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**Aid Effectiveness Revisited:  
Comparative Studies of Modalities of Aid to Asia and Africa**

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# Aid Effectiveness Revisited: Comparative Studies of Modalities of Aid to Asia and Africa

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## **Abstract**

This paper provides a variety of evidence that shows that in Asia, aid leveraged private investment in the long run, while in Africa the correlation between aid and domestic investment was at best ambiguous. Aid in Africa was diametrically opposite to that of Asia in terms of the amounts the countries received, the sector compositions, the size of individual projects, and the intensity of donor involvement. The sharp contrast in aid effectiveness between Asia and Africa could be attributed at least in part to those differences in the modality of aid delivery. Based on the above analysis, the paper concludes with a few suggestions that could link aid more closely to private investment, and avoid pitfalls that Africa experienced.

Key words: Official development assistance; aid effectiveness; foreign direct investment; East Asia; Sub-Saharan Africa.

JEL classifications: O19; O20.

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## I. Introduction

The effectiveness of aid in raising economic growth has been a subject of voluminous research. Yet, a survey of the literature has failed to find any empirical relationship linking aid to growth that is sufficiently robust to serve as a guide for policy makers or to give comfort to the public that their tax money has been or will be well spent.

Indeed, the recent research casts doubts on the earlier findings on which much of the current policies of the multilateral and bilateral aid agencies are based. For example, Hansen and Tarp (1999), Easterly and Roodman (2004) and others credibly challenged the proposition advanced by Burnside and Dollar (2000) and the World Bank (1998), that aid is effective in raising economic growth in countries where policies are sound. Similarly, Rajan and Subramanian (2005) question the robustness of the claim of Clemens, et al., (2004) that “short-impact” aid has been effective for growth.<sup>2</sup> Roodman (2004), systematically testing the statistical robustness of the existing hypotheses, found no robust relationship, except a negative relation between aid effectiveness and geography (tropics) of the recipient country.<sup>3</sup>

However, the absence of statistically reliable correlation between economic growth and aid does not mean that aid has been universally ineffective, or the existing aid effectiveness stories contain no truth. Rather, it means, “the entire enterprise of running cross-country growth regressions may be plagued by noise in data, which makes it hard to establish any relationship even if they actually exist ... If noise in data plagues all findings, then strong claims about aid effectiveness based on cross country evidence are unwarranted (Rajan and Subramanian (2005), p. 19).”

The above analyses assume that aid is a homogeneous variable, namely one dollar of aid would have the same impact on growth or investment, irrespective of how it was delivered. In this paper, we show that modalities of aid delivery in Asia and those of Africa were substantially different. On this basis, we introduce aid as region specific variables and run the conventional GMM regressions. We then complement these regressions with a variety of other evidence comparing aid to Asia and that to Africa.

Our main findings are as follows:

- a. In general, aid does matter to foreign and domestic investments. But the structure in which aid has impacted on investment flows appears systematically different between East Asia and Sub-Saharan Africa (SSA).

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<sup>2</sup> As defined by Clemens *et al.*, (2004), this consists of economic infrastructure, real sector projects, and budget support.

<sup>3</sup> For a comprehensive survey of literature, see Gupta, et al., (2005).

- b. In East Asia, aid was small but combined with other public interventions in a strategic design specifically aimed at promoting private investment. Aid thus leveraged a much larger amount of private investment, and made a modest yet significant contribution to growth in the region.
- c. In SSA, the relationship between aid and domestic investment is at best ambiguous. Given its focus on budgetary support and social sectors, the amount of aid money spent on non-tradables was extremely large. Aid thus raised the relative price of non-tradables—i.e., causing real exchange rate appreciation—exerted upward pressures on inflation, or kept real interest rates high, all of which worked against private investment.
- d. In aid to Africa, the balance may have shifted too far in favor of social sector and budgetary support at the expense of economic infrastructure and real sector projects. Aid to encourage good policies is useful and necessary, but where aid has been already very large, policy support should be delivered in a way not to add further demand pressures on non-tradables. An approach where aid is more directly linked to catalyzing private investment should be considered.

Section II provides econometric evidence that shows that the impact of aid on investment in the recipient country was different between East Asia and Africa. Given the empirical results, we attribute the difference to aid modalities. Section III then elaborates upon the characteristics of modalities of aid in Asia, and look into the relationship between aid and investment in the region. Section IV discusses aid in Africa. Section V aims to draw some implications of these findings on effective aid modalities in the African context. A brief observation concludes the paper. Technical data and econometric issues are discussed in Annex.

## **II. Does Modality Matter?**

The central question of this paper is whether aid has a positive impact on growth and/or investment, and if so, whether such impact is different between two contrasting regions: East Asia and Sub-Saharan Africa.<sup>4</sup> Although aid agencies deliver aid in different forms and for

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<sup>4</sup> The findings of Clemens (2002) are not encouraging. He stipulated that the fundamental rationale for reallocating world capital via public intervention (i.e., aid) is either (a) to substitute for private capital where international capital market failures prevented capital to flow to developing countries; or (b) to complement private capital where domestic market failures left otherwise productive investments unfinanced. He found that neither domestic nor foreign flows of private capital respond positively to past impulses of the International Bank for Reconstruction and Development (IBRD) credit. He also found that both bilateral flows and IMF lending are negatively associated with subsequent private capital inflows.

different purposes, in theory, it may not really matter what aid agencies assist in recipient countries, because aid money might be fungible if it were not accompanied by relevant policy reforms (e.g., Gupta *et al.*, 2003; Odedokun, 2004). In reality, however, on the more practical levels it seems uncomplicated to differentiate aid among regions—as it impacts growth—given the marked differences in growth performance particularly between East and Southeast Asia and Africa after several decades of foreign aid. Aid modalities must be of necessity reflected in the channels through which aid is delivered, as shown in Iimi and Ojima (2008).

Thus, we simply hypothesize that aid is different across geographical regions in terms of its effect on investment, in particular in attracting direct investment from abroad and catalyzing private domestic investment. As will be shown below, in fact, aid in Asia and that in Africa were diametrically opposite to each other in its modalities—namely, the size of individual projects, the sectoral allocations, and the intensity of donor involvement.

We run a series of regressions to test the responses of foreign direct investment (FDI) and gross domestic investment (GDI) to aid inflows in developing countries, with data from more than 100 aid recipient countries for the period 1972–2003. Following the conventional treatment, the sample period is divided into 8 four-year sub-periods, and the averages of four-year sub-periods of each variable were deployed as observations. Since all dependent and independent variables are potentially endogenous, one of the conventional Generalized Method of Moments (GMM) estimators, the Arellano-Bond (1991) dynamic panel estimator, was employed.

In order to test our hypothesis, we regress foreign or domestic investment on aid, differentiating its coefficients across regions, i.e., Asia,<sup>5</sup> Sub-Saharan Africa and others. In this specification, if aid to Asia is not qualitatively different from that of Africa as a determinant of investment, the estimated coefficients for the aid variables should be broadly the same in magnitude and the statistical significance.

Our results indicate that aid to Asia is qualitatively different from that to Africa. Despite some potential weakness in statistical robustness, they confirm that the impact of aid on domestic and foreign investment in Asia is positive and significant, while that of Africa is ambiguous.

- First, we introduce aid as one variable, assuming that aid was the same across regions as it impacted GDI. With gross domestic investment (GDI) as dependent variable, in the linear specification, the estimated coefficients on aid are small but significant (Table 1). In the case of FDI, the lagged aid variable turned out to be a

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<sup>5</sup> Bangladesh, China, Hong Kong SDR, India, Indonesia, Korea, Malaysia, Pakistan, the Philippines, Sri Lanka, Thailand and Viet Nam.

plausible determinant of FDI in the non-linear specification (Table 2). However, the estimated coefficient is small and only weakly significant.

- We then introduce aid as region-specific variables. With GDI as dependent variable, the coefficients for aid in Asia are statistically different from those for Africa in linear specification. In the non-linear models, the aid coefficients for Asia are clearly different from those for Africa, even more so than the case of the linear specification. The test statistics for this difference  $\chi^2(4)$  is 31.85. In non-linear specification, when aid is introduced as one variable, the correlation is statistically insignificant.
- In the FDI equations, the overall explanatory power improves when the aid coefficients are allowed to vary across regions. In addition, in the non-linear specification, we can easily reject the null hypothesis that the coefficient on aid in Asia is equal to the corresponding figure for Africa. The relevant test statistics is estimated at  $\chi^2(4) = 10.53$ .

### III. Aid in East Asia

#### 1. Aid in East Asia was small and mostly for infrastructure.

The amount of aid that East Asian countries received was small, compared with the norms for African countries that we are now accustomed to. Annual aid flows to Indonesia, Malaysia, the Philippines, and Thailand ranged mostly in  $\frac{1}{2}$ –2 percent of GDP in the 1960's, 1970's, and 1980's (Figure 1).<sup>6,7</sup> Even in terms of U.S. dollars, aid to East Asia was small relative to that of several African countries. Aid to Thailand was about US\$600 million per annum through the 1980's, one half of aid that Tanzania now receives. The Tanzanian economy is only one fifth of that of Thailand.

In East Asia, aid was mostly for infrastructure and real sector projects (Table 3). Such projects, for instance, comprised more than 90 percent of total assistance in Malaysia (on a commitment basis). The average among the above-mentioned four countries was 70 percent. In contrast, program assistance was very limited. Indonesia and the Philippines received structural adjustment program assistance, but it amounted to only US\$1.3 billion (in

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<sup>6</sup> In this note, aid is a gross concept (i.e., disbursements of grants and concessional loans), and does not include debt forgiveness and capitalization of interest payments, which the Organization of Economic Corporation & Development (OECD) classify as part of official development assistance (ODA).

<sup>7</sup> For Indonesia, reliable GDP data are not available for the 1960's. Korea received a large amount of aid in the decade following the Korean War, but it fell sharply thereafter.



constant 2003 dollars) for both countries combined through the period 1975–90. In other words, it was on average less than US\$50 million per year per country.

In East Asia, donors engaged in a few large projects. The size of the projects was on average US\$7–8 million, with more than 10 percent of them exceeding US\$20 million. Each major donor on average undertook only 4 projects per year in each country during 1973–89. As seen below, this is in stark contrast to donor activities in Africa.

Of particular note, in East Asia Japan was by far the largest donor, providing 40–50 percent of total donor assistance to Indonesia, Malaysia, the Philippines and Thailand. The United States provided 10–20 percent, and other bilateral donors offered a much smaller share. The multilateral development banks played a more modest role, with their financing equal to 4–5 percent of total aid flows.

## **2. Aid leveraged private capital in Asia.**

It is well known that the phenomenal growth in East Asia in the 1970's and the 1980's was driven by the massive accumulation of capital, in which FDI played an important part. According to IFC (2005b), “the success of China, India, and the East Asian tigers ... has helped build a consensus that private firms produce the new jobs and economic growth for poverty reduction. So, if the aim is pro-poor growth (and it is), there is no substitute for bringing a better business climate to places where poor people already live or can easily move.” The range of instruments offered by aid agencies has expanded to official concessional loans, dispute resolution, performance-based grants, loans to the private sector, insurance and guarantees for private investors, equity investments in the private sector, and an array of stand-alone technical assistance.

We performed a series of GMM regressions for 12 major aid recipient countries in Asia.<sup>8</sup> It is noteworthy that the small sample size is a major problem in relying on the Arellano-Bond estimators. However, having established aid as a significant determinant of investment in Asia with a sufficiently large sample above, we sought region-specific relations between aid and investment, focusing on data from the region only.

