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Local Financial Development and the Aid-Growth Relationship

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Abstract

With official development assistance (ODA) set to rise as countries strive to meet the Millennium Development Goals (MDGs), aid effectiveness remains an important area of development policy. An increasing number of studies support the notion that ODA can contribute to growth in a nonlinear relationship. In this paper, we investigate a new hypothesis regarding this relationship: that deeper financial markets in aid-recipient countries facilitate the management of aid flows, thereby enhancing aid effectiveness. An empirical analysis, using a panel data set, finds robust support for the hypothesis.

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I. INTRODUCTION

"Questions about the effectiveness of aid, particularly to countries that receive large amounts of it, remain a central concern of development policy." World Bank (2003)

The core objective of the Millennium Development Goals (MDGs) is to reduce world poverty by half between 1990 and 2015, from 29 percent to 14.5 percent. The achievement of the goal requires sustained economic growth by developing countries and support from the donor community in the form of increased aid flows. Following the reaching of the Monterrey Consensus in March 2002, the international community has reaffirmed its commitment to increase aid to encourage progress toward the MDGs.[2] Accordingly, donor countries target to allocate 0.7 percent of their GNP to foreign assistance, a significant increase from the levels of around 0.25 percent of their GNPs observed in the late 1990s. Notwithstanding a decline in aid flows in the late 1990s, aid remains a significant share of the recipient countries' economies. For instance, aid remains above 4 percent of the GNI of sub-Saharan African countries, and around 2 percent of the GNI of low-income countries (Figure 1). Moreover, at 16 percent, the fraction of low-income countries with aid-to-income ratios above 20 percent remains significant even though this fraction represents a decline from the 25 percent registered earlier.[3]

This continuing significance of donor support positions the issue of *aid effectiveness* at the center of development policy discussions, creating a demand for greater scrutiny of the effectiveness of aid. The manifold effects of aid on the recipient economy, including on economic growth, savings, government spending, fiscal policy management, real exchange rates, and corruption, have been studied extensively in the literature.[4] As empirical evidence regarding the growth benefits of aid flows has been ambiguous, a consensus that foreign assistance actually works has formed only gradually. Moreover, many studies suggest that donor support works more effectively only if necessary conditions—ranging from "good" macroeconomic policies and negative external shocks to "good" geography—prevail.[5] In

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[2] See World Bank (2002) for the definition of the goals.

[3] See World Bank (2003).

[4] White (1992) provides an overview of the results found on the relationship between aid and growth, aid and the real exchange rate, and aid and savings. Boone (1996) analyzes the effects of aid on economic growth. Buliř and Hamann (2001) show that, given the uncertainty in aid flows, large aid flows could create difficulties in fiscal discipline. Lensink (1993) and Pillai (1982) find that total aid flows have a negative effect on government revenue, while Stotsky and Wolde Mariam (1997) find the contrary. Knack (2001) and Alesina and Weder (2002) find empirical support for the argument that higher aid levels erode the quality of governance or increase corruption.

[5] Dalgaard, Hansen, and Tarp (2002) discuss the role of geography, while Guillaumont and Chauvet (2001) discuss the role of external shocks.

that context, this paper examines the role local financial markets play in enhancing recipient countries' capacity to absorb aid in a manner that boosts its effectiveness.

Since the late 1990s, the international development partners have focused on the findings of Burnside and Dollar (2000) (henceforth, BD) that foreign aid contributes significantly more to real GDP growth if the economic policies pursued by the recipient government are classified as "good." The authors define good macroeconomic policies as those encompassing low inflation, increased trade openness, and small budget deficits, or, preferably, budget surpluses. The appropriateness of the policy indicator BD use has been criticized on the grounds that it is very difficult to pinpoint which macroeconomic policy allows for improved aid effectiveness. Moreover, their results have been found to be fragile to changes in samples, inclusion of additional control variables, and/or alternative specifications (Dalgaard and Hansen, 2001; Guillaumont and Chauvet, 2001; Hansen and Tarp, 2000 ; Hudson and Mosley, 2001; and, recently, Easterly, Levine, and Roodman, 2003). Nonetheless, these results have been confirmed by a few studies. Collier and Dollar (2002) use the World Bank's Country Assessment and Institutional Policy Index (CPIA) as a proxy for good macroeconomic policies and find supporting evidence for the BD result. Also, including additional control variables in the BD regression, Collier and Dehn (2001) find supporting evidence for that paper's result. Overall, the findings in the literature seem to suggest that while good macroeconomic policies are good for growth, their contribution to aid effectiveness remains ambiguous.

