Foreign aid, foreign direct investment and domestic investment nexus in landlocked economies of Central Asia

Arazmuradov, Annageldy

University of Bergamo

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Annageldy Arazmuradov*

Department of Economics and Management of Technology, University of Bergamo, Dalmine, Italy

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This paper investigates the relationship between official development assistance, foreign direct investment (FDI) and domestic investment in landlocked and transition economies of Central Asia. It is important for donor countries to understand whether their investments induce foreign direct investment or not. If they do, it creates ground for public-private partnership. If they do not, then it points to reassessing mechanisms to '*aid architecture*'. For public multinational enterprises, it is important to gain positive public opinions and further explore new markets. For governments, it is crucial to devise policies to favour foreign transfers that bring more welfare improvements. Our results from seemingly unrelated regression for regional sample demonstrate that: (a) foreign aid and FDI are complementing flows, and, (b) we found crowding-in effect: domestic investments increase FDI and vice versa, but not foreign aid. We conclude that there is evidence of public-private investment partnership.

Keywords: Central Asia; transition economies; foreign direct investment; official development assistance

Introduction

Do external financial flows help developing countries to grow? This is one of the most important questions in economic growth and development literature, especially as financial resources in developed economies are becoming more limited. Every year, OECD[1] donors give enormous amount of financial resource to five landlocked post-communist and complex Central Asian economies (CA5)[2] in terms of official development assistance (ODA), which is broadly humanitarian assistance from developed countries[3]. ODA is administered by OECD Development Assistance Committee (DAC) that consists of 24 developed countries[4]. On the other side, multinationals launch their projects via foreign direct investment (FDI) searching for more profit. Both of these transfers are crucial to transition low-income nations. FDI helps recipient countries to encourage rise in specialisation and rising income of low-skilled that would eventually lift their wages and decrease inequality. ODA aims to improve social welfare, decrease inequality and raise skilled workers pool through technical assistance. At least on a conceptual level, both flows extend common features to recipient countries.

In a historically important International Conference for Development (2002) document, "*The Monterey Consensus*"[5], and follow-up Doha Declaration on Financing for Development outcome

*Email: annageldy.arazmuradov@unibg.it

report, FDI is viewed as an addition to ODA[6]. UNCTAD also stress this point in advising local governments: "Channelling some ODA into investment projects financed jointly with domestic financial institutions…"[7]. It is important for donor countries to understand whether their investments also induce foreign direct investment. At first it seems they are two different flows and no link exists because FDI is a capital account item and ODA is a transfer payment of current account though both constituent balance of payments entries. On the other hand, donors who give assistance are also ones who conduct FDI, called 'vanguard effect' (Kimura and Todo, 2010). If there is in fact a connection, then it could create grounds for public-private partnership, such as tiding aid with domestic private sector investments. If there is no connection, then it points to reassessing the mechanisms of 'aid architecture' for long-term civil society building goals. For public multinational enterprises (MNEs) it is equally important to gain positive public opinion and to further explore new markets for profit seeking motives. For recipient local societies and their governments, it is crucial to devise policies to favour a particular foreign capital that brings tangible contribution to domestic welfare improvements.

The central focus of this paper is to explore a possible link between aggregate ODA and FDI in five landlocked Central Asian countries with similar socio-economic situations and financial systems. Harms and Lutz (2006) studied 76 developing countries before 2000, excluding CA(5) economies, and found that ODA is a complement to FDI. Moreover, they also found that stimulating effect of ODA is higher in countries with unfavourable institutional environment. We specifically test their latter conclusion to see whether this also holds for Central Asia economies.

The link between FDI-ODA was studied only by few scholars and there is no specific consensus yet. For example, Kosak and Tobin (2006) state in their panel study of 90 various growth level group of countries from 1970 to 2001 that FDI and ODA are unrelated, as each had specific effects on economic growth. Caselli and Feyrer (2007) study groups of developed and developing countries also emphasise that foreign investment and foreign aid are more like substitutes than complements. None of mentioned studies above includes Central Asian economies. According to the theory of FDI, private investments are favoured more when certain business conditions in host countries are met, such as macroeconomic stability, infrastructure, regulation and financial system intact (Navaretti and Venables 2004, Globerman and Shapiro 2002, Davies 2011). Foreign aid is essentially targeted at improving these conditions.