Our estimation results indicate that in Asia, one dollar of aid led to more than one dollar of investment, and that this positive impact of aid was subject to a diminishing return to scale. Although our results were not completely satisfactory, the correlation between aid and investment was fairly robust against variations in specifications.

- Table 4 presents GMM estimates with FDI as a dependent variable. It shows that if the relation between FDI and aid is assumed linear, the estimated coefficients

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<sup>8</sup> Bangladesh, China, Hong Kong SDR, India, Indonesia, Korea, Malaysia, Pakistan, the Philippines, Sri Lanka, Thailand and Viet Nam.

on aid—both contemporaneous and lagged—are statistically insignificant, with or without non-aid explanatory variables such as population (proxy for market size), per capita GDP, and telephone network (proxy for infrastructure). However, if the relation between FDI and aid is assumed non-linear, the coefficients on both contemporaneous and lagged aid turned out positive and statistically significant. As expected, both are subject to a diminishing return to scale. These non-linear estimates indicate that aid of one percent of GDP would lead to FDI of about 1½ percent of GDP, once its impacts are fully absorbed.<sup>9</sup>

- Table 5 presents our GMM estimates with GDI as a dependent variable. As in the case of FDI, the non-aid explanatory variables do not seem to add much in the estimation. In all specifications, the correlation between GDI and aid with a lag of one period was strongly positive and significant. The estimated coefficient on contemporaneous aid was insignificant but negative, and thus the relation between the contemporaneous aid variable and the lagged one is unstable. However, in all specifications, the impact of lagged aid dominates the contemporaneous effect over the medium term. Overall, the non-linear specification without non-aid variables appears to be more satisfactory than the others, although this specification satisfies the non-autocorrelation hypothesis only weakly—at the 5 percent significance level. The estimated equation suggests that aid of 1 percent of GDP would lead to GDI of some 4–5 percent of GDP, once its impact is fully absorbed over five periods or 20 years (see Figure 2).

### **3. Impact of Japanese aid may not have been so different from that of other donors.**

In Asia, Japanese aid primarily financed large infrastructure projects to assist the private sector development and to encourage private investment. Typically, each project combined several instruments of assistance in a package. It consisted of (a) concessional loans for financing infrastructure; (b) grants for technical assistance for transfer of know-how; and (c) non-concessional loans to finance other elements of the project that are commercially viable but too risky for private enterprises alone. In addition, to leverage private capital, the package often included co-financing with private financial institutions, as well as equity participation and official guarantees to encourage direct investment by foreign firms. Combining these instruments of assistance in a package—designed specifically for promoting private investment—is characteristic of Japanese aid.

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<sup>9</sup> The addition of non-aid explanatory variables does not seem to enhance the explanatory power much, as the coefficients of these variables turned out to be statistically insignificant. This probably suggests that they were not a good proxy of the factors they were meant to represent.

An example of such Japanese assistance is the industrial development project in the Eastern Seaboard of Thailand over the 1980's. In this project, concessional loans were extended for the construction of ports, roads, railways and industrial parks. Non-concessional loans were provided to finance more commercial elements of the project, e.g., power plants and natural gas and oil pipelines, and co-financing with private financial institutions was arranged for them. Trade finance and partial guarantees of equity investment were also offered to facilitate direct investment from Japanese firms in this industrial development area.

In other projects, Japanese aid was designed to pave the way for privatization and private ownership of public utilities. In the Phu My Power Generation project in Viet Nam, to augment the country's supply capacity of electric power through having its new power generation plants owned and operated by the private sector, the Japanese agency, together with the World Bank and the Asian Development Bank, provided concessional loans for strengthening power transmission capacity. This is because the power transmission and distribution segment—which was to remain in the public sector—was considered a pre-requisite for private ownership of power generation plants. The Japan Bank for International Cooperation (JBIC) also extended concessional loans to upgrade the equipment of the first of three power generation plants to be built. The successful operation of the first power plant reduced the risk of investing in a power plant. Then, the second and third power plants were constructed with equity investment of private firms and co-financing of private banks.

The previous research suggests that in Asia, Japanese aid not only promoted FDI from Japan but also contributed to local business development and direct investment of non-Japanese firms. The International Development Center of Japan (IDCJ) (1996) reports that Japanese aid substantially raised the internal rate of return of FDI from both Japanese and other foreign companies. Using large-scale macro econometric models developed for Malaysia, Indonesia and Thailand, it estimated that the internal rate of return to Japanese FDI in 1972–92 was 25.8 percent, but had it not been for Japanese ODA, it would have been 16.3 percent. The impact on the rate of return was similar for FDI from the United States. The IDCJ (1996) attributes 16.1 percent of Thailand's exports in 1992 to FDI during the preceding 20 years.<sup>10</sup> All in all, the cumulative impact of FDI during 1972–92 is estimated at 9.5 percentage points of GDP in 1992. If there had not been Japanese aid, the impact would have been 3.6 percent of GDP.

But, was Japanese aid different from that of the other donors in its impact on private investment, particularly FDI, in recipient countries? To help answer this question, we performed GMM regressions of FDI from Japan or FDI from all countries over aid from Japan and that of the other donors. Our analysis can provide some pieces of evidence; the

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<sup>10</sup> According to Fukao, et al., (2003), manufacturing subsidiaries of U.S. firms in East Asia sold 28 percent of their products to the United States and 33 percent to other export markets in 1999. The comparable figures for the U.S. subsidiaries in Latin America were 22 percent and 13 percent, respectively. Similarly, manufacturing subsidiaries of Japanese firms in East Asia sold 26 percent of total to Japan and other export markets, each. In contrast, Japanese subsidiaries in Latin America sold 77 percent in local markets.

results may indicate that the impact of Japanese aid may have been larger but only slightly (Table 6).

- Our GMM estimate with non-linear specification shows that Japanese aid impacted FDI from Japan positively, but that correlation was not so strong. Aid of the other donors did not affect Japanese FDI significantly.
- As regards the impact on FDI from all countries, again in non-linear specification, the estimated coefficient of contemporaneous Japanese aid was large and strongly significant. In this case, the coefficient of lagged Japanese aid was negative but insignificant. The impact of aid from the other donors was also positive, although this correlation was statistically less significant.

The above estimates suggest that the catalytic effects of aid on private investment in Asia may not have been a quality unique to Japanese aid. This result appears, broadly speaking, in conflict with the existing evidence, such as Economic Planning Agency (2001). This study expanded the sample base of Burnside and Dollar (2000) and Hansen and Terp (2000) to cover 121 countries in 1960–97, and performed growth regressions on unbalanced panel data using the weighted Generalized Least Squares (GLS) technique. The estimated equation has a high explanatory power and indicates that Japanese concessional loan assistance was considerably more effective in raising growth than other forms of aid of all donors combined (Table 7).<sup>11</sup> While results of this kind of exercise have to be seen with a grain of salt, the conflicting outcomes suggest that the issue should be examined further, perhaps with a case study approach in which various possible channels linking aid to growth are directly examined.

#### **IV. Aid in Sub-Saharan Africa**

##### **1. Aid to Africa was large and focused on social sectors.**

In many ways, aid to Africa was diametrically opposite to that of East Asia. First, aid has been very large in most African countries. Annual gross aid flows were on average equivalent to 13 percent of GDP during 1980–2003 (the median was 11 percent of GDP). Twelve countries received aid equivalent to more than 20 percent of GDP. Fourteen countries got aid of more than US\$500 million per annum (Figure 3). Only in nine countries, aid was less than US\$100 million despite the fact that the economies of most African countries are small.

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<sup>11</sup> Kawasaki (2002) developed a CGE (computable general equilibrium) model of global trade with regional and sectoral data for 1996–2000. It estimates that by expanding the capital stock and hence the production capacity, Japanese ODA raised the permanent level of real GDP by 0.2–0.7 percent of GDP.

Second, the efficiency of bilateral donor operations was low. This is because many major bilateral donors were active in practically all countries in Sub-Saharan Africa, mostly with a very small budget, and each of them engaged in a large number of extremely small projects and programs in each country. For example, for Netherlands, the median of annual aid flows to a recipient country was only US\$5.7 million. It provided aid to 44 out of 50 countries in Sub-Saharan Africa. It had on average 14 projects per country per year, and the median of value of projects was a tiny US\$64,000 (Table 8).<sup>12</sup> Diankov et al., (2005) and Acharya et al., (2004) cite the fragmentation and proliferation of donor assistance as a key problem lowering the effectiveness of aid in the region.

Third, aid in Africa was predominantly for social sector projects, budgetary support and program assistance. In Africa, the share of social sector projects was, understandably, always high compared with East Asia. Still, in the 1980's, the balance between infrastructure and real sector projects on one hand, and social sector projects and program assistance on the other was about fifty-fifty. This balance shifted dramatically in the past two decades. In 2000–03, infrastructure and real sector projects comprised only 21 percent of total (excluding debt relief), with the remainder going to social sector projects and program assistance (70 percent) and emergency aid (10 percent), as shown in Table 9.

Did Japan adopt in Africa the approach that its officials believed was successful in Asia? Japan seems to have tried to do so when it began its official assistance to Africa in the 1970's. However, data reveal that subsequently, the focus shifted from infrastructure to structural adjustment and then to education and health, in order to conform to the priorities of the donor community. Then, debt cancellation came to be accepted as a common practice. Japan acquiesced to this policy, but insisting that it would not extend concessional loans to a country that had sought outright cancellation of its debt. As a result, most African countries became ineligible to receive Japanese yen loans. This meant that Japan lost one of the main instruments that were central in its aid policy in East Asia.

Moreover, beginning in 1990, Japanese aid to Africa fell steadily, reflecting the erosion of political support for ODA as well as the difficult fiscal situation that had emerged. By the early 2000's, Japanese aid halved to the equivalent of US\$679 million per year, i.e., only 0.01 percent of Japan's GNI. At the same time, Japanese aid apparently became less concentrated geographically in the region, with its aid money spread rather evenly among the recipients. As a result, the amount of aid that each African country received from Japan became smaller over time (Figure 4).

In the early 2000's, the median of Japanese aid for African countries was only US\$6 million per year. Even the five largest recipients received only US\$40 million to US\$70 million per

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<sup>12</sup> In contrast, Japan had a similar number of projects in its aid to the countries in East Asia, but for an economy [100] times larger. The median of the value of projects of Japanese aid was US\$10 million, which was 50 times that of the UK's in Africa.

annum. Japan's aid typically amounted to 0.2–0.6 percent of GDP, and was greater than 1 percent of GDP only in several of the smallest of small countries. This was very small compared with the Japanese comprehensive aid programs implemented to finance large infrastructure projects in East Asia.<sup>13</sup>

## **2. Growth effect of the social program aid approach is not apparent.**

Proponents of aid for Africa have been buoyed by the recent upturn in economic indicators in Sub-Saharan Africa, in particular in countries where aid has been extremely large (e.g., Uganda, Tanzania, Madagascar, and Ethiopia). The acceleration in economic growth, combined with the deceleration in inflation, is impressive, and the country authorities as well as the bilateral and multilateral development agencies should be congratulated for these achievements.

