

The Relationship between Foreign Aid and FDI in South Asian Economies

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Abstract

This study investigates whether or not foreign aid attracts foreign direct investment (FDI) in South Asian economies. Using various econometric techniques, the investigation is performed based on the concept of substitutable and complementary relationship between FDI and classified foreign aid. Foreign aid classified into aid in the shape of physical capital, and aid for human capital and infrastructure development. The results suggest that both aid in the shape of physical capital and aid for human capital and infrastructure development serve as complementary factors to foreign direct investment rather than being substitutable in South Asian economies. Thus, we conclude that aid flow in South Asian countries attract FDI into the region.

Keywords: Foreign aid, FDI, South Asia, Physical capital, Human capital, Infrastructure development

1. Introduction

Although the concept of foreign aid and foreign direct investment (FDI) arose 40 years before, time to time numerous theories and analyses related to aid and FDI have been entering into the scene of research due to the dynamic trend of regional and global economies because both aid and FDI are crucial factors and play vital role in the way of formation of physical and human capital, and directing the recipient countries towards economic growth and development. In this respect, the relationship between these two factors is considered as a topic of this study with respect to the South Asian economies. In this study, South Asian used to refer Bangladesh, Pakistan, India and Sri Lanka. Looking at the macroeconomic environment in South Asian countries, it seems supporting for promotion of more FDI flow into the region. Most of the South Asian countries are exhibiting strong and healthy macroeconomic performance in recent years. Economic growth is strong, which is one of the principle factors supporting the strong potential for FDI, with savings and investment rates high, inflation moderate, and trade expanding and fiscal deficits lower. Moreover, integrated global environment, supportive institutions and liberalization policies during 1990s and early 2000s also support more FDI flow into the region. As a result of this context, recent years have seen a rise of FDI in South Asia (ADB, 2008). The studies of Sahoo (2006) and Asteriou (2008) have also suggested that there is a positive and significant correlation between FDI and GDP growth rates in South Asian economies.

Despite the gains of recent years, the countries in South Asia remains a less attractive destination for FDI compared to other region. Some of the bottle necks are the reason, poor infrastructure is one of among them that could hamper

the inflow of foreign capital. In addition, South Asian countries were ranked low on the quality of infrastructure in the region (WEF, 2007). Moreover, the rate of domestic saving is not sufficient to finance for enough fixed capital formation to accelerate growth in the region though rate of investment in South Asia reached a high of 31.9% of GDP in 2006, up from 22.2% in 2001 (ADB, 2008). Therefore, the countries in South Asia have to concentrate on the ways to overcome these bottle necks and promote much more Foreign Direct Investment (FDI) for their sustain growth.

Indeed, since South Asian region has also been a destination of foreign aid for decades fulfilling various objectives such as socio-economic development and political benefits, this study pays attention on analysing whether foreign aid can be used to overcome the bottle necks and help in attracting more FDI into the region because foreign aid can play an essential role fulfilling saving gap, accumulating physical and human capital stock and developing infrastructure in the host countries (McGillivray, 2009). Especially, foreign aid inflow in the shape of human capital and infrastructure development can play a vital role by serving as complementary factor to attract much more FDI into the host countries. But, if the foreign aid flow is in the shape of physical capital, it will accumulate domestic capital (Gong et al., 2007) and may serve as substitute to the FDI in the host countries (Selaya et al., 2008). Since aid for South Asian countries contains these two types of classifications, this study classifies aid into two broad categories such as aid in the shape of physical capital and aid for human capital and infrastructure development in order to analyse their relation to the FDI.

The figures from (1)-(4) show the trend of classified aid flow such as aid flow in the shape of physical capital (Aidk), aid for human capital and infrastructure development (Aida), and FDI. Aid for human capital and infrastructure development is higher than aid in the shape of physical capital in most of the years. FDI is in upward trend especially in Pakistan, Sri Lanka and India. In these countries, it can be observed that the percentage volume of aid which is for human capital and infrastructure development in the total volume of aid flow, over takes the aid that is in the shape of physical capital after the end of 90s. Therefore, the countries in South Asia could be in the line of developing human capital and infrastructure receiving foreign aid which will lead to attract FDI into the region.

