AID AND GROWTH: A COMPARATIVE STUDY BETWEEN SUB-SAHARAN AFRICA AND ASIA

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Abstract
This study investigates the relationship between aid and economic growth and analyses factors that might have influenced this relationship in two major aid recipients regions, Sub-Saharan Africa and Asia that started from similar levels of real GDP per capita but had different patterns of development. The results from applying generalised method of moments procedures to a sample of 44 Sub-Saharan African countries and to a sample of 31 Asian countries from 1972 to 2007 indicate a negative relationship between aid and growth in both regions. Mixed results were found for the influence of policy variables, institutional quality and financial development.
JEL classification: O11; F35
Keywords: foreign aid; economic growth; Sub-Saharan Africa; Asia; aid effectiveness

1. Introduction

Although starting from a similar position in terms of real GDP per capita, Sub-Saharan Africa and Asia have taken different paths in terms of economic growth. From the 1960s onwards, most Asian economies were able to sustain a positive average growth rate, while the African region experienced a sharp decline of its average growth rate. In the last few decades, even though the rate of economic growth in Africa has risen, this region, especially Sub-Saharan Africa, remains the lowest-income region in the world. One of foreign aid flows' main goals is to promote economic growth so it is not surprising that these regions have received large aid inflows, with Sub-Saharan African aid receipts significantly larger than those of the Asian region. Bearing these regional characteristics in mind, the aim of this study is to empirically analyse whether aid contributed positively to economic growth in each of these two regions and to identify some of the factors which might be directly related to the effectiveness of aid in each case and thus might shed some additional light on their differential growth performance.

The question of aid effectiveness has been largely debated in the literature due to its implications to policies regarding aid allocation. Several authors have empirically tested this relationship and have tried to identify what undermines or exacerbates the effects of aid on economic growth and which are the mechanisms of transmission from aid to growth. The definition of the Millennium Development Goals (MDGs)[1] by the United Nations in 2002 has awakened the attention of governments and institutions to the question of poverty and inequality around the world. These eight goals, aimed at

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[1] The Millennium Development Goals include eradicating extreme poverty and hunger, achieving universal primary education, promoting gender equality and empower women, reducing child mortality, improving maternal health, combating HIV/AIDS, malaria, and other diseases, ensuring environmental sustainability, and developing a global partnership for development.

promoting social and economic development, are to be accomplished until 2015. Although considering other indicators of human development accomplishment, the MDGs are also based on the assumption that the impact of aid in economic growth is generally positive. However, the results of several studies have pointed in the opposite direction, i.e. that aid has been inefficient in fostering economic growth. More recently, the economic crisis faced by Europe and the likelihood of an associated decrease in remittance flows clearly put the debate of aid effectiveness back in the agenda. This study contributes to the empirical literature by taking a deeper regional perspective on the relationship between aid and growth and by systematically investigating determinants of aid effectiveness, taking into account the possible heterogeneity of the relationship across regions, but interpreting the results from a comparative standpoint.

For this purpose, we estimate a standard growth regression for two samples, a sample of 44 Sub-Saharan African countries and a sample of 31 Asian countries, over the period 1972-2009, comparing the results associated with the use of different GMM panel data econometric techniques. The results lend some support to the idea of a negative relationship between aid and growth in both regions. In addition, mixed results were found for the influence of policy variables, institutional quality and the level of financial development on aid effectiveness, depending on the region and on the estimation methodology used.

The remainder of this paper is organised as follows: section 2 briefly describes aid and growth trends in Asia and Sub-Saharan Africa. Section 3 presents a review of some of the empirical literature on aid effectiveness. Section 4 specifies the empirical model, describes the variables included in the regressions and reports the methodologies and results. Finally, section 6 concludes.

2. Aid and growth trends in Asia and Sub-Saharan Africa

When analysing the patterns of aid flows and economic growth at a regional level, one notices a striking difference in the trajectories of Asia and Sub-Saharan Africa. Figure 1 portrays the evolution of real GDP per capita in three different regions, East Asia & Pacific (all-income levels, 36 countries), South Asia (8 countries) and Sub-Saharan Africa (all income levels, 49 countries) over the period 1960-2010. Comparing the values for these regions, it is interesting to notice that GDP per capita is higher in Sub-Saharan Africa than in South Asia until the last five years under analysis, when the value for GDP per capita became lower in Sub-Saharan Africa. The East Asia & Pacific region has departed from a slightly better position when compared to the other two regions, and additionally experienced a sharp upward trend in GDP. In terms of average growth rates of real GDP for 10-year periods, the patterns of growth were very irregular. Average growth rates were positive in the three regions, with the exception of Sub-Saharan African rates in the periods 1981-1990 and 1991-2000. Asian average growth rates have been higher than the African rates during almost all the 10-year periods, registering a strong performance especially during the last decade.

Figure 2 plots the net ODA flows per capita for Asian and Sub-Saharan African regions. From the analysis of Figure 3, it is straightforward to conclude that the value of aid inflows is higher in Sub-Saharan African countries than in Asian countries. During the 1960s, the values of ODA per capita received by these countries were not significantly different. However, from the 1970s to the present, the value of aid flows to

Sub-Saharan African countries has soared. While in 1972 the difference in ODA per capita received between Sub-Saharan Africa and the Asian regions was around 3US$, this value has climbed to around 50US$ in 2006.

Figure 1. GDP per capita (constant 2000 US$)

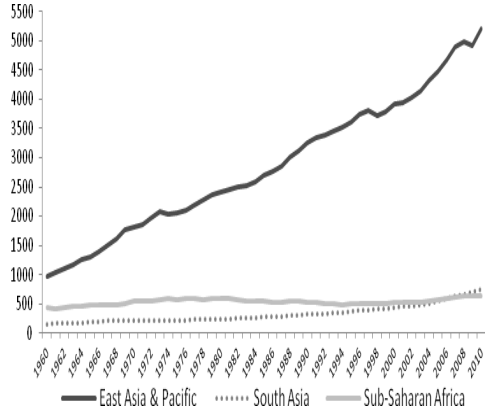
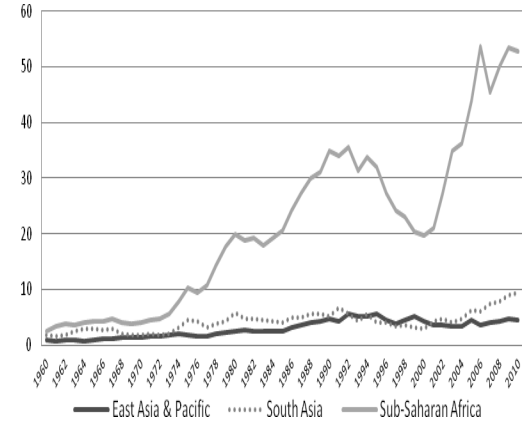


Figure 2. Net ODA per capita by recipient region (current US$)

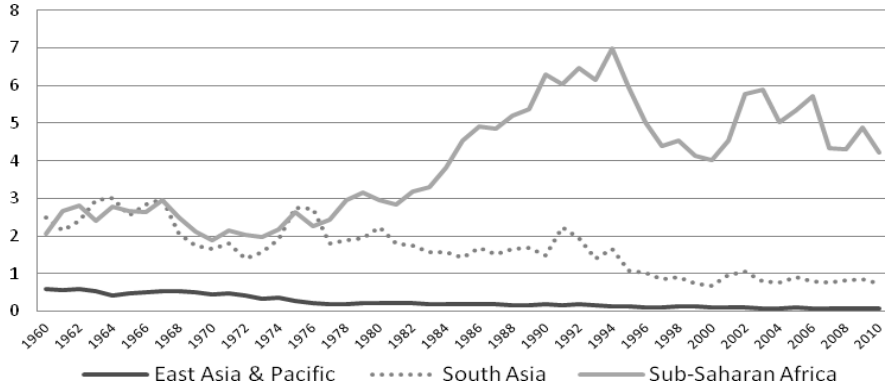


Source: WB (2012), *World Development Indicators*, Washington, D.C.: World Bank.