However, the effectiveness of aid can or should not be assessed in terms of short-run outcome. Aid can almost always boost economic activity in the short-run by providing demand for industries operating with excess capacity. Crops that would otherwise have been kept in subsistence farming could be brought to markets for sale, in response to domestic demand generated by aid. In most African countries, a period of good economic performance is often followed by a bad one. At any given time, good performers are mixed with not-so-good ones. The issue is not a short-term impact, but rather whether aid leads to a self-sustained long-term improvement of growth performance.

A long-term positive impact of aid on economic growth and broader development indicators is not apparent in Africa. For example, if we observe the relationship between the amount of aid and the extent of improvement in HDI, or the increase of per capita GDP, of recipient countries over the period 1980–2003, it does not appear that aid mattered much. The aid-weighted average improvement in the HDI of African countries is not higher than the simple average. The aid-weighted average increase of per capita GDP is lower than the simple average for the same period. These results hold even if we exclude from the sample the countries heavily afflicted by HIV/AIDS or the conflict cases (as defined by countries where emergency aid was more than 30 percent of total). See Table 10. A simple cross-section regression shows that the correlation between HDI (annual average percentage change in 1980–2003) and aid (ratio to GDP in the same period) is positive but insignificant.

Is there strong evidence that “aid worked” in countries where economic policies are good, as contended by Burnside and Dollar (2000)? Not really, if the World Bank/IMF structural adjustment programs were to signify “good policies.” Let us illustrate. The countries that

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<sup>13</sup> Japan did not do well in its aid to Africa, if the outcome is measured in terms of the improvement of the Human Development Index (HDI) of the recipient countries. The average HDI, weighted by the share of the recipient in total Japanese aid to Sub-Saharan Africa, improved by 6 percent in one decade from 1980 to 1990, and 1.6 percent from 1980 to 2000, but this improvement was lower than the corresponding figure of any of the other major donors. The average for Japan was also lower than the simple average of all African countries

received aid under structural adjustment programs continuously during the 1990's (in at least 8 of 11 years) raised HDI on average by 5.8 percent over the decade (Table 11). This is lower than the average improvement of HDI of Sub-Saharan African countries over the same period (excluding four countries in Southern Africa heavily inflicted by HIV/AIDS, i.e., Botswana, Lesotho, Swaziland and South Africa). The countries that received structural adjustment program aid in the 1990's did not get much of that aid in the 1980's. Yet these countries achieved a greater improvement of HDI in the 1980's.

This finding does not mean that good policies are not needed, but rather the good policies embodied in the structural adjustment programs were apparently insufficient to make aid result in higher HDI or economic growth.

Aid can raise growth permanently only if it leads to higher capital formation, particularly the private capital. Otherwise, dependency on aid would be perpetual, and development would not be sustainable.

### **3. There is no robust empirical evidence that aid raised private investment in Africa.**

In Africa, apparently, larger aid is associated with lower private investment. Figure 5 depicts the simple correlation between the average ratio of private investment to GDP and the average aid to GDP ratio for all Sub-Saharan African countries, for which data are available in 1990–99.

The observations in the figure include the countries where there is obviously no causal relationship between the private investment ratio and aid or the cases where the causality runs from high private investment to low aid. For example, in Mauritius, while economic performance was good—and the private investment ratio was high by African standards—aid was small. In Angola, Namibia, and several others, private investment was driven primarily for enclave operations for exploitation of natural resources by multinational companies, and hence was not affected much by aid. In Liberia, Burundi, Congo (former Zaire) and some others, private investment was non-existent almost over the sample period, due to the ongoing conflicts and insecurity. Excluding these cases from the sample, a simple regression of private investment per GDP on the aid-to-GDP ratio—the variables being the average for 1995–2003—generated the coefficient of -0.17 with a *t* statistic of -1.91.

This regression does not of course establish causality, and generally there are many statistical difficulties to do so. However, the key question for policy makers is not so much if aid would reduce investment, but rather whether they could reasonably presume that aid would result in an increase in investment. In this regard, Easterly and Dollar (1999) examined 35 African countries, and observed that (a) no African country satisfied the prediction that investment would increase with aid at least one for one; and (b) 8 countries showed a positive and significant relationship between aid and investment, but 12 countries showed a negative and

significant relationship. The implication is that the history does not give us a firm basis to expect that aid would lead to higher investment.<sup>14</sup>

The results of our GMM estimates support the view that in Africa the relationship between aid and investment is ambiguous.

- We experimented with a number of empirical models to test the relationship between aid and FDI, and they suggested no meaningful relationship (Table 12). Only possible exception was the linear specification, where the correlation was weakly significant and negative. These results are consistent with the general perception that FDI in Africa is largely confined to the exploitation of natural resources in enclave operations (with a few notable exceptions such as Lethoto, Mauritius and Seychelles).
- The linear specifications of the aid-GDI relationship yielded the positive and significant coefficients of both contemporaneous and lagged aid (Table 13). However, these coefficients are small, compared with the Asian case. Aid of one percent of GDP would lead to GDI of only 0.5 percent of GDP over time (Figure 6). Moreover, if we assume that the relation between aid and domestic investment is non-linear (as is generally expected), our GMM estimates show that aid was not a significant determinant of GDI, with or without the non-aid explanatory variables. The estimated coefficients on non-aid variables were either insignificant or a wrong sign.

The estimate of the aid-GDI long-run multiplier of 0.5 does not necessarily suggest that aid crowds out private investment in Africa. Not all of aid was intended to increase public investment. Indeed, a large majority of aid in Africa was most likely meant to augment public consumption, rather than investment. Moreover, aid could have substituted for public investment that would have been funded by domestic resources. However, in combination with the estimation results on FDI, it seems fair to conclude that if aid played a role to catalyze private investment, it must have been very weak.

#### **4. Aid could have hindered private investment.**

Although the empirical evidence is somewhat inconclusive, it is conceivable that aid has weakened private investment in Africa. There are reasons to support this inference:

##### **First, the supply response to aid was limited, both in the short- and long-run.**

- In Africa, the aid policy of the international community has been based on the premise that if macroeconomic policies are sound, the economy is liberalized, and a

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<sup>14</sup> According to IFC (2005), Djankov et al., find that ODA as a whole indirectly retards growth by increasing government consumption and reducing total investment as a share of GDP. On the other hand, Hansen and Tarp (2001) finds that gross domestic investment (as a share of GDP) responds positively to aid.



good progress is made toward good governance, then the environment for private investment would improve and the private sector would naturally take off. Based on this premise, donors increased budget and balance of payment support to promote structural adjustment and other policy-based programs. In the end, however, the promised take-off was not observed in general. After nearly ten years of continuous, successful structural adjustment and US\$18 billion of aid (in constant 2003 dollars) to support it, private investment remains pitifully low. The average private investment-to-GDP ratio for countries that implemented structural adjustment was 12.6 percent in 2003, which was not much different from the level in 1995 or the simple average of all Sub-Saharan African countries in 2003 (Table 14).

- Given the focus on budgetary aid and the priority attached to education and other social services, aid did not help much in augmenting capital formation. Only 20 percent of aid in 1980–2003 was used for economic infrastructure and real sector projects. Moreover, there is ample anecdotal evidence that much of the aid for infrastructure did not translate to permanent increase in physical capital. Often it was not well maintained for the lack of adequate funding and local commitment.
- The weight of the empirical literature suggests that in Africa, public investment—much of which was aid—was not positively correlated to economic growth even with a low degree of significance (e.g., Deverajan et al., 2001). If aid were to have had a significant supply response, intuitively it would be difficult to understand why per capita income in Africa remained so low after decades of massive aid.

**Second, aid-financed government consumption of non-tradables was large in most countries in Africa.** In Asia, aid was predominantly for infrastructure and used primarily to finance machineries, supplies and equipment that were imported from abroad. More than 80 percent of Japanese aid in 1975–85 was spent for directly financing imports (DAC database). To the extent aid money is used directly to finance imports, it does not affect the domestic demand-supply balance. In contrast, in Africa aid was primarily for budget support, program aid and social sector projects, a large majority of which was spent locally particularly on non-tradables. Aid in this category was more than 5 percent of GDP (on a commitment basis) in most African countries, and exceeded 10 percent of GDP for several, in 1995–2003.

**Third, given the limited supply response, the ensuing excess demand for non-tradables caused either an increase in the relative price of non-tradables (i.e., real exchange rate appreciation), inflation, and/or an increase in real interest rates, all of which affected private investment negatively.** Let us illustrate:

- Suppose that the government did not adjust fiscal or monetary policy in response to aid inflows. Then, the demand for non-tradables would increase by the amount of aid-financed government consumption. The relative price of non-tradables would then rise—i.e., the real exchange rate would appreciate—enough for the private sector to

reduce its consumption of non-tradables by the amount of aid-financed government consumption and increase the consumption of tradables correspondingly. Thus, the current account would worsen by the amount of aid, leaving international reserves and hence reserve money unchanged. With money supply unchanged, the overall price level will not change.

- The government could mitigate or avoid real exchange rate appreciation by monetizing aid inflows (i.e., buying foreign exchange and injecting reserve money) and inflating the economy. For instance, if the real value of non-aid related government spending on non-tradables is reduced—via inflation—by the amount of aid-financed government consumption of non-tradables, the demand-supply balance in the domestic non-tradables market would be unaffected, and hence no change in the relative price of non-tradables, i.e., the real exchange rate. The nominal exchange rate would depreciate *pari pasu* with the price of non-tradables.
- The government could also avoid real appreciation (and inflation), if it sold government securities to the private sector to raise the latter's savings. A reduction in current private consumption of nontradables could cancel out aid-financed public consumption of non-tradables. The private consumption of tradables would also be reduced, and hence the current account would improve and international reserves rise. In this case, however, the cost for the economy would be an increase in real interest rates.

Table 15 shows the interplay of aid flows and the related variables for the African countries that received budget support, program aid and social sector projects more than 5 percent of GDP per year (a proxy for aid money spent on non-tradables). In general, it is difficult to directly trace the aid impact on the real exchange rate, inflation and real interest rates. However, there are several typical cases where the countries experienced either significant real appreciation (e.g., Benin), a double-digit inflation (e.g., Ghana and Mozambique), high real interest rates (Gambia and Uganda), high inflation and real interest rates (Madagascar, Malawi and Tanzania), or inflation, high real interest rates and real exchange rate appreciation (Zambia).

The IMF (2005) observes that there is no evidence of real exchange rate appreciation in response to a surge in aid flows in Africa. We should be careful not to conclude from this observation alone that there was no aid-related Dutch disease syndrome or no other harmful effects. Data are subject to large margin of errors in most African countries. It is well known that the exchange rates are subject to a lot of noise and could well deviate from economic fundamentals for some time. If there were large capital outflows concomitant to an increase in aid flows (as seen in the cases of aid surge in recent years), no appreciation pressures would be expected. After all, as per the IMF (2005), the private investment to GDP ratio fell over the period of aid surge in all cases.

## V. Implications for Effective Donor Assistance

A key lesson from East Asia is that if aid is to be effective in the long-run, it would have to lead to private capital formation, both domestic and foreign. Private-to-private flows, particularly FDI, directly boost growth and relieve poverty. Aid would have to be an integral element of recipient government's development strategy, which would focus on the mobilization of private capital. An objective of aid should be to assist the private sector development, and its effectiveness should be judged to a large extent by its impact on private investment over the medium to long term.