The approach taken in this paper to investigate the hypothesis that the impact of aid is significantly larger and positive when local financial markets are more developed takes its cue from the recent efforts in the growth literature to underscore the impact of institutions and local conditions on economic growth while controlling for other macroeconomic variables. The role of local financial markets in enhancing efficient allocation of resources and generating economic growth is well established in the literature.[6] The discussion below builds on an alternative role of local financial markets, where its depth has a bearing on the capacity of a country to absorb aid flows in a manner that does not jeopardize private sector development and weaken aid effectiveness. In particular, more developed local financial markets provide room for the monetary authorities to conduct monetary and exchange rate management, so as to curb the disincentives to the private sector that can be associated with high government spending.

The hypothesis is based on the following argument. Foreign aid, interpreted as an income transfer to the government, allows increased public spending, including, in some instances, public investment. The overall effect of aid flows on the recipient economy, however, goes beyond this direct effect. To the extent that the management of aid-induced increased domestic liquidity and foreign exchange available impinges on the level and variability of interest rates and the real exchange rate, all affecting private sector

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[6] McKinnon (1973), Boyd and Prescott (1986), Greenwood and Jovanovic (1990), and King and Levine (1993), among others, discuss the growth effects of well-functioning financial markets. However, Favara (2003), using a variety of econometric methods, does not find robust support for the notion that finance spurs economic growth.

development, foreign aid has secondary effects. We hypothesize that deeper financial markets facilitate such management, thereby enhancing the overall effect of aid on growth. To investigate this hypothesis, we follow the recent empirical growth literature and test the significance of aid and the interaction of aid and financial market depth in explaining economic growth. We find that aid flows alone play an ambiguous role in economic growth. However, countries with deeper financial markets seem to gain significantly more from aid flows.

The rest of the paper is organized as follows: Section II discusses the interest rate and real exchange rate impact of aid inflows. In Section III, the empirical model and the data are discussed, Section IV presents the empirical results, and Section V concludes.

II. AID INFLOWS, EXCHANGE RATES, AND DOMESTIC INTEREST RATES

Theoretically, the real exchange rate effects of large foreign aid flows have been extensively discussed in the literature. While some studies have found aid to have an appreciating effect on the real exchange rate,[7] others have come up with different results. For instance, analyzing the impact of aid on the real exchange rate in Tanzania (during 1967–93), Nyoni (1998) finds that the real exchange rate depreciated more during a period of increased aid flows. Sackey (2001) also finds evidence of a dampening effect of aid on the real exchange rate in Ghana in a study covering 1962–96.

The appreciating effects of aid on the real exchange rate can be thought of in the context of the "Dutch disease" problem. The increased resource inflow in the form of foreign aid has effects similar to the windfall gains from natural resource discoveries. Foreign assistance allows increased spending on both tradables and nontradables. The increased demand for tradables can be satisfied by imports without necessarily altering the domestic production structure. In contrast, the increased demand for nontradables would require a positive domestic supply response and can affect relative prices, international competitiveness, and the domestic production structure. If the price of nontradables adjusts upward and there is excess capacity or idle production factors in the economy, the real exchange rate would appreciate without an alteration in the domestic production structure detrimental to tradables, notably exportables.[8] In the absence of excess capacity, such an alteration would occur. In this regard, as van Wijnbergen (1986) summarizes: "substantial amounts of aid will put upward pressure on the real exchange rate and will, in that way, counteract the export promotion schemes often recommended by aid donors." The possible intersectoral resource allocation is an equilibrium response to increased aid flows. Nonetheless, its magnitude and the price pressures that generate it can be altered by monetary and exchange rate management.