As far as the trend of FDI and aid is concerned in South Asian economies, this study focuses two objectives. Firstly, this study investigates whether foreign aid for human capital and infrastructure development plays a crucial role as a complementary factor attracting FDI into the region. Secondly, since one of the categories of foreign aid is in the shape of physical capital, this study also investigates whether this category crowds out FDI as substitute. We perform various econometric techniques under the hypotheses of FDI have positive relationship with aid for human capital and infrastructure development while it is negative with the aid in the shape of physical capital. The remainder of the paper is structured as follows. Section 2) presents review of literature Section 3) presents data and methods in which section 3.1) presents co-integration analysis investigating long run equilibrium between FDI and classified foreign aid. Section 3.2) presents Granger causality analysis and discusses direction of causality of the variables. Section 3.3) presents fixed effect and instrumental variable analyses to investigate magnitude of impact of aid on FDI, and the complementary and substitutable characteristics of the variables. Section 4) summarises the main results and offers some conclusions.

2. Review of Literature

Researchers have various findings and discussions on the relationship between foreign aid and FDI. (Selaya et al., 2008) suggested that aid may raise the marginal productivity of capital by financing complementary inputs, such as public infrastructure projects and human capital investment, on the other hand crowds out productive of private investments if it comes in the shape of physical capital flow. The authors also suggest that the combined effect of these two types of aid on FDI small but average positive. Tobin et al. (2006) found that aid and FDI are unrelated in world's poorer countries, further emphasising that foreign aid flow in developing countries mainly in the form of supporting government budget, humanitarian activities and human capital development; it makes sense that foreign aid unlikely crowd out FDI. Boone (1995) also argued that aid does not significantly increase investment and growth but increase the size of government. Kasuga (2007) found that relative impact of financial source such as foreign direct investment, aid and savings are depend on countries' income level, financial structure, and government infrastructure. According to Caselli et al. (2007) the marginal product of capital is roughly same across countries, and increasing aid flows to developing countries will lower the marginal product of capital in these countries and tend aid and FDI to be substitute rather than being complements. Investigating whether and how foreign aid facilitate FDI flows into less developed countries, Kimura et al.(2009) argued that foreign aid in general doesn't have any significant effect on FDI. In contrast, Asiedu et al. (2009) argued in different way that foreign aid mitigates the risk of FDI in the receiving countries, which includes the violation on contractual agreements, changes in laws and regulations or the right out nationalisation of foreign-owned property can be mitigated by receiving foreign aid that could be either from the countries that owned FDI or other donors. Supporting this suggestion, Karakaplan et al. (2005) empirically investigated the effect of aid on foreign direct investment in a view of hypothesis that receiving

aid also becomes more likely to receive FDI and concluded that the countries that receive aid also become more likely to receive FDI, but this happens especially in case of good governance and financial market development. Upon investigation on Japan's official development assistance in promoting foreign direct investment inflow in the case of China, Serverine (2005) concluded that Japanese aid flow have significant positive impact on private investors location choice in China.

3. Data and Methodology

The data on foreign aid classified into seven categories in the data base of the Organization for Economic Co-operation and Development (OECD). But, we classify into two broad categories according to the purpose of our study. The first category is aid for physical capital development, Aidk, proxied by assistance for production sector while the second category of aid is for human capital and infrastructure development, Aida, proxied by assistance for economic infrastructure and humanitarian aid. The data on FDI is drawn from the World Bank Development Indicators (WDI) database. It should be noted that, in this study, the sample size is relatively small running from 1995 to 2007 because of the availability of sectoral data in the OECD data base, and also FDI started emerging after 1990s in South Asian countries. This study excludes Afghanistan, Nepal, Bhutan and Maldives due to the countries dependency on Aid and FDI, and availability of data.

