Culminating Projects in Economics   Department of Economics

12-2016

The Effect of Foreign Direct Investment, Foreign Aid and International Remittance on Economic Growth in South Asian Countries

Nikhil Joshi
St. Cloud State University, joni1101@stcloudstate.edu

Follow this and additional works at: https://repository.stcloudstate.edu/econ_etds

The Effect of Foreign Direct Investment, Foreign Aid and International Remittance on

Economic Growth in South Asian Countries

by

Nikhil Joshi

A Thesis

Submitted to the Graduate Faculty of

St. Cloud State University

in Partial Fulfillment of the Requirements

for the Degree of

Masters of Science

in Applied Economics

December, 2016

Thesis Committee:
Dr. Artatrana Ratha, Chairperson
Dr. Masoud Moghaddam
Dr. Chukwunyere Ugochukwu

Abstract

The total amount of money sent from the developed world to the developing world has always been increasing with no signs to slowing down. Foreign aid and remittance are at its highest levels ever recorded. Even with these large sums of money transfer, there still seem to be no consensus among economists regarding the effectiveness of external development finance and foreign exchange earnings (Foreign Direct Investment, foreign aid or remittance) in promoting economic growth. This paper attempts to identify an econometric model that properly portrays this relationship and analyze the effect of external development finance and foreign exchange earnings on economic growth in South Asia. A Fixed Effect panel model is developed using data of Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka ranging from 1960 to 2014. These findings suggest that only remittance have a consistent positive effect on growth, where as Foreign Direct Investment and foreign aid have varying effect dependent upon model specification.

Table of Contents

List of Tables

List of Figures

I. Introduction

For decades, foreign aid or Official Development Assistance (ODA) has been employed as a solution to various socio-economic problems in the developing countries. The Millennium Development Goals (MGDs) are eight development goals that were created during a summit of the United Nations (UN) in New York on September 2000. The first goal, to eradicate extreme poverty and hunger, was achieved five years before the deadline of 2015; they managed to cut the percentage of people living in extreme poverty (initially was USD 1 a day, but was adjusted to USD 1.25 in 2008 by the World Bank due to higher than anticipated price levels in many developing countries) by half. However, there are still 1.2 billion people around the world living in extreme poverty (UN, 2015).

Billions of dollars are given to developing countries every year by various donor countries and aid agencies. Foreign aid from Development Assistance Committee (DAC) reached a new high of USD 129 billion (OECD, 2010). The U.S. alone gives a total of 50 billion US Dollar in aid to other countries each year. Israel is the highest aid recipient from the U.S. It is estimated that the total of aid given to Israel in 2012 was 3.1 billion US Dollar (Richardson, 2012). Even with the large sums of foreign aid being given to developing and countries, there still seem to be no consensus among economists regarding the effectiveness of foreign aid, as an external force in the economy, to help the economy grow.

UN initially set to achieve all eight MGDs by 2015. However, uneven progress for the goals meant that some were achieved ahead of schedule and some were not. After the deadline, during the UN Sustainable Development Summit on September 2015, world leaders came up with a set of new goals called the Sustainable Development Goals (SGDs). These seventeen goals were created to help address various socio-economic issues such as poverty and inequality

by 2030. This set of goals is more hopeful compared to MDGs; note the first two goals are: no poverty and zero hunger.

Foreign aid or Official Development Assistance (ODA) is the more traditional option when it comes to external development finance and foreign exchange earnings used to help developing countries. It is not until recently that Foreign Direct Investment (FDI) and remittance stepped into the spotlight of economic research. This is mainly because there has been an increase of 10% of all FDI into developing countries with a sum of USD 525 billion in 2010 (UNCTAD, 2011), and remittances for all developing countries were estimated to be around USD 325 billion (World Bank, 2010).

This study aims to examine the effects of all three sources of external development finance and foreign exchange earnings (FDI, ODA and remittance) on economic growth in South Asia. By using Gross Domestic Product (GDP) as the dependent variable and FDI, ODA, and remittances as the independent variables, while controlling for population, life expectancy, capital formation, and economic openness calculated by trade shares. A conclusion will be drawn regarding the effectiveness of each source of external development finance and foreign exchange earnings in improving the GDP of the country.

II. Literature Review

Burnside and Dollar (2000) investigated the relationship between foreign aid, economic policy and growth of GDP per capita. Most of their data were taken from the World Bank Debt Reporting System. With six four-year period growth rates (in 56 developing countries) as the dependent variable, against initial national income, an index that measures the quality of economic policy, foreign aid, and the interaction term between foreign aid and the index to measure policy. The index for economic policy consisted of fiscal surplus, inflation, and trade

openness. They concluded that aid has a positive impact on growth in developing countries with good fiscal, monetary, and trade policies. On the other hand, presence of poor economic policy with foreign aid leads to none or little effect towards economic growth (Burnside and Dollar 2000). In their attempt to understand the effectiveness of foreign aid, they found a trend towards better economic policy among poor countries, compared to previous years. This means that even in poor countries, their economic policy is improving such that it would better expedite the effects of foreign aid when they are given to developing countries. However, the total amount of foreign aid given has been decreasing. In 1997, Organization for Economic Co-operation and Development (OECD) countries gave less foreign aid, as a proportion of their GNP, than they have in decades. This tells us that with the conditions in developing countries improving, thus allowing aid to be applied more effectively, the amount of aid has actually diminished (Burnside and Dollar 2000).

There have been multiple critics to the results of the study by Burnside and Dollar. Different scholars have pointed out a number of flaws in their approach towards the issue and argue against aid allocation only to countries with good economic policies. Using the same model as Burnside and Dollar and an updated and more complete data, Easterly (2003) changes the definition of "aid", "good policy", and "growth", which resulted in different conclusions compared to Burnside and Dollar. Concessional loan, also referred to as soft loan is granted on more generous terms than regular market loans, such as below-market interest rate, grace periods or a combination of both (OECD 2003). Including concessional loans into the definition of aid led to a statistically insignificant interaction term between foreign aid and economic policy: even at a 10 percent significance level. Thus, implying that there might not be a relationship between foreign aid and good economic policy as Burnside and Dollar (2000) had previously claimed.