However, even if such private sector development strategy was pursued in Africa, no immediate successes may realistically be expected. Devarajan et al., (2001) present the evidence of poor returns to investment in Africa with cross-country data, and argue that "the much-denigrated capital flight out of Africa may well have been a rational response to low returns at home (p.98)." Lensink and White (1998) estimated the probability of a developing country attracting significant private capital inflows, and found that such probability was very low for almost all African countries. The World Bank and IMF (2005) lucidly describe poor governance, inadequate infrastructure, high security risks, and other weak investment climate, all of which remain firmly entrenched and depressed risk-adjusted rates of return on private investment to the unacceptably low levels.

Nevertheless, the differences in modalities of aid delivery between Asia and Africa—and the statistical evidence that suggests that modality matters—suggest several modifications of the current aid strategy in Africa:

First, the scale of aid to recipient countries. In Asia, aid was small and mostly for infrastructure, so one needed not to worry about Dutch Decease and other potential adverse macroeconomic consequences. This is not the case for many countries in Africa.

It will be critical to continue to support sound macroeconomic policies and good governance. However, for countries with large aid inflows and ample international reserves, the support should be extended without financing (a la IMF's new Policy Support Instrument). For others, IMF's traditional balance of payment support would be appropriate. Namely, the funding should not be used to finance increased government spending but to augment international reserves.<sup>15</sup> The policy program should feature a heightened focus on promoting long-term growth, possibly including increasing private investment and lowering real interest rates as performance targets.

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<sup>15</sup> The IMF (2005) endorses a policy of not using part of aid and "saving" it in increased international reserves as a short-run choice, for countries with large aid inflows and low international reserves. While this policy may make sense from narrow interests of the recipient country, it may not be fully appropriate from global perspectives. Surely, there must be some poor countries where aid is in short supply and is badly needed to meet immediate humanitarian or developmental needs. Moreover, most donor countries are facing a very difficult fiscal situation.

Radelete (2004) recommends that donors “begin to allocate aid more seriously to poor countries with strong and moderate governance” and that “well-governed countries ... should receive more of their aid as program funding (p.1).” “Well-governed countries” are already receiving the large amount of aid, much of it in program aid. A pre-condition before moving further in this direction should be enhancement of supply response to policy programs on the basis of which program aid is given. A more definitive progress in improving a business environment more conducive to private investment is imperative. Otherwise, a further increase in aid-financed demand on non-tradables would harm private investment by leading to real exchange rate appreciation or an increase in real interest rates.

Second, the composition of aid. The focus on immediate social needs is entirely appropriate in aid to Africa, given the immediate needs to attend to dire living conditions such as poor health, a lack of safe water, and low primary school enrolment. However, the balance may have shifted too far in that direction at the expense of long-term development objectives, including economic infrastructure. In redirecting aid for infrastructure, aid agencies should take steps not to repeat mistakes of the past—poor maintenance and white elephants. Greater accountability and full ownership will be essential. As was practiced in many projects in Asia, involvement of private investors as a co-financier will provide greater scrutiny in designing, implementation and maintenance of infrastructure projects.

Actually, if implemented well, aid projects in social sectors should complement long-term economic goals. A better-trained, healthier work force is essential to attract FDI and latch onto the global value chain. However, to ensure a more lasting result, greater accountability and ownership are needed. A possible step in this direction may be to give program aid to local communities to fund social projects they select and implement. The funding should be contingent upon a modest cost sharing by local communities, to ensure full ownership and long-term commitment. A more radical possibility may be to give aid vouchers to the poor. This possibility is usually dismissed, but IFC (2005) argues that aid vouchers “aim at providing purchasing power and choice to those who need it most, when they need it, with a minimum of waste and misdirection.

Finally, the size of individual projects and donor involvement. In Asia, donor projects were generally large, and donors were engaged in a limited number of projects in each recipient country. The opposite is the case in Africa. Much efficiency gains can be made by allowing larger projects, including for infrastructure, and by scaling down the intensity of donor involvement via greater donor coordination.

## **VI. Conclusion**

The goal of the donor community in Africa is laudable and deserves support. Radelete (2004) shows that the new, large private aid institutions are succeeding in achieving their narrowly defined social targets (such as HIV/AIDS, malaria, tb). The World Bank and the IMF (2005) argued that “large increases in aid will be needed, particularly to accelerate progress towards the non-income MDGs (p.20).”

However, if we are to agree that perpetual dependency on aid is not good for the Africans, then it should be delivered in such a way that would lessen the need for it over time. Aid should eventually lead to self-sustained development. In Africa, the balance has shifted too far in favor of short-term social needs at the expense of real development objectives.

There is little convincing evidence that suggests that aid has contributed significantly to economic growth in Africa over the last three decades. While the recent upturn in economic performance in many African countries is encouraging, over a longer horizon, even “good performers”—for which large program and other aid were given—have not achieved better results than others. Life expectancy has continued to fall at an alarming pace in many countries.

A buoyant private sector is a prerequisite for continual economic growth and poverty reduction. In Africa, aid does not seem to have catalyzed private investment, which remains pitifully low. In contrast, the existing literature and anecdotal evidence suggest that aid contributed modestly to the phenomenal growth in East Asia. The key was that aid leveraged a larger amount of private investment. Aid was not large but combined with other means of public intervention strategically designed to achieve this goal. Building on this experience, this paper offered an approach where aid may more closely linked to a goal of catalyzing private investment.

Table 1. GMM Estimate for GDI: All Regions

	Aid to All regions		Aid to Asia, Africa and Others as separate variables	
	Linear	Quadratic	Linear	Quadratic
$\Delta GDI(-1)$	0.5473 *** (0.1341)	0.5637 *** (0.1398)	0.5437 *** (0.1381)	0.5634 *** (0.1430)
$\Delta GDI(-2)$	0.0048 (0.0559)	0.0153 (0.0577)	0.0098 (0.0567)	0.0433 (0.0579)
$\Delta GDI(-3)$	-0.1098 (0.0721)	-0.1124 (0.0737)	-0.1253 * (0.0750)	-0.1033 (0.0735)
$\Delta AID_{Total}$	0.1452 *** (0.0546)	-0.0632 (0.0819)		
$\Delta AID_{Total}(-1)$	0.1121 ** (0.0470)	0.1093 (0.1010)		
$\Delta AID_{Total}^2$		0.0024 *** (0.0006)		
$\Delta AID_{Total}^2(-1)$		-0.0003 (0.0009)		
$\Delta AID_{Asia} 1/$			-0.8186 ** (0.4257)	0.5245 (1.6195)
$\Delta AID_{Asia}(-1)$			1.4036 *** (0.4829)	3.7654 ** (1.6785)
$\Delta AID_{Asia}^2$				-0.1119 (0.1050)
$\Delta AID_{Asia}^2(-1)$				-0.2125 * (0.1222)
$\Delta AID_{SSA}$			0.1752 *** (0.0449)	-0.0483 (0.0846)
$\Delta AID_{SSA}(-1)$			0.1052 ** (0.0453)	0.0453 (0.0953)
$\Delta AID_{SSA}^2$				0.0024 *** (0.0007)
$\Delta AID_{SSA}^2(-1)$				0.0003 (0.0008)
$\Delta AID_{Other}$			-0.0105 (0.1358)	-0.1628 (0.2962)
$\Delta AID_{Other}(-1)$			0.1318 (0.1623)	0.8397 ** (0.4347)
$\Delta AID_{Other}^2$				0.0054 (0.0085)
$\Delta AID_{Other}^2(-1)$				-0.0222 * (0.0136)
Constant	0.3832 ** (0.1981)	0.3623 * (0.1971)	0.8123 ** (0.3488)	0.4194 ** (0.2039)
Obs.	385	385	385	385
No. of groups	117	117	117	117
Wald $\chi^2$ statistics	39.15	645.93	49.90	945.31
Arrelano-Bond test(2 <sup>nd</sup> order):				
z	-1.83	-1.78	-1.78	-1.75
p-value	0.0668	0.0755	0.0746	0.0794

Note: The one step estimation is performed with the dependent variable of  $\Delta GDI$ . The robust standard errors are shown in parentheses. \*10% level significance; \*\*5% level significance; \*\*\*1% level significance. Time dummies are included.

Source: Authors' estimation.

Table 2. GMM Estimate for FDI: All Regions

	Aid to All regions		Aid to Asia, Africa and Others as separate variables	
	Linear	Quadratic	Linear	Quadratic
$\Delta FDI(-1)$	-0.5248 * (0.3148)	-0.5150 * (0.3036)	-0.5421 * (0.3240)	-0.4084 (0.3118)
$\Delta FDI(-2)$	-0.2883 *** (0.0858)	-0.2683 *** (0.0808)	-0.2764 *** (0.0885)	-0.2904 *** (0.0931)
$\Delta FDI(-3)$	-0.0390 (0.1373)	-0.0058 (0.1354)	-0.0231 (0.1441)	-0.0490 (0.1285)
$\Delta AID_{Total}$	-0.0391 * (0.0228)	0.0384 (0.0628)		
$\Delta AID_{Total}(-1)$	0.0466 (0.0503)	0.1473 * (0.0907)		
$\Delta AID_{Total}^2$		-0.0008 * (0.0005)		
$\Delta AID_{Total}^2(-1)$		-0.0011 * (0.0006)		
$\Delta AID_{Asia} 1/$			0.0895 (0.1616)	0.7166 (0.4585)
$\Delta AID_{Asia}(-1)$			0.4829 *** (0.1862)	1.3581 *** (0.5261)
$\Delta AID_{Asia}^2$				-0.0500 * (0.0274)
$\Delta AID_{Asia}^2(-1)$				-0.0806 ** (0.0358)
$\Delta AID_{SSA}$			-0.0287 (0.0211)	0.0641 (0.0776)
$\Delta AID_{SSA}(-1)$			0.0158 (0.0500)	0.1013 (0.0978)
$\Delta AID_{SSA}^2$				-0.0010 (0.0007)
$\Delta AID_{SSA}^2(-1)$				-0.0007 (0.0007)
$\Delta AID_{Other}$			-0.0635 (0.0491)	0.4036 * (0.2329)
$\Delta AID_{Other}(-1)$			0.2141 (0.1393)	-0.2495 (0.2363)
$\Delta AID_{Other}^2$				-0.0141 ** (0.0071)
$\Delta AID_{Other}^2(-1)$				0.0124 * (0.0075)
Constant	1.0001 *** (0.2364)	0.9904 *** (0.2258)	1.0574 *** (0.2661)	1.0070 *** (0.2606)
Obs.	383	383	383	383
No. of groups	112	112	112	112
Wald $\chi^2$ statistics	52.59	92.32	58.13	104.61
Arrelano-Bond test(2 <sup>nd</sup> order):				
z	-1.45	-1.43	-1.49	-1.23
p-value	0.1460	0.1460	0.1371	0.2186

Note: The one step estimation is performed with the dependent variable of  $\Delta FDI$ . The robust standard errors are shown in parentheses. \*10% level significance; \*\*5% level significance; \*\*\*1% level significance. Time dummies are included.

Source: Authors' estimation.

Table 3. Characteristics of Aid to East Asia, 1973–89

	Aid Flows		Number of Projects per year, per donor	Average size of projects	Median size of projects	Share in total aid	
	Annual average	Percent of GDP				Economic infrastructures and real sector projects	Program assistance
<b>Indonesia</b>	1076.8	1.4%	8	7.8	2.0	62.7%	19.8%
<b>Malaysia</b>	184.5	0.8%	1	8.3	0.5	91.6%	2.4%
<b>Philippines</b>	461.5	1.7%	3	7.6	1.3	50.9%	27.3%
<b>Thailand</b>	396.0	1.2%	4	6.5	1.2	74.6%	2.1%
<b>Average</b>	<b>529.7</b>	<b>1.3%</b>	<b>4</b>	<b>7.5</b>	<b>1.3</b>	<b>70.0%</b>	<b>12.9%</b>

Note: Including only donors with total aid commitment of more than \$50 millions in the period 1973-1989.