To quantify the above concerns we built a panel data set and estimated our data by simultaneous equation modelling of seemingly unrelated regressions (SUR) proposed by Zellner (1962) to account the issue about simultaneity and cross-section error correlation. Different panel data techniques were employed in their research on FDI for post-communist transition economies (Lansbury *et al.* 1996; Bengoa and Sanches-Robles 2003; Campos and Kinoshita 2003; Johnson 2006; Kenisarin 2008) among others.

Our result on regional (pooled) regression level supports Harms and Lutz (2006) conclusions and we found positive influence of ODA on FDI inflows into 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 reverse effect, that FDI also attracts foreign aid (ODA).

We contribute to the empirical literature on FDI-ODA link by bringing new insights about foreign aid effects in less studied Central Asian regions that could be helpful for international donor organisations, so that they could better devise their programs and do *'aid architecture'*, possibly enable better predictions of future aid packages. It could also provide thoughts on re-

assessing public-private collaboration. Our understanding is that, the present paper is the first paper that studies foreign transfer flows' link in five remote economies in Central Asia.

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

Theoretical Considerations

There are various ways foreign aid could affect foreign direct investment in host countries. According to Harms and Lutz (2006), if foreign aid is directed to infrastructure projects, human capital and complementary inputs could have "*infrastructure effect*". Enhanced domestic conditions could lure foreign investors. Inflows of foreign aid are also expected to raise countries marginal product of capital (MPC) of domestic firms, which in turn attracts FDI. Another effect, '*rent-seeking*', might also appear, possibly arrive from the fact that local firms compete for rents from foreign aid. This situation reduces MPC that would results in less innovation activities, R&D spending and reduction in efficiency (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 '*financing effect*' that directly augments the balance of payment of the recipient country, as it helps foreigners to secure their profit repatriation. Arellano *et al.* (2009) argues that aid could increase the supply of tradable goods and reduce the price of non-tradable goods. They call it '*Dutch-disease effect'* that discourages the FDI. Kimura and Todo (2010) claim that there is also '*vanguard effect*' of foreign aid, meaning countries who give aid also tend to place an FDI in specific host economies. Mody *et al.* (2003) state that there is an '*information effect'* that foreign aid is carrying into host countries. Private information which is not accessible to the foreigner is revealed to investor via foreign aid. Aid programs help investors to collect data and build a picture of recipient countries.

In general, channels of foreign capital entering the region could be outlined as follows: foreign aid is directed into social infrastructure targeting complementary inputs, namely, health, education, water related projects and/or economic infrastructure, including energy, communication, and transportation. FDI is focused on physical capital projects, production, manufacturing, banking industries and natural resource extracting sectors. Numerous researches were devoted to analyses of FDI, but very few researches addressed the Central Asian (CA) region that is located in the middle of the East and West continents trade route[8.] Several studies focused on FDI effects of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan (De Melo *et al.* 1997; Gylfason 2000; Edmiston *et al.* 2003; Bayulgen 2005; Boudier-Bensebaa 2005; Penev 2007; Kenisarin and Andrews-Speed 2008), but they were under the framework of Commonwealth of Independent States (CIS)[9] or Central and Eastern Europe (CEE)[10] that included countries with different economic setup. Studies that focused solely on these five countries are scarce and addressed primarily the social and political structure (such as in Gleason, 2001; Dowling and Wignaraja, 2006). Some studies presented a narrative of economic policy developments in the region. For example, Dikkaya and Keles (2006) address the FDI in Kyrgyzstan through a case study approach. Other scholars, for instance Venables (2009) showed benefits of regional integration in Central Asia via general equilibrium tools. 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 transitional path of Central Asian countries. Kalyuzhnova (2003, 2008, 2011) thoughtfully reflects on social and economic developments, and energy related issues.

Moreover, the direct link between FDI and ODA was studied only in 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) study broad groups of developing countries. Kimura and Todo (2010) and Blaise (2005) focus on Japanese FDI and aid flow interactions. Carro and Larrú (2010) look at FDI-ODA link in Argentina and Brazil. Kapfer *et al.* (2007) construct infrastructure aid-FDI links for 59 countries. Asiedu and Nandwa (2009) show that aid mitigate appropriation risk on FDI for 35 low-income and 28 Sub-Saharan Africa. Hien (2008) looks at FDI-ODA in 28 provinces of Vietnam. Bhavan *et al.* (2011) analyse nexus between FDI and ODA for South Asian economies. Beladi and Oladi (2006) apply the FDI-ODA link into a three-goods general equilibrium model and found that when foreign aid is directed to public good, it could crowd out foreign investment in the recipient country, when given a factor intensity condition.