Changing the index for good economic policy still resulted in an insignificant interaction term. He concluded that the links between foreign aid and economic development is much more complicated than just economic policy.

In the second part of the research conducted by Easterly (2003), he attempted to question the theory behind foreign aid. By considering a Solow-style neoclassical model and endogenous growth models, he discussed how these models are flawed in their application in real life. The theory assumes that foreign aid will increase investment, which in turn will lead to economic growth. Out of the 88 aid recipient countries (on which the data span from 1965-1995), only six had a significant coefficient indifferent from zero for the relation between aid and investment. Likewise, only four countries showed a positive significant coefficient for the relation between investment and economic growth. This allowed him to argue that foreign aid does not actually lead to economic growth as the growth models suggest.

Nwaogu and Ryan (2015) used a dynamic spatial framework to empirically investigate how FDI, foreign aid and remittances affect the economic growth, measured by the growth rate of real GDP per capita, in 53 African countries and 34 Latin American and Caribbean countries.

Plenty of previous research have been conducted on the subject of the three sources of external development finance and foreign exchange earnings, however this study controls for all three external growth variables to eliminate potential omitted variable bias problems and country interdependence by using a dynamic spatial model. Previous studies have failed to account for all three external factors in the same equation to try to explain economic growth in developing countries. Past literatures also fail to account for spatial dependence among countries. Controlling for spatial dependence is important because economic growth in one country will

also increase the growth rate of its neighboring countries due to trade and migration (Lesage and Fischer, 2008).

By using a dynamic spatial-lag model, a linear regression incorporated with a serially lagged dependent variable and a spatially lagged dependent model, Nwaogu and Ryan were able to see how current growth of a particular country is not only affected by current aspects of its economy, but also by previous growth as well as the growth of neighboring countries.

The study used a panel data made up of eight 5-year periods ranging from 1970 to 2009. By taking the average data of every 5 years, they were able to eliminate cyclical effects in the data. To avoid spatial heterogeneity, separate analyses were performed for the 53 African and 34 Latin American and the Caribbean (LAC) countries. As the two continents could possibly attract different types of FDI and/or foreign aid due to difference in geographic characteristics and economic growth paths, it would not be appropriate to pool the two continents together. The independent variables used in this study include FDI, foreign aid, remittances, gross capital formation, inflation, telephone lines, openness, schooling, government consumption, and political right.

The result section was broken down into two sections, the data from African countries and the data from the LAC. According to the results for Africa, model specification greatly impacted the effect of which of the external finances affects country growth. Excluding other external financial sources caused omitted variable bias, thus resulting in a positive and significant impact of foreign aid and FDI on growth, but not remittances. However, when they controlled for all three variables together, only lagged FDI had a positive and significant impact on country growth. Remittances are usually transferred through informal channels such as friends and family, thus are very hard to keep track of. Especially due to the lack of adequate and

reliable formal financial markets, people from Africa are forced to highly rely on informal channels. On the other hand, according to the results for LAC, foreign aid was the only external finance source that had a significant impact on country growth in all models. This significant impact is negative, meaning that foreign aid has a negative impact on country growth in developing countries. With foreign aid is injected into the economy with poor health, it causes more inequality and encourages less efficient and a more corrupt government. However, when the three factors are summed up to create a new variable total capital inflow, the new variable does not affect growth in LAC.

Benmamoun and Lehnert (2013) looked into external development finance and foreign exchange earnings and its effect on economic growth, especially whether international remittances is better for country growth compared to FDI and foreign aid. By using a System-Generalized Method of Moments (GMM), they analyzed growth rates of low and middle-income countries.

The benefits of international remittances have been underestimated in the past due to the fact that individual transfer payments are channeled through informal markets making it very hard to analyze its full influence on economic growth. However, more recently, there has been a growing interest in the importance of remittances. This interest was sparked by the rapid increase of remittance into low and middle-income countries.

Previous literatures only looked at independent effect of remittance, aid and FDI. In this study, Benmamoun and Lehnert compared the significance of FDI, foreign aid, and international remittance as determinant of economic growth, measured by growth rate of real GDP per capita, in developing countries.

By using a 16-year panel data ranging from 1990-2006 covering 180 different countries. The independent variables used in this study are FDI as a percentage of GDP, foreign aid as a percentage of GDP, remittances as a percentage of GDP, openness, population growth, inflation, democracy, governance and log of initial GDP per capita. By using income groups, indebtedness and FDI dependency, they were able to separate the countries into categories according to economic development level and financing needs. A low-income group includes all economies with GNI per capita of USD 975 or less. Middle-income group includes all economies with GNI per capita of USD 976 to 11,905.

Using GMM estimation, the results of the study indicated that FDI, foreign aid, and remittance all have positive and significant impact on country growth in low-income countries. However, this is not the case for middle-income countries, where the external finance sources are no longer significant. They ran a hypothesis testing on a significant difference in the coefficient value for the three external finance sources. The tests indicated that the only significant difference on the impact on country growth was between remittance and foreign aid, where remittance had a significant larger coefficient.

III. Data

All the data used in this study were taken from the World Bank database available online. *GDP* is the aggregate value of all products in the country plus product taxes less the subsidies not included in the value of the products. Depreciation of assets or depletion of natural resources was not taken into account when making this calculation. *FDI* is the direct investment calculated as the sum of equity capital, reinvestment of earnings, and other capital divided. It is an investment made by someone who lives in a different country owning at a minimum of 10 percent of the ordinary shares of voting stocks. *ODA* is the net official development assistance. It

consists of loans (with a grant element of at least 25 percent) and grants by official agencies that are members of the DAC, multilateral institution, and non-DAC countries with the intention to promote economic development and improving welfare and standard of living of recipient countries. *REM* is the total value of all transfers in cash or in kind made or received by resident household to or from non-resident households. All the variables mentioned above were extracted in nominal form in US Dollar values. By using the GDP deflator, also extracted from the World Bank online database, we convert the nominal data into real values at constant prices of 2010.