Source: CRS/Aid Activities.



Table 4. GMM Estimate for FDI on Aid: Asia<sup>1</sup>

	With Non-aid Explanatory Variables		With Aid Variables Only	
	Linear	Quadratic	Linear	Quadratic
$\Delta$ FDI(-1)	0.1043 (0.2311)	--0.0123 (0.1944)	0.1278 (0.1971)	0.0262 (0.1854)
$\Delta$ AID	0.2278 (0.2841)	1.0542 * (0.5696)	0.1991 (0.2703)	0.9746 * (0.5691)
$\Delta$ AID(-1)	-0.1186 (0.1003)	0.4762 * (0.2638)	-0.1177 (0.1003)	0.4769 * (0.2625)
$\Delta$ AID <sup>2</sup>		-0.0670 * (0.0356)		-0.0624 (0.0343)
$\Delta$ AID <sup>2</sup> (-1)		-0.0567 ** (0.0250)		-0.0561 ** (0.0242)
$\Delta$ Population(-1)	0.0036 (0.0045)	0.0049 (0.0041)		
$\Delta$ GDP per capita(-1)	-0.0003 (0.0004)	-0.0004 (0.0005)		
$\Delta$ Telephone network	-0.0011 (0.0021)	0.0007 (0.0032)		
Constant	0.2086 (0.1269)	0.1852 (0.2083)	0.3755 ** (0.1985)	0.4556 ** (0.1849)
Obs.	60	60	60	60
No. of groups	11	11	11	11
Wald $\chi^2$ statistics	4382.34	3063.12	55.97	1911.46
Arrelano-Bond test(2 <sup>nd</sup> order):				
z	-0.70	-1.46	-0.73	-0.87
p-value	0.48	0.15	0.46	0.39

Note: The one step estimation is performed with the dependent variable of  $\Delta$ FDI. The robust standard errors are shown in parentheses. \*10% level significance; \*\*5% level significance; \*\*\*1% level significance. Time dummies are included.

1/Including Bangladesh, China, Hong Kong, India, Indonesia, Korea, Malaysia, Pakistan, the Philippines, Sri Lanka, Thailand, and Vietnam.

Source: Authors' estimation.

Table 5. GMM Estimate for GDI on Aid: Asia<sup>1</sup>

	With Non-aid Explanatory Variables		With Aid Variables Only	
	Linear	Quadratic	Linear	Quadratic
$\Delta$ GDI(-1)	0.5421 *** (0.1232)	0.5668 *** (0.1046)	0.5331 *** (0.1275)	0.5687 *** (0.1002)
$\Delta$ AID	-0.4646 (0.6333)	-2.2040 (1.7053)	-0.8755 (0.6067)	-2.3100 (1.6526)
$\Delta$ AID(-1)	0.8240 ** (0.3583)	3.9922 *** (1.003)	0.9261 ** (0.4464)	4.4992 *** (1.0990)
$\Delta$ AID <sup>2</sup>		0.1280 (0.1109)		0.1240 (0.1064)
$\Delta$ AID <sup>2</sup> (-1)		-0.2936 *** (0.0734)		-0.3426 *** (0.0909)
$\Delta$ Population(-1)	0.0103 (0.0123)	0.0141 (0.0103)		
$\Delta$ GDP per capita(-1)	0.0016 (0.0012)	0.0019 (0.0013)		
$\Delta$ Telephone network	-0.0274 ** (0.0115)	-0.0228 * (0.0103)		
Constant	0.2480 (0.5632)	1.2797 (1.5061)	-0.5844 * (0.3558)	-0.5854 (0.4409)
Obs.	61	61	61	61
No. of groups	11	11	11	11
Wald $\chi^2$ statistics	259.44	62.71	44.03	94.67
Arrelano-Bond test(2 <sup>nd</sup> order):				
z	-1.36	-1.91	-1.44	-2.12
p-value	0.17	0.06	0.15	0.03

Note: The one step estimation is performed with the dependent variable of  $\Delta$ GDI. The robust standard errors are shown in parentheses. \*10% level significance; \*\*5% level significance; \*\*\*1% level significance. Time dummies are included.

1/Including Bangladesh, China, Hong Kong, India, Indonesia, Korea, Malaysia, Pakistan, the Philippines, Sri Lanka, Thailand, and Vietnam.

Source: Authors' estimation.

Table 6. GMM Estimate for Japanese Aid and FDI in Asia<sup>1</sup>

Dependent Variable	ΔJapanese FDI		ΔFDI	
	Linear	Quadratic	Linear	Quadratic
ΔJapanese FDI(-1)	-0.2764 ** (0.1304)	-0.4238 ** (0.1828)		
ΔFDI(-1)			0.1217 (0.1482)	0.0441 (0.1495)
ΔJapanese AID	-0.2021 (0.1716)	0.3123 (0.3094)	0.8560 (0.7207)	1.8946 *** (0.5764)
ΔJapanese AID (-1)	0.1814 (0.1443)	0.7104 * (0.3795)	-0.7666 (0.7752)	-0.5034 (1.6370)
ΔJapanese AID^2		-0.1517 *** (0.0583)		-0.6408 *** (0.2026)
ΔJapanese AID^2(-1)		-0.1646 * (0.0973)		-0.1207 (0.3791)
ΔOther Aid	0.0013 (0.0410)	-0.5717 (0.3796)	-0.1348 (0.2490)	0.7746 * (0.4090)
ΔOther Aid (-1)	-0.0611 (0.0448)	-0.2616 (0.2257)	0.0940 (0.1687)	0.9265 (0.6574)
ΔOther Aid^2		0.0527 (0.0331)		-0.0654 * (0.0401)
ΔOther Aid^2(-1)		0.0237 (0.0218)		-0.0936 * (0.0573)
Constant	-0.1190 * (0.0716)	-0.0696 (0.0500)	0.1184 (0.1358)	0.2459 * (0.1334)
Obs.	51	51	60	60
No. of groups	11	11	11	11
Wald $\chi^2$ statistics	127.17	63.11	204.65	459.44
Arrelano-Bond test(2 <sup>nd</sup> order):				
z	0.61	1.01	-0.77	-1.11
p-value	0.54	0.31	0.44	0.27

Note: The one step estimation is performed with the dependent variable of ΔFDI (only Japanese or total investment). The robust standard errors are shown in parentheses. \*10% level significance; \*\*5% level significance; \*\*\*1% level significance. Time dummies are included.

1/Including Bangladesh, China, Hong Kong, India, Indonesia, Korea, Malaysia, Pakistan, The Philippines, Sri Lanka, Thailand, and Vietnam.

Source: Authors' estimation.

Table 7. Growth Regression by Economic Planning Agency

Variable	Coef.
ln(Initial GDP)	-0.01
Sub-Saharan Africa	-1.56**
Civil war	-0.78**
Assassinations	-0.16**
Oil shock periods	-2.11**
Financial depth (-1)	0.04**
Fiscal surplus (-1)	0.09**
Inflation (-1)	-0.01**
Economic openness	2.02**
Yen loans per GDP (-1)	0.23**
Other ODA per GDP (-1)	0.03**
Constant	5.43**
No. of obs.	2,019
No. of group	100
Adj. R-squared	0.26
Durbin-Watson statistics	1.52
S.E. of regression	5.33

\*\* 5% significance level.

Note: Although the choice of variables follows the previous literature in this area, this estimation result seems to depend on a different data treatment. Each data point might be a year-country observation, though no details are explained in the original paper. The conventional treatment is to take the four or five-year average in order to avoid a short-term volatility in the variables.

Source: Economic Planning Agency (2001).

Table 8. Characteristics of Aid to Sub-Saharan African Countries, by Donor

	Number of Projects per year	Number of countries with project aid	Number of project, per country, per year	Average size	Median size	Average aid flows per year (in 2003 USD millions)	Median aid flows per year (in 2003 USD millions)
1980-89							
France	514	44	11.7	1,138	267	44.3	15.5
Germany	68	39	1.7	4,622	2,345	17.6	12.8
Italy	63	40	1.6	5,853	1,502	12.4	4.8
Japan	72	42	1.7	4,405	2,268	15.0	7.3
Netherlands	117	40	2.9	1,282	522	8.2	2.7
United Kingdom	29	22	1.3	3,375	1,101	26.2	14.8
United States	140	42	3.3	2,272	1,318	32.9	15.5
1990-99							
France	445	49	9.1	1,733	442	51.9	19.8
Germany	151	48	3.1	2,916	1,060	23.7	19
Italy	201	48	4.2	1,047	165	9.3	3.3
Japan	106	47	2.3	5,681	3,239	19.4	9.3
Netherlands	384	45	8.5	802	140	11.3	5
United Kingdom	244	42	5.8	1,559	477	15.2	2.9
United States	275	47	5.9	1,888	792	24.2	13.8
2000-03							
France	1081	50	21.6	633	151	26.8	10.9
Germany	715	48	14.9	813	182	14.4	12.1
Italy	431	45	9.6	246	23	3.4	0.8
Japan	325	47	6.9	1,085	72	13.6	6.0
Netherlands	602	44	13.7	639	64	13.9	5.7
United Kingdom	453	42	10.8	1,532	232	22.8	2.4
United States	774	48	16.1	1,163	343	33.1	18.3

Source: CRS/Aid Activities.