The findings on FDI-ODA 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 aid goes to support human capital, and 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 marginal product of capital (MPC) and report that MPC is roughly the same across developing countries, and inflow of foreign aid only reduces MPC. In their study, foreign aid is *more substituted* to FDI. In their study of 81 developing countries (excluding Central Asia from 1988-1999), Harms and Lutz (2006) claims that FDI and ODA are *complements*. Moreover, they argue that after controlling for regulation in host countries, catalysing effect of aid is stronger in countries with unfavourable institutional environment. In South Asian countries foreign aid drives the FDI in the study of Bhavan *et al.* (2011).

Foreign Transfers' Trends in Central Asia

From 1991, all five countries declared their independence and started building their economies. Kazakhstan is the largest and by territory is the half the size of Europe[11]. Central Asia is under energy related political game between USA, Russia and China, according to Financial Times "*Investing in Central Asia 2008*" Special Report (FT.com, 2010). The importance of studying capital flows into these countries is justified by its strategic geographical location, which gives European Union economies, USA, Japan and China 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 favour foreign investors. The region is rich in natural resources, especially in oil and natural gas, minerals and metals – they are of primary interest to multinational enterprises as input factors. For European Union, Central Asia is the potential source of future energy supply, especially natural gas.

Another reason to investigate FDI inflows would be that local firms are restricted and have constrains to external funding opportunities. Availability of finance to support their businesses via FDI inflows (stock, portfolio and loans) is a very favourable condition to revive the landlocked region's economic development.[12] Liquidity constraints would prevent local firms from creating competitive advantages through rigidities of exporting their goods. The region

demonstrated high potential for market growth and trade relations. Industrial structure of Central Asian region characterised by oligopolistic markets in the main industrial sectors affiliated to mineral resources/energy, and with monopolistic domestic competition. At the same time countries have their particular outlook for economic reforms and international policy and local developments. The major type of FDI in Central Asia is Greenfield investment[13]. This is when MNEs create their foreign operation units overseas and integrate vertically. Also, FDI inflows are mostly export oriented and not directed to serve local market according to ADB World Investment Report (2010). Major investors are firms from USA, Japan, China, and developing Asia. Foreign capital lands in oil and energy sector, while service sector is almost untouched. This may be due to fact that still after 1991, economies could not efficiently build sound regulations, functioning financial services and advances in structural reforms. MNEs entered the domestic economies of CA(5) vertically thus reducing the transfer costs and financial risks. The major types of foreign investment only happen after reaching agreement with top government officials. The weak domestic firms' competition gives competitive advantage to multinational firms. MNEs that possess superior knowledge and technology simply enjoy the amateur markets of CA(5). In practice, MNEs enter the markets with political stability in the region as the only concern according to Krugman (1979).

Table 1. Inward FDI, ODA and Domestic Investment for the period 1992-2009.

Country	**FDI**		**ODA**		**DOM**		**GDP**	
	Average FDI Flows ($)	Annual Average FDI growth (%)	Average ODA flows ($)	Annual Average ODA growth (%)	Average DOM Flows ($)	Annual Average DOM growth (%)	Average GDP ($)	Annual Average GDP growth (%)
KAZ	1,100.90	7.9	78.55	-10.5	41,440.50	-10.0	2,945.78	3.6
KYR	20.96	51.3	117.08	-13.7	675.47	-8.3	451.56	0.7
TAJ	794.90	48.1	1,134.64	-21.9	19,606.27	-16.5	313.97	0.3
TKM	4,994.02	5.0	14,175.18	-17.4	1,322.909.27	-26.5	1,684.77	2.3
UZB	19.69	-23.7	80.17	-23.7	4,686.86	-26.6	474.44	2.8

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, DOM-gross fixed capital formation and GDP-gross domestic product are measured in per capita real 2000 US Dollars in millions. GDP-in thousands values. *Source*: UNCTAD , UNCTADstat (online database,2011) and own calculations.

