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Source: *The Journal of Developing Areas*, Summer 2017, Vol. 51, No. 3 (Summer 2017), pp. 153-171

Published by: College of Business, Tennessee State University

Stable URL: https://www.jstor.org/stable/10.2307/26416938

The Journal of Developing Areas
Volume 51 No. 3 Summer 2017

THE EFFECTS OF FOREIGN AID ON ECONOMIC GROWTH IN DEVELOPING COUNTRIES

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ABSTRACT

Decades of research regarding the effect of foreign aid on economic growth in less developed countries have produced inconclusive results. Research in this literature has been plagued by a variety of empirical impediments. Among them, measurement and endogeneity issues, sparse sets of control variables that may be correlated with both foreign aid and economic growth such as institutional quality, and disagreements regarding the appropriate econometric methodology. This paper highlights a further issue: the heterogeneous effects of foreign aid on growth across less developed countries. Previous studies have pooled all of the developing countries together, treating them as homogenous, despite that developing countries are vastly different across both observable and unobservable dimensions. Developing countries differ in their stages of development, per capita income, socio-economic, financial, and political characteristics. For this reason, the World Bank (2012) broadly classifies the developing countries into two categories: low income developing countries (LIDCs) and high income developing countries (HIDCs) based on per capita income. Our hypothesis is that the relationship between foreign aid and economic growth should be different among LIDCs and HIDCs. For this reason, we analyze the relationship between foreign aid and economic growth separately for LIDCs and HIDCs, producing estimates using samples which are more likely to be homogenous. Integrating the fullest set of control variables thus far in the literature such as unemployment rate, capital formation, government budget surplus, inflation rate, degree of trade openness, and corruption, and using GMM methodology in a dynamic setting we find that foreign aid has positive effects on growth in high-income developing countries and negative effects on growth in low-income developing countries. We also find that higher unemployment rates, higher inflation, and higher levels of corruption reduce economic growth in both LIDCs and HIDCs. Additionally, higher level of capital formation, a larger budget surplus, and higher degrees of trade openness contribute positively to economic growth in both LIDCs and HIDCs. We do not find any evidence that time trends in the data affect our results. The result remains after accounting for endogeneity concerns and when a measure of institutional quality proxied by corruption. The finding implies that foreign aid has beneficial effects in high-income developing countries which are at latter stages of development. This suggests that countries need to gain some "traction" before foreign aid can help.

JEL Classifications: C30, F00, F01, O1
Keywords: foreign aid, economic growth, high-income developing countries, low-income developing countries, capital formation, corruption.
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INTRODCUTION

Can foreign aid contribute to economic growth in less developed countries? Understanding the relationship between foreign aid and economic growth in less developed countries is a challenging research topic and has also been a controversial issue. While this topic has been studied extensively in the development economics literature, there has been neither a theoretical consensus nor consistent empirical evidence that concludes whether the relationship between foreign aid and economic growth in less developed countries is positive, negative or non-existent. Early research on foreign aid, dating back to the 1940s and 1950s, was consistent with the optimism of foreign aid effectiveness after the war. It also provided a conceptual foundation for this optimism where foreign aid was analyzed in the context of the two-gap model of aid, largely based within the tradition of Harrod-Domar[1] growth models. Recognizing the importance of the saving gap, Chenery and Shout (1966) identified that a foreign exchange gap is also problematic because developing countries were unlikely to have the export earnings required to import capital goods for investment. The authors suggested that foreign aid could help fill this gap, which motivated them to develop a "dual gap" model. These studies generally concluded that foreign aid contributed positively to economic growth in less developed countries. However, White (1992) pointed out that, while high levels of aid were achieved, the anticipated growth was not. Later researchers came to the same conclusion (e.g., Kosack 2003; Werlin 2005; and Kasper 2006). The lack of economic growth following the provision of foreign aid motivated a substantial amount of empirical research aiming to analyze the reason for this by investigating the relationship between foreign aid and domestic savings. This body of research found that the connection between foreign aid and domestic savings in less developed countries is not as clear-cut as had been previously believed. Despite tackling this issue from a number of different directions, no consensus was reached as these studies led to conflicting results[2]. More recent research in this area also continues to paint a mixed picture, where some findings suggest that foreign aid has an impact on economic growth while others do not[3].

The sign in the relationship between foreign aid and economic growth seems to be sensitive to chosen econometric technique, endogeneity problems, and lack of reliable data. An additional issue that we raise regarding the mixed results of previous empirical studies concerns the heterogeneity in the data. It is reasonable to expect that the relationship between foreign aid and economic growth may vary conditional on country characteristics such as income per capita and the stage of economic development. Previous studies have pooled all of the developing countries together, treating them as homogenous, despite that developing countries are vastly different across both observable and unobservable dimensions. Developing countries differ in their stages of development, per capita income, socio-economic, financial, and political characteristics. For this reason, the World Bank (2012) broadly classifies the developing countries into two categories: low income developing countries (LIDCs) and high income developing countries (HIDCs) based on per capita income[4]. As categorized, LIDCs and HIDCs are likely to have different socio-economic, financial, and political institutions. Therefore, an empirical analysis that pools these countries together may mask the effect of foreign aid if the heterogeneity across these groups is not appropriately accounted for. Previous studies

have pooled LIDCs and HIDCs together, and it is questionable whether those analyses are fully illuminating the effect of foreign aid on economic growth.

Our hypothesis is that the relationship between foreign aid and economic growth should be different among LIDCs and HIDCs. For this reason, we analyze the relationship between foreign aid and economic growth separately for LIDCs and HIDCs, producing estimates using samples which are more likely to be homogenous. We examine the impact of foreign aid and a comprehensive set of variables that have been used sporadically in previous studies as the determinants of economic growth. The covariates in our analysis include the unemployment rate, the level of gross capital formation relative to GDP, the county's government budget surplus to GDP, the inflation rate, the level of trade openness relative to GDP, and a measure of corruption. Our findings suggest that foreign aid affects economic growth differently in LIDCs and HIDCs. Foreign aid negatively impacts economic growth in LIDCs while it positively impacts economic growth in HIDCs. We also find that higher unemployment rates, higher inflation, and higher levels of corruption reduce economic growth in both LIDCs and HIDCs. Additionally, higher level of capital formation, a larger budget surplus, and higher degrees of trade openness contribute positively to economic growth in both LIDCs and HIDCs. We do not find any evidence that time trends in the data affect our results.