Table 9. Aid to Sub-Saharan Africa, 1980–2003 1/

	Aid flows		Sectoral distribution (% of all commitments)				
	In 2003 USD millions	% of GDP	Economic & production infrastructures 1/	Social services infras. & program aid 2/	Action relating to debt	Emergency aid	Other commitment
Angola	313.3	3.5	26.0	44.4	2.8	22.8	3.9
Benin	261.4	11.3	34.0	59.0	5.5	0.3	1.2
Botswana	149.0	3.0	39.3	55.1	3.2	1.4	1.0
Burkina Faso	455.2	13.9	34.7	60.3	3.3	0.5	1.3
Burundi	250.8	20.1	29.4	54.5	2.5	13.0	0.6
Cameroon	500.3	4.1	26.4	47.4	25.0	0.3	0.9
Cape Verde	131.4	27.2	32.5	64.3	0.5	1.6	1.2
Central African Rep.	186.8	13.2	47.2	46.7	4.4	0.4	1.3
Chad	254.9	14.5	39.1	56.3	2.2	1.6	0.8
Comoros	58.7	20.8	37.3	58.9	2.2	1.3	0.3
Congo Dem.Rep.	604.7	5.3	20.1	24.1	45.7	5.2	4.9
Congo, Rep.	174.4	5.9	27.2	50.0	16.7	3.5	2.5
Cote d'Ivoire	614.3	5.0	22.6	50.0	25.1	0.5	1.7
Equatorial Guinea	41.7	7.3	38.1	57.3	3.6	0.1	0.8
Ethiopia	1005.2	11.8	34.7	47.6	3.0	12.1	2.6
Gabon	128.4	2.1	33.0	46.1	18.9	0.8	1.1
Gambia	101.6	23.2	39.9	56.1	2.1	0.7	1.2
Ghana	696.0	6.0	43.5	51.0	3.4	0.2	2.0
Guinea	336.2	9.9	41.9	50.3	5.7	2.0	0.2
Guinea-Bissau	122.3	41.6	30.4	46.5	20.0	1.9	1.2
Kenya	884.6	7.8	42.8	47.6	5.8	2.3	1.5
Lesotho	145.1	15.3	42.1	54.7	0.8	0.6	1.8
Madagascar	461.2	10.3	37.1	46.9	13.5	0.7	1.7
Malawi	466.0	23.3	28.6	64.4	3.4	2.0	1.6
Mali	544.1	16.3	32.8	61.1	3.8	0.9	1.4
Mauritius	79.5	2.1	54.7	44.7	0.1	0.3	0.3
Mozambique	949.7	23.3	27.3	48.3	19.2	3.7	1.4
Namibia	110.0	3.5	32.8	63.7	0.0	1.3	2.1
Niger	400.2	14.6	30.7	62.5	5.0	1.0	0.8
Nigeria	226.4	0.5	25.3	71.0	2.7	0.6	0.4
Rwanda	399.5	16.9	26.7	57.7	1.9	11.6	2.0
Sao Tome & Principe	38.7	61.7	37.6	48.2	12.8	0.7	0.7
Senegal	703.2	12.2	32.1	57.2	9.0	0.3	1.3
Seychelles	28.3	5.1	39.1	51.2	5.8	0.4	3.5
Sierra Leone	194.2	15.6	20.8	42.9	20.2	12.8	3.3
South Africa	234.9	0.2	13.7	84.3	0.0	0.5	1.5
Swaziland	62.0	4.8	47.1	49.9	0.2	0.9	2.0
Tanzania	1233.6	13.5	40.2	45.4	12.0	1.7	0.8
Togo	196.0	10.6	36.6	51.5	10.4	0.7	0.7
Uganda	663.9	10.4	28.2	63.3	4.8	2.7	1.0
Zambia	733.4	17.4	30.0	52.2	15.5	0.9	1.3
Zimbabwe	434.6	4.0	28.1	61.7	2.3	6.3	1.6
<i>Simple average</i>	<i>370.9</i>	<i>12.8</i>	<i>33.6</i>	<i>53.7</i>	<i>8.2</i>	<i>2.9</i>	<i>1.5</i>
<i>Median</i>	<i>254.9</i>	<i>11.3</i>	<i>33.0</i>	<i>51.5</i>	<i>4.4</i>	<i>0.9</i>	<i>1.3</i>

Source: CRS/Aid Activities.

1/ Includes: Economic infrastructures and services: transport and storage, communications, energy, banking and financing services, business and other services; Production: agriculture, forestry and fishing, industry and construction, and trade and tourism.

2/ Includes: Social infrastructures and services: education, health, population program, water supply and sanitation, government and civil society, other social infrastructure and services and multi-sector projects; Program assistance: structural adjustment (with IBRD/IMF), food aid excluding relief food aid, and other general programme and commodity assistance.

Table 10. Improvement of HDI and per capita GDP in Sub-Saharan Africa, 1980–2003

	Aid weighted average 1/	Simple average
Human development index		
All SSA countries	11.8	11.4
SSA excl. conflict cases 2/	10.7	10.7
SSA excl. AIDS cases 3/	12.6	13.8
Per capita GDP		
All SSA countries	2.9	7.3
SSA excl. conflict cases	6.4	15.3
SSA excl. AIDS cases	0.3	-0.2

Source: World Development Indicators

1/ Average change in per capita GDP of aid recipients, weighted by share of the recipient in total aid of donor to Sub-Saharan Africa. Excluding countries for which per capita GDP was not available.

2/ Countries affected by conflicts are those with a share of emergency aid that is at least 16 percent of total aid (1995-2003): Angola, Burundi, Democratic Republic of Congo, Liberia Rwanda, Sierra Leone, Somalia and Sudan.

3/ Countries affected by AIDS are: Botswana, Lesotho, South Africa, and Swaziland.

Table 11. Improvement in HDI of Countries with Structural Adjustment Programs (SAP) during 1990–2000 1/

	Change in HDI	
	1990 - 1999	1980 - 1990
Benin	14.7	9.5
Burkina Faso	7.5	11.7
Cameroon	-2.7	11.0
Cote d'Ivoire	-3.2	0.2
Ghana	8.9	9.2
Malawi	8.4	5.7
Mali	16.7	10.5
Mozambique	15.8	4.0
Niger	8.8	-1.2
Senegal	1.2	18.9
Tanzania	-4.4	
Uganda	15.9	
Zambia	-11.5	-2.7
Average of countries with SAP	5.8	7.0
Average of Sub-Saharan Africa 2/	6.6	7.4

1/ Countries that received SAP aid in at least 8 of 11 years, and for which HDI data is available

2/ Excluding AIDS cases: Botswana, Lesotho, South Africa & Swaziland.

Sources: HDI- Human development report 2004 (UNDP); SAP- OECD CRS/Aid Activities – All Commitments – All Details: 1973 – 2004.



Table 12. GMM Estimate for FDI on Aid: Sub-Saharan Africa

	With Non-aid Explanatory Variables		With Aid Variables Only	
	Linear	Quadratic	Linear	Quadratic
$\Delta$ FDI(-1)	-0.5973 *** (0.1627)	-0.6096 *** (0.1624)	-0.6659 *** (0.1786)	-0.6672 *** (0.1794)
$\Delta$ FDI(-2)	-0.2962 (0.2209)	-0.2687 (0.2158)	-0.2163 (0.2584)	-0.1863 (0.2505)
$\Delta$ FDI(-3)	-0.2309 * (0.1218)	-0.2168 (0.1185)	-0.3397 *** (0.1192)	-0.2779 *** (0.1059)
$\Delta$ AID	-0.0465 * (0.0248)	0.0058 (0.0664)	-0.0300 * (0.0180)	0.0423 (0.0648)
$\Delta$ AID(-1)	0.0118 (0.0463)	0.0547 (0.1059)	0.0348 (0.0474)	0.1203 (0.0960)
$\Delta$ AID <sup>2</sup>		-0.0006 (0.0005)		-0.0008 (0.0005)
$\Delta$ AID <sup>2</sup> (-1)		-0.0004 (0.0007)		-0.0008 (0.0006)
$\Delta$ Population(-1)	-0.0458 (0.0829)	-0.0548 (0.0811)		
$\Delta$ GDP per capita(-1)	-0.0034 (0.0026)	-0.0028 (0.0028)		
$\Delta$ Telephone network	0.0032 (0.0091)	0.0022 (0.0097)		
Constant	0.2657 (0.3949)	0.1466 (0.5041)	0.3054 (0.3675)	0.5501 (0.4581)
Obs.	148	148	150	150
No. of groups	43	43	44	44
Wald $\chi^2$ statistics	802.85	1027.38	171.34	394.48
Arrelano-Bond test(2 <sup>nd</sup> order):				
z	-1.54	-1.19	-1.53	-1.05
p-value	0.1230	0.2329	0.1259	0.2957

Note: The one step estimation is performed with the dependent variable of  $\Delta$ FDI. The robust standard errors are shown in parentheses. \*10% level significance; \*\*5% level significance; \*\*\*1% level significance. Time dummies are included.

Source: Authors' estimation.

Table 13. GMM Estimate for GDI on Aid: Sub-Saharan Africa

	With Non-aid Explanatory Variables		With Aid Variables Only	
	Linear	Quadratic	Linear	Quadratic
$\Delta$ GDI(-1)	0.4575 ** (0.1938)	0.5251 ** (0.2057)	0.5379 *** (0.1912)	0.5955 *** (0.2020)
$\Delta$ GDI(-2)	-0.0948 (0.1052)	-0.0744 (0.1140)	-0.0908 (0.1060)	-0.0782 (0.1138)
$\Delta$ GDI(-3)	0.0289 (0.1014)	0.0328 (0.1066)	0.0200 (0.1109)	0.0196 (0.1145)
$\Delta$ AID	0.2094 *** (0.0680)	0.0032 (0.0712)	0.1971 *** (0.0401)	-0.0136 (0.0743)
$\Delta$ AID(-1)	0.1265 ** (0.0438)	0.0673 (0.0982)	0.1060 ** (0.0429)	0.0848 (0.1155)
$\Delta$ AID <sup>2</sup>		0.0023 *** (0.0006)		0.0019 *** (0.0006)
$\Delta$ AID <sup>2</sup> (-1)		0.0002 (0.0009)		-0.0001 (0.0010)
$\Delta$ Population(-1)	0.0376 (0.1092)	0.0621 (0.0972)		
$\Delta$ GDP per capita(-1)	0.0024 (0.0035)	0.0011 (0.0035)		
$\Delta$ Telephone network	-0.0222 ** (0.0104)	-0.0203 (0.0105)		
Constant	1.3431 (1.2746)	1.8858 (1.2627)	0.5105 (0.4084)	0.5352 (0.4353)
Obs.	139	139	141	141
No. of groups	41	41	42	42
Wald $\chi^2$ statistics	35.33	618.31	44.44	634.69
Arrelano-Bond test(2 <sup>nd</sup> order):				
z	-0.45	-0.45	-0.44	-0.52
p-value	0.6493	0.6493	0.6589	0.6024

Note: The one step estimation is performed with the dependent variable of  $\Delta$ GDI. The robust standard errors are shown in parentheses. \*10% level significance; \*\*5% level significance; \*\*\*1% level significance. Time dummies are included.

Source: Authors' estimation.

Table 14. Private Investment before and after Structural Adjustment Programs  
(in percent of GDP)

	1995	2003
Benin	6.9	11.0
Burkina Faso	12.4	11.2
Cameroon	13.3	15.4
Ethiopia	9.0	10.0
Ghana	7.1	14.4
Mali	13.5	17.4
Mozambique	17.6	13.9
Niger	1.8	5.7
Tanzania	16.2	11.1
Uganda	12.2	15.6
<b>Average of countries with SAP</b>	11.0	12.6
<b>Average of Sub-Saharan Africa</b>	13.9	11.7

[1] Countries that received SAP aid in at least 7 of 9 years.

Excluding Chad whose economic indicators were influenced by the construction of oil pipeline.