When analysing ODA as percentage of GNI (Figure 3), one notices an increase in aid dependence of Sub-Saharan Africa from the mid 1970s to the mid 1990s mainly due to its decreasing GNI. The downward trend that followed this period was caused by a reduction of aid flows to this region (see Figure 2). Various reasons are given for this decline. Some was a result of currency values and classification factors, yet even after their correction the contraction in net flows of ODA in real terms has been significant (Botchwey 2000). With respect to African countries, donor fatigue was also pointed as a cause. This was mainly a result of increasing domestic fiscal pressures and of a change in donor priorities to other parts of the world, namely Eastern Europe and the former Soviet Union (Loxley and Sackey 2008). However, as the flows increased again in the early 2000s, the aid dependence of Sub-Saharan Africa augmented once more. On the contrary, the dependence ratio in Asian regions has dwindled significantly.

Previous studies have made reference to the contrasting features found for the Asian and the Sub-Saharan African regions. In their study of the Asian region, Dowling and Hiemenz (1983, 3) mentioned that in the seventies “Asia has grown rapidly compared to other developing areas”, while, for the case of Africa, Salisu (2010, 3) suggested that “there is more to the economic problems prevalent in Africa than the low revenue base or maybe there is a disconnect between aid and growth in Sub-Saharan Africa”. The “striking difference in development trajectories of East Asia compared to Sub-Saharan Africa since the beginning of the 1960s” was “the point of departure” for a study held by the Japan Bank for International Cooperation (2008, 4), in which the authors claim that “the contribution of aid to economic development appears to diverge significantly between these two regions, in particular in assisting the development of the institutional capacity to sustain economic development” (JBIC 2008, 1).

Figure 3. Net ODA received as percentage of GNI by recipient group (current US$)



Source: WB (2012), *World Development Indicators*, Washington, D.C.: World Bank.

These considerations led to studies where the samples of countries in analysis were restricted to these two regions, or to one of them in specific, arguing that combining regions with such different realities does not fully capture their uniqueness. The approach taken in this study is legitimised in the light of these arguments. Having observed such different trends in aid and growth and bearing in mind the divergence in their development paths and the specificity of the factors and conditions that propelled the diverse outcomes, it appears to be adequate to analyse two different samples, one for each region, and to draw conclusions from the comparison of the estimated results.

3. A brief overview of the empirical literature

The impact of aid on growth has been long debated among researchers, with the first empirical studies dating back to the early 1970s. The theoretical and empirical approaches have evolved, originating different results and policy recommendations [see Hansen and Tarp (2000) for a description of this evolution]. The benchmark study on aid effectiveness is that of Burnside and Dollar (2000). These authors have concluded that aid has a positive effect only in countries pursuing "good" policies. This claim had a great impact on international aid agencies, namely the World Bank, which reported their results and claimed for a need to increase aid flows. Still, it has also triggered responses from several authors and has entailed an intense debate [Dalgaard and Hansen (2000); Hansen and Tarp (2001); Easterly et al. (2004); Burnside and Dollar (2004a)]. Nevertheless, some lent support to their work and built upon the study to find specific criteria for targeting aid [Collier and Dehn (2001); Collier and Dollar (2002)]. Yet, these studies have been submitted to several tests relating to specification differences, variable definitions and sample expansion by Roodman (2007) who found their results to be fragile, especially to sample expansion.

Many others have followed different approaches to the subject of aid effectiveness[2], accounting for the possibility of a negative impact of public instability [Chauvet and Guillaumont (2003)] or trying to identify the impact of institutional quality

[2] For comprehensive surveys see Hansen and Tarp (2000), Hermes and Lensink (2001), McGillivray et al. (2006) and Temple (2010).

[Burnside and Dollar (2004b); Baliamoune-Lutz and Mavrotas (2009)]. The hypothesis that external and climatic factors (trends in terms of trade, short-term export instability and natural disasters, among others) may influence aid effectiveness has also been a subject of investigation [see Collier and Dehn (2001), Chauvet and Guillaumont (2003), Dalgaard et al. (2003) or Rajan and Subramanian (2005) as examples]. During the last decades, other approaches have been pursued. Clemens et al. (2004) and Minoiu and Reddy (2007, 2010) divided aid into categories, according to its target. Dovern and Nunnenkamp (2007) pursued a different perspective and focused on the effect of aid on growth accelerations. Other authors tried to shed light on aid effectiveness by tracking an outcome more specific than economic growth, namely education and health improvements, while some applied different methods of estimation.

The results are far from unanimous. Doucouliagos and Paldam (2008, 2009, 2011, 2012) have assessed the published research on foreign aid effectiveness applying meta-analysis to an initial set of 68 papers in 2008 and enlarging it in 2011 to 105 papers and a total of 1217 estimates of aid effectiveness. They have found discouraging results for the average effect of aid in generating growth. Their claim has been defied by Mekasha and Tarp (2011) who have reached opposite conclusions. However, in a study answering to these authors, Doucouliagos and Paldam (2012) discuss some methodological disagreements and argue that their study validates the initial findings.

In this paper we pursue a somewhat different approach, focusing on specific regions, namely Sub-Saharan Africa and Asia, following the line of research of other authors who have also tried to explore the regional differences in terms of aid effectiveness. Several studies have focused on the successful case of Asia[3], where "growth rates suggest[ed] that aid flows seem[ed] to have been well utilized" (Dowling and Hiemenz 1983, 3) and on the challenging results for Africa[4], a region that "has been a major recipient of aid for decades, yet has exhibited very poor economic growth performance over that period" (Gomanee et al. 2005, 1055).

For the case of Africa, Gomanee et al. (2005) focused on the transmission mechanisms through which aid impacts on growth. Using a sample of 25 Sub-Saharan African countries over the period 1970 to 1997 and residual generated regressors, they found a positive sign for the aid effect. Investment was identified as the most significant transmission mechanism, though they also considered effects through financing imports and government consumption spending. In a paper examining trends in official aid to Africa from 1960 to 2002, Addison et al. (2005) found that «aid does appear to have contributed to growth in SSA and thereby, to poverty reduction». Loxley and Sackey (2008) have included 40 countries in their study on the effect of aid on income growth in Africa. Considering the period between 1973 and 2004 and with the use of the ordinary least squares estimator, their results indicated a positive and statistically significant relationship between aid and economic growth via investment. However, other studies point to a negative effect of aid on growth. Mallik (2008) examined the effect of aid in promoting growth in "the six poorest and highly-dependent African countries", Central African Republic, Malawi, Mali, Niger, Sierra Leone and Togo. Applying cointegration analysis to periods varying between 1965 and 2005 depending on the country, the author

[3] For a brief reference to earlier studies see Burke et al. (2006) and Chowdhury and Das (2011).
[4] Country specific studies are mentioned in Addison et al. (2005) and Mallik (2008).

concluded that in five out of the six countries there is a negative relationship between aid and growth in the long run and, with the exception of Niger, in the short run there seems to be no significant effect of aid in economic growth.