This paper has four primary contributions to the current debate about the effectiveness of foreign aid on economic growth in less developed countries: (1) We examine the effects of foreign aid separately on economic growth in LIDCs and HIDCs, thereby identifying these effects for each group on more homogenous samples than in previous work. (2) In addition to foreign aid, we incorporate more control variables of economic growth than any other previous study in this literature. (3) Our data set covers a much longer time period than previous work. (4) We also estimate the relationship between foreign aid and economic growth in a dynamic panel data setting using GMM to mitigate endogeneity issues. The rest of this paper is organized as follows. Section 2 describes the debates regarding the effects of foreign aid on economic growth in less developed countries. Section 3 presents the models and describes the results. Section 4 concludes.

THE DEBATE: POSTIVE VERSUS NEGATIVE EFFECT OF FOREIN AID ON ECONOMIC GROWHT

The debate regarding the relationship between foreign aid and economic growth in less developed countries has been controversial and has attracted considerable attention in the economic development literature. Early research in the 1940s and 1950s, analyzed in the context of the two-gap model of aid, generally concluded that foreign aid contributed positively to economic growth. A large number of subsequent studies confirmed this result in a variety of contexts. Building on earlier work, Chenery and Shout (1966) and Papenek (1973) also reported that foreign aid leads to economic growth. Dowling and Hiermenz (1982) studied the effect of foreign aid on growth in thirteen Asian countries. After controlling for the effect of trade, finance, and government intervention, they found that foreign aid has a positive and significant effect on economic growth in those countries. Levy (1988), followed by Gomanee et al., (2005) and Ekanayake and Chatrna (2010), all present evidence that foreign aid has contributed positively to economic

growth in Sub-Saharan African countries through the channel of funding public investment. Hatemi and Irandoust (2005) investigated the relationship between aid and growth among the six major recipients of aid from Sweden from 1974 to 1996: Botswana, Kenya, Tanzania, Sri-Lanka, Ethiopia, and India. Their results concluded that the foreign aid positively contributed to the economic growth in those countries. Using generalized method of moment (GMM) estimation, Moreira (2005) found a positive relationship between aid and growth for 48 developing countries over the period 1970 to 1998. Burnside and Dollar (2000) used a standard cross-country panel regression and reported that foreign aid has a positive effect on growth in a good macro policy environment.

However, it is theoretically unclear that foreign aid should boost economic growth. Proponents believed that foreign aid would supplement the domestic savings in the less developing countries and lead to more capital formation and investment that produces economic growth. Friedman (1958) was the first economist who predicted "new aid programs would not lead to economic growth." Griffin and Enos (1970) later contested the assertion of gap models that foreign aid leads to one-to-one increase in savings. Their empirical study using cross-country data reported a negative relationship between capital inflows and domestic savings in developing countries, raising doubts that foreign aid can positively impact economic growth. Griffin (1970) provided additional evidence that supported a negative association between capital inflows and domestic savings. These findings were supported further by Weisskopf (1972), who also found a negative relationship between foreign aid and domestic savings. However, Gupta (1970) found no relationship between foreign aid and domestic savings in his study.

Other researchers found a negative relationship between aid and growth. Voivodas (1973) reported an insignificant negative impact of foreign aid on economic growth for a sample of twenty-two LIDCs between 1956 and 1968. Mosley (1980) made an important contribution to the literature by incorporating lagged aid variables into his model and by accounting the potential endogeneity. On average, he found a negative association between aid and growth although the coefficient on foreign aid was not statistically significant. Boone (1996) reinvigorated the aid effectiveness debate in mid 1990s. He used a panel of 91 developing countries covering the period 1971 to 1990 to investigate the effect of foreign aid on investment, consumption, and measures of well-being in less developed countries. He concluded that foreign aid leads to increase in government consumption rather than increasing investment or benefiting the poor or leading to economic growth. In a more recent study, Mallik (2008) examined the effect of foreign aid on six of the poorest African countries that are also heavily depended on foreign aid. These countries and the data periods considered for each country are Central African Republic from 1977 to 2004; Malawi from 1965 to 2005; Mali from 1965 to 2005; Niger from 1965 to 2005; Sierra Leone from 1970 to 2005; Togo from 1980 to 2004. He used co-integration methods to identify whether there is a long-run relationship between foreign aid and economic growth, where he used real per capita GDP to measure growth. His results showed that there was a negative relationship between foreign aid and economic growth in the long run for most of these countries, while there was no significant effect of aid on growth in the short-run. Ekanayake and Chatrna (2010) found mixed effects of foreign aid on economic growth in their study of 85 developing countries, covering Asia, Africa, Latin America and the Caribbean over the period spanning 1980 to 2007. They found that foreign aid positively impacted Sub-Saharan

countries but negatively affected other regions of the world. In an attempt to identify reasons why the literature had been so inconclusive, Doucouliagos and Paldam (2006) maintained that much of the variation between studies can be attributed to data and specification differences and that journal and institutional affiliation also can influence reported results. Following Mosely (1980), Kourtellos et al. (2007) and Alvi et al. (2008) argued that the impact of foreign aid on growth differ among previous studies due to existing endogeneity resulting from the exclusion of important control variables. He also argued that the relationship between aid and growth is non-linear. Rajan and Subramanian (2008) also raised the issue of endogeneity in the aid-growth relationship. They argued that aid flows could go to countries that are doing particularly badly or to the countries that are doing particularly well which creates a spurious correlation between aid and growth. However, after correcting for the endogeneity bias, they found weak (or little) evidence for a relationship between foreign aid and economic growth.