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[7] See van Wijnbergen (1985 and 1986).

[8] The small open economy assumption implies that the country will be a price taker in the tradables market; hence the relative price will change on account of the increase in the price of the nontradables.

A. The Role of Monetary Management in Mitigating Aid-Driven Price Pressures

In order to explore the role that monetary management can play in mitigating the possible negative effects of aid flows, the following example is illustrative. The amount of foreign aid disbursed increases the amount of foreign exchange available to the recipient economy, as well as the government resources, until the aid-induced spending occurs. The share of this aid-induced spending that goes to nontradables would result in increased domestic liquidity. This increased liquidity can, in turn, create inflationary pressures, requiring sterilization by the monetary authorities. If the monetary authorities do not sterilize the excess liquidity, the upward pressure on domestic prices will, in turn, generate appreciation pressures on the real exchange rate. Alternatively, the monetary authorities could choose to sterilize the excess liquidity, in which case the choice of sterilization instruments, their volume and the timing of their use determine the secondary effects of aid flows.

The sterilization, carried out either by open market sales of treasury securities or foreign exchange, would have effects on the interest rate and the nominal exchange rate. If the sterilization is tilted towards treasury bills in a shallow domestic money market, the level and volatility of domestic interest rate will increase. If the sterilization is carried out through sales of large amounts of foreign exchange, the real exchange rate will appreciate via the nominal exchange rate appreciation. However, an appropriate mix of sterilization instruments can minimize upward pressures on both the nominal exchange rate and the domestic interest rate. Hence, the choice of instrument for sterilization would be driven by the objective of minimizing the adverse impact on the incentives for private sector activity, where such impact depends on the absorptive capacity of the domestic securities and foreign exchange markets.[9] In other words, we suggest that the effect on the interest rate and the nominal exchange rate would depend on the depth of the financial markets and the conduct of monetary management.

B. Aid Flows and Monetary Management: Uganda's Example

Uganda's recent experience with aid flows provides a good case study to observe the effects of aid on monetary management.[10] Foreign assistance to Uganda has steadily increased since the early 1990s: net donor inflows, as a share of GDP increased from 8 percent in fiscal year 1997/98 to 11.7 percent in 2001/02.[11] The increased donor support

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[9] The assumptions of the underlying model are that domestic prices are fully flexible, and that there is a floating exchange rate regime.

[10] Adam (2001) provides a comprehensive overview of the effects of aid on the macroeconomic management and exchange rate in Uganda.

[11] The figures are obtained from IMF's staff report for the 2002 Article IV consultation with Uganda (http://www.imf.org/external/pubs/ft/scr/2003/cr0383.pdf). Net donor inflows encompass official assistance to the government, including budget and project grants, concessional official loans, and HIPC initiative assistance, net of interest and amortization due on external public debt to official creditors.

contributed to the financing of the country's Poverty Eradication Action Plan (PEAP) through higher government spending. The composition of expenditure was tilted toward the nontradables sector, creating concerns about appreciative pressures on the real exchange rate. To observe the targets set in the country's monetary program with the aim of containing inflation, there was a need for sterilization of excess liquidity. The net domestic fiscal liquidity injected[12] in 2001/02, amounted to around 6.2 percent of GDP, which created a sterilization requirement beyond what the original monetary program had allowed for. Given the relatively thin financial markets, the need for sterilization contributed to both increased domestic interest rates—from around 5 percent to almost 20 percent between the second half of 1998 and the second half of 2000—and appreciation pressures on the nominal exchange rate, especially during 2000–01. The complication monetary management underwent and the adverse impact it had on both the levels and volatility of interest rates and the exchange rate can be attributed to the low financial absorptive capacity associated with the shallowness of Uganda's financial markets.

