finding to the following additional facts about these two countries. First, these nations received sizable total foreign aid during 1992–2009: Kyrgyzstan ($23.8–$315) million; Tajikistan ($11.9–$409) million-much higher than the rest. Second, for the period of 2007–2008 Kyrgyzstan was in third place among the top ten nations from 181 world economies in pro-market reforms (*Doing Business 2009* Report IBRD/World Bank, 2008). This report especially tracks local government's actions in improving the business environment, which gives us grounds to believe in a viable link between foreign aid and foreign direct investment in this economy. Also, the *Investing Across Borders-2010* report by the World Bank Group places Kyrgyzstan in first place among Central Asian economies in terms of the domestic foreign ownership participation rate. From the official document *Tajikistan's Quest for Growth: Stimulating Private Investment* (World Bank, 2011), we could infer that Tajikistan's government has initiated tangible actions for enhancing the investment climate. To summarize, we don't pretend to solve all issues related to analysis of this complex relationship, and we think that there definitely exist other sources to support our findings. Our rationale from empirical estimation leads us to believe that the positive "*stimulating effect*" between foreign aid and private capital is observed due to the lean economic conditions, low national output, and substantial foreign aid inflows in Kyrgyzstan and Tajikistan.

6. Concluding Remarks

This paper attempts to empirically tackle the currently debated issue on the link between foreign aid and foreign direct investment in five Central Asian economies for the period 1992–2009. In contrast to previous contributions, we built a simple model and applied the SUR technique to test the above conjecture.

The principal conclusion of the paper is that, on a regional level, aggregate foreign aid has a complementing effect on foreign direct investment in the five Central Asian economies. The reverse effect is also present, so we accept the finding as a positive association or link between ODA and

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[22] The same data source reports: 1.613$–6.891$ (Kazakhstan); 679$–3.485$ (Turkmenistan) and 641$–1.215$ (Uzbekistan).

FDI in the region. Our finding supports the result by Harms and Lutz (2006) on the strong positive effect of aid on FDI, especially in the sorts of rigid institutional environments that are present in Central Asian economies. Another important observation is that aggregate foreign direct investment inflows induce more domestic investment. This is very important since, as is well known, domestic investment increases the size of the capital stock and therefore helps determine long-run growth. Thus, we believe that foreign aid raises the quality of local complimentary input such as education and health, while foreign direct investment brings advanced technology and possibly shifts the production frontier upward and ultimately contributes to increases in efficiency and productivity. Regarding foreign direct investment, this also implies that domestic firms are learning to better combine external technology with domestic inputs in the production process.

However, the direct link between foreign aid and private investment at the aggregate country level is found only in two countries - Kyrgyzstan and Tajikistan - even though these nations have received less foreign capital (although more aid) on average for the period. We explain this result as follows: foreign aid works in countries with low national incomes given sufficient foreign aid inflows, especially in the early transition period.

If our finding on the effect of donor aid on the foreign private investment-flow nexus is true, then international humanitarian organizations indeed could boost positive pro-growth changes in domestic economies in collaboration with MNEs. This means that a better understanding of the role and value of donor aid could substantially reduce outflows of aid and increase its efficiency through a sort of public-private partnership. MNEs are most likely to be more collaborative with international donors operating in Central Asia and other developing economies around the world.

On the policy level, in order for the CA (5) economies to better accommodate FDI, they should reconsider their procedures with regard to foreign aid-i.e., (1) identify the potential sectors and industries in which the ODA-FDI link is present, (2) ease capital market regulation, (3) enforce a prudent legal system, (4) encourage technological progress through trade in machinery and equipment, and most importantly (5) direct aid towards human capital to raise the "*absorptive capacity*". These well-studied supply side management practices are supposed to contribute to long-term economic growth. In the short term, adjustments to the money supply and taxation and an increase in government spending could boost the aggregate demand and hence increase national output-GDP.

Future research could juxtapose our model with similar transition economies and try to obtain further evidence from disaggregated external monetary inflows. We continue to think that capital transfer studies reveal better results when approached from the individual country level.

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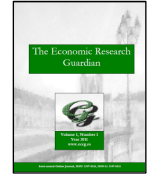
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Appendices

Table A1 - Data Sources and Descriptions

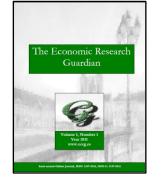| Variable	Name	Description	Source
FDI	FDI	Foreign Direct Investment. The value of capital of MNEs in the host country in real terms. U.S. dollars at current prices in millions.	UNCTAD
Official Development Assistance	ODA	Net Official Development Assistance received and aid received. U.S. dollars at current prices in millions.	UNCTAD
Domestic Investment	DOM	Gross Fixed Capital Formation minus FDI inflows. In this way, we can obtain local investments by government and private sector in fixed assets and human capital less payments for foreign debt. U.S. dollars at current prices in millions.	UNCTAD
Globalization Index	GLOB	KOF Globalization Index. Measures macroeconomic environment. 0–100.	KOF
Pop	Pop	Population in millions of people.	UNCTAD
CPI	CPI	Consumer Price Index.	IMF

Table A2 - Descriptive Statistics Summary

Variable	Units	Obs.	Mean	Std. Dev.	Min	Max
FDI	Millions USD	90	8560.768	40540.69	-24	329166.7
ODA	Millions USD	90	13016.4	91989.88	5.884357	861000
DOM	Millions USD	90	1206949	9386283	20.38859	8.84e+07
GLOB	0-100	85	38.42625	11.10762	15.14242	59.74965
Pop	Millions USD	90	11.13199	7.945662	3.881973	27.12806
CPI	Percent	90	2.759488	3.828602	1.00e-05	19.14858
Year	Years	90			1992	2009

Note: All monetary variables are in real terms.

Table A3 - Correlation Matrix

	FDI	ODA	DOM	GLOB	Year
FDI	1.0000				
ODA	0.1282	1.0000			
DOM	0.0671	0.9843*	1.0000		
GLOB	-0.1701	-0.1784	-0.1435	1.0000	
Year	-0.2872*	-0.2274*	-0.2090*	0.5478*	1.0000

Note: Variables are in real terms. Significant correlations at 5% significance level are marked by *.

A4 - Variables of the Model

Dependent Variables

Foreign Direct Investment (FDI) – This is an aggregate per capita real value in current millions of U.S. dollars converted into real values by dividing by the Consumer Price Index (CPI). The reason for choosing flow and not stock value is that we seek to capture the link between FDI-ODA, and we cannot do so in case when FDI is a stock variable, which means it is a part of domestic capital.

Official Development Assistance (ODA) – This is taken from the UNCTAD database and is in aggregate form. It includes what is actually received (not disbursed, meaning that it has been allocated but not yet transferred to the recipient county) as official development assistance and aid made by DAC donor countries. We use yearly aggregate data in this study. The variable was deflated by CPI and expressed in natural logarithmic form per capita.

Domestic Investment (DOM) – This variable is the domestic investment of the government into fixed assets such as plants, buildings, roads, and infrastructure minus FDI. The variable was deflated by CPI and expressed in natural logarithmic form per capita. Note that this variable is also in flow form and is not a net value (after depreciation). It is investment to domestic capital stock.

Independent Variable: Environmental

KOF Globalization Index (GLOB) – This index contains three components and is defined as: (1) *economic globalization*, featured as long-distance flows of goods, capital, and services, and market-exchange attributes such as information and perceptions; (2) *political globalization*, defined as a diffusion of government policies; and (3) *social globalization*, expressed as the dissemination of ideas, information, images, and people. Source: http://globalization.kof.ethz.ch/