Additionally, some have argued that existing corruption prevents foreign aid from having a positive impact on economic growth in these countries. According to Jon (2003), many major international financial institutions such as the World Bank have ignored the adverse effect of corruption on political, social, financial, and economic institutions of less developed countries that are recipients of foreign aid. He also showed that corruption interrupts the relationship between foreign aid and economic growth. Brautigam and Knack (2004) reported that foreign aid may actually increase corrupt activities in the recipient countries because there will be more resources for the interested people to fight over. Kasper (2006) argues that over the past 50 years $1 trillion (USD) in total given to Sub-Saharan African countries has not produced any significant impact on economic growth. The author attributes this to corruption that has hindered economic growth of the most aid-recipient countries in this region. Knack (2000) investigated whether aid and quality of governance are related. He defined quality of governance in terms of bureaucratic quality, corruption, and rule of law. He found that aid dependent countries tend to have low institutional quality, meaning they have low accountability, more rent seeking opportunities, scare away talented workers from bureaucratic positions, and therefore are not under pressure to reform inefficient policies and institutions. He argued that higher aid levels reduce the quality of the institutions in these countries instead of improving the quality of the institutions, and that is why in most cases foreign aid does not lead to economic growth. More than six decades of research on foreign aid and economic growth has produced no conclusive evidence. However, a substantial number of concerns have been raised regarding the identification of this relationship, including mitigating factors such as corruption, endogeneity and potential heterogeneous effects across countries. Our research attempts to tackle all of these issues to provide fresh evidence on whether or not foreign aid affects economic growth.

EMPIRICAL ANALYSIS

Our estimation sample utilizes annual data for 55 LIDCs and 56 HIDCs from 1970 to 2010. All data are collected from the World Development Indicator database published by the World Bank (2010, 2011, 2012, 2013, and 2015)[5]. A listing of countries for the LIDC and HIDC categorization can be found in Tables 1 and 2.

TABLE1. LOW-INCOME DEVELOPING COUNTRIES (LIDCs)
PER CAPITA GNI ≤US($) 1,035

Economy	Economy
Algeria	Iraq
Angola	Jamaica
Bangladesh	Kenya
Bolivia	Korea, Dem. Rep.
Burkina, Faso	Lesotho
Burundi	Madagascar
Cambodia	Maldives
Cameroon	Mauritania
Cape Verdi	Myanmar
Central African Republic	Namibia
Chad	Nepal
China	Nigeria
Colombia	Pakistan
Cote dIvoire	Papua New Guinea
Cuba	Paraguay
Djibouti	Peru
Dominican Republic	Philippines
Ecuador	Samoa
Egypt, Arab Rep.	Senegal
El Salvador	Sierra Leone
Gambia	Sri Lanka
Ghana	Suriname
Guatemala	Swaziland
Guinea-Bissau	Syria
Haiti	Tanzania
Honduras	Zambia
India	Zimbabwe
Iran, Islamic Republic	

TABLE2. HIGH-INCOME DEVELOPING COUNTRIES (LIDCs)
PER CAPITA GNI >US($) 1,035

Economy	Economy
American Samoa	Mayotte
Argentina	Mexico
Bahrain	Montenegro
Barbados	Nicaragua
Belize	Northern Mariana Islands
Botswana	Oman
Brazil	Palau
Bulgaria	Panama
Chile	Peru

Costar Rica	Puerto Rico
Croatia	Qatar
Cyprus	Romania
Dominica	Russian Federation
Equatorial Guinea	Saudi Arabia
Faeroe Islands	Serbia
French Polynesia	Seychelles
Gabon	Slovak, Rep.
Granada	Slovenia
Guam	South Africa
Hungary	St. Kitts and Nevis
Israel	St. Lucia
Kazakhstan	St. Vincent and the Grenadines
Kuwait	Trinidad and Tobago
Latvia	Turkey
Lebanon	United Arab Emirates
Libya	Uruguay
Malaysia	Venezuela
Mauritius	Virgin Islands (U.S.)

In addition to foreign aid, this study uses six important covariates that have been known in previous research to impact economic growth. No single previous study regarding foreign aid has incorporated all of these variables collectively as determinants of economic growth. Importantly, each of the control variables is also likely to be correlated with the disbursement of foreign aid as well as economic growth and omitting them could lead to bias. The control variables are: Unemployment Rate, Capital Formation, Government Budget Surplus, Inflation Rate, Degree of Trade Openness, and Corruption.

EMPIRICAL MODELS AND RESULTSs

We adopt two primary approaches to study how foreign aid contributes to economic growth in LIDCs and in HIDCs. First we estimate a dynamic panel data model with country fixed effects and show that these results are not sensitive to including fixed time effects. Our dependent variable (measure of economic growth) is the logarithm of GDP per capita which is regressed on lagged GDP per capita, foreign aid, the unemployment rate, capital formation, budget surplus, inflation rate, and the degree of openness of a country to international trade. Since economic growth is persistent among countries that we study, omitting the lag dependent variable could lead to biased results. However, the resulting correlation between the lagged dependent variable and the error term will itself generate bias. Therefore, our second approach is to estimate the model using GMM to account for the endogeneity. Finally, since institutional quality may be correlated with both foreign aid disbursement and economic growth, we conclude the analysis by including a measure of corruption to the models as an additional specification.

Dynamic Panel Data Model

To draw inferences on the relationship between foreign aid and economic growth, we estimate the following fixed-effects model using OLS for LIDCs and HIDCs separately:

$$GDPP_{it}=\alpha_0 + \alpha_1 GDPP_{i,t-1} + \alpha_2 AID_{i(t-3)} + \alpha_3 Inv_{i(t-2)} + \alpha_4 U_{i(t-1)} + \alpha_5 BS_{i(t-1)} + \alpha_6 \Pi_{i(t-1)} + \alpha_7 Opn_{i(t-1)} + \varepsilon_{it} \quad (1)$$

$$\varepsilon_{it} = \mu_i + \nu_{it} \quad (2)$$

In equation (1), a country is indexed by *i* and a year is indexed by *t*. $GDPP_{it}$ is the natural logarithm of per capita income; $AID_{i(t-3)}$ is foreign aid as a percentage of GDP lagged 3 periods; $Inv_{i(1-2)}$ represents the level of gross capital formation to GDP lagged two periods; $U_{i(t-1)}$ represents the unemployment rate in the non-agricultural sector lagged one period; $BS_{i(t-1)}$ is the level of budget surplus to GDP lagged one period; $\Pi_{i(t-1)}$ is the inflation rate lagged 1 period; and $Opn_{i(t-1)}$ represents the level of trade openness to GDP lagged one period. Finally, μ_i captures unobservable factors specific to country *i* that are constant over time and ν_{it} is a white noise disturbance term. The independent variables are lagged to reflect the notion that it takes time for the impacts to be realized. All lag lengths were determined by Akaike and Bayesian Information Criterion, and both AIC and BIC confirmed the same lag length for each variable.