Burke et al. (2006) empirically tested the effect of aid on growth in three Asian countries, Thailand, Indonesia and the Philippines. Using data from 1970 to 2000 and a simultaneous-equation model these authors found no sufficient evidence to claim that aid had a significant effect on growth in these regions for the period under analysis. Asteriou (2009) investigates this relationship in Bangladesh, Nepal, India, Sri Lanka and Pakistan, for the period spanning from 1975 to 2002 using mean group and pooled mean group estimation techniques. He found robust evidence of a positive impact of foreign aid on GDP growth. Focusing also on South Asia, Kaosar and Idrees (2010) use the Least Squares Dummy Variables (LSDV) model with fixed effects and consider the period ranging from 1971 to 2005. The obtained results lead them to support the conclusions that preclude foreign aid as effective. Following the same line of research of Asteriou (2009), but considering a period from 1976 to 2008 and a sample which included Bangladesh, India, Nepal, Pakistan and Sri Lanka, Chowdhury and Das (2011) have also tried to verify the link between aid and growth in the same Asian region. The results found using time series and panel cointegration procedures indicate a positive relationship.

The analysis of subsamples of the world regions carried out by some authors also allows for some conclusions on aid effectiveness in these two regions. Duc (2006) investigated the regional differences of the relationship between aid and growth over the period 1975-2000. Among several conclusions, the author highlighted the adverse effect of aid on growth in Sub-Saharan African countries and the positive effect of aid on growth in South Asian nations during the period 1992-2000. Contrarily, Ekanayake and Chatrna (2010) used a larger sample with data for 85 countries for the period 1980-2007 and confirmed the existence of a positive effect of aid on growth in African countries but found a negative effect of aid on growth in Asian countries. However, the coefficients were not statistically significant.

4. Empirical estimations

4.1. Empirical model and data

We start with a linear growth regression specification and then extend it to account for interaction terms between aid and the variables which can have an impact on its effectiveness. The basic equation is:

$$y_{i,t} - y_{i,t-1} = \beta_y y_{i,t-1} + \beta_a a_{i,t} + \beta_z^{'} z_{i,t}^{'} + \mu_t + \varepsilon_{i,t} \qquad (1),$$

where the subscripts *i* and *t* represent countries and time, respectively. The variable y is the logarithm of real GDP per capita, $a_{i,t}$ is aid receipts relative to GDP and $z_{i,t}^{'}$ is a vector of exogenous variables that might affect growth. μ_t are time-fixed effects to capture the impact of business cycles and $\varepsilon_{i,t}$ is the error term.

Following what is standard practice in empirical growth studies, we allow growth in period *t* to depend on $y_{i,t-1}$ to capture the convergence effects and so β_y is expected to be negative. The term $a_{i,t}$ is included to assess the impact of foreign aid on growth and

β_a is expected to be positive. The subset of the vector of the control variables, $z'_{i,t}$, was selected considering not only their importance as growth determinants, but also their potential for affecting the growth response to aid inflows. Bearing in mind the indicators which have appeared in empirical growth studies, we include in the vector of the control variables: human capital, government consumption relative to GDP, trade openness relative to GDP, inflation, institutional quality and broad money (M2) over GDP. We also include the logarithm of population and gross capital formation as a proxy for investment.

We then extend the regression specification by including, in turns, the interaction of aid with each of the control variables which may have an impact on its effectiveness: M2 over GDP, government consumption relative do GDP, inflation, trade openness relative to GDP and institutional quality. The following equation is the regression with an interaction term.

$$y_{i,t} - y_{i,t-1} = \beta_y y_{i,t-1} + \beta_a a_{i,t} + \beta'_z z'_{i,t} + \beta_1 a_{i,t} z^1_{i,t} + \mu_t + \varepsilon_{i,t} \qquad (2),$$

where $z^1_{i,t}$ represents one of the control variables in particular. We interact aid with the control variables one at a time to simplify both the estimations and the interpretation of the results. Each of the regressions was run for the two regions in separate in order to allow for comparative analysis.

Our sample consists of a panel dataset that comprises 75 countries, 44 Sub-Saharan African countries and 31 Asian countries[5], from 1972 to 2007, dividing the total period into nine four-year time periods. Table A.2 in the Appendix provides details on the sources and construction of the different variables. Real per capita GDP growth is measured as the log difference of GDP per capita in constant 2000 US$. Aid is measured as net Official Development Assistance (ODA), relative to GDP[6]. Although other studies have used different measures of aid, namely Effective Development Assistance (EDA), we opt to employ ODA due to data availability and for an easier comparison with the results obtained in other studies. Additionally, despite the fact that we recognise that the distinct components of ODA have dissimilar impacts in economic growth, the goals of this study led us not to include the disaggregation of ODA.

Concerning the control variables, the regression includes the gross ratio of total secondary enrolment as a measure of human capital. Following Barro and Sala-i-Martin (2004), we also add a government consumption variable which intends to measure expenditures that do not have direct effects on productivity, but entail distortions of private decisions. While the first is expected to have a positive effect on growth, the impact of the second one is expected to be negative. Given that the government consumption variable partly represents choices made by governments, the interaction of this term with aid is included to verify if it has some influence on the effect of aid. In addition, we include the logarithm of population as a measure of the labour force and gross capital formation over GDP to account for investment.

The second group of control variables is related to macroeconomic policy indicators. The policy index used by Burnside and Dollar (2000) has been subject to a lot of criticism. Instead of including a policy index, other authors (e.g. Gomanee et al. 2005

[5] Table A.1 in the Appendix provides the full list of the countries in the sample.

[6] Due to data availability, aid was computed as net ODA (in current US$) over GDP (in current US$).

and Loxley and Sackey 2008) have incorporated policy indicators and this will be our approach as well. Trade openness, measured by the ratio of exports plus imports to GDP[7], is included to account for the degree of openness of the economy and inflation is added as an indicator of monetary policy[8]. Following the reasoning of other studies, including the work by Burnside and Dollar (2000), we account for the fact that policy measures taken in each country may have an influence on aid effectiveness. Though recognising the limitations of these variables to accurately represent macroeconomic policies, it is our belief that they can provide some insight regarding their influence in the effect of aid on economic growth. Having this in mind, each of their terms will be interacted with the aid term.

To capture institutional and political effects, we use a measure of institutional quality[9], which averages the scores of failure of state authority, collapse of democratic institutions and violence associated with adverse regime changes. A bad level of institutional quality (which corresponds to a high level of the index) will have a negative effect on economic growth. Considering that "a corrupt, incompetent government is not going to use aid wisely and outside donors are not going to be able to force it to change its habits" (Burnside and Dollar 2004b, 2) and that "[i]f the channel through which aid promotes growth is investment, then institutions should play a crucial role" (Baliamoune-Lutz and Mavrotas 2009, 511), the term Aid × Inst. quality is included to verify the influence of institutional quality in aid effectiveness. In addition, broad money (M2) over GDP is used as a proxy for the development of the financial system. This variable is lagged one period because of concerns over its endogeneity. We also include the interaction of this variable with aid to investigate whether the level of financial development influences the aid effect on growth. Some data was not available for some countries in some time periods, so the panels obtained for each of the regions are unbalanced.