C. Deepening Financial Markets: An Avenue for Mitigating Adverse Secondary Effects of Large Aid Flows

Deeper financial markets, or greater financial absorptive capacity, allow monetary management to mitigate the negative incentive effects of aid flows, thereby increasing the gains associated with donor support. In particular, even if the real exchange rate were to appreciate in response to increased foreign exchange inflows, the depth of the financial markets, can, by easing monetary and exchange rate management, help contain the magnitude of the appreciation and, thereby, its likely adverse impact on export growth. Furthermore, deeper, well-functioning financial markets can, especially if they are associated with a wide spectrum of monetary policy instruments, play an important role in curbing the possible crowding-out effects of aid on private investment, that are exerted through high and volatile interest rates.

As indicated above, to investigate the hypothesis that a greater financial absorptive capacity enhances aid effectiveness, we test the significance of aid interacted with financial market depth in explaining economic growth, while controlling for determinants of growth usually included as explanatory variables in growth regressions.

III. Empirical Model and Data Description

The objective of the empirical analysis carried out below is to examine the significance of financial absorptive capacity in enhancing aid effectiveness, under the assumption that it helps minimize the negative indirect effects of aid flows. For the specification of the empirical growth model that allows investigation of this hypothesis, we follow Mankiw, Romer, and Weil (1992).[13] They derive an empirical specification based on

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[12] Defined as overall fiscal balance, excluding grants, net of interest payments on external debt and government expenditure on imports.

[13] Among may others, Levine and Renelt (1992) review alternative specifications for empirical growth regressions.

the assumption that, because countries are unlikely to be at their steady states, transitional dynamics should be more important. As a starting exercise, we look at the direct effect of aid on economic growth and estimate the following equation by pooled least squares regressions:

$$Growth_{it} = \beta_{0i} + \beta_1 \log(IGDP_{it}) + \beta_2 Aid_{it} + \beta_3 Controls_{it} + v_{it} \tag{1}$$

The logarithm of the real GDP per capita at the beginning of the period, in this case the first year of each five-year time period in the panel data set, is included to capture the convergence effects, as is standard in the empirical growth literature. The list and description of the control variables are provided in detail below.

In order to examine the role financial market depth can play in the aid-growth nexus, the interaction between aid and financial markets is used as an additional explanatory variable. Both aid and financial markets are also included as explanatory variables in the analysis in order to ensure that the interaction term does not proxy for them. Hence, we run the following regression:

$$Growth_{it} = \beta_{0i} + \beta_1 \log(IGDP_{it}) + \beta_2 Aid_{it} + \beta_3 Finance_{it} + \beta_4(Aid_{it} * Finance_{it}) + \beta_5 Controls_{it} + v_{it} \tag{2}$$

The specification of equations (1) and (2) differs from BD in two related ways. First, it is based on country-specific fixed effects, while BD use time-specific fixed effects. Second, it excludes all time-invariant country characteristics included in the BD study, considering that these characteristics are captured by country-specific fixed effects. Ethnic fractionalization and regional dummies are among the excluded time-invariant characteristics.[14]

Next, we describe the data used in the empirical analysis, specifically the measures of aid, financial market development, economic growth, and a number of controlling variables typically used in growth regressions. The source of data is the World Development Indicators (WDI) database, compiled by the World Bank (2002), unless otherwise indicated.

Aid is measured as a share of gross national income (GNI) and is compiled from the Organization for Economic Cooperation and Development (OECD) database on official development assistance. Grants by official agencies of the members of the Development Assistance Committee (DAC) are included, as are loans with a grant element of at least 25 percent, and technical cooperation and assistance. Alternative measures of donor support are also considered. The first measure, provided by the World Bank, is net official aid, recording the actual international transfer by the donor of financial resources or of goods or services valued at the cost to the donor, less any repayments of loan principal during the same period. It includes grants by official agencies of the members of the DAC and loans with a grant element of at least 25 percent, and technical cooperation and assistance. The second measure is effective development assistance (EDA), compiled by Chang, Fernandez-Arias, and

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[14] Assassinations were excluded from the analysis since the available data not only restrict the data set in the analysis significantly but also have a very small variation.