Table 3 shows the results from equation (1). The first column lists the variables.in the model.. The second column displays the estimates for low-income developing countries (LIDCs) and the third column displays the results for high-income developing countries (HIDCs). The estimated coefficient on foreign aid is negative and statistically significant for LIDCs, while it is positive and statistically significant for HIDCs. This result is new to the literature and shows that foreign aid has heterogeneous effects on growth based on whether a country is classified as LIDC or HIDC by the World Bank. The estimates suggest that foreign aid is beneficial to countries that are further along in the development process but harmful to countries in the early stages of development.

TABLE3. PANEL DATA ESTIMATES WITH COUNTRY FIXED EFFECTS, DEPENDENT VARIABLE: PER CAPITA INCOME

Variable	LIDC	HIDC
$GDPP_{i,t-1}$	-0.68**	-0.82**
(-2.99)	(-2.22)	
$AID_{i,t-3}$	-1.74**	1.93**
(-2.93)	(3.54)	
$Inv_{i,t-2}$	1.45**	1.62**
(2.62)	(2.81)	
$U_{i,t-1}$	-1.17**	-1.77**
(-2.28)	(-2.98)	
$BS_{i,t-1}$	0.78*	1.43**
(2.07)	(3.11)	

$\Pi_{i,t-1}$	-1.78*	-1.68**
	(-2.11)	(-2.55)
$Opn_{i,t-1}$	1.18*	1.97**
	(2.07)	(2.17)
Constant	12.24**	11.49**
	(11.24)	(18.16)
	R^2=0.447	R^2=0.499
	N=2,139	N=2,259
	Std. Error=6.98	St. Error=7.31
	DW-stat=2.01	DW-stat=2.05
	P(F-stat)=0.02	P(F-stat)=0.03

*t-values are in parentheses. * indicates significance at 5%, ** indicates significance at 1%.*

The coefficient on investment is positive and significant for both groups of the countries. This result is consistent with the findings in Kormendi and Meguire (1985), Barro (1991), and Levine and Renalt (1992). The coefficient on the unemployment rate is negative and statistically significant across both groups of countries, which is also consistent with previous research[6]. The results for budget surplus, inflation and trade openness are also consistent with previous findings. Countries with a large budget surplus relative to GDP have stronger economic growth, while high inflation is shown to affect economic growth in both groups of countries negatively. Our model shows that regardless of level of income, the more a country is open to international trade, the more it experiences economic growth. Finally, it is worth nothing that a less than zero coefficient on lagged output per capita will be consistent with the conditional convergence theory of the neoclassical model. We now consider how individual effects across countries may vary over time. Allowing for time effects enable us to control for the unobservable variation that all countries may face - but to which they may have a different foreign aid response. Our main goal is to test whether time effects play a destabilizing role in coefficients of interest. More specifically, we are checking for stability on foreign aid coefficients in LIDCs and HIDCs regressing over time. The model is given by:

$$GDPP_{it}=\lambda_0 + \lambda_1 GDPP_{i,t-1} + \lambda_2 AID_{i(t-3)} + \lambda_3 Inv_{i(t-2)} + \lambda_4 U_{i(t-1)} + \lambda_5 BS_{i(t-1)} + \lambda_6 \Pi_{i(t-1)} + \lambda_7 Opn_{i(t-1)} + \delta_{it} T_t + \upsilon_{it} \quad (3)$$

$$\upsilon_{it} = \theta_t \alpha_i + \varepsilon_{it} \quad (4)$$

here $\delta_{it}T_t$ is our time effects (indicator variables for each year) are interacted with foreign aid. We choose 1970 as the base year. Thus we have 40 interaction terms between our annual dummies and foreign aid variable from 1971 to 2010. In equation (4), ε_{it} are mean-zero random noise, α_i represents unobservable characteristics, and θ_t is elasticity of the unobservables to a given change in economic growth at time t. This specification implies that the temporal pattern of the effect of α_i on $GDPP_{it}$ is the same across different countries (Baltagi, 2008). Table 4 shows results from regression (3)

where results for the effect of foreign aid on economic growth in LIDCs and HIDCs are reported in the second and the third column, respectively.

TABLE4. MODELS ALLOWING FOR THE FOREIGN AID EFFECT TO VARY OVER TIME, DEPENDENT VARIABLE: PER CAPITA INCOME

Variable	LIDC	HIDC
$GDPP_{i,t-1}$	-0.0171*	-0.0447*
(-2.02)	(-2.04)	
$AID_{i,t-3}$	-1.26**	1.72**
(-2.83)	(3.21)	
$Inv_{i,t-2}$	1.15**	1.88**
(2.78)	(2.90)	
$U_{i,t-1}$	-1.12*	-1.54**
(-2.12)	(-2.81)	
$BS_{i,t-1}$	0.88*	1.56**
(2.03)	(3.09)	
$\Pi_{i,t-1}$	-1.64*	-1.45**
(-2.16)	(-2.61)	
$Opn_{i,t-1}$	1.09*	1.76**
(2.07)	(2.17)	
Constant	11.98**	13.77**
(6.71)	(10.21)	
R^2=0.447	R^2=0.499	
N=1,655	N=1,877	
Std. Error=6.88	St. Error=7.31	
DW-stat=2.03	DW-stat=2.07	
P(F-stat)=0.05	P(F-stat)=0.01	

*t-values are in parentheses. * indicates significance at 5%, ** indicates significance at 1%.*

Accounting for time-varying effects of foreign aid does not have any meaningful effect on our main results. For LIDCs, the foreign aid coefficient is once again negative and significant. The year effects interacted with foreign aid are not jointly statistically different from zero in our LIDCs regression. The calculated F-statistic is 0.33 and is less than the critical value of 4.62 for 1 percent significance level and (2, 35) degrees of freedom. As for HIDCs, the foreign aid coefficient is positive and significant, again consistent with the results in Table 3. The year effects interacted with foreign aid are not jointly different from zero here either, yielding a calculated F-statistic of 0.96 compared to the critical value of 4.62. Thus we conclude that foreign aid coefficients are stable over time and across countries within LIDC and HIDC groups.