3.1 Co-integration analysis

As first step, we investigated the long-run equilibrium relationship between FDI and Aidk, and FDI and Aida. As a prior step of investigating long-run equilibrium and causality analyses, we employ Augmented Dickey-Fuller (ADF) test to investigate stationary properties of the time series used in this study. Subsequently, the Engle-Granger's residuals analysis is obtained by regressing FDI on Aidk and Aida and which is used to find long run equilibrium properties by hypothesising that the residuals obtained by regression is stationary, $I(0)$ means that there is a co-integration between the variables. The co-integration results, presented in table 1, suggest that the null hypothesis that residuals is stationary can be rejected of the variables between FDI and Aidk, and FDI and Aida in case of Bangladesh and Pakistan respectively, means that there is no evidence of long-run relationship in these cases. The null hypothesis between the variables of FDI and Aidk can not be rejected in case of Pakistan, Sri Lanka and India, suggests that the variables are co-integrated. In similar way we found that there is a long-run relationship between FDI and Aida in case of Bangladesh, Sri Lanka and India.

3.2 Granger Causality analyses

As second step, having results of co-integration test of Bangladesh, Sri Lanka, Pakistan and India, we are interested to investigate the direction of causality between the variables. Since no evidence of co-integration between FDI and Aidk, and FDI and Aida in case of Bangladesh and Pakistan respectively, these two cases are excluded from causality analysis. Since the variables which we use in this study have different stationary properties and as they are considered as endogenous variables entering the VAR model, in order to perform the Granger causality test, we have to ensure that all the variables included in the system are stationary (Granger, 1988). Therefore in this section of analysis the non-stationary variables are differenced to make them stationary. The Wald test, which follows the chi-square distribution, is computed to test the causal relationship among the variables based on the bilateral VAR frame work. The optimal lag length is chosen based up on Schwarz criterion (SBIC).

In order to perform the test; we consider the systems of equations as;

$$y_t = \alpha + \sum_{j=1}^k \delta_j y_{t-j} + \sum_{j=1}^k \beta_j x_{it-j} + \varepsilon_t \quad (1)$$

$$x_{it} = \alpha + \sum_{j=1}^k \delta_j x_{it-j} + \sum_{j=1}^k \beta_j y_{t-j} + u_t \quad (2)$$

Where y denotes FDI and x_i denotes Aidk and Aida as we test causality analysis between FDI and Aidk, and FDI and Aida individually. α is constant, δ and β are parameters, k denotes lag term, and ε_t and u_t are error terms. In equation (1) the null hypothesis that x doesn't Granger cause y if $\beta_1 = \beta_2 = \dots = \beta_k = 0$. Similarly in equation (2) y doesn't Granger cause x if $\delta_1 = \delta_2 = \dots = \delta_k = 0$. The results in table 2 suggest that the null hypothesis can be rejected considering FDI and Aida that there is an evidence of causality directed from FDI to Aidk in case of Sri Lanka, Pakistan and India. At the same time, Aida Granger causes FDI in Bangladesh, Sri Lanka and India as well. There is evidence that Aidk Granger causes FDI and FDI Granger causes Aida only in India and Bangladesh respectively. Concluding this section of analysis, foreign aid flow in the shape of human and infrastructure development Granger cause FDI in all the countries, Pakistan is excluded from the analysis, and only in Bangladesh there is Granger causality in reverse direction. FDI granger causes foreign aid flow in the shape of physical capital in Sri Lanka,

Pakistan and India as well. However, to see magnitude and sign of the relationship of the variables we move to next step having an empirical model.