4.2. Estimation methodology and results

The regression specification described in the previous paragraphs poses some challenges for estimation. The first is the possible existence of endogeneity of aid. As it was highlighted by several authors, aid cannot be perceived as a lump-sum transfer, independent from the level of income (Hansen and Tarp, 2001). This question undermines the results obtained using the ordinary least squares (OLS) estimator, which will be inconsistent. In addition, the possibility of a significant correlation between the policy variables and the country-specific effects would result in inconsistent instrumental variables estimators because the policy indicators are used as instruments. Part of the literature on economic growth has focused on the debate about the endogeneity of the

[7] There is a recognized difficulty in measuring openness and therefore there are various possible indicators. We opt not to use the popular indicator by Sachs and Warner (1995) and follow the choice made by several other authors (e.g. Loxley and Sackey 2008 and Chowdhury and Das 2011).

[8] Initially, the variable budget surplus relative to GDP was included to represent fiscal policy. However, it was later excluded due to collinearity with the government consumption variable.

[9] Although there are various measures which account for political instability and institutional quality, due to data availability the chosen measure was the index constructed by the Political Instability Task Force (PITF, 2010).

explanatory variables in growth equations. According to the results of these studies, it can be assumed that most of the explanatory variables included in aid-growth regressions are probably endogenous (Hansen and Tarp, 2001). In order to try to overcome these specificities, we use the generalised method of moments (GMM) estimator, developed for dynamic models of panel data, as it offers a fairly robust solution to the problems of possible misspecification[10].

In this vein, regressions are estimated using first the Difference GMM estimator and then the System GMM estimator (Arellano and Bond 1991; Arellano and Bover 1995; Blundell and Bond 1998), both considering the two-step estimations[11,12]. As using lagged difference as an instrument results in an estimator with a large variance, to solve this, Arellano and Bond (1991) propose the use of the generalised method of moments (GMM) dynamic panel estimator. Blundell and Bond (1998) have shown that if the instruments are only weakly correlated with the endogenous variables, the estimates will be biased. To reduce potential biases and imprecision, Arellano and Bover (1995) and Blundell and Bond (1998) use a system, referred to as "system GMM", that combines a regression in differences (using lagged values as instruments) and a regression in levels (using the additional instruments) with a different vector of instruments for each type of regression.

Regressions (1.1)-(1.6) and (2.1)-(2.6) are estimated considering as instruments the lags of the dependent variable using all available orthogonality conditions and, since the additional regressors are considered exogenous, they are used as their own instruments. However, though asymptotically exploiting all possible orthogonality conditions yields maximal efficiency, a smaller subset might be preferable in finite samples. As this is the case in this study and given the small number of observations in each of the subsamples, we restrict the number of lags of the dependent variable used as instruments. Also, in this specification, the regressors are treated as endogenous. In regressions (1.7)-(1.12), no lags of y earlier than *t-4* are used as instruments. In regressions (2.7)-(2.12), when the Difference GMM is used, no lags of y earlier than *t-3* are used as instruments and, when System GMM is used, no lags of y earlier than *t-5* are used as instruments. The Sargan test and a second-order serial correlation test were run in order to address the validity of the estimations.

In each table of results, the first two columns indicate the results for the estimation of the base specification given by equation (1), excluding any interaction terms. The results in the remaining columns refer to the estimations including each of the interaction terms in turns, as specified in equation (2). A constant and time dummies were

[10] The model was first estimated using standard pooled OLS, and fixed effects and random effects methods. The results are available from the authors upon request. They are different from the ones presented in this study. The sign of aid is negative for both regions, though it has no statistical significance in the case of Sub-Saharan Africa.

[11] All the regressions in this study were estimated using GRETL version 1.9.2csv (2010) available from http://gretl.sourceforge.net/.

[12] In two-step estimation, standard errors are by default computed using the Windmeijer (2005) correction. For comparison of results with other studies, an option was used to emulate DPD package for Ox in the estimations, which retains the constant and specifies that time dummies are entered in levels instead of in differenced form.

included but their coefficients are not reported here as they do not offer a significant contribute to explaining the differences in growth rates.

Table 1 summarises the main results for the estimations using the Sub-Saharan African countries[13], which vary when the estimation method is changed from GMM-DIF to GMM-SYS. The most significant variables are aid, human capital and the logarithm of population. Aid has a negative and significant impact on aid regardless of the estimation method. The inclusion of both the interaction with broad money and with government consumption indicated that these variables have no influence on aid effectiveness, though the magnitude of the aid coefficient diminishes and it loses significance.

The coefficient of the term Aid × Inflation is positively significant indicating that in countries with higher levels of inflation, the impact of aid will be also be higher. In addition, its inclusion leads to an increase in the magnitude of the aid coefficient, which remains statistically significant. A part of the literature on aid effectiveness has studied the existence of Dutch disease effects, according to which large inflows of foreign capital, including aid, can lead to inflation (Loxley and Sackey 2008). Accordingly, the positive sign found for the Aid × Inflation may be related to the existence of these effects. Concerning the variable trade openness, the results indicate that aid has a negative impact on growth conditional on the level of openness to international trade. The higher the degree of openness of an economy, the lower will be the impact of aid on growth. This result, which is at odds with the predicted, may be influenced by the effect of the terms of trade and of the difference between the value of imported and exported goods.

Finally, the results for the Aid × Inst. quality term lead one to conclude that this variable has no impact on the effect of aid on economic growth. The coefficients of the variables level of initial GDP, inflation, institutional quality and gross capital formation have the expected sign, but most of them are not statistically significant. The level of financial development has a positive effect on economic growth. However, it loses significance when the GMM-SYS estimator is used. The sign of the coefficients changes with the methodology and no statistical significance is found. Concerning the variable trade openness, in contrast with the theoretical predictions, the results indicate a small but negative impact on growth. However, the coefficients lose significance when GMM-SYS is used. The results for the variables human capital and the logarithm of population indicate a positive and significant effect of the first on economic growth and a negatively significant effect of the second. Turning now to the case of Asian countries, the results are presented in Table 2. In terms of statistical significance, the results are similar to those obtained for the Sub-Saharan African sample.

As in Table 1, the results change when different estimation methods are used. Looking at the results in the first row of variables of Table 2, aid has a negative and significant impact on economic growth regardless of the estimation methodology applied, despite the fact that the coefficients lose some significance when GMM-SYS is used. The magnitude of the coefficients is greater than in the results for the African countries. The differences between the two subsamples are deeper when one considers the results for the interaction terms.

[13] For the results presented in Tables 1-4 the respective Sargan test *p*-values imply that one cannot reject the null hypothesis that the instruments are valid. In addition, the results for the test of serial correlation indicate the absence of second-order serial correlation, which means that the estimated coefficients are not rendered inconsistent.