Endogeneity and Generalized Method of Moments Estimation

Our specifications above included a lagged depended variable because GDP per capita is persistent over time. Omitting the lagged value would lead to bias due to the persistence but including it also creates an endogeneity problem. To illustrate, consider a simplified version of equations (1) and (3):

$$GDPP_{it}^{q} = \lambda_0 + \lambda_1 GDPP^{q}_{i(t-1)} + X_{it}\Gamma + \varepsilon_{it} \quad (5)$$

where q ϵ [HIDC, LIDC] is assigned according to the World Bank classification as in the previous section. The matrix of regressors X contains the same control variables as before. One method of estimating the parameters of (5) involves taking first-differences such that

$$GDPP_{it}^{q} - GDPP^{q}_{i(t-1)} = \beta(GDPP_{i(t-1)}^{q} - GDPP^{q}_{i(t-2)}) + \delta(X_{it}-X_{i(t-1)}) + (\varepsilon_{it}-\varepsilon_{i(t-1)}) \quad (6)$$

However, the ensuing correlation that arises between the lagged dependent variable would seriously bias the OLS estimator (Hsiao, 2003). Asymptotically, this bias is more pronounced the greater the variance of the individual effects. Nerlove (1967) shows that this result also holds in finite samples. Anderson and Hsiao (1981) describes an instrumental variable implementation that - for our own application - involves choosing either $GDPP^{q}_{i(t-2)}$ or $[GDPP^{q}_{i(t-2)} - GDPP^{q}_{i(t-3)}]$ as an instrument for $[GDPP^{q}_{i(t-1)} - GDPP^{q}_{i(t-2)}]$. However, Arellano and Bond (1991) point out that these (second lags) are not the only two viable instruments. For our purpose, any $GDPP^{q}_{(t-2-j)}$ term for all J=0,1,…. may be uncorrelated with the error term while not necessarily uncorrelated with the lagged endogenous term. The procedure developed by Arellano and Bond (1991) treats the model as a system of equations, one for each period, where the matrix of differenced instruments is built recursively and estimated within a GMM approach[7].

Table 5 reports the results of the effects of foreign aid on per capita income in LIDCs and HIDCs from the dynamic panel model estimated with a procedure that combines the Anderson and Hsiao (1981) instrumental variable procedure, and the Arellano and Bond (1991) system-GMM procedure.

TABLE5. DYNAMIC PANEL REGRESSION USING GMM, DEPENDENT VARIABLE: PER CAPITA INCOME

Variable	System-GMM Estimation	System-GMM Estimation
LIDC	HIDC	
$\Delta GDPP_{it}$	-0.48*	-0.80*
(-2.04)	(-2.32)	
ΔAID_{it}	-0.18*	0.94**
(-2.09)	(5.2)	
ΔInv_{it}	0.77**	0.42**
(3.28)	(7.18)	
ΔU_{it}	-0.49**	-0.98**
(-3.44)	(-3.19)	
ΔBS_{it}	0.07*	0.11*
(1.95)	(1.99)	

$\Delta\Pi_{it}$	-0.09*	-0.87*
(-2.01)	(-2.00)	
ΔOpn_{it}	0.17*	0.87**
(1.97)	(2.40)	
SG chi2(88)=161	SG chi2(93)=175	
P>chi2=0.00	P>chi2=0.00	
N=1,220	N=1,332	
H chi2(88)=86.8	H chi2(93)=111	
P>chi2=0.29	P>chi2=0.18	

t-*values are in parentheses. * indicates significance at 5%, ** indicates significance at 1%. SG and H denote the Sargan and Hansen tests of over-identifying restrictions for the matrix of instruments for the System-GMM estimation procedure.*

and positive and statistically significant for HIDCs. Furthermore, the other control variables have the same sign and significance as before, but are larger in magnitude. To this point, our statistical models have included many theoretically consistent control variables that may also be correlated with foreign aid disbursements. However, an important omitted factor that could bias the results is a country's institutional quality. As pointed out earlier, literature is mixed as to whether foreign aid distributors take into account the quality of institutions, such as corruption, but there is a long strand of literature that shows corruption and institutional quality are important factors determining economic growth. For our purposes, if institutional quality is correlated with both foreign aid disbursements and economic growth, then our earlier estimates will be biased. In the next section, we include a measure of corruption to our models to proxy for institutional quality.

Corruption and Economic growth

In this section, as a measure of institutional quality, we add a measure of corruption to the other independent variables included in the standard panel data model and the first differenced model estimated by GMM. Because the corruption data begins in 1983, we estimate the dynamic panel data model for the same two groups of countries (LIDCs, and HIDCs) on the sample of data from 1983 to 2010. The exercise will provide insight into (1) how corruption interacts with the effect of foreign aid on growth and (2) the extent to which our previous results were affected by omitted variable bias. The most frequently used measure of corruption in development economics research is one compiled in International Country Risk Guide (ICRG, 2015). The ICRG monitors 140 countries and uses 5 criteria (or indicators) to provide financial, political, economic risk information and forecasts. One of the criteria is the level of corruption in the government. Based upon the level of corruption the countries are ranked from 0 to 6, where 0 indicates the lowest level of corruption and 6 indicates the highest level of corruption. We first modify the estimation model from Table 3 (equations (1) and (2)) by adding the corruption index variable ($CICRG_{it}$) and an interaction term with foreign aid. This model we estimate is:

$$GDPP_{it}=\alpha_0 +\alpha_1 GDPP_{i,t-1}+\alpha_2 AID_{i,t-2} + \alpha_3 Inv_{i,t-2} + \alpha_4 U_{i,t-1} + \alpha_5 BS_{i,t-1} + \alpha_6 \Pi_{i,t-1} \quad (7)$$

$$+ \alpha_7 Opn_{i,t-1}+ \alpha_8 CICRG_{it}+ \alpha_9 Aid*CICRG_{i,t-2} + \varepsilon_{it}$$

$$\varepsilon_{it} = \nu_i + \mu_{it} \quad (8)$$

The results of equation (7) are presented in Table 6.