Sources:

Per capita GDP- World Development Indicators

SAP- OECD CRS/Aid Activities - All Commitments (Table 1)

Table 15. Domestic Liquidity Impact, 1995–2003  
(In percent of GDP; annual average)

Countries 1/	Net-aid flows	Change in International Reserves 2/	Increase in reserve money	Inflation rate	Real rate of interest	Change in Real Effective Exchange Rate 3/
Benin	9.4	2.0	1.2	4.6	-	3.4
Burkina Faso	13.6	1.9	1.2	3.2	-	1.7
Cape Verde	20.1	1.0	1.6	4.0	8.4	0.8
Comoros	12.8	2.4	1.9	3.0	-	1.3
Ethiopia	14.1	0.7	1.1	2.8	8.1	-1.9
Gambia	11.9	-1.1	3.1	5.2	20.0	-5.8
Ghana	10.1	1.3	3.2	29.0	-	-0.6
Madagascar	9.6	0.9	1.2	13.4	15.1	2.2
Malawi	23.0	0.5	1.6	31.8	15.0	1.4
Mali	13.7	2.6	2.1	3.0	-	-0.6
Mozambique	25.1	-	1.4	17.9	-	1.4
Niger	12.8	0.8	0.5	3.2	-	-0.9
Senegal	9.5	2.1	1.2	2.3	-	1.5
Tanzania	11.5	2.3	0.9	11.4	13.1	-3.8
Uganda	12.2	1.4	0.8	4.7	16.2	1.0
Zambia	18.0	-	1.5	27.2	16.0	13.4
<b>Average</b>	14.2	1.3	1.5	10.4	14.0	0.9

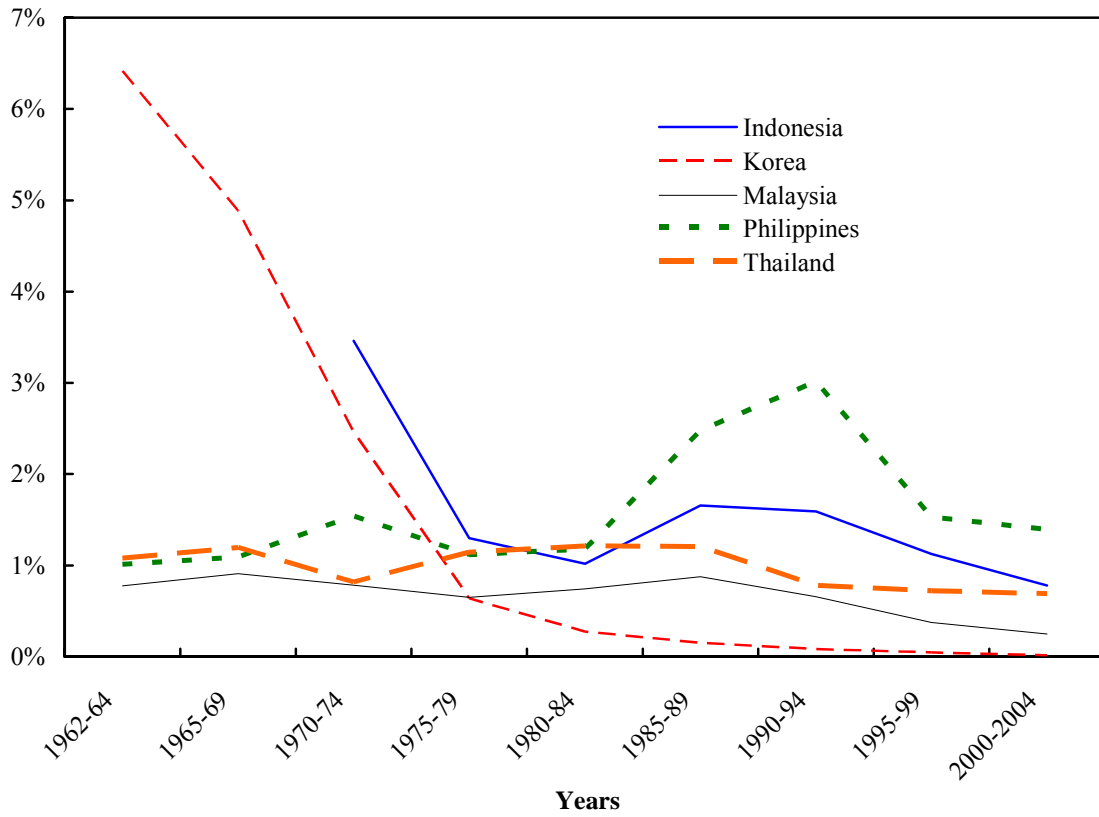
Sources: IMF, African Department database, and WEO database.

1/ Countries with social sector projects and program aid exceeding 5 percent of GDP. Excluding Chad and Guinea-Bissau.

2/ A negative sign indicates decrease.

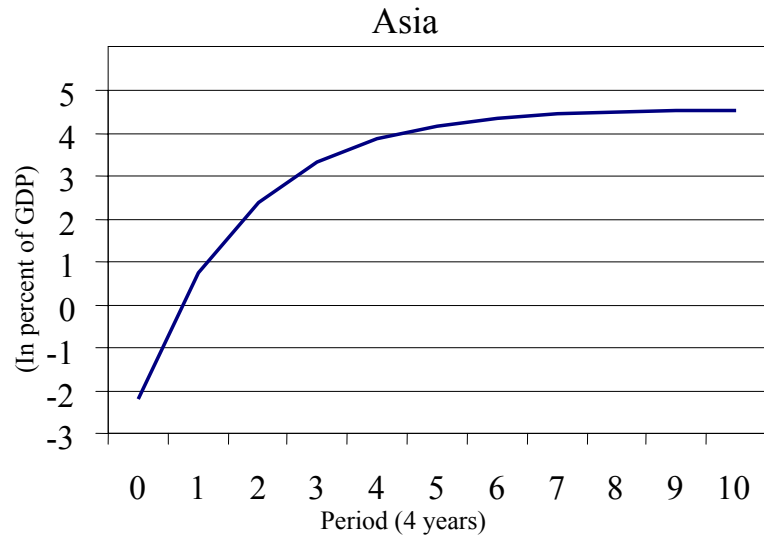
3/ A negative sign indicates depreciation.

Figure 1. Aid Flows in East Asia  
(In percent of GDP)



Source: DAC and WEO

Figure 2. Cumulative Impulse Response of GDI to Aid



Source: Authors' estimation.

Figure 3. Aid Flows to Sub-Saharan Africa

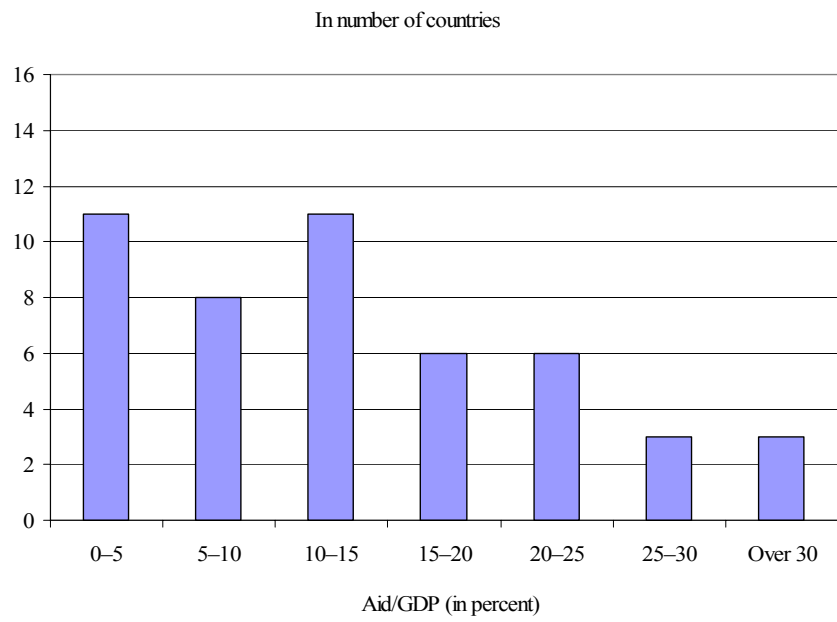
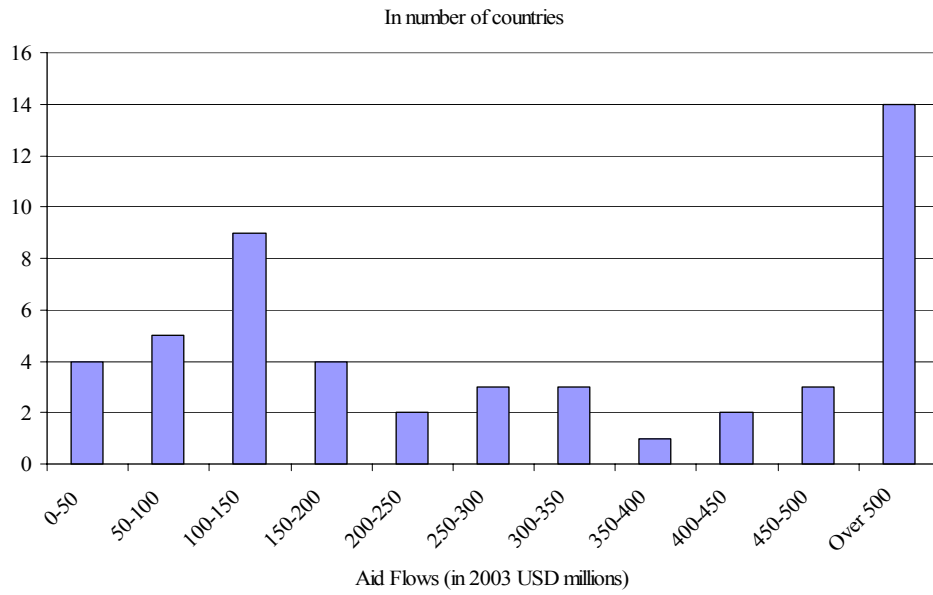


Figure 4. Distribution (Lorenz Curve) of Japanese Aid among Recipients in Sub-Saharan Africa

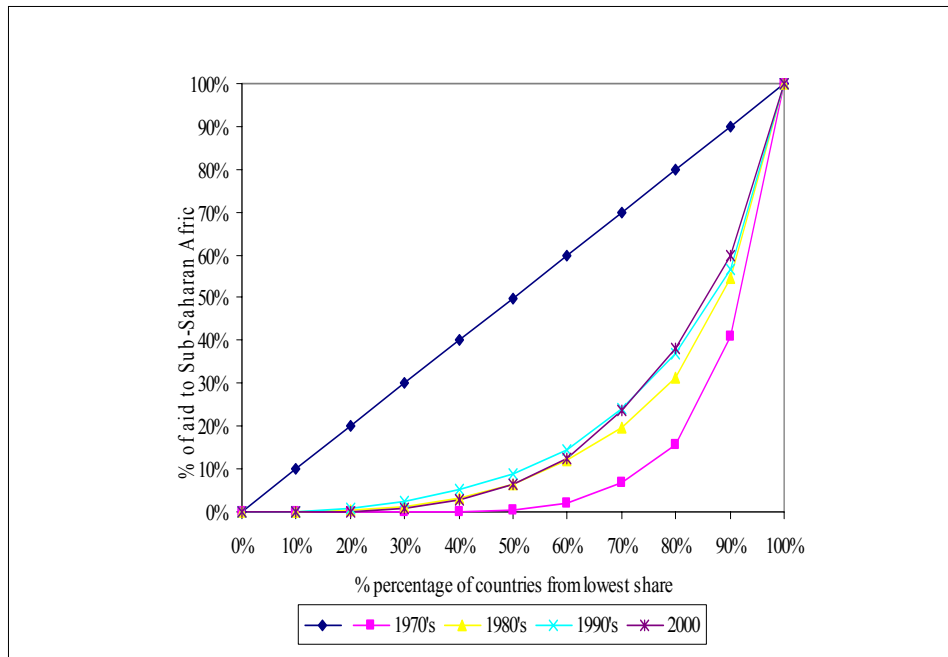
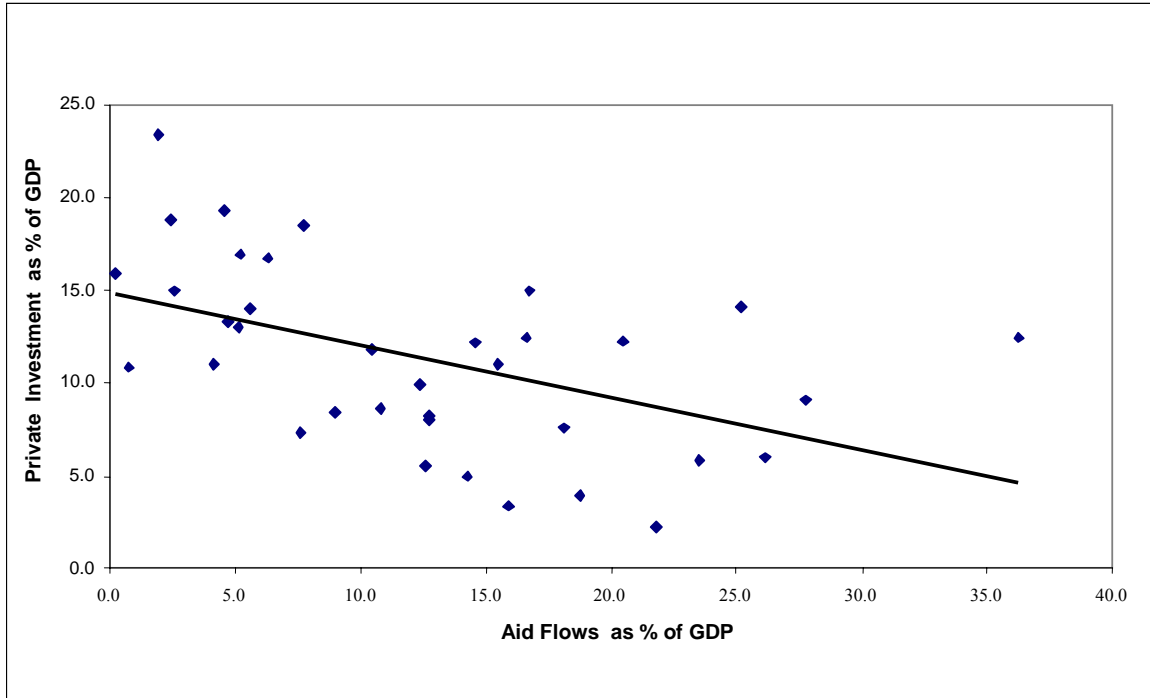