3.3 An Empirical Model

As final step, using panel data, we employ fixed effects and instrumental variable methods with an empirical model. In panel setting the econometric interpretation of aid-FDI relationship is

$$FDI_{it} = \beta_0 + \beta_1 Aid_{it}^a + \beta_2 Aid_{it}^k + \beta_3 (Aid_{it}^a)^2 + \beta_4 V_{ijt} + u_{it} \quad (3)$$

where FDI_{it} is foreign direct investment per capita in country i at time t , whereas j denotes the supporting variable to the model that determine FDI. Aid_{it}^a denotes aid for human capital and infrastructure development, Aid_{it}^k is aid in the shape of physical capital development, $(Aid_{it}^a)^2$ is squared form of Aid_{it}^a . The possible relationship between FDI and aid for human capital and infrastructure development which serves as a complementary factor to the FDI, is nonlinear (Selaya et al., 2008), V_{ijt} denotes vector of supporting variables that determine FDI, and u_{it} is error term. The vector includes population growth rate, POP, Trade openness index, TO, Gross domestic product per capita, GDP and $FDI_{i,t-1}$ which is lagged term of foreign direct investment. This equation can be estimated consistently with a fixed effect model (FE). Since there is a possible that being aid variables with endogenous character in the empirical model we need to have one more analysis to overcome endogeneity of the variables. For instance, if the donors systematically disburse more aid in order to attract FDI to the region or to avoid FDI expropriation in host countries, aid would be endogenous (Asiedu, 2009). Although, in principle, the endogenous problem can be avoided using instrumental variable techniques; the fundamental problem is that there are no ideal instrumental variables (Selaya et al., 2008). However, a good instrument would be a variable which is highly correlated with aid variables but not with error term in the regression. Then, we perform instrumental variable (IV) method in order to overcome endogenous problem of the variables.

The fixed effects method controls two sets of supporting variables. In first set we employ lagged term of FDI which reduces the need of controlling other determinants of FDI (Frenkel, 2004). The second set excludes the lagged term of FDI and includes other determinants of FDI. The results in specification (1) and (2) in table 3, using fixed effect model, show that the aid in the shape of physical capital development is positive but not significant. The positive coefficient values support the concept that aid in the shape of physical capital serves as complementary factor to FDI in these countries. Thus, there is no crowding out effect among these variables. Though, the coefficient values of aid for human and infrastructure development is low, it is positive and significant that also supports the argument that aid for human and infrastructure development serves as complementary factor and is likely to attract FDI in South Asian countries. The lagged term of FDI used for controlling other variables that determine FDI, is significant. Alternatively, the results of specification (2) controls gross domestic product per capita, growth rate of population and trade openness index as determinants of FDI to get more reliable results.

In the Panel Instrumental variable (IV) method, we tested endogeneity of the aid variables using regression based Hausman test. This method also includes two sets of instrumented variables, and all aid variables are instrumented with the instruments of lagged term of aid variables, population growth rate, and trade openness index and lagged form of foreign direct investment per capita, in the sense that we take aid variables as endogenous variables, trade openness index and lagged term of FDI as independent variables and growth rate of population and lagged term of aid variables as instrumental variables. The results, shown as specification (3) and (4) in table 3, support that aid for human capital and infrastructure development serves as complementary factor with FDI in the region, and no evidence that there is a significant correlation between FDI and aid in the shape of physical capital in the region, thus, no point arguing crowding out effect in this regard. The coefficient of Aid_{it}^a gives expected sign and is significant. This non-linear relationship comes from the fact that the effect of aid as a complementary factor is ambiguous, means that, briefly, the aid as a complementary factor has a positive effect on domestic savings and thus, domestically financed capital investment. This result comes from the fact that, according to the Solow's concept, aid as a complementary factor shifts the production function thereby raising the steady state levels of income and domestic savings (Acemoglu, 2008). In case of non-linearity concept of aid, some authors have also given evidence from their findings on the existence of decreasing returns of aid (McGillivray et al., 2006). Accordingly, the results show the non-linear relationship between aid for human capital and infrastructure development and FDI is negative and significant.