OPEN is the proportion of the trade volume of each country relative to their overall GDP. This is calculated by taking the sum of exports and imports and dividing it by GDP. Exports and imports of a country are the value of all goods and services such as merchandise, freight, insurance, transport, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal and government services provided and received to and from the rest of the world, respectively. However, these values do not include compensation of employees, investment income and transfer payments. *POP* is the total count of all residents regardless of legal status or citizenship, except for refugees not permanently settled in the county of asylum. *LE* is the life expectancy at birth. This number is the total number of years a newborn would be expected to live if similar health patterns at the time of their birth persisted throughout its life. *GCF* is the gross capital formation, which consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in

production or sales. According to the 1993 System of National Accounts (SNA), net acquisitions of valuables are also considered capital formation. Data are in constant 2010 US Dollar.

Table 3.1 – Summary Statistics, full data

Variable	No. of obs.	Mean	Maximum	Minimum	Std. Dev.
FDI (billions)	160	$ 2.819	$ 50.174	$ -0.411	$ 288.069
ODA (billions)	160	$ 3.961	$ 21.017	$ 0.096	$ 99.464
REM (billions)	160	$ 9.229	$ 60.632	$ 0.003	$ 1,295.292
OPEN	160	45.057	113.597	12.009	25.519
POP (millions)	160	288.069	1,295.292	0.667	402.693
LE (years)	160	63.191	74.795	49.988	6.086
GCF (billions)	160	$ 66.832	$ 728.580	$ 0.348	$ 141.811

Note: Table is derived from the unbalanced sample of all 6 counties (Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri Lanka) in South Asia. Observation points are based on availability of data, which may vary from country to country.

The summary statistics found in Table 3.1 gives us a general idea of the data used in the study. The average *FDI* and *REM* of $ 2.819 billion and $ 9.229 billion respectively are both lower than their standard deviations. This means that there is a great deal of variation in the data. This is due to the fact that India is such a large economy, where as other counties like Bhutan and Nepal are significantly smaller in comparison. As seen from the summary of population, the minimum value for population is only 667,000. On the other hand, the largest population size is at 1.3 billion. This is almost 2000 time larger than the smallest population size. Due to this we

attempted to normalize a few of the variables by taking the logarithms and also incorporate per capita versions of them.

Table 3.2 – Summary Statistics, Bangladesh (1976-2014)

Variable	N	Mean	Maximum	Minimum	Std. Dev.
FDI (billions)	39	$ 0.391	$ 1.890	$ -0.066	$ 0.544
ODA (billions)	39	$ 4.090	$ 9.641	$ 1.313	$ 2.570
REM (billions)	39	$ 4.558	$ 12.103	$ 0.213	$ 3.489
OPEN	39	27.639	48.111	16.688	9.604
POP (millions)	39	117.611	159.078	72.930	26.967
LE (years)	39	61.723	71.626	49.988	6.607
GCF (billions)	39	$ 13.417	$ 42.425	$ 1.429	$ 11.321

Note: Table is derived from the balanced sample of only 4 counties (Bangladesh, India, Pakistan, and Sri Lanka).

Table 3.3 – Summary Statistics, India (1976-2014)

Variable	N	Mean	Maximum	Minimum	Std. Dev.
FDI (billions)	39	$ 9.490	$ 50.174	$ -0.411	$ 13.098
ODA (billions)	39	$ 6.493	$ 21.017	$ 1.149	$ 5.115
REM (billions)	39	$ 25.461	$ 60.632	$ 7.738	$ 17.142
OPEN	39	26.387	55.545	12.009	14.755
POP (millions)	39	963.094	1295.292	636.183	202.460
LE (years)	39	60.215	68.014	51.689	4.887
GCF (billions)	39	$ 232.201	$ 728.580	$ 43.701	$ 216.140

Note: Table is derived from the balanced sample of only 4 counties (Bangladesh, India, Pakistan, and Sri Lanka).

Table 3.4 – Summary Statistics, Pakistan (1976-2014)

Variable	N	Mean	Maximum	Minimum	Std. Dev.
FDI (billions)	39	$ 2.035	$ 8.464	$ 0.176	$ 1.856
ODA (billions)	39	$ 6.830	$ 21.780	$ 1.592	$ 4.784
REM (billions)	39	$ 14.155	$ 36.054	$ 2.768	$ 9.262
OPEN	39	69.242	88.636	46.364	11.019
POP (millions)	39	123.540	185.044	68.818	34.942
LE (years)	39	61.258	66.183	55.658	3.094
GCF (billions)	39	$ 8.900	$ 25.195	$ 2.164	$ 6.026

Note: Table is derived from the balanced sample of only 4 counties (Bangladesh, India, Pakistan, and Sri Lanka).

Table 3.5 – Summary Statistics, Sri Lanka (1976-2014)

| Variable	N	Mean	Maximum	Minimum	Std. Dev.
FDI (billions)	39	$ 0.616	$ 1.617	$ -0.043	$ 0.351
ODA (billions)	39	$ 3.596	$ 10.356	$ 0.346	$ 2.921
REM (billions)	39	$ 3.526	$ 5.542	$ 0.530	$ 1.070
OPEN	39	33.731	38.909	27.720	2.829
POP (millions)	39	17.760	20.869	13.717	2.176
LE (years)	39	70.727	74.795	66.592	2.336
GCF (billions)	39	$ 19.419	$ 31.352	$ 7.200	$ 6.931

Note: Table is derived from the balanced sample of only 4 counties (Bangladesh, India, Pakistan, and Sri Lanka).

Tables 3.2 - 3.5 are the summary statistics from a balanced dataset after dropping Bhutan and Nepal from the data, as these two counties were the ones with the most missing data. Excluding both counties allowed us to collect a sample from 1976 all the way to 2014. Looking at the summary statistics after the data were broken down by country in table 3.2 to 3.5, we can see that the standard deviations for India is larger than any other country, especially for their FDI, remittance and capital formation. In an attempt to normalize the data, we transformed some/all of the variables into their corresponding natural logarithm (Ln) or per capita form to minimize the embedded large deviations.