Serven (1999). As we find that alternative measures of donor assistance are highly correlated, we report those using the ODA data compiled by the OECD.[15]

The World Bank Financial Structure Database and WDI provide several financial market series, ranging from the volume of lending in an economy to the size and depth of the stock market. In the broadest sense, these measures can be classified into two categories: those relating to the bank and nonbank financial institutions and those relating to the stock market. Owing to the lack of comparable and sufficient time series for stock market data in aid-recipient economies included in our sample, we mainly rely on the former category of financial markets, and follow King and Levine (1993). Three variables are included in our work. The first measure, liquid liabilities of the financial system *(LLY)*, is broad money as a share of GDP—in other words, money and quasi money divided by GDP. This is the broadest measure of financial intermediation and includes three types of financial institutions: the central bank, deposit money banks, and other financial institutions, thereby providing a measure of the overall size of the financial sector without distinguishing between different financial sectors and institutions. Second, we use private sector credit *(PSC)*, which equals the value of credits extended by all financial intermediaries to the private sector divided by GDP. The third measure, bank credit *(BANKCR)*, is the share of credit extended by deposit money banks to the private sector in GDP. This measure covers a portion of the private sector credit measure. These two credit measures capture the beneficiary aspect of the financial intermediation and add some information beyond the sheer size of the financial sector.

Economic growth, *GRW*, is measured as the growth of real per capita GDP in constant (1995) U.S. dollars. Domestic investment consists of outlays for fixed capital formation. Government consumption, *GOV*, is the ratio of general government final consumption expenditures to GDP. To capture the impact of the vulnerability of ODA recipients to terms of trade shocks, we use the change in the terms of trade of goods, *PTOT*. *GRW* and *GOV* are obtained from the WDI database, while *PTOT* is derived from the terms of trade of goods provided by the IMF's World Economic Outlook (WEO) database. The institutional quality measure used is *bureaucratic quality* (*BURQ*), obtained from the *International Country Risk Guide (ICRG)*,[16] Human capital (*HK*) is measured as the "average years of secondary schooling," obtained from Barro and Lee (1996).[17]

The panel we start with includes 86 countries for the period 1970–99 divided in six five-year time periods from 1970–74 to 1995–99. While the time periods comprise five years, many studies—BD, Hansen and Tarp (2000), Easterly, Levine, and Roodman (2003)

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[15] Dalgaard and Hansen (2001) have also shown a high correlation between these alternative measures and point out that the measures could be used interchangeably in such analysis.

[16] A monthly publication of Political Risk Services that reports data on the risk of expropriation, level of corruption, rule of law, and bureaucratic quality in an economy.

[17] Available at http://www.cid.harvard.edu/ciddata/ciddata.html

—use four years.[18] Regarding country coverage, except for cases where data for some explanatory variables were not available, the sample we use comprises low- and middle-income countries generally included in other studies on the aid-growth nexus referred to earlier.[19] The list of countries used in the regression analysis, as well as a detailed description of all the data, is in the Data Appendix.

Table 1 presents aggregate descriptive statistics for aid flows, financial markets, and growth data for the reduced data set used on which the regressions are based. There is considerable variation across countries and across time in the aid-to-GNI ratios, ranging from −0.08 percent for Malaysia in 1995–99 to 55.79 percent for The Gambia in 1985–89. Financial market measures also show significant variation across countries and across time. The liquid liabilities measure ranges from 8.13 percent for Brazil during 1980–84 to 116.5 percent for Jordan during 1990–94; the private sector credit measure ranges from 1.92 percent for Ghana during 1980–84 to 148 percent for Thailand during 1995–99, and the bank credit measure ranges from 1.7 percent for Ghana during 1980–84 to 96.2 percent for Thailand during 1995–99. Similarly, the growth rates vary greatly, ranging from -8.99 percent for Sierra-Leone during 1995–99 to 11.7 percent for the Republic of Congo during 1980–84.