TABLE6. PANEL DATA ESTIMATES WITH COUNTRY FIXED EFFECTS AND INCLUDING CORRUPTION, DEPENDENT VARIABLE: PER CAPITA INCOME

Variable	LIDC	HIDC
$GDPP_{i,t-1}$	-0.92**	-0.39**
	(-5.20)	(-2.91)
$AID_{i,t-3}$	-1.25**	1.51**
	(-2.59)	(3.66)
$Inv_{i,t-2}$	1.03**	1.29**
	(5.96)	(9.96)
$U_{i,t-1}$	-1.21**	-1.68**
	(-3.99)	(-4.28)
$BS_{i,t-1}$	0.52*	1.21*
	(1.95)	(1.98)
$\Pi_{i,t-1}$	-0.67**	-0.89**
	(-2.59)	(-3.62)
$Opn_{i,t-1}$	1.13**	1.61**
	(3.25)	(2.98)
$CICRG_{i,t}$	-1.72**	-1.14
	(-3.01)	(-3.67)
$Aid*CICRG_{i,t-2}$	-0.44**	-0.21*
	(-2.34)	(-1.97)
Constant	-2.75*	-2.63**
R^2=0.357	R^2=0.485	
N=2,184	N=2,322	
Std. Error=6.67	Std. Error=7.31	
DW-stat=2.02	DW-stat=2.05	
P (F-stat)=0.04	P (F-stat)=0.03	

*t-values are in parentheses. * indicates significance at 5%, ** indicates significance at 1%.*

Corruption and its interaction with foreign aid are found to be important determinants of economics growth. In particular, the coefficient of the corruption variable is negative and statistically significant for both LIDCs and HIDCs, indicating that the higher a country's level of corruption the lower it would experience economic growth. This is the previously established result regarding corruption and growth in the literature. Corruption is also expected to negatively affect economic growth through its interaction with foreign aid. The expectation is confirmed in our data as the coefficient on the interaction variable ($Aid*CICRG_{i,t-2}$) is negative and statistically significant. Also note

that the size of the coefficients of the corruption variable and its interaction with foreign aid are larger in absolute value for LIDCs than HIDCs. This indicates that, for the same level of corruption and aid, growth is impeded more in LIDCs than HIDCs both through the direct effect of corruption as well as through dragging down the beneficial effects of foreign aid. The first differenced analog of Table 6 is presented in Table 7 where the model is estimated by system-GMM as we did with the model in Equation (6) that produced the results in Table 5.

TABLE7. DYNAMIC PANEL REGRESSION USING GMM AND INCLUDING CORRUPTION, DEPENDENT VARIABLE: PER CAPITA INCOME

Variable	System-GMM Estimation	System-GMM Estimation
LIDC	HIDC	
$\Delta GDPP_{it}$	-0.68*	-0.82**
(-1.99)	(-2.22)	
ΔAID_{it}	-0.60**	0.43**
(-4.70)	(3.27)	
ΔInv_{it}	2.41**	2.69**
(3.78)	(3.85)	
ΔU_{it}	-1.07*	-1.65**
(-1.99)	(-3.38)	
ΔBS_{it}	0.14*	0.18*
(2.18)	(1.97)	
$\Delta \Pi_{it}$	-1.24**	-1.97**
(-2.32)	(-3.44)	
ΔOpn_{it}	0.21*	0.64*
(1.97)	(2.09)	
$\Delta Aid*CICRG_{i,t}$	-0.77**	-0.48**
(-3.10)	(-2.40)	
SG chi2(89)=164	SG chi2(94)=178	
P>chi2=0.00	P>chi2=0.00	
N=1,240	N=1,360	
H chi2(88)=77.19	H chi2(93)=107.25	
P>chi2=0.33	P>chi2=0.29	

*t-values are in parentheses. * indicates significance at 5%, ** indicates significance at 1%. SG and H denote the Sargan and Hansen tests of over-identifying restrictions for the matrix of instruments for the System-GMM estimation procedure.*

There is no main effect for $CICRG_{it}$ in the model because it results in a column of 1s after first differencing. Therefore, the results are comparable to those in Table 5 except there is the addition of the first differenced interaction term between corruption and foreign aid, $Aid*CICRG_{i,t-2}$. The main effect of foreign aid remains negative for

LIDCs and positive for HIDCs and the sign and significance of the remaining control variables are consistent with previous results. The estimated coefficient for the interaction term between foreign aid and corruption is also consistent with Table 6 – high levels of aid and corruption reduce economic growth.

CONCLUSIONS

This paper contributes to a long line of economic research on the effect of foreign aid on economic growth, a debate that began more than six decades ago. While early research supported the belief (both empirically and theoretically) that foreign aid has or should have a positive effect on economic growth in less developed countries, the literature that followed often produced findings that were inconsistent with early research. Today, there is no consensus theoretically or empirically regarding the relationship between foreign aid and economic growth in the developing world.

This paper produces fresh insights into the debate. Previous literature using data sets on different countries or regions of the world has at times found that foreign aid benefits some of those countries but not others. Yet, without looking at all less developed countries together and systematically identifying heterogeneous effects, it is not clear if the differing effects those researchers found are due to underlying economic characteristics that can be generalized to all less developed countries or whether those differing effects are simply apply to the specific countries being analyzed in that particular study.

We examine the effects of foreign aid separately on economic growth in low-income (LIDCs) and high-income countries (HIDCs) classified by the World Bank. This design has two advantages. 1) We can identify potential heterogeneous effects on groups of countries that can be clearly identified based on economic characteristics. 2) Previous studies that pool all the countries together may mask the true effects of foreign aid on growth if the observed and unobserved heterogeneity is not accounted for. By splitting the sample this way, our estimates are produced using a more homogenous sample. Our main result is that we find very clear differences in the effects of foreign aid on economic growth across these samples: foreign aid increases growth for HIDCs but reduces growth for LIDCs.