Table 1. Aid and growth regressions with and without interactions, GMM estimators (Sub-Saharan Africa). Dependent Variable: Growth rate of real per capita GDP

Sample												
Regression	(1.1)		(1.2)		(1.3)		(1.4)		(1.5)		(1.6)	
Method	D GMM	S GMM	D GMM	S GMM	D GMM	S GMM	D GMM	S GMM	D GMM	S GMM	D GMM	S GMM
Aid	-0,021 ***	-0,033 ***	-0,013 *	-0,018 *	-0,015	-0,023	-0,076 ***	-0,088 ***	-0,007	-0,015	-0,021 **	-0,031 ***
	(0,008)	(0,01)	(0,008)	(0,01)	(0,017)	(0,026)	(0,019)	(0,016)	(0,01)	(0,018)	(0,009)	0,012
Initial GDP (natural logarithm)	-1,013	-1,054	-1,02	-1,066	-1,015	-1,051	-1,042	-1,066	-1,008	-1,079	-1,011	-1,049
	(0,054)	(0,068)	(0,051)	(0,055)	(0,054)	(0,075)	(0,058)	(0,061)	(0,058)	(0,062)	(0,053)	0,068
M2, lagged	0,009 **	0,007	0,014 **	0,013 *	0,009 **	0,007	0,008 **	0,006	0,009 **	0,007 (0,005)	0,009 **	0,008
	(0,004)	(0,005)	(0,006)	(0,007)	(0,005)	(0,006)	(0,004)	(0,005)	(0,004)		(0,004)	0,006
Gov. Consumption	-0,004	0,004	-0,001	0,007	0,003	0,011	0,009	0,01	0,004	0,007	-0,006	0,004
	(0,01)	(0,011)	(0,011)	(0,013)	(0,023)	(0,031)	(0,01)	(0,012)	(0,011)	(0,013)	(0,009)	0,012
Human capital	0,026 ***	0,023 ***	0,023 ***	0,019 ***	0,026 ***	0,023 ***	0,016 **	0,017 ***	0,024 ***	0,023 ***	0,026 ***	0,023 ***
	(0,007)	(0,006)	(0,008)	(0,007)	(0,007)	(0,007)	(0,007)	(0,005)	(0,006)	(0,006)	(0,007)	0,007
Inflation	-0,058	-0,001	-0,054	-0,004	-0,061	-0,017	-0,141 **	-0,174 ***	-0,041	-0,003	-0,058	-0,002
	(0,052)	(0,047)	(0,049)	(0,049)	(0,057)	(0,055)	(0,062)	(0,057)	(0,048)	(0,05)	(0,052)	0,049
Trade openness	-0,006 **	-0,005	-0,006 **	-0,005	-0,006 **	-0,005 **	-0,006 ***	-0,005 *	-0,004	-0,004	-0,006 *	-0,005
	(0,003)	(0,003)	(0,003)	(0,003)	(0,002)	(0,003)	(0,002)	(0,003)	(0,002)	(0,003)	(0,003)	0,003
Institutional quality	-0,021	-0,012	-0,04	-0,048	-0,024	-0,013	-0,008	-0,032	0,013	-0,032	-0,002	-0,03
	(0,071)	(0,075)	(0,064)	(0,079)	(0,071)	(0,084)	(0,072)	(0,061)	(0,074)	(0,076)	(0,134)	0,15
Population (natural logarithm)	-0,412 ***	-0,363 ***	-0,404 ***	-0,366 ***	-0,405 ***	-0,388 ***	-0,408 ***	-0,362 ***	-0,411 ***	-0,394 ***	-0,418 ***	-0,361 0,098
	(0,083)	(0,092)	(0,085)	(0,098)	(0,079)	(0,082)	(0,088)	(0,111)	(0,078)	(0,085)	(0,081)	
G. cap. formation	0,011	0,01	0,013*	0,012*	0,011	0,011	0,009*	0,009*	0,012*	0,01*	0,011	0,01
	(0,007)	(0,007)	(0,007)	(0,007)	(0,007)	(0,007)	(0,005)	(0,005)	(0,006)	(0,006)	(0,007)	0,007
Aid × M2			-0,0006	-0,0008								
			(0,0005)	(0,0006)								
Aid × Gov. C.					-0,0005	-0,0006						
					(0,002)	(0,002)						
Aid × Inflation							0,013 ***	0,016 ***				
							(0,005)	(0,004)				
Aid × Trade O.									-0,0003 *	-0,0002 *		
									(0,0002)	(0,0002)		
Aid × Inst. quality											-0,002	0,001
											(0,006)	(0,009)
Obs.	122	166	122	166	122	166	122	166	122	166	122	166
Instrum.	44	52	45	53	45	53	45	53	45	53	45	53
Sargan test[a]	0,62	0,37	0,63	0,33	0,63	0,38	0,3	0,42	0,51	0,32	0,6	0,41
Corr.[b]	0,37	0,22	0,38	0,26	0,34	0,3	0,31	0,47	0,29	0,31	0,38	0,2

Notes: The variables are described in more detail in the text and in Annex B, Table B.1. Two-step estimations are used both in Difference GMM (D GMM) and in System GMM (S GMM). The estimations are computed using the default commands for these estimators. The DPD style is considered in all the regressions. A constant and time dummies for the nine periods are included in all regressions. Robust standard errors (Windmeijer correction) are in parenthesis. * Significant at the 10-percent level. ** Significant at the 5-percent level. *** Significant at the 1-percent level. [a]The *p*-value of Sargan's test for overidentifying restrictions. [b]The *p*-value of a test for second-order serial correlation in the residuals of the differenced equation. Obs. Is the number of observations. Instrum .is the number of instruments.

In the Asian subsample, only the coefficients for the interaction of aid with inflation and with trade openness are significant and only using the GMM-DIF estimator. Moreover, the sign of the coefficient for aid does not lose significance as it would be expected were aid effectiveness conditional on these variables. The main conclusion of these last observations is that the results do not indicate that the five variables in consideration influence the impact of aid on economic growth.

Comparing with the results obtained for African countries, one may notice that the main differences in the explanatory variables are in the coefficients for broad money, government consumption, human capital, trade openness and the logarithm of population. For broad money and trade openness, the signs of the coefficients are different in the two subsamples and for the later the results indicate no relationship between trade openness and economic growth in Asian countries, in contrast with the results for Sub-Saharan Africa. Concerning the government consumption variable, the results contradict the theoretical predictions, but the magnitude of the coefficients is very small.

The variable human capital appears not to have a significant impact on the economic growth in the Asian region. This result is at odds with the consensual idea that part of the Asian growth miracle was due to education. Again, the justification for this apparent contradiction may be related to the choice of the variable and to data availability. Finally, the effect of the logarithm of population is not significant when GMM-SYS is applied, result that contrasts with the subsample of African countries.

The last estimations were carried out applying restrictions in the lags of the dependent variable and considering different assumptions regarding the exogeneity of the variables, as specified above. Tables 3 and 4 summarise the obtained results. The aim of this change in the specifications was to reduce the number of instruments since the number of observations was small in both subsamples.

The main conclusion of the analysis of the tables is that a lot of coefficients lose their statistical significance, especially in the case of Sub-Saharan Africa. The summary of results in Table 3 indicates that human capital is the only variable which remains significant in almost all of the estimations.

It is also noteworthy that there are significant changes when the GMM-SYS is applied. When no interactions are considered and GMM-SYS is applied, aid has a negative and significant impact. The inclusion of interaction terms changes the significance of the coefficient for aid, which means that these factors may have an impact on aid effectiveness. However, none of the estimated coefficients for interactions was found to be significant.Considering now the results in Table 4, again the change in the estimation process produces differences in the magnitude, significance and, in some cases, in the sign of the coefficients. As in the case of African countries, when no interactions are considered, the effect of aid is negatively significant. When the interaction with broad money is included, the coefficient of aid loses significance, but $\text{Aid} \times \text{M2}$ is negative and significant, indicating that the effect of aid is negative depending on the level of financial development.