IV. RESULTS AND INTERPRETATION

As noted above, we start by studying the direct impact of aid on economic growth and run a fixed-effects panel regression:[20]

$$Growth_{it} = \beta_{0i} + \beta_1 \log(IGDP_{it}) + \beta_2 Aid_{it} + \beta_3 Controls_{it} + v_{it}. \qquad (1)$$

We run weighted least-squares (WLS) regressions.[21] A priori, we expect to find the impact on growth of the different explanatory variables to be as follows: negative for government consumption and initial GDP; and positive for human capital, terms of trade shocks, financial market development, institutional quality, and possibly ODA. Table 2a presents results based on the regressions for the sample defined in the appendix. However, because data are missing for some of the control variables, the sample used in each specific regression could differ from the original 86-country sample, as well as in the time coverage. For example, the institutional measures provided by the *ICRG* start in the 1980s, limiting most of the analysis to that of a sample of four 5-year period averages per country. Each column includes the number of cross sections and observations used in the analysis. As the

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[18] In testing the robustness of BD result, Easterly, Levine, and Roodman use also longer time periods.

[19] The regression results reported, however, include 42–46 countries, given the limited availability of *ICRG* data on bureaucratic quality.

[20] A Hausman test for fixed versus random effects favors fixed effects.

[21] Cross-section weights are used to correct for cross-section heteroskedasticity.

analysis focuses on the role played by financial markets, the regression results include alternative measures of financial market depth. Column (1) uses *LLY*, column (2) uses *PSC*, and column (3) uses *BANKCR* as respective measures of financial market depth. In each regression, we control for initial GDP, government consumption, human capital, changes in the terms of trade, financial market depth, and institutional quality.

The results show that the expected directional relationships hold in most cases. The most important finding from this set of regressions is that ODA is positively and significantly associated with economic growth, a result found in many other recent studies. This result, which neglects the possible endogeneity of ODA and the nonlinearity of the aid-growth relationship that have emerged from many studies, should be scrutinized.

The remainder of the analysis aims at illustrating the possible effect of financial development—the financial market channel—on aid effectiveness, and at testing the robustness of such an effect considering other variants of the nonlinearity of the aid-growth relationship.

A. Assessing the Relationship Between Financial Development and Aid Effectiveness

We first test the significance of aid interacted with financial market depth in explaining growth, and then we test the robustness of the result. As noted above, in order to ensure that the interaction term does not proxy for the interacted variables, we include both variables individually as well. To reiterate, we run the following regression:

$$Growth_{it} = \beta_{0i} + \beta_1 \log(IGDP_{it}) + \beta_2 Aid_{it} + \beta_3 Finance_{it} + \beta_4 (Aid_{it} * Finance_{it}) + \beta_5 Controls_{it} + v_{it} \quad (2)$$

As shown in Table 2b, the interaction term is found to be positive and significant across all three measures of financial market depth. These results suggest that a larger absolute size of the financial market increases the economy's "financial" absorptive capacity, enabling policymakers to manage aid flows in a manner that enhances aid effectiveness.

Then, we test for the endogeneity of ODA to ensure that the estimates of our variable of interest are consistent. We use a version of the Hausman test, to determine whether there is a need to instrument ODA in extended growth models that include nonlinear ODA terms. The results of the test indicate that ODA cannot be considered as exogenous, regardless of the measure of financial market depth used.