The over all results suggest that foreign aid flow for infrastructure and human capital development in South Asian countries can be used as a vehicle for creating environment in order to attract much more FDI into the region. Aid on human capital and infrastructure development would play crucial role in facilitating FDI in these countries because aid for infrastructure and human capital influences on FDI inflow in both direct and indirect ways. Development in transport, electricity, telecommunication, water and gas facilitate foreign investors in the way of accessing markets of input and output, and allow mass production of output. In addition to that, development in human capital enhances knowledge and working capacity of the labours leading to facilitate more FDI into the region. At the same

time, enhancement of the quality of labours eventually increase their income, consumption and then market size. In this study, since foreign aid in the shape physical capital is also seen as complementary factor, we conclude that this type of aid may transferred to mitigate the risks of FDI in these countries. Therefore, we strongly suggest that more foreign aid should be directed towards complementary factor in order to enhance absorptive capacity of South Asian countries. We further emphasise that there should be coordination between donors and recipients with respect to this matter to be used aid effectively and efficiently. Proper monitoring and evaluation system in donors side and feedback system from the recipient side, avoiding fungibility of aid, which is known as if the government spending pattern and the objectives of the donors are not coordinated in terms of actual destination of aid that leads to meaning of fungibility of aid (McGillivray et al., 2000), are very important to make aid efficient.

4. Conclusion

In this paper, we investigate the relationship between FDI and foreign aid for physical capital development, and human capital and infrastructure development for a group of four South Asian countries. For these four countries we get results from co-integration, Granger causality, fixed effect and instrumental variable analyses. Co-integration analysis suggests that there is a long-run relationship between FDI and aid in the shape of physical capital in Sri Lanka, Pakistan and India, but not in Bangladesh where as the long-run relationship between FDI, and aid for human capital and infrastructure development is in Bangladesh, Sri Lanka and India, but not in case of Pakistan. In Bangladesh and Pakistan, respectively, there is no evidence for co-integration between FDI and aid for physical capital development, and FDI and aid for human capital and infrastructure development. Upon investigating the direction of causation, we found that aid for human capital and infrastructure development causes FDI in Bangladesh, Sri Lanka and India. Aid for physical capital causes FDI only in India, not in other countries, where as FDI causes aid for human capital and infrastructure development only in Bangladesh. On other hand, FDI causes aid in the shape of physical capital in Sri Lanka, Pakistan and India. Fixed effects and instrumental variable analyses also give results supporting the concept of FDI and foreign aid is complementary in these countries. Since aid serves as complementary factor to FDI in these countries, our suggestion is that foreign aid in South Asian countries can be a vehicle for attracting much more FDI into the region. Because, though several surveys have identified bottle necks that hinder FDI in South Asia, there is still much potential for these countries to promote FDI. Hopefully, the findings of this study also join as one of them.

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Table 1.Results of Co-integration analysis

Country	FDI -Aidk		Co-integration	FDI-Aida		Co-integration
	t value	CV		t value	CV	
Bangladesh	-2.192	[-3.000]	No	-3.614	[-3.000]	Yes
Sri Lanka	-3.880	[-3.000]	Yes	-4.205	[-3.000]	Yes
Pakistan	-4.029	[-3.000]	Yes	-2.590	[-3.000]	No
India	-3.801	[-3.000]	Yes	-3.327	[-3.000]	Yes

Note: CV denotes Mackinnon critical value at 5% level and the lag length for all variables is zero, (0)

Table 2. Results of Granger causality analysis.

Country	Direction of Causality				Direction of causality			
	Aidk → FDI	p-value	L	chi2	Aida → FDI	p-value	L	chi2
Bangladesh	Aidk → FDI	--		--	Aida → FDI	0.000	[3]	78.12
	FDI → Aidk	--		--	FDI → Aida	0.010	[3]	11.243
Sri Lanka	Aidk → FDI	0.554	[3]	2.0877	Aida → FDI	0.000	[3]	84.416
	FDI → Aidk	0.000	[3]	192.1	FDI → Aida	0.364	[3]	3.1818
Pakistan	Aidk → FDI	0.185	[3]	4.8228	Aida → FDI	--		--
	FDI → Aidk	0.003	[3]	14.072	FDI → Aida	--		--
India	Aidk → FDI	0.001	[3]	17.264	Aida → FDI	0.001	[3]	44.136
	FDI → Aidk	0.000	[3]	19.925	FDI → Aida	0.464	[3]	2.5639

Note: L denotes lag length.