Still from tables 3.2 - 3.5, we can see that the countries vary in trade openness. Pakistan seemed to have the most open economy, where its trade volume accounts for almost 70 percent of GDP. This is relatively a high value compared to the other countries such as India and

Bangladesh whose average trade volumes only account for 26-percent and 27-percent, respectively. On the other hand, there is not much variation in life expectancy among the countries. Sri Lanka seems to have the highest life expectancy average in comparison to the other three countries. Also, the standard deviation of *LE* in table 3.1 was only 6.086 years.

Figures 3.1 - 3.3 are the time series graph of the mean of FDI, foreign aid and remittance from the balanced dataset. We can see that there is a sharp increase in FDI in year 2005, and reaches its maximum average in 2008. Even though it is not a steady increase in average FDI, we can see that levels of FDI have increased compared to years before 2000. Foreign aid has always been volatile in value as it keeps on increasing or decreasing from year to year, however, there is a clear trend in the data, which shows an increase in average foreign aid over the years. As seen from figure 3.2, the mean *ODA* reached its peak in 2014. Unlike foreign aid, remittance has constantly been increasing, almost exponentially. On the other hand, just like foreign aid, the mean remittance also peaks in 2014.
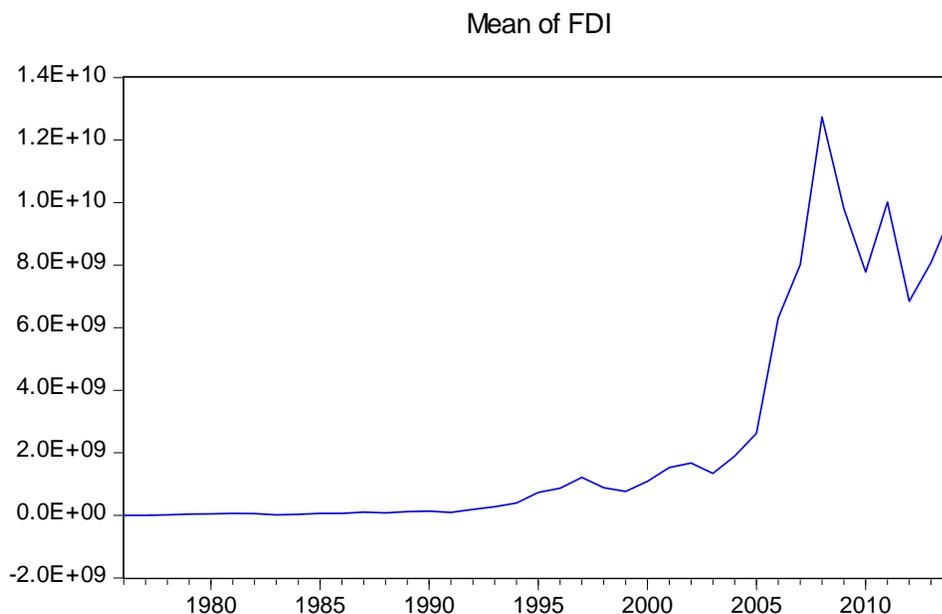
Mean of FDI

Note: Mean of FDI is calculated by taking the average value of nominal FDI in Bangladesh, India, Pakistan and Sri Lanka every year from 1976 to 2014.
Figure 3.1 – FDI (1976-2014)
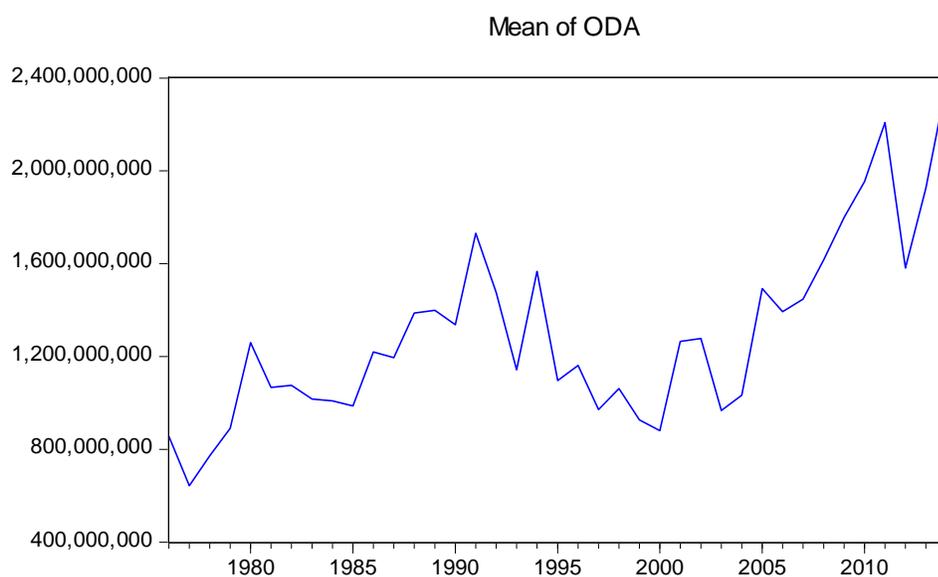
Mean of ODA