From Table 1 we can see that, on average, Central Asian countries are different in terms of attracting FDI with the leading position of Turkmenistan. If all nations average growth was positive, Uzbekistan on average would end on a big negative side, with 23.7 percent decline in real terms per capita. The first two countries in the ranking of the most attractive destinations for FDI flows are Kazakhstan and Turkmenistan, which both have abundant oil and gas resources.

Moreover, the average growth of ODA was negative for all economies. The foreign aid also declined approximately fourfold from $242 million to $51 million between the sample periods. On the other hand, Kyrgyzstan is in second place for ODA after Turkmenistan and has huge mineral resources of non-ferrous metals (mercury ores and antimony), substantial coal reserves and gold, while Tajikistan is another region attracting much of the foreign aid and very rich in mineral deposits such as metallic ores (zinc, iron, mercury, gold, tin and lead) and common salts (such as carbonates, fluorites). On the other hand, domestic investment (DOM) had decreased on average terms. Turkmenistan, Tajikistan and Kazakhstan per capita real gross fixed investments surged. Overall, annual growth is still negative. We observe the pattern of increase of FDI and decline of DOM that raise a question on whether FDI served financing the domestic investment in the region. We discuss this issue later in the paper.

Econometric methodology

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). The reason is that each foreign flow has its own mechanism based on previous contributions. FDI is administered through a private channel and aid is through a public one. Both of these flows are part of balance of payments. Hence, we would assume some reverse association between them. Additionally, we would like to test external flows' effect on investments by local economies. This carries a crucial point: if foreign flows reduce domestic investment, such as financing, this means that economies of CA (5) are less concerned with long-term growth prospects. If they complement domestic flows then we consider it as a positive event that meliorates process of transition. Since we deal with capital movement, we also include KOF globalisation index (Glob) to control for rigidities of recipient economies (Dreher, 2006). 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 FDI, ODA and domestic investment (DOM) are defined simultaneously, we estimate our model, through solving three equations simultaneously using seemingly unrelated regressions (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:

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

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

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

$$i = 1, \dots N \; ; t = 1, \dots T$$

(1)

where i- countries (N=5) and t-time frame (T=18), *FDI*- foreign direct investment, *ODA*- official development assistance, *ala*- foreign aid, *DOM*- gross fixed capital formation in host country minus FDI since fixed capital portion of external flows (Yonas, 2011), Glob- KOF is the globalisation index.

We have included *Year* to account for country effects and also for technological progress. Given dimensions of our sample the estimation was implemented by employing SUR estimation technique proposed by Zellner (1962). This method allows us to jointly estimate three equations for our sample. Also, SUR estimator is based on small N=5 and large T=18 that is the feature of our sample[14]. SUR imposes 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. Estimator is efficient under the homoscedasticity condition which is managed by imposing bootstrapped standard errors. SUR estimation permits us to allow for the serial correlation over panels. Our estimates are complacent with maximum likelihood 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 get bigger sample which increase degrees of freedom and reduce collinearity between variables. According to literature, using SUR would improve the efficiency of our estimates over the traditional pooled OLS (POLS) methods, where we cannot simultaneously estimate two equations gives more efficiency gain. Hence, we prefer the SUR methodology.

Data

We construct a long form panel data where time dimension (T=18) exceeds the number of countries (N=5). All yearly aggregate variables are in real values[15] transformed into natural log to reduce variability and 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, variables descriptions and sources are presented in Table A1 in the Appendix.

Firstly, we chose these five countries, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan, because they share similar economic, geographic and political setup. The remaining ten Former Soviet Union (FSU) Republics were different from the historical and geo-political view[16]. From 1991, all our five Republics broke away from the Soviet Union and established their sovereign states[17]. Secondly, the so-called initial conditions principle appears if we were to look at the economic factors driving foreign direct investment into this region (De Melo *et al.,* 1997). Not all Soviet Union countries were the same before the break; Baltic, Transcaucasus and Eastern Europe countries had industrial bases, while Central Asian countries could be classified as agricultural and natural resources regions. Thirdly, the inclusion of only these five countries avoids the problem of *sampling bias*, for example, comparing countries with different levels of industrial setup that is very important in empirical investigation. Following our initial theoretical discussion and from past literature as mentioned in earlier sections, we have constructed relevant variables for our model. Statistical reporting in home countries is not

comprehensive and is underdeveloped, so we use aggregate databases from international organisations, such as Nations Conference on Trade and Development (UNCTAD) and IMF. This is coherent with the objective of our *ex-post* study; to understand FDI-ODA link after 18 years of independence, 1992-2009[18].