Table 2. Aid and growth regressions with and without interactions, GMM estimators (Asia). Dependent variable: Growth rate of real per capita GDP

Sample	31 Asian countries (nine four-year time periods, 1972-2007)											
Regression	(2.1)		(2.2)		(2.3)		(2.4)		(2.5)		(2.6)	
Estimation method	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM
Aid	-0,188***	-0,161***	-0,262***	-0,095	-0,219***	-0,142*	-0,348***	-0,309**	-0,277***	-0,221*	-0,183***	-0,163***
	(0,023)	(0,027)	(0,1)	(0,108)	(0,065)	(0,086)	(0,061)	(0,125)	(0,049)	(0,119)	(0,026)	(0,025)
Initial GDP (natural logarithm)	-0,904	-0,823	-0,789	-0,867	-0,868*	-0,845	-1,015	-0,905	-0,863	-0,989	-0,895	-0,776
	(0,104)	(0,179)	(0,144)	(0,237)	(0,071)	(0,145)	(0,116)	(0,286)	(0,098)	(0,215)	(0,122)	(0,19)
M2, lagged	-0,017**	-0,018	-0,028**	-0,01	-0,021***	-0,017**	-0,011*	-0,014	-0,018***	-0,012	-0,017**	-0,02*
	(0,007)	(0,011)	(0,013)	(0,012)	(0,007)	(0,008)	(0,006)	(0,017)	(0,005)	(0,012)	(0,007)	(0,01)
Gov. consumption	0,089***	0,099***	0,092**	0,085**	0,089***	0,098***	0,082***	0,083**	0,084***	0,074*	0,089***	0,096***
	(0,016)	(0,037)	(0,02)	(0,036)	(0,029)	(0,026)	(0,014)	(0,035)	(0,014)	(0,04)	(0,017)	(0,033)
Human capital	0,013	0,015	0,017*	0,01	0,014**	0,015*	0,012	0,014	0,011	0,013	0,013	0,015*
	(0,01)	(0,009)	(0,009)	(0,009)	(0,006)	(0,008)	(0,009)	(0,01)	(0,007)	(0,011)	(0,011)	(0,009)
Inflation	-0,172	-0,028	-0,094	-0,053	-0,153	-0,067	-0,456**	-0,369	-0,121	-0,113	-0,179	-0,051
	(0,173)	(0,196)	(0,169)	(0,203)	(0,226)	(0,228)	(0,218)	(0,366)	(0,172)	(0,249)	(0,165)	(0,172)
Trade openness	0,007	0,009	0,01	0,009	0,009	0,008	0,003	0,006	0,007	0,003	0,007	0,011
	(0,007)	(0,009)	(0,006)	(0,007)	(0,007)	(0,008)	(0,006)	(0,013)	(0,007)	(0,012)	(0,007)	(0,008)
Institutional quality	-0,1	-0,109	-0,082	-0,282	-0,117	-0,112	-0,083	-0,0005	-0,096	-0,05	-0,047	-0,226
	(0,167)	(0,172)	(0,132)	(0,333)	(0,151)	(0,177)	(0,143)	(0,193)	(0,134)	(0,182)	(0,327)	(0,149)
Population (natural logarithm)	-0,228**	-0,105	-0,175**	-0,346	-0,187	-0,183	-0,277***	-0,241	-0,223***	-0,312	-0,225**	-0,147
	(0,106)	(0,239)	(0,086)	(0,266)	(0,116)	(0,186)	(0,092)	(0,384)	(0,064)	(0,277)	(0,106)	(0,204)
G. cap. formation	0,02	0,026*	0,033	0,04	0,024	0,031	0,023	0,029*	0,02	0,024	0,023	0,032**
	(0,017)	(0,014)	(0,021)	(0,027)	(0,019)	(0,023)	(0,021)	(0,016)	(0,018)	(0,026)	(0,02)	(0,015)
Aid × M2			0,001	-0,002								
			(0,002)	(0,002)								
Aid × Gov. cons.					0,001	-0,001						
					(0,004)	(0,004)						
Aid × Inflation							0,083***	0,07				
							(0,031)	(0,05)				
Aid × Trade openness									0,001*	0,0005		
									(0,0005)	(0,001)		
Aid × Inst. quality											-0,003	0,023
											(0,058)	(0,033)
Observations	62	90	62	90	62	90	62	90	62	90	62	90
Instruments	39	47	40	48	40	48	40	48	40	48	40	48
Sargan test[a]	0,95	0,99	0,99	0,99	0,98	1,00	0,94	0,99	0,99	0,99	0,96	1,00
Corr. [b]	0,56	0,58	0,75	0,21	0,73	0,82	0,53	0,86	0,26	0,99	0,71	0,94

Notes: The variables are described in more detail in the text and in Annex B, Table B.1. Two-step estimations are used both in Difference GMM and in System GMM. The estimations are computed using the default commands for these estimators. The DPD style is considered in all the regressions. A constant and time dummies for the nine periods are included in all regressions. Robust standard errors (Windmeijer correction) are in parenthesis. * Significant at the 10-percent level. ** Significant at the 5-percent level. *** Significant at the 1-percent level. [a]The *p*-value of Sargan's test for overidentifying restrictions. [b]The *p*-value of a test for second-order serial correlation in the residuals of the differenced equation.

Table 3. Aid and growth regressions with and without interactions, GMM estimators with restrictions (Sub-Saharan Africa). Dependent variable: Growth rate of real per capita GDP