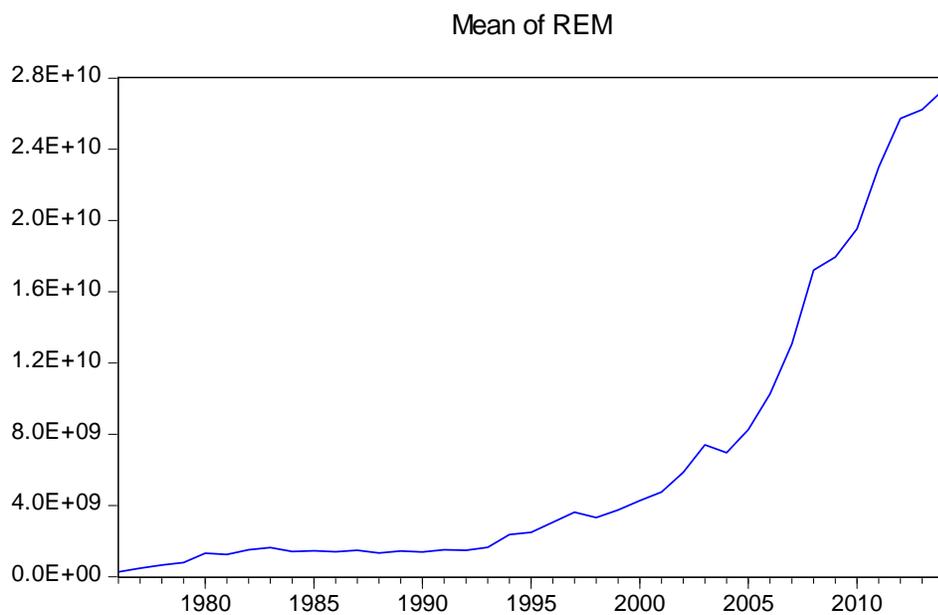Note: Mean of ODA is calculated by taking the average value of nominal ODA in Bangladesh, India, Pakistan and Sri Lanka every year from 1976 to 2014.
Figure 3.2 – ODA (1976-2014)

Mean of REM

Note: Mean of remittance is calculated by taking the average value of nominal remittance in Bangladesh, India, Pakistan and Sri Lanka every year from 1976 to 2014.
Figure 3.3 – Remittance (1976-2014)

IV. Model and Methodology

In this empirical study, we made use of panel data ranging from 1960 to 2014 of the 6 countries in South Asia (Bangladesh, Bhutan, India, Nepal, Pakistan and India). The base model is derived from Benmamoun and Lehnert (2013) and Nwaogu and Ryan (2015).

Due to limitations on the availability of data, we ran the same model with two different datasets. The first dataset consisted of the full common dataset, which includes all 6 countries ranging from 1960 to 2014. This dataset was referred to as full data hereinafter. The second dataset was a balanced dataset, however only included Bangladesh, India, Pakistan and Sri Lanka and only range from 1976 to 2014. This dataset will hereby be referred to as balanced data. Initially, we ran our first model just as a pooled Ordinary Least Squares (OLS) and compared the results between the two aforementioned datasets.

We calculated the correlation coefficient of the three variables of interest because taking the Ln of one of the two variables that are correlated can help prevent multicollinearity.

Table 4.1: Correlation Coefficients of FDI, ODA and remittance

Correlation	FDI	ODA	REM
FDI	1.000000		
ODA	-0.139608	1.000000	
REM	0.808561	0.157471	1.000000

Note: The correlation coefficient was calculated for the full dataset

From table 4.1, we can clearly see that there is a large correlation between FDI and remittance. In order to correct for this, we took the Ln of remittance. This will also help normalize the data for remittance because as we mentioned earlier, there is a great deal of variation in the values of data due to the difference in the sizes of the economy used in this study.

Similar to the first model, we ran a pooled OLS regression for our second model. We then compared not only the estimates from different data sets, but also the effect of the Ln transformation of remittance.

As both datasets are panel data, even though one is unbalanced and the other is balanced, we ran a Fixed Effects Model (FEM) on both datasets to see if it is a better estimation method compared to a pooled OLS. This modeling provides an opportunity to assign different intercepts for each cross section unit (CSU), thus controlling for time-invariant individual effect of each CSU.

OPEN and *LE* was dropped from our model as they cannot be converted into per capita format. *CGF* was also dropped as to see the effects of just the variables of interest against GDP. We ran a FEM where both *FDI* and *REM* were left at level data as the fourth model.

Finally, we ran the model in the per capita format where we remove population as an independent variable and calculate all GDP, FDI, ODA and remittance in terms of population by dividing all their real values by the total population and thus, creates new per capita variables in our fifth model:

$$GDP\_pc_{it} = FDI\_pc_{it} + ODA\_pc_{it} + REM\_pc_{it} + \varepsilon_{it}$$

where the subscript "$_{it}$" is the country index and year index, respectively; and ε_{it} is the error term. Just like for models one through four, we ran the same regression on both our full data and balanced data. This will allow us to get a better analysis of the model and the estimated coefficients.

A formal testing of our final model was done by conducting the Redundant Fixed Effects Test followed by the Hausman Test. These two tests helped determine the most appropriate regression method to be used as our estimated model. The Redundant Fixed Effects Test

compares FEM against a pooled OLS method. The null hypothesis states that a FEM is redundant, and the alternative is that it is not redundant and should be preferred over pooled OLS. The Hausman Test is used to test Random Effects Models against FEM. With the null hypothesis being that there is no difference between the two, and the alternative hypothesis being that there is a significant difference between the two, in which case the Random Effects Model is not appropriate.

V. Hypotheses

The three external development finance and foreign exchange earnings (FDI, ODA and remittances) should all have a positive relationship with GDP. As more resources are brought into the economy, it should shift their Production Possibility Frontier outward, thus enabling them to increase output to levels they were not able to before. This increase in output means their GDP should increase. The more open an economy, they more they are open to outside technology. They are also able to tap into the global market, including US and Europe, thus increasing their exports, and eventually output. We can expect a positive relationship between GDP and openness. Life expectancy and population should also have positive relations with GDP. The longer people live means they are able to work longer and contribute more to the economy. Also a higher life expectancy implies better health care and more knowledgeable people. Better health care means that the country is more developed, thus has higher productivity levels and a higher GDP. As for population, growth theory suggests that higher population allows more allocation of labor into research and development, thus increases productivity in the country, allowing higher output further and thus, increasing GDP. The higher the capital formation, we can expect higher GDP. This is because as there are more capital, the productivity

of labor increases, thus increasing both total production and wages. This means higher investment and consumption, which both would lead to a higher GDP.