Results

The simultaneous estimation of equation 1 in our total sample is presented in Table 2. Explanatory variables explain variability in FDI and ODA equations quite well, at 80% and 63.5% respectively. We observe that the coefficient for ODA is highly significant, with a one unit increase raise FDI by 0.34 units. Since our model is in log-log form, estimates can be interpreted as elasticities. This means one percent invested in foreign aid would only induce 0.34% increase in FDI, which is relatively inelastic At first sight the elasticity appears very low, but upon careful inspection at the institutional and social-economic situation this result is plausible. This suggests that donors are at least trying to create investment atmosphere through their humanitarian projects in CA(5) economies.

From the ODA equation we infer that 0.49 percent increase in foreign aid is due to one percent increase in FDI – this is supported statistically. As one can easily observes, the same link produces different and richer results depending from which observation point we select. Most importantly, we try to capture the link on the regional level that depicts political decision making. Our elaboration on the result is that the ODA arrived earlier than FDI, because it is a support to assist countries at the beginning of transition in 1991. The FDI lagged behind due to uncertain political and economic situation in the first few years of independence. For that reason we started our analysis from 1992 to give lead time for ODA to be absorbed. Through their contacts and establishing offices, representations and embassies of donor countries made introduction of their foreign policies to host CA(5) economies.

The common logic of donor aid is that the aid should stimulate self-sustainable development. In another word, donors expect from aid recipients that they will have their own initiatives and stimulate economic/social progress after the aid term has finished. Agencies such as World Bank, IMF, ADB, UN, USAID and various embassies carry out their missions and have settled offices in CA(5). They served as a connection (or first-hand information) to private foreign investors to learn about these countries, make contacts, find the right people, and ultimately invest into these countries. Private investors, who are public MNEs, could not individually conduct their investment projects, because they had to deal with hidden uncertainty. We suggest that ODA helped them to mitigate these risks up to certain degree that are also shown by our empirical results. This fact is also illustrated in study of Asiedu *et al.* (2009) where they demonstrate that foreign aid indeed reduce adverse effect of expropriation risk on FDI. They found that ODA effect helped to mitigate host country governments' rigidities. For example, any foreign investor could rely on his embassy in CA(5) to get a back-support and assistance as the only legitimate "insiders" channel. Our estimates show that ODA had a very important role for FDI attraction in Central Asian region from the 1992-2009 period.

Table 2. SUR Regional Regression.

Dep.Var: FDI		FDI	(B.SE)	(z)	(P-value)
ODA	γ_1	0.335	0.137	2.45	0.014
DOM	γ_2	0.890	0.084	10.60	0.000
GLOB	γ_3	0.028	0.021	1.31	0.190
YEAR	γ_4	0.136	0.060	2.25	0.024
CONSTANT	γ_0	-275.616	120.433	-2.29	0.022
Dep.Var: ODA		ODA	(B.SE)	(z)	(P-value)
FDI	β_1	0.489	0.215	2.27	0.023
DOM	β_2	0.061	0.241	0.25	0.799
GLOB	β_3	-0.002	0.024	-0.08	0.934
YEAR	β_4	-0.140	0.068	-2.06	0.039
CONSTANT	β_0	280.647	135.450	2.07	0.038
Dep.Var: DOM		DOM	(B.SE)	(z)	(P-value)
FDI	δ_1	0.871	0.084	10.36	0.000
ODA	δ_2	0.041	0.155	0.27	0.790
GLOB	δ_3	-0.027	0.020	-1.35	0.177
YEAR	δ_4	-0.102	0.059	-1.74	0.082
CONSTANT	δ_0	207.537	117.146	1.77	0.076

FDI Equation: N	75	ODA Equation: N	75	DOM Equation: N	75
R2	0.8070	R2	0.6313	R2	0.8312
RMSE	1.187041	RMSE	1.379153	RMSE	1.147229
F-stat /P-value	509.71/ 0.0000	F-stat /P-value	142.14/ 0.0000	F-stat /P-value	516.82/0.0000

Note: FDI-real log of FDI per capita, DOM-log of real gross fixed capital formation per capita, ODA-log of real official development assistance per capita, GLOB-globalisation KOX index. N-number of observations, R2-goodness of model fit, B.SE-bootstrapped standard errors (under 400 replications). RMSE-room mean square error. F-stat/P-value- shows whether the model's coefficients are statistically significant.