Table 3. Results of fixed effect and IV analysis

Variables	FE		IV	
	(1)	(2)	(3)	(4)
Aidk	.0002675 (0.867)	.0006572 (0.660)	.0183689 (0.474)	.0000818 (0.980)
Aida	.0049789*** (0.014)	.0034714** (0.070)	.0250406** (0.154)	.0299789*** (0.000)
Aida-sq	-7.24000*** (0.015)	-5.1400** (0.070)	-2.86000 (0.557)	-4.18000*** (0.000)
FDI _{t-1}	.8985038*** (0.000)		.3345215 (0.506)	
GDP		.0317647*** (0.000)		
POP		4.684415** (0.043)		
TO		.16267** (0.086)		-0.824457 (0.684)
Intercept	-1.761192 (0.833)	-29.70137 (0.000)	-6.014341 (0.678)	-13.02178 (0.151)
R-square	0.7239	0.6851	0.1469	0.0454
F-test	19.24	17.14		
Wald Chi2			43.05	54.72

*, **, *** Denotes significance at a 10%, 5%, 1% level, respectively. P values are shown in parentheses.

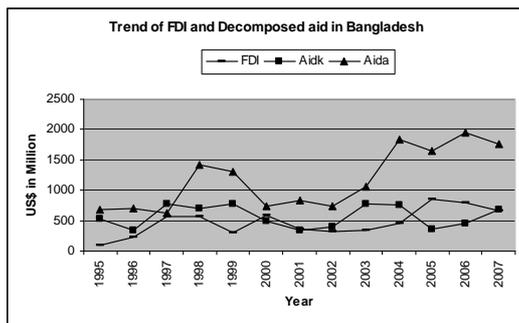


Figure 1.

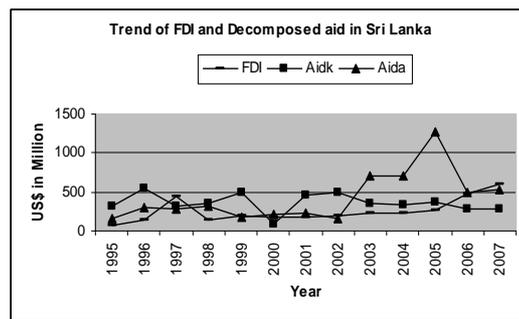


Figure 2.

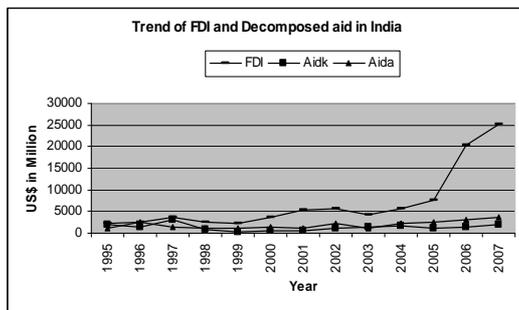


Figure 3.

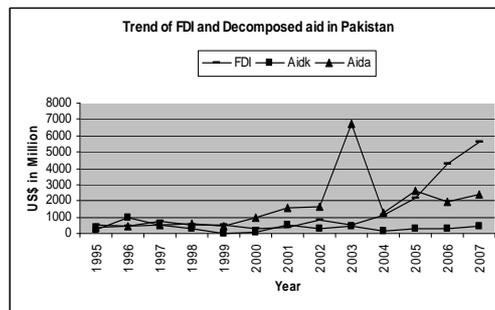


Figure 4.