IV. Results

As mentioned above, we ran the same model twice, once with the full data and a second time with the balanced data. The adjusted R-squared, F-statistic along with its p-value, and the Durbin-Watson statistic were also considered when comparing model specifications.

Starting with the very first model, we ran a standard pooled OLS on both full data and the balanced data. We regressed real GDP against real values of FDI, ODA, remittance and gross capital formation, population, openness and life expectancy.

Table 6.1: Estimation results (Models 1 – 4), full and balanced data

Variable	Model 1		Model 2		Model 3		Model 4	
	Full Data	Balanced Data	Full Data	Balanced Data	Full Data	Balanced Data	Full Data	Balanced Data
FDI	-5.32	-0.51	-0.02	0.68	5.03***	5.63**	14.06***	14.38***
	(1.42)	(0.13)	(0.01)	(0.18)	(2.79)	(3.39)	(6.45)	(6.05)
ODA	54.44***	33.22***	58.70***	28.68***	2.44	0.36	1.91	1.89
	(10.33)	(7.00)	(11.34)	(6.34)	(0.62)	(0.13)	(0.64)	(0.57)
REM	11.09***	3.60	-	-	-	-	10.62***	10.64***
	(2.73)	(1.29)					(7.84)	(7.19)
Ln(REM)	-	-	-2.93 E+09	8.48 E+10***	5.90 E+09	1.38 E+10	-	-
			-(0.34)	(2.94)	(0.54)	(1.04)		
POP	931.10***	1030.36***	1006.70***	870.37***	-2520.59***	-2736.28***	-1381.60***	-1423.27***
	(13.97)	(14.02)	(16.22)	(9.39)	(14.30)	(18.07)	(8.04)	(7.62)
OPEN	1.49 E+09***	3.75 E+08	1.11 E+09	-1.72 E+08	8.98 E+08	9.43 E+08	-	-
	(2.62)	(0.45)	(1.62)	(0.21)	(1.14)	(1.17)		
LE	8.87 E+09***	-2.56 E+09	1.19 E+10***	-9.35 E+09**	2.48 E+09	2.31 E+09	-	-
	(2.77)	(0.83)	(3.83)	(2.37)	(0.90)	(0.82)		
GCF	-0.07	0.18	0.48**	0.39	2.37***	2.43***	-	-
	(0.22)	(0.55)	(2.01)	(1.46)	(15.34)	(17.21)		
Intercept	-8.24 E+11***	2.44 E+10	-9.2 E+11***	-1.35 E+12***	5.88 E+11***	5.73 E+11***	5.68 E+11***	6.72 E+11***
	(3.76)	(0.11)	(3.23)	(3.04)	(2.81)	(2.62)	(11.58)	(10.93)
R-Squared	0.94	0.91	0.93	0.91	0.98	0.98	0.96	0.96
Adj. R-Squared	0.93	0.91	0.93	0.91	0.98	0.98	0.96	0.96
F-statistic	317.25	212.17	301.70	223.06	721.05	891.50	527.13	517.88
Probability(F-statistic)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Durbin-Watson statistic	0.53	0.35	0.51	0.33	0.45	0.71	0.56	0.64

Note: Figures in parenthesis indicate absolute value of t-stats. Significant coefficient estimates are denoted with asterisks, with significant at the 1%, 5%, and 10% levels denoted "***", "**" and "*" respectively.

Both outputs from model 1 had high adjusted R-squared values, and the full data model had many significant variables. However, the Durbin-Watson statistics of 0.525 and 0.354 are very low and raised concern. Both *OPEN* and *LE* have significant positive effect on GDP in model 1. *GCF*, on the other hand, is not significant even at the ten percent level. As seen in table 6.1, when we ran the same regression with the balanced data, all three (*OPEN*, *LE* and *GCF*) became insignificant even at the ten percent level.

FDI was not significant even at the ten percent level for both datasets. Notice that with the balanced data, remittance also became insignificant even at the 10% level. We suspected that the two variables became insignificant in the model due to multicollinearity. Thus, we tried models two through five, one at a time, to solve various econometric problems seen in this output.

Results from model 2 showed that logging remittance did not help. In model 1, running a regression with the full data, remittance had a significant positive effect on GDP. However, as seen in table 6.1 when we take the Ln of *REM* for model 2, it then became insignificant. On the contrary, for our balanced data, the Ln of *REM* came to be significant in the results, unlike remittance in our first model. There was also only a very small improvement in the value of the adjusted R-squared, where as there seemed to be a decrease in the Durbin-Watson statistic in model two. These changes were not desirable, thus we moved on to the next model.

In an attempt to fix the issues in model one and two, we tried using a different estimation method. By using the FEM, we are able to control for the unobserved variation in each cross section that stays constant over time. Seen in table 6.1, this model is slightly better in comparison to the first two as its adjusted R-squared and Durbin-Watson statistics are higher than its predecessors. However, there seem to be still plenty of insignificant variables.

By dropping *OPEN*, *LE* and *GCF* our *FDI* and *REM* did become significant at the cost of *ODA* not being significant. This is not an issue as foreign aid was not correlated with either FDI or remittance. The Durbin-Watson statistic was still too low; this indicated the possibility of autocorrelation.

Notice that for both models three and four, our population variable was negative and significant. This contradicts our initial hypothesis that population will have a positive relationship with GDP. We had predicted that as population increases, there should be an increase in GDP as well. However, according to table 6.1, our results suggest the opposite. The effect of population is suppressed in model four, in comparison to model three. In our results from model four run with the full data, an increase in one person in the country leads to a decrease in GDP by 1,381 US Dollar. This negative effect could have been caused by a low labor force participation rate. In other words, a high population does not necessarily mean a larger labor force. A high total dependency ratio, measured as the ratio between the numbers of dependents (aged zero to 14 and over the age of 65) to the total population can mean a low labor force participation rate even though there is a large population base.