Our results seem to be very robust. Our estimation models incorporate more control variables of economic growth and utilize data with a much longer time span (1970-2010) than any other previous study in this literature. In addition to foreign aid, our regressors include the unemployment rate, capital formation, budget surplus, inflation rate, and the degree of openness of a country to international trade. We also include a measure of institutional quality that is proxied by the level of corruption in the country. All of our control variables yield theoretically consistent estimates, and controlling for institutional quality does not alter our main results. Furthermore, corruption has the standard impact on growth typically found in the literature (it reduces growth) but we also find that high levels of corruption mitigate the positive effects of foreign aid. Finally, our basic panel data models are dynamic and possibly yield estimates that are biased by endogeneity issues. We adopt GMM techniques to account for these endogeneity issues.

Our finding that foreign aid has such a clear, and opposite, effect on economic growth depending on the World Bank income classification is novel and has important

policy implications. This result suggests more broadly, that the effects of foreign aid depend on the development stage of the country under consideration, conditional on economic characteristics that we control for. Since we find that foreign aid has beneficial effects in high-income countries (latter stages of development), this suggests that countries need to gain some "traction" before foreign aid can help. In fact, our results show that foreign aid actually hurts economic growth before that "traction" is gained. There is clearly something about the early stages of the development process that inhibits efficient use of resources provide by foreign aid. We show that poor institutional quality and corruption certainly act as an inhibitor to foreign aids benefits, but this cannot be the only road block because we find that same inhibiting effect in high-income countries that benefit from foreign aid.

ENDNOTES

[1]See Harrod (1948) and Domar (1947) for growth models that were the most well-known formulations of the gap theory. The models assume that there is an excess supply of labor in less developed countries and that the growth in these countries is constrained only by the availability and productivity of capital. Since savings in the developing countries are likely to be too low to achieve a targeted growth rate, foreign aid was needed in order to relieve the savings constraint and increase investment, thus leading to economic growth.

[2]See for example: (Papanek 1972; Papanek 1973; Mosley 1980; Mosley at al.; 1987).

[3]See for example: (Bacha 1990; Taylor 1990; Rajan and Subramanian 2005; M' Amanja and Morrissey 2006; Burnside and Dollar 2000).

[4]The World Bank issued the first World Development Report in 1978. Their classification of developing countries has changed over time. For instance, in 1978 they sub-classify these countries between "low" and "middle income" countries. The installment we use in this paper (WDR 2012) divides developing countries into "low" and "high" income. The benchmark criteria have also changed. For example, in 1978 the benchmark was based in per capita GNP (US$250) whereas in 2012 the benchmark was based in per capita Gross National Income (US$1035).

[5]We could find reliable and consistent annual data from 1970 to 2010.

[6]This relationship between the unemployment rate and economic growth was famously pointed out in the early 1960s by economist Arthur Okun, known as "Okun's law." Knotek (2007) updated Okun's analysis, which covered data from 1948 to 2007 and came to much the same conclusion.

[7]With this differenced-GMM approach the endogenous variable is properly instrumented with suitable lags of its own levels---other exogenous regressors and outside variables may enter the matrix of instrument in a standard way. However, with this differenced-GMM Arellano and Bond estimator, the lag levels may be poor instruments for first differences in models (like ours) in which highly persistent variables are considered. Thus we opt to make use of an augmented version - a system-GMM approach first described in Arellano and Bond (1991). For details on this estimation procedure, see :(Blundell and Bond 1998). We applied the XTABOND2 procedure in STATA, which conducts a finite-sample correction to the two-step covariance matrix to correct for the downward bias of the standard errors (see Windmeijer 2005).

REFERENCES

Alvi E., D. Mukherjee and Shukralla, E.K. 2000, "Aid, Policies, and Growth in Developing Countries: A New Look At The Empirics", *Southern Economic Journal*, vol. 74, no. 3, pp. 693-706.

Anderson, T.W. and Hsiao, C. 1981," Estimation of Dynamic Models with Error Components", *Journal of the American Statistical Association*, vol. 76, pp: 595-606.

Arellano, M., and Bond, S. 1991," Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations", *Review of Economic Studies*, vol. 58, pp. 277-297.

Bacha, E. L. 1990, "A Three-Gap Model of Foreign Transfers and the GDP Growth Rate in Developing Countries", *Journal of Development Economics*, vol. 32, pp. 279–296.

Baltagi, B. H. 2008," Econometric Analysis of Panel Data*",*. Fourth Edition, Chichester: John Wiley & Sons.

Barro, R.J. 1991, "Economic Growth in Cross Section of Countries", *Quarterly Journal of Economics*, vol. 106, pp. 407-444.

Blundell, R., & Bond, S. 1998, "Initial Conditions and Moment restrictions in Dynamic Panel Data Models", *Journal of econometrics*, vol. *87*, no. 1, pp. 115-143.

Boone, P. 1996, "Politics and The Effectiveness of Foreign Aid," *European Economic Review*, vol. 40, pp. 289–329.

Brautigam, D. A. and Knack, S. 2004, "Foreign Aid, Institutions, and Governance in Sub-Saharan Africa", *Economic Development and Cultural Change*, vol. 52, no. 2, pp. 255- 285.

Burnside, C. and Dollar, D. 2000, "Aid, Policies and Growth", Policy Research Working Paper, No. 1777, *The World Bank, Development Research Group*.

Chenery, H. B., and Strout, A. 1966, "Foreign Assistance and Economic Development", The *American Economic Review*, vol. 56, pp. 679-733.

Domar, E. 1947, "Expansion and Employment", *American Economic Review*, vol. 137, pp. 34-55.

Doucouliagos, H. and Paldam, M. 2006, "Aid Effectiveness on Accumulation. A Meta Study", *Kyklos*, vol. 59, pp. 227-54.

Dowling, M. and Hiemenz, U. 1982, "Aid, Savings and Growth in the Asian Region", Economic Office Report Series 3, *Asian Development Bank: Manila*.

Ekanayake, M. and Chatrna, D. 2010, "The Effect of Foreign Aid on Economic Growth in Developing Countries", *Journal of International Business and Cultural Studies*, vol. 32, pp. 1–13.

Friedman, M. 1958, "Foreign Economic Aid", *Yale Review*, vol. 47, no. 4, pp. 501-516.

Gomanee, K. Gomanee, K., Girma, S. and Morrisey, O. 2005, "Aid and Growth in Sub-Saharan Africa: Accounting for Transmission Mechanisms", *Journal of International Development*, vol. 178, pp. 1055–1075.