The positive sign of domestic investment variable (DOM) in FDI equation also makes sense, because improvements in domestic infrastructure, coupled with abandoned natural resources, would attract investors. This means domestic capital drives increases in foreign direct investment. This is natural according to us. Economies that are growing would be demanding more of FDI. In opposite, even though ODA grew over time we could not find positive effect of domestic investment (DOM) in foreign aid. One possible explanation is that at the early stages of economic development, transition countries are more concerned with economic growth and not human capital development, for example, complementary inputs. Countries' current accounts' have increased due to revenues from mineral endowments or other means, which brings increased foreign currency reserves. If so, this added to domestic savings which in turn would allow substantial investments directed into building infrastructure, plants, and facilities by local governments in later years.

Domestic investment is complemented by FDI shown by statistically significant positive sign at 0.87. This finding is also corroborated by looking at FDI equation. Foreign aid (ODA) does not seem to influence domestic investment. To be more precise, people are not informed enough to participate in money allocation and investment decisions in CA(5) in general. This is also likely due to the priority FDI receives in fulfilling the immediate needs of CA(5) economies. It also means that FDI has more power to instigate positive changes in local economies. Even though FDI is broadly considered as export oriented, which means that it is not oriented to serve local markets, it would render slight positive spillovers. The detailed mechanism of this process can be included in future studies.

Since FDI and ODA complement each other according to our findings, we surmise that increase of quality of foreign aid could prepare fertile grounds for FDI activities and vice versa, though indirectly. What is more important here is that they are not competing flows - FDI improves industrial and foreign aid helps human aspects of growing states.

Concluding Remarks

We were able to draw conclusions on the complicated task of FDI-ODA link on a regional level. The main conclusion of our paper is that, on a regional level, aggregate foreign aid had a minor facilitating effect, for example, complementing foreign direct investment in Central Asian economies. The reverse effect is also present, so we accept the finding of some positive association or link between FDI and ODA in the region. Our observation is supported by findings of Harms and Lutz (2006), especially, in amateur institutional environments that are present in Central Asian economies.

Another important observation from our study is that FDI flows positively affect complementing domestic investment. As it is well known that domestic investment determines the size of the stock of capital, and therefore helps determine the long-run growth. Thus, for example, foreign aid equally raises the local complimentary inputs quality such as education, health while foreign direct investment bring advanced technology and possibly shift the production frontier upward and ultimately contribute to a raise in efficiency and productivity. Regarding FDI, this also implies that domestic firms are learning to better combine external technology with domestic inputs in production process.

If our finding in the interaction of donor aid to foreign private investment flows nexus is true, then international humanitarian organisations indeed could boost positive changes in domestic economies in collaboration with multinational companies. This means better

understanding in the role and value of donor aid could substantially reduce outflows, and increase its efficiency via 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.

The future avenues for research on foreign transfers could include juxtaposing different models and estimations to results we obtained in the present study. It would be very interesting indeed to analyse the effect of disaggregated ODA on aggregate FDI, and also on disaggregated one if available data permit us doing so. Understanding which industries accommodate ODA are more complements to FDI, could give us clues on location decisions of foreign aid to donor agencies. Also, more in-depth studies in disaggregated FDI, such as Greenfield investment (building a plant, factory etc.) and portfolio investment (joint ventures, subsidiaries, branches) could shed better light on complex relationships and assist in advancing research in Central Asian economies.

Appendices

Table A1. Data Sources and Descriptions.

Variable	Name	Description	Source
FDI	FDI	The Foreign Direct Investment. The value of capital of MNEs in host country in real terms. US Dollars at current prices in millions.	UNCTAD
Official Development Assistance	ODA	Net official Development Assistance received and aid received, US Dollars at current prices in millions.	World Bank Development Indicators (WDI online)
Domestic Investment	DOM	Gross Fixed Capital Formation minus FDI inflows. This way we can obtain local investments by government and private sector into fixed assets and human capital less payments for foreign debt. US Dollars at current prices in millions.	UNCTAD
Globalization Index	Glob	Globalization Index by KOF.	KOF
Pop		Population	UNCTAD
CPI		Consumer Price Index	IMF

Table A2. Descriptive statistics Summary: Total Sample.