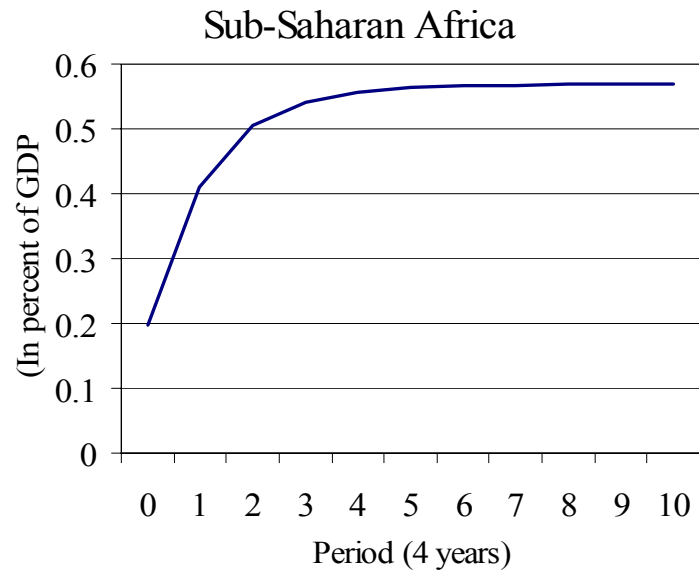


Figure 5. Aid and Private Investment in Sub-Saharan Africa, 1990–99 1/



1/ Including all African countries for which data is available.  
Sources: IFS and WEO databases.

Figure 6. Cumulative Impulse Response of GDI to Aid



Source: Authors' estimation.

## Data and Econometric Issues

### Methodology

Since all dependent and independent variables are potentially endogenous in our case, one of the conventional Generalized Method of Moments (GMM) estimators, the Arrelano-Bond (1991) dynamic panel estimator, is employed. Consider the following model:

$$y_{it} = \sum_{j=1}^p y_{it-j} \alpha_j + \sum_{j=0}^q x_{it-j}' \beta_j + c_i + c_t + \varepsilon_{it} \quad (1)$$

where  $y_{it}$  is a dependent variable, which is either foreign direct investment to country  $i$  at period  $t$  ( $FDI_{it}$ ), or gross domestic investment in country  $i$  at period  $t$  ( $GDI_{it}$ ). The independent variables,  $x_{it}$ , include aid ( $Aid_{it}$ ) and other relevant variables. Since the impact of aid is potentially nonlinear, aid squared is introduced as an additional independent variable. The individual country and the period specific fixed effects,  $c_i$  and  $c_t$ , respectively, are also incorporated in the estimated equation. Time dummies are included for all specifications.

By taking the first difference, the equation becomes:

$$\Delta y_{it} = \sum_{j=1}^p \Delta y_{it-j} \alpha_j + \sum_{j=0}^q \Delta x_{it-j}' \beta_j + c_t + (\varepsilon_{it} - \varepsilon_{it-1}) \quad (2)$$

Under the assumption that there is no second-order autocorrelation in the first-differenced idiosyncratic errors, the lagged levels of the dependent and independent variables can be considered to be valid instruments.

In principle,  $x_{it}$  should include all relevant country-specific characteristics that affect capital investment. We have investigated four of such variables for which time series data are fully available: population as a proxy for market size; per capita GDP (constant 2000 US\$) as a proxy for labor cost; the number of subscribers to fixed-line and mobile phones (per 1,000 people) as a proxy for infrastructure; and exports of natural resources per GDP as a proxy for resource richness. The last variable was meant to capture the feature that some African countries with abundant natural resources would likely attract foreign investment but not receive much aid. In general, however, this variable has been found irrelevant to the aid-investment relationship and thus dropped from our analyses.<sup>16</sup>

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<sup>16</sup> The selection of these variables mainly follows the existing literature on foreign investment location, which generally suggests that FDI tends to be determined by host country's domestic market size, its ability to export in the regional area, relative labor costs, the quality of infrastructural facilities, and industrial agglomeration (e.g., Belderbos and Carree, 2002; Cieslik and Ryan, 2004; Farrell, *et al.*, 2004; Milner, *et al.*, forthcoming).

Moreover, when these independent variables are introduced, the degree of freedom is reduced to the extent that precludes the possibility of incorporating aid in three regions (Asia, Africa, and the other regions) as separate variables. For these reasons, the models in which only the aid variable is adopted in  $x_{it}$  are estimated as well. This allows us to focus on the bivariate relationship between investment and aid flows.

While the GMM model presumably controls for the country-specific fixed effect, the cross-country literature in this area has shown that the estimates tend to be sensitive to potential country-specific heterogeneity. Thus, the robust estimator of the variance-covariance matrix of the parameters is used in this paper. In fact, it was found that the standard errors are quite different when assuming a homoskedastic error term. This can be interpreted as the presence of a heteroskedastic error term. Under the assumption of heteroskedasticity, the conventional Sargan statistics cannot be calculated.

Taking into account the fact that investment has a considerable degree of persistence over time, the model is specified with 3 lags for the dependent variable ( $p=3$ ). However, when the sample is limited to a particular region, the length of lags is more restricted because of an insufficiency of the degree of freedom. For the aid variable, the length of lags is set as  $q=2$ .

## Data

The current analysis uses data from 111 developing countries, for which historical macroeconomic statistics are available. The sample period covers 1972-2003, which is divided into 8 four-year periods: 1972-75, 1976-79, 1980-83, 1984-87, 1988-91, 1992-95, 1996-99, and 2000-03, following the conventional treatment in the existing literature. Taking the four-year averages will be instrumental in mitigating measurement errors caused by short-term economic fluctuations.

For the aid-FDI equation, the dependent variable, FDI, is defined in percent of GDP.<sup>17</sup> In the aid-to-GDI equation, the share of GDI in GDP is used for the dependent variable.<sup>18</sup> Both FDI and GDI data are sourced from the World Bank's *World Development Indicators*. For the aid variable, the existing literature indicates that the empirical aid effects may be sensitive to the choice of variables (e.g., Easterly, 2003). One of the conventional measurements is the amount of net aid in terms of GDP (e.g., Hansen and Tarp, 2001).<sup>19</sup> However, as far as the

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<sup>17</sup> By definition, FDI is net inflows of foreign capital to acquire a lasting management interest (10 percent or more of voting stock), such as equity capital, reinvestment of earnings, and other long- and short-term capital.

<sup>18</sup> Although the focus of this paper is the private component of gross domestic investment, the latter (GDI) was selected as the dependent variable. This is because it has been found that private investment is highly correlated with its lagged values. This property may make the GMM estimator biased and unstable (Blundell, *et al.*, 2000).

<sup>19</sup> For aid variables, Burnside and Dollar (2000) use the World Bank's Effective Development Assistance database, where the grant component of each concessional loan is combined with outright grants. On the other

(continued)

aid-to-investment linkage is concerned, aid may be better measured by total grants and gross loans minus debt forgiveness and reorganized debt equivalence, because the last two types of aid would unlikely contribute directly to investment in the real economy. All aid data depend on OECD's *International Development Statistics*.

The summary statistics is shown in Table A.1. Overall, the average of FDI per GDP is 2.6 percent, and the domestic investment ratio averages 23.1 percent. Aid received by developing countries amounts to 9 percent of GDP, but this may vary largely across countries. Some seldom rely on foreign aid, and others are heavily dependent on aid that may exceed 100 percent of GDP. Of particular note, these figures may differ among regional areas. In Asia, for instance, aid dependency is relatively low compared with Sub-Saharan Africa. While the aid to GDP ratio in Asia is only 2.4 percent on average, the ratio for African countries reaches 14 percent. On the other hand, domestic investment in Asia is larger than that in SSA. Thus, African countries had granted a relatively large amount of aid but might not use it for capital formulation in the economy.

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hand, another alternative may be aid per capita, which is consistent with growth theory (Trumbull and Wall, 1994; Alesina and Weder, 2002).

Table A.1. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
All regions					
Foreign direct investment (FDI)	1153	2.61	14.72	-11.87	481.99
Gross domestic investment (GDI)	1226	23.12	8.43	2.95	90.28
Effective aid	1021	8.96	12.19	0.00	113.90
Of which: Japanese aid	967	0.74	1.79	0.00	22.38
Other aid	967	8.31	11.44	0.00	107.17
Asia 1/					
Foreign direct investment (FDI)	84	1.28	1.78	-1.62	8.09
Of which: Japanese FDI	74	0.31	0.36	0.00	1.58
Gross domestic investment (GDI)	85	25.24	7.25	6.73	40.58
Effective aid	83	2.40	2.43	0.01	10.22
Of which: Japanese aid	83	0.62	0.54	0.00	2.88
Other aid	83	1.77	2.08	0.01	8.16
Sub-Saharan Africa					
Foreign direct investment (FDI)	338	2.10	5.14	-6.43	62.20
Gross domestic investment (GDI)	331	20.38	9.93	2.95	90.28
Effective aid	339	14.08	14.14	0.00	113.90
Of which: Japanese aid	320	0.56	0.76	0.00	6.73
Other aid	320	13.80	13.88	0.10	107.17

Note: The variables are in percent of GDP, unless otherwise indicated.

1/ Including Bangladesh, China, Hong Kong, India, Indonesia, Korea, Malaysia, Pakistan, the Philippines, Sri Lanka, Thailand, and Vietnam.

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