In an attempt to improve our Durbin-Watson, we tried changing the structure of our model and changed our variables into per capita form. This meant that in our next model, we were only left with the three variables on interest (in per capita format) on the right-hand side, and GDP per capita on the left-hand side.

As seen in table 6.5, all three variables (and the intercept) became significant at the 5 percent level. There is a slight drop in the adjusted R-squared value. Nevertheless, the models were still both very much significant with p-values approaching zero. There was also an increase in the Durbin-Watson statistics for results from both datasets.

The coefficient of FDI per capita is negative and significant even at the one percent level in both datasets. In model 5, from the balanced data, there is a slightly larger effect on GDP per capita when compared to the full data, however the difference is only 1.47 real US Dollars. A significant negative coefficient means that as more and more FDI is sent to countries in South Asia, it causes a decrease in the GDP of the country. According to our full data model, for every real dollar per capita sent to a South Asian country, their GDP per capita will decrease by 12.92 real US Dollar. According to our balanced data model, for every dollar sent to a country, it will decrease their GDP per capita by 14.39. This is different from what we had predicted earlier in our hypothesis. We predicted that for every dollar of FDI, the country will have more resources at its disposal, thus increasing their GDP by increasing their production possibility frontier. However, due to corruption and mismanagement of funds, an increase in resources of a South Asian country does not necessarily shift their production possibility frontier outward. High amounts of FDI could also cause labor-displacing technology to cause technological unemployment, thus leading to a lower GDP values. Another possibility is that there could be no/little technology transfers. Large multinational corporations based in developed countries will ensure there is no knowledge spillover when they shift production to a different country. They tend to be only focused on looking for cheap labor available in South Asian countries. It could also be a representation of the large amounts of profits that are being sent back to pay dividends to the investors.

In model 5, both *ODA_pc* and *REM_pc* were positive and significant at the five percent level. In table 6.5, the output generated from model five using the full data, an increase in foreign aid and remittance by one real dollar per capita increases GDP per capita by 9.25 real US Dollar and 2.15 US real Dollar, respectively. This means that as predicted in our initial hypothesis, a

higher value for either of the two external development finance and foreign exchange earnings per capita relates to higher GDP per capita in South Asian countries. This coefficient value suggests the existence of the multiplier effect. The GDP per capita of the South Asian countries increase with a multiple of greater than one for every dollar increase in external development finance and foreign exchange earnings per capita.

A coefficient of 9.25 for *ODA_pc*, from table 6.1, is a large number. This means that in South Asia, foreign aid funded programs improve the GDP per capita of the recipient country by 9.25 times its value. This result should be a great motivation to channel more money as foreign aid and fund more development projects in South Asia.

Table 6.2: Redundancy Fixed Effects Test, full data

Effects Test	Statistic	Degrees of Freedom	Probability
Cross-section F	14.5222	(5,177)	0.0000
Cross-section Chi-square	63.9384	5	0.0000

Table 6.3: Redundancy Fixed Effects Test, balanced data

Effects Test	Statistic	Degrees of Freedom	Probability
Cross-section F	14.2855	(3,149)	0.0000
Cross-section Chi-square	39.4370	3	0.0000

We ran the Redundancy Fixed Effects Test on both full data and balanced data. As seen in tables 6.2 and 6.3, both tests concluded that there is no redundancy in running the FEM in comparison to a pooled OLS regression. After we concluded that the FEM is more appropriate than pooled OLS, we then tested FEM against the Random Effects Model by using the Hausman Test – the findings are in Table 6.4.

Table 6.4: Hausman Test

Dataset	Effects Test	Chi-Square Statistic	Degrees of Freedom	Probability
Full data	Cross-section random	5.060264	3	0.1674
Balanced data	Cross-section random	42.856479	3	0.0000

Seen from table 6.4, the Hausman test for the full data, with a probability of 0.1674, failed to reject the null hypothesis that there is no significant difference between Fixed Effects and Random Effects. However, as a result of the type of data used in this study, we preferred the FEM with our full data.. On the other hand, the Hausman test for the balanced data concluded that there is a significant difference between Random Effects and Fixed Effects and thus, we preferred the FEM based on the redundancy test results presented in tables 6.3 and 6.4.

As a result of our statistical testing, we run our final model for both datasets. Unsatisfied by the low Durbin-Watson statistics and concern over autocorrelation, we included an AR(1) term into our FEM and called it model 6. By including AR(1) we will change the form of the model equation to a stochastic difference equation.

Table 6.5: Estimation results (Models 5 – 6), full and balanced data

Variable	Model 5		Model 6	
	Full Data	Balanced Data	Full Data	Balanced Data
FDI_pc	-12.92***	-14.39***	1.43	0.81
	(3.16)	(3.18)	(1.38)	(0.44)
ODA_pc	9.25***	8.24***	-5.33***	-5.61***
	(15.00)	(14.92)	(8.63)	(8.39)
REM_pc	2.15**	3.78***	2.19**	1.72*
	(2.33)	(4.42)	(2.48)	(1.75)
AR(1)	-	-	0.88***	0.89***
			(74.19)	(64.01)
Intercept	1,242.76***	1,297.44***	1,389.77***	1,404.86***
	(9.68)	(10.20)	(7.28)	(5.63)
R-Squared	0.79	0.82	0.98	0.97
Adjusted R-Squared	0.78	0.81	0.98	0.97
F-statistic	83.38	110.41	839.00	720.99
Probability(F-statistic)	0.00	0.00	0.00	0.00
Durbin-Watson statistic	0.66	1.18	2.5	2.39

Note: Figures in parenthesis indicate absolute value of t-stats. Significant coefficient estimates are denoted with asterisks, with significant at the 1%, 5%, and 10% levels denoted "***", "**" and "*" respectively.