Variable	Units	Obs	Mean	Std. Dev.	Min	Max
FDI	Millions USD	90	1386.098	8860.164	-1.04715	82458.3
ODA	Millions USD	90	3117.122	23620.93	.3663392	221794.4
DOM	Millions USD	90	1198388	9383478	-1028.761	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

A3. Variables of the Model

Dependent Variables

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

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

Gross Fixed Capital Formation (**Capital**) - this variable is the domestic investment of the government into fixed assets such as plants, buildings, roads and infrastructure. Variable was deflated by CPI and expressed in natural logarithmic form per capita. Note that this variable is also in flow form and it is not a net value (after depreciation). It is investment to domestic capital stock.

Notes

1. Organization for Economic Co-operation and Development (OECD) has a development assistance committee (DAC) that base their decision on disbursing 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 (per capita GNI $936-$3.705): Turkmenistan; GNI $3.706-11.455): Kazakhstan. DAC reviews every 3 years GNI per capita reported by World Bank and make a list of potential recipients. (OECD website: www.oecd.com)
2. Central Asian economies comprise of: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.
3. On principles, mechanism and opinions on effects of ODA 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 call ODA as foreign aid in this paper.
4. Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States and the European Commission (EC). The World Bank, the International Monetary Fund (IMF) and the United Nations Development Programme (UNDP) participate as permanent observers. (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, from 18 to 22 March 2002.
6. Doha Declaration on Financing for Development: 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)
7. "Trade and Development Report 2008', UNCTAD: http://www.unctad.org/Templates/Page.asp?intItemID=4580&lang=1 (Accessed 15 December 2011)
8. For example, in USA, Bobonis and Shatz, (2007), in Latin America, Bengoa and Sanches-Robles (2003), in Europe and Asia (Jaumotte 2004) among other comprehensive studies.
9. CIS is the abbreviation for Commonwealth of Independent States that created in December 08, 1991. It consists of twelve countries: Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan and Georgia (that left CIS on August 14, 2008). The three Baltic States (also former Soviet Republics): Estonia, Latvia and Lithuania did not join the CIS.
10. CEE or CEES-stands for Central and Eastern Europe former communist countries: Baltic States- Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Hungary, Romania, Bulgaria, Albania; states of former Yugoslavia- Slovenia, Croatia, Bosnia-Herzegovina , Serbia, Kosovo, Montenegro and Macedonia.
11. According to reports from World Bank and International Monetary Fund Former Soviet Union (FSU), economies classified as Energy Exporters are Azerbaijan, Kazakhstan, Turkmenistan, Uzbekistan and Russia and Energy Importers are Armenia, Belarus, Georgia, Kyrgyzstan, Moldova, Moldavia, Tajikistan and Ukraine.
12. More detailed analysis on FDI effects on recipient countries consult Navaretti and Venables (2004); Mody (2004), Krkoska (2001); Kirkpatrick (2006); Tondel (2001); Carstensen (2004); Mileva (2008), Dobrinsky (2007) and recently Hanousek *et al.,* (2011)
13. FDI is classified as "Greenfield investment" when the MNEs invest by building new factories, plants, offices, entities and buildings in host country. These new economic units have their own accounting books.

14. Since our sample is in long panel format we technically cannot apply traditional fixed (FE) or random effects (FE) modelling or similar estimators such as instrumental variable (IV) generalized method of moments (GMM),that are based on large N and small T assumption regarding a sample. However, we could apply pooled estimators such as generalised least squares GLS but it does not allow us simultaneity estimate our equations. (Baum, 2006, Cameron and Trivedi, 2009).
15. We deflated monetary variables by the Consumer Price Index (CPI) from IMF (2000=100).
16. Soviet Union had 15 Republics that after the break were all collectively called Commonwealth of Independent States (CIS). The breakdown of countries by geographical markup is following: Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan); Baltic (Estonia, Latvia, Lithuania); Eastern Europe (Belarus, Moldova, Ukraine); Eurasia (Russia); Transcaucasus (Armenia, Azerbaijan, Georgia);
17. 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).
18. Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan were included in the sample. Source: http://en.wikipedia.org/wiki/Central_Asia (Accessed 15 December 2011)

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