Griffin, K. 1970, "Foreign Capital, Domestic Savings and Economic Development", *Bulletin of the Oxford University Institute of Economics and Statistics*, vol. 321, pp. 99–112.

Griffin, K. and Enos, J.L. 1970, "Foreign Assistance: Objectives and Consequences", *Economic Development and Cultural Change*, vol. 18, pp. 313-327.

Grossman, G. M., Helpman, E. 1991." Innovation and Growth in the Global Economy", Cambridge: MIT Press.

Gupta, K.L. 1970, "Foreign Capital and Domestic Savings: A Test of Haavelmo's Hypothesis with Cross-Country Data: A Comment", *Review of Economic and Statistics*, vol. 52, no. 2, pp. 214–16.

Harberger, A. C. 1998, "A Vision of the Growth Process", *American Economic Review*, vol. 88, no. 1, pp. 1-32.

Harrod, R. 1948, "Towards a Dynamic Economics", London: Macmillan.

Hatemi-J, A. and Irandoust, M. 2005, "Foreign Aid and Economic Growth: New Evidence from Panel Cointegration", *Journal of Economic Development*, vol. 301, pp. 71-80.

Hsiao, C. 2003," Analysis of Panel Data", Cambridge University Press.

International Country Risk Guide 2015, *The PRS Group*, www.epub.prsgroup.com/products/international-country-risk-guide-icrg

Jon, Q. 2003, "Curbing Corruption in Asia: A Comparative Study of Six Countries", *Eastern University Press*, pp. 1-241.

Kaspar, W. 2006, "Make Poverty History: Tackle Corruption", *The Centre for Independent Studies*, vol. 67, New South Wales: CIS.

Knack, S. 2000, "Aid Dependence and the Quality of Governance: A Cross-Country Empirical Analysis", *Southern Economic Journal*, vol. 682, pp. 310-329.

Knotek, E. 2007," How Useful Is Okun's Law?" Federal Reserve Bank of Kansas City, *Economic Review*, QIV, 4th Quarter, pp. 73–103.

Kormendi, R. C., and Meguire P. G. 1985, "Macroeconomic Determinants of Growth: Cross-country Evidence", *Journal of Monetary Economics*, vol. 16, pp. 141-163.

Kosack, S. 2003, "Effective Aid: How Democracy Allows Development Aid to Improve the Quality of Life", *World Development*, vol. 3, no.1, pp. 1–22.

Kourtellos A, C.M. Tan, and Zhang, X. 2007," Is the Relationship Between Aid and Economic Growth Nonlinear?", *Journal of Macroeconomics*, vol. 293, pp. 515–540.

Levine, R., and Renelt, D. 1992, "A Sensitivity Analysis of Cross-country Regressions", *The American Economic Review*, vol. 824, pp. 942-963.

Levy, V. 1988, "Aid and Growth in the Sub-Saharan Africa: The Recent Experience", *European Economic Review*, vol. 32, pp. 1777-1795.

Mallik, G. 2008, "Foreign Aid and Economic Growth: A Cointegration Analysis of the Six Poorest African Countries", *Economic Analysis and Policy*, vol. 382, pp. 251-260.

M'amanja, D. and Morrissey, O. 2006, "Foreign Aid, Investment, and Economic Growth in Kenya: A Time Series Approach", *Credit Research Paper, No. 06/05, University of Nottingham*.

Moreira, S.B. 2005, "Evaluating the Impact of Foreign Aid on Economic Growth: A Cross-country Study", *Journal of Economic Development*, vol. 302, pp. 25-49.

Morrissey, O. 2006, "Aid or Trade, or Aid and Trade?" Australian *Economic Review*, vol. *39*1, pp. 78-88.

Mosley, P. 1980," Overseas Aid: Its Defence and Reform", Brighton: Wheatsheaf.

Mosley, P., Hudson, J. and Horrell, S. 1987 "Aid, the Public Sector and The Market in Less Developed Countries", *Economic Journal*, vol. 97, pp. 616–41.

Mundell, R. A. 1965, "Growth, Stability, and Inflationary Finance", The *Journal of Political Economy*, pp. 97-109.

Nerlove, M. 1967, "Experimental Evidence on the Estimation of Dynamic Economic Relations from a Time Series of Cross Sections", *Economic Studies Quarterly*, vol. 18, pp. 42-74.

Papanek, G.F. 1972, "The Effects of Aid and Other Resource Transfers on Savings and Growth in Less Developed Countries", *Economic Journal*, vol. 82, pp. 934–50.

Papanek, G. F. 1973, "Aid, Foreign Private Investment, Savings and Growth in Less Developed Countries", *Journal of Political Economy, vol.* 811, pp. 120–130.

Rajan, R and Subramanian, A. 2005, "What Undermines Aid's Impact on Growth?", *IMF Working Paper,WP/05/126*.

Rajan R.G. and Subramanian, A. 2008, "Aid and Growth: What does the cross-country evidence really show?", *Review of Economics and Statistics*, vol. 904, pp. 643-665.

Taylor, L., 1990," A Three-Gap Model, Problems of Developing Countries in the 1990s", *World Bank, Washington DC*, pp. 55–90.

Voivodas, C.S. 1973, "Exports, Foreign Capital Inflow and Economic Growth", *Journal of International Economics*, vol. 3, pp. 337-349.

Weisskopf, T. E. 1972, "The Impact of Foreign Capital Inflow on Domestic Savings in Underdeveloped Countries", *Journal of international Economics*, vol. *2*1, pp. 25-38.

Werlin, H. 2005," Corruption and Foreign Aid in Africa", *Foreign Policy Research Institute*, vol. 49, no. 3, pp. 517-527.

White, H. 1992," The Macroeconomic Impact of Development Aid: A Critical Survey", *The Journal of Development Studies*, vol. 28, no. 2, pp. 163–240.

Windmeijer, F. 2005, "A Finite Sample Correction for the Variance of Linear Efficient Two-Step GMM Estimators", *Journal of Econometrics*, vol. 261, pp. 25-51.

World Bank 2010, 2011, 2012, 2013, 2014, 2015, *World Development Indicators, World Bank, Washington, D.C.*

World Bank 2012, *World Development Report, World Bank, Washington, D.C.*