Sample												
Regression	(1.7)		(1.8)		(1.9)		(1.10)		(1.11)		(1.12)	
Estimation method	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM
Aid	-0,008	-0,039***	-0,028	0,017	-0,009	-0,04	-0,027	-0,081**	-0,018	-0,019	-0,004	-0,031*
	(0,015)	(0,015)	(0,041)	(0,073)	(0,036)	(0,044)	(0,05)	(0,038)	(0,025)	(0,029)	(0,031)	(0,017)
Initial GDP (natural logarithm)	-0,981	-1,16**	-0,989	-1,158**	-0,98	-1,162**	-0,991	-1,157*	-0,78	-1,183**	-0,976	-1,176**
	(0,073)	(0,069)	(0,082)	(0,079)	(0,082)	(0,077)	(0,085)	(0,084)	(0,08)	(0,078)	(0,103)	(0,071)
M2, lagged	0,001	0,003	-0,008	0,023	0,001	0,003	0,002	-0,0005	0,002	0,005	-0,0002	0,002
	(0,01)	(0,011)	(0,022)	(0,024)	(0,011)	(0,01)	(0,012)	(0,009)	(0,01)	(0,01)	(0,014)	(0,011)
Gov. Consumption	0,021	0,004	0,029	0,003	0,021	0,003	0,03	-0,009	0,02	0,007	0,023	0,004
	(0,026)	(0,03)	(0,031)	(0,022)	(0,046)	(0,039)	(0,03)	(0,022)	(0,026)	(0,028)	(0,033)	(0,026)
Human capital	0,031**	0,026**	0,039**	0,017	0,031**	0,026**	0,018	0,022**	0,029**	0,026***	0,031**	0,028***
	(0,013)	(0,01)	(0,018)	(0,011)	(0,013)	(0,01)	(0,019)	(0,011)	(0,013)	(0,009)	(0,014)	(0,011)
Inflation	-0,097	0,013	-0,121	-0,052	-0,096	0,019	-0,203	-0,167	-0,103	0,002	-0,105	-0,004
	(0,077)	(0,11)	(0,09)	(0,085)	(0,081)	(0,105)	(0,313)	(0,128)	(0,086)	(0,084)	(0,169)	(0,111)
Trade openness	-0,002	-0,006	-0,008	-0,005	-0,002	-0,006	0,0002	-0,003	-0,003	-0,007*	-0,003	-0,006
	(0,005)	(0,004)	(0,012)	(0,007)	(0,005)	(0,005)	(0,008)	(0,006)	(0,007)	(0,004)	(0,006)	(0,004)
Institutional quality	-0,003	-0,388	0,007	-0,219	-0,002	-0,378	0,034	-0,234	-0,033	-0,35*	0,007	-0,206
	(0,219)	(0,26)	(0,223)	(0,302)	(0,232)	(0,268)	(0,58)	(0,329)	(0,212)	(0,2)	(0,985)	(0,281)
Population (natural logarithm)	-0,237	-0,318**	-0,365	-0,287	-0,236	-0,328**	-0,179	-0,286*	-0,228	-0,392***	-0,263	-0,318**
	(0,148)	(0,134)	(0,309)	(0,195)	(0,151)	(0,141)	(0,221)	(0,163)	(0,167)	(0,135)	(0,202)	(0,125)
G. cap. formation	0,004	0,0002	0,009	0,008	0,004	-0,001	-0,002	-0,012	0,003	0,0003	0,004	-0,003
	(0,011)	(0,017)	(0,015)	(0,017)	(0,011)	(0,016)	(0,016)	(0,012)	(0,012)	(0,013)	(0,017)	(0,016)
Aid × M2			0,001	-0,003								
			(0,003)	(0,003)								
Aid × Gov. cons.					0,00003	0,00003						
					(0,0025)	(0,0027)						
Aid × Inflation							0,007	0,016				
							(0,018)	(0,012)				
Aid × Trade openness									0,0001	-0,0002		
									(0,0003)	(0,0003)		
Aid × Inst. quality											-0,002	-0,014
											(0,046)	(0,025)
Observations	122	166	122	166	122	166	122	166	122	166	122	166
Instruments	25	33	25	33	25	33	25	33	25	33	25	33
Sargan test[a]	0,35	0,31	0,33	0,3	0,25	0,26	0,51	0,09	0,32	0,21	0,44	0,21
Serial correlation[b]	0,17	0,24	0,38	0,48	0,2	0,24	0,25	0,53	0,17	0,32	0,25	0,23

Notes: The variables are described in more detail in the text and in Annex B, Table B.1. Two-step estimations are used both in Difference GMM and in System GMM. The estimations are computed using the default commands for these estimators, but no lags of y earlier than *t-4* were used as instruments and the explanatory variables were treated as endogenous. The DPD style is considered in all the regressions. A constant and time dummies for the nine periods are included in all regressions. Robust standard errors (Windmeijer correction) are in parenthesis. * Significant at the 10-percent level. ** Significant at the 5-percent level. *** Significant at the 1-percent level. [a]The *p*-value of Sargan's test for overidentifying restrictions. [b]The *p*-value of a test for second-order serial correlation in the residuals of the differenced equation.

Table 4. Aid and growth regressions with and without interactions, GMM estimators with restrictions (Asia). Dependent Variable: Growth rate of real per capita GDP

Regression	(2.7)		(2.8)		(2.9)		(2.10)		(2.11)		(2.12)	
Estimation method	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM	Difference GMM	System GMM
Aid	-0,225***	-0,153***	0,019	-0,069	0,332	0,02	-0,462*	-0,372*	0,233	-0,096	-0,194	-0,194***
	(0,076)	(0,05)	(0,125)	(0,108)	(0,657)	(0,118)	(0,245)	(0,211)	(0,317)	(0,192)	(0,119)	(0,072)
Initial GDP (natural logarithm)	-1,000	-1,033	-1,112	-1,347	-1,065	-1,453*	-1,005	-1,042	-1,092	-1,156	-1,538	-1,146
	(0,079)	(0,121)	(0,142)	(0,307)	(0,238)	(0,241)	(0,087)	(0,138)	(0,139)	(0,292)	(0,689)	(0,213)
M2, lagged	-0,007	-0,013	0,02	0,02	0,041	0,027	-0,007	-0,008	-0,001	-0,005	-0,004	-0,011
	(0,008)	(0,009)	(0,015)	(0,019)	(0,054)	(0,019)	(0,007)	(0,013)	(0,008)	(0,022)	(0,009)	(0,007)
Gov. consumption	0,086**	0,107***	0,173***	0,094***	0,288	0,12***	0,101**	0,091**	0,133**	0,099**	0,044	0,1***
	(0,039)	(0,028)	(0,063)	(0,03)	(0,257)	(0,04)	(0,044)	(0,041)	(0,053)	(0,039)	(0,084)	(0,023)
Human capital	0,02*	0,013	0,027***	0,011	0,025**	0,0007 (0,01)	0,027**	0,009 (0,011)	0,024***	0,008	0,036**	0,015
	(0,011)	(0,013)	(0,008)	(0,009)	(0,013)		(0,011)		(0,007)	(0,013)	(0,017)	(0,01)
Inflation	-0,474**	-0,413	-0,687***	-0,698**	0,23	-0,299	-0,802*	-0,681***	-0,462*	-0,617**	-1,519	-0,479*
	(0,22)	(0,286)	(0,262)	(0,339)	(0,833)	(0,282)	(0,447)	(0,212)	(0,277)	(0,264)	(1,249)	(0,259)
Trade openness	-0,004	0,002	-0,02*	-0,012	-0,03	-0,013	-0,012	0,002	0,009	0,0007	-0,026	-0,002
	(0,007)	(0,008)	(0,011)	(0,016)	(0,028)	(0,013)	(0,012)	(0,009)	(0,013)	(0,014)	(0,022)	(0,014)
Institutional quality	0,098	-0,044	-0,115	-0,231	-0,516	-0,269	0,239	-0,189	-0,336	-0,158	2,4	-0,004
	(0,407)	(0,539)	(0,668)	(0,320)	(0,912)	(0,451)	(0,589)	(0,408)	(0,687)	(0,62)	(3,067)	(0,384)
Population (natural logarithm)	-0,352***	-0,176	-0,214	-0,539	-0,681	-0,803*	-0,31	-0,362	-0,598	-0,555	-1,087	-0,314
	(0,133)	(0,334)	(0,355)	(0,478)	(0,707)	(0,435)	(0,21)	(0,396)	(0,394)	(0,581)	(1,06)	(0,435)
G. cap. formation	0,035	0,02	0,074**	0,022	0,111	0,035	0,052*	0,042	0,096*	0,041	0,012	0,034
	(0,029)	(0,033)	(0,036)	(0,033)	(0,084)	(0,052)	(0,031)	(0,042)	(0,051)	(0,045)	(0,073)	(0,021)
Aid × M2			-0,006**	-0,004*								
			(0,003)	(0,002)								
Aid × Gov. cons.					-0,051	-0,02**						
					(0,062)	(0,009)						
Aid × Inflation							0,114	0,089				
							(0,119)	(0,091)				
Aid × Trade openness									-0,007	-0,001		
									(0,005)	(0,003)		
Aid × Inst. quality											-0,668	-0,125
											(0,691)	(0,141)
Observations	62	90	62	90	62	90	62	90	62	90	62	90
Instruments	20	35	20	35	20	35	20	35	20	35	20	35
Sargan test[a]	0,48	0,81	0,81	0,84	0,75	0,88	0,31	0,6	0,87	0,4	0,77	0,88
Correlation	0,77	0,48	0,1	0,69	0,74	0,73	0,32	0,9	0,51	0,93	0,45	0,62