Seen in the output for model 6 in table 6.5, the very last model did not have a significant *FDI_pc*, even at the ten percent level, for both datasets. *ODA_pc*, on the other hand, now has a negative coefficient of -5.33 and -5.61 for the full data and balanced data, respectively. This value was significant even at the one percent level. This can be interpreted as an increase in foreign aid per capita by one dollar decrease the recipient's GDP per capita by 5.33 or 5.61 US Dollar for full data and balanced data, respectively. This means that according to FEM with AR(1) model, foreign aid actually hurts the recipient country in South Asia. Similar to FDI, in a country where corruption and mismanagement of funds are the norm, more foreign aid could lead of a lower GDP. Instead, it only causes more chaos in an already chaotic economy.

Remittance appears to be the only external development finance and foreign exchange earnings that stayed positive and significant as predicted. According to 6.5, when remittance per capita is increased by a dollar, the GDP per capita of South Asian countries increases by 2.19 US Dollar and 1.72 US Dollar in the regression ran under model 6 and model 7, respectively. This means that for every dollar transferred by resident household to or from non-resident households, there is an increase in GDP in the country. Remittance has been in the shadows when it comes to economic research due to the difficulty of obtaining data in comparison to FDI and foreign aid. FDI and foreign aid are given through formal channels and can be recorded easily. However, remittance is not controlled and mostly happens through back channels, thus is difficult to calculate. Due to this issue, the data on remittance will always be undervalued. This causes problems when analyzing the effect of remittance on economic growth and development.

VII. Conclusion

In this empirical study, we have focused on developing a proper econometric model in an attempt to examine the effect of all three sources of external development finance and foreign exchange earnings (FDI, foreign aid and remittance), and its effect on the economic growth in South Asian countries. Focusing on one specific geographic region, this study potentially overcomes the aggregation bias faced by studies using worldwide or continent level data. The findings of this study indicate that there is little/no indication of positive effect of FDI and foreign aid on economic growth. Out of the six different models we ran, there seemed to be a variation in the effect of FDI and foreign aid.

Running a pooled regression seemed to make FDI not significant. Even when taking the Ln of the values for remittance, due to possible multicollinearity, a pooled OLS did not produce a significant effect from FDI. Switching to a FEM did make it positive and significant in both

models three and four as seen in table 6.5. However, in model 5, where we changed the level regression equation into the per capita format, FDI had a negative effect of GDP. Lastly, when adding an AR-term to correct for autocorrelation, FDI once again became insignificant.

Foreign aid started off as being positive and significant as predicted. However, when we ran a FEM, it later became insignificant. In model 5, the aforementioned per capita format did help make it positive and significant once again. But, when we included the AR-term in model 6 to correct for autocorrelation, foreign aid had a significant negative effect on GDP.

According to the result of this study, the effect of external development finance and foreign exchange earnings, especially for FDI and foreign aid, is highly dependent on the model specification. This means that we would be able to alter the findings of studies on external development finance according to the scholar's liking. This is parallel to what Nwaogu and Ryan (2015) found in their study of African countries. In this study, only remittance seems to have the most consistent effect on economic growth. Remittance had a positive and significant effect from model 4 through model 6. After dropping *OPEN*, *LE* and *GCF*, remittance had a positive and significant effect on economic growth as we predicted. If remittance increases by one real dollar per capita, GDP per capita increases by 2.19 real dollar and 1.72 real dollar in the full data and balanced data, respectively.

Limitations of this study could be that because data on production are easier to collect than data on spending, many countries generate their primary estimate of GDP using the production approach (World Bank, 2010). The quality and reliability of data on developing countries could be an issue too. If we were to look into the data in detail, some of the values seem to be more of an estimate rather than what was observed at that specific time and place.

Some policy implications that can be derived from this study is that the governments of South Asian countries should focus more on creating an official channel in which people can send money back to their home countries easily. This will not only be beneficial to the people sending the money home, but also allow researchers to better keep track of the true value of remittances. There is very limited data on remittances, especially for smaller developing countries like Bhutan and Nepal. As remittance slowly gains momentum in the academic world, the availability of a formal count of remittances would definitely encourage more and more research.

As for future extensions of research, it would be very good if a time-series analysis were done for each country in South Asia. However, due to lack of such data, the results from that study might not be as convincing as it could be. With technology playing such an integral role in today's society, the potential to collect more data is there. It would be difficult to track down past data, but if we kept collecting future data, someday there will be a large enough dataset to do an in-depth analysis on the effects of external development finance and foreign exchange earnings on economic growth. Especially, as the level of foreign aid and remittance are currently at their all-time high and FDI is also increasing.

References

1. Benmamoun, Mamoun, Lehnert, Kevin, "Financing Growth: Comparing the Effects of FDI, ODA, and International Remittances", *Journal of Economic Development*, Vol. 38, No. 2 (June 2013), pp. 43-65

2. Burnside, Craig, Dollar, David, "Aid, Policies, and Growth" *American Economic Association* Vol. 90, No. 4 (September 2000), pp. 847- 868

3. Easterly, William, "Can Foreign Aid Buy Growth?" *Journal of Economic Perspectives* 17, No. 3 (Summer 2003), pp. 23-48

4. Nwaogu, Uwaoma G., Ryan, Michael J., "FDI, Foreign Aid, Remittance and Economic Growth in Developing Countries" *Review of Development Economics*, Vol. 19, No. 1 (2015), pp. 100-115

5. Richardson, C., "U.S. Foreign Aid by Country", *Huffington Post*, August 30 2012. Accessed Nov. 2015
http://www.huffingtonpost.com/2012/08/30/us-foreign-aid-by-country_n_1837824.html

6. UNCTAD, "Foreign Direct Investment in LDCS: Lessons Learned from the Decade 2001-2010 and the Way Forward," Accessed Aug. 2016
http://unctad.org/en/Docs/diaeia2011d1_en.pdf

7. United Nations, "The Millennium Development Goals Report", Accessed Feb 2016
http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf

8. World Bank, "How We Classify Countries, The World Bank", Accessed Jan 2016
https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

9. World Bank, "The little Data Book 2016", Accessed March 2016
https://openknowledge.worldbank.org/bitstream/handle/10986/23968/9781464808340.pdf?sequence=4&isAllowed=y