Notes: The variables are described in more detail in the text and in Annex B, Table B.1. Two-step estimations are used both in Difference GMM and in System GMM. The estimations are computed using the default commands for these estimators, but when the Difference GMM is used, no lags of *Y* earlier than *t-3* were used as instruments and, when System GMM is used, no lags of *Y* earlier than *t-5* were used as instruments, and the explanatory variables were treated as endogenous. The DPD style is considered in all the regressions. A constant and time dummies for the nine periods are included in all regressions. Robust standard errors (Windmeijer correction) are in parenthesis. * Significant at the 10-percent level. ** Significant at the 5-percent level. *** Significant at the 1-percent level. [a]The *p*-value of Sargan's test for overidentifying restrictions. [b]The *p*-value of a test for second-order serial correlation in the residuals of the differenced equation.

Before turning to the main conclusions from the regressions, it is important to underline that the results presented in this study are conditioned by data availability and by the specifications considered in the application of the estimation methodologies, and that has implications on the analysis that has been carried out. Bearing this in mind, this study concurs to the claim that aid may have a negative effect on economic growth. Although the obtained results are very sensible to the choice of the estimation procedure used, a few considerations may be made regarding the comparison with some of the studies mentioned in section 3.

When no interactions are included, the sign of the coefficient for aid is negative and significant in most of the estimations for Sub-Saharan African countries, and negative and significant in all the estimations for Asian countries. These conclusions are partially in accordance with the studies by Duc (2006) and by Ekanayake and Chatrna (2010) who have also focused on the study of this question at a regional level. For Sub-Saharan Africa, Duc (2006) obtained a negative relationship between aid and growth, while Ekanayake and Chatrna's (2010) results indicated a positive relationship. For the Asian region, Duc (2006) found a positive effect of aid on growth, while Ekanayake and Chatrna (2010) obtained the opposite result.

The results for the effect of the policy variables, institutional quality and financial development are mixed and no general conclusion can be drawn from them. As it was mentioned during the analysis of the tables, the results vary significantly from the Sub-Saharan African subsample to the Asian subsample. However, considering specific cases, their impact on aid effectiveness cannot be totally disregarded. Unlike what has been claimed by Burnside and Dollar (2000) and other subsequent studies, the effect of aid was found to be conditional on "good" policies only in some of the regressions. Moreover, the results depend on the type of policy considered and on the region in analysis. In addition, the results do not lend support to the idea that institutional quality has an influence on aid effectiveness in contrast to what was stated by Burnside and Dollar (2004b) and by Baliamoune-Lutz and Mavrotas (2009).

6. Conclusion

The studies on aid effectiveness are likely to continue as no consensual conclusions have yet been found. In this study, we have tried to address the question by separating a sample of recipient countries into two subsamples, one for the Sub-Saharan African region and other for the Asian region. By comparing the role of aid in samples with such disparate growth rates, the main goal was to overcome to some extent the problem of sample heterogeneity, i.e. to overcome the problems stemming from including regions with such different specificities in a single sample.

The dataset included a total of 75 countries, which were divided into two samples, one with 44 Sub-Saharan African countries and another with 31 Asian countries, covering a nine four-year time period from 1972 to 2007. The variables included are similar to those used by other authors, for comparability reasons, the main differences being the use of the policy variables in a disaggregated form and the source of the institutional quality indicator.

The results show a negative and significant relationship between aid and growth in each of the regions. Considering the results for the effect of the policy variables, institutional quality and the level of financial development, they are mixed and it is

difficult to draw general conclusions. However, despite the fact that the results vary significantly from the Sub-Saharan African subsample to the Asian subsample, if one considers specific cases, their impact on aid effectiveness can not be totally ignored.

These results illustrate the existence of mixed results and support the widespread perception of the difficulty to find robust conclusions, with changes in the estimation techniques leading to important differences in the results. This means that the conclusions must be carefully drawn.

The observations made above confirm the need to further examine the theoretical assumptions and to find other empirical methodologies in order to overcome the problems associated with the heterogeneity of countries. The Pooled Mean Group estimation and the cointegration analysis are examples of other methodologies used more recently. However, these might be difficult methods to apply due to data availability. Other possible approaches could be to disentangle the transmission channels through which aid affects growth or to base the analysis on a disaggregation of total aid into categories. All these alternatives may lead to future advances on the understanding of the impact of foreign aid on economic growth.

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Appendix

Table A.1. Countries in the samples

Sub-Saharan Africa	Guinea	Tanzania	Korea, Rep. of
Angola	Guinea-Bissau	Togo	Kuwait
Benin	Kenya	Uganda	Lao P.D.R.
Botswana	Lesotho	Zambia	Lebanon
Burkina Faso	Liberia	Zimbabwe	Malaysia
Burundi	Madagascar		Maldives
Cameroon	Malawi	Asia	Mongolia
Cape Verde	Mali	Bahrain	Nepal
Central African Rep.	Mauritania	Bangladesh	Oman
Chad, Rep. of	Mauritius	Bhutan	Pakistan
Comoros	Mozambique	Brunei Darussalam	Philippines
Congo, Dem. Rep. of	Namibia	Cambodia	Saudi Arabia
Congo, Rep. of the	Niger	China	Singapore
Cote D'Ivoire	Nigeria	Cyprus	Sri Lanka
Djibouti	Rwanda	India	Syrian Arab Republic
Equatorial Guinea	Senegal	Indonesia	Thailand
Ethiopia	Seychelles	Iran, Islamic Rep. of	United Arab Emirates
Gabon	Sierra Leone	Iraq	Vietnam
Gambia, The	Sudan	Israel	
Ghana	Swaziland	Jordan	

Table A.2. Variables description and sources

Variable name	Description	Source
Aid	Official development assistance (ODA) as a share of GDP (current US$)	WDI (2012)
Broad money (M2)	Money and quasi money (M2) as % of GDP, lagged one period	WDI (2012)
GDP	Growth rate and logarithm of initial level of per capita GDP (constant 2000 US$)	WDI (2012)
Government consumption	General government final consumption expenditure (% of GDP)	WDI (2012)
Gross capital formation	Gross capital formation (% of GDP)	WDI (2012)
Human capital	Gross ratio of total secondary enrollment	WDI (2012)
Inflation	Inflation, consumer prices (annual %), computed as ln(1+inflation)	WDI (2012)
Institutional quality	Average of the scores of failure of state authority, collapse of democratic institutions and violence associated with adverse regime changes	Political Instability Task Force (PITF, 2010)
Population	Population (natural logarithm)	WDI (2012)
Trade openness	Trade (% of GDP)	WDI (2012)

Notes: All variables aggregated over time using arithmetic averages, with the exception of GDP.