The test is carried out by running, for each measure of financial market depth, two WLS regressions. In the first, we regress ODA on all exogenous variables and instruments and retrieve residuals. In the second regression, we estimate growth, *GRW*, including the residuals from the first regression among the regressors. If the coefficient on the residuals is statistically significant, then the WLS estimates will be biased and inconsistent. Table 3a presents regressions of ODA on its determinants, including each of the three measures of financial market depth. Results on the signs and statistical significance of the different variables are mixed. Among the variables with significant coefficients, only two—initial GDP and mortality—have signs expected from the literature regardless of the financial market depth indicator used. In Table 3b, the growth regressions run to test for endogeneity

of ODA are reported for each of the three measures of financial market depth. The residuals from the regressions in Table 3a are significant, casting doubt on the consistency of WLS estimates. Thus, the following discussion is based on instrumental variable (IV) regressions, weighted two-stage least-squares (WTSLS) regressions more precisely. The variables used to instrument ODA are population and infant mortality rates, as well as all the explanatory variables in the growth regressions reported in Table 3a.

As results in Table 4a indicate, support for our hypothesis is strong. In columns (1) and (2), where the depth of the financial market is measured *LLY* and *PSC*, respectively, aid has a negative and significant impact on growth, while the interaction term is positive and significant at 1 percent. In column (3), where the financial market depth measure used is *BANKCR*, both aid and the interaction term are positive and significant at 1 percent and 5 percent, respectively. The three financial market depth measures used capture the end-user aspect of financial intermediation and suggest that, the larger the private sector's share in financial intermediation, the greater the absorptive capacity of the local economy and the better the opportunity for the monetary authorities to manage aid flows appropriately.

While the interaction term is found to be statistically significant in Table 4a for the three measures of financial market depth, the financial market measure itself is found to be statistically insignificant. Given the nonconsideration of donor assistance in the literature studying the growth impact of financial intermediation, a one-to-one correspondence of our results with those in the large literature on growth is precluded. Nonetheless, it is worth noting, that while many studies analyzing the impact of finance on growth find such an impact to be positive and significant, some studies suggest that the results are not robust (Favara, 2003). Also, studies of aid effectiveness that have included the depth of the financial sector among control variables have not found robust support for a significant impact of finance on growth.[22] Our results suggest that, when ODA is included among other determinants of growth and is also interacted with financial market development indicators, deeper financial markets can help spur growth through other channels. This hypothesis is corroborated by the notion of threshold that emerges from the regressions presented in Table 4a. In columns (1) and (2), aid itself has a negative and significant impact on growth while the interaction terms have a positive and significant impact, as indicated above. This suggests that, unless the local financial markets of aid-recipient economies are developed beyond a certain level, aid will have a negative effect on growth. The thresholds from which the impact of aid on growth becomes positive are 13.25 percent and 12.74 percent for the ratios of M2 to GDP and PSC to GDP, respectively. In column (3), where the only credit to the private sector considered is that from deposit money banks, aid itself has a positive impact on growth. In addition, there is support for the hypothesis that the deeper the financial system, the greater the positive impact of aid on growth. In Table 4b, the list of instruments is amended to include the lag of the interaction term, the findings on our variables of interest do not change, although there are changes on other coefficients in the regression. Clearly, a deeper financial market is an important means to an end rather than the end itself, in that it allows for a better management of aid flows, so as to enhance aid effectiveness.

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[22] See Hansen and Tarp (2000) and Burnside and Dollar (2000), among others.

This discussion raises the question of whether the interaction term and the individual terms under consideration, that is, aid and financial market depth, are jointly significant. This is especially important given the lack of significance of individual measures of financial market depth in some regressions in which the interaction term is found to be significant at 5 percent. The last three rows in Tables 4a and 4b report the chi-squared test statistics for the joint significance of the interaction term with (i) aid flows, (ii) the financial market depth indicator, and (iii) aid flows and the financial market depth indicator together. For all measures of financial market depth, the chi-squared statistics support the joint significance hypotheses. These findings provide some insights into the results of the basic model presented in Table 2a. In that model both aid and the financial market measures have a positive impact on growth, albeit the impact of *BANKCR,* is marginally not significant. The results in Tables 4a and 4b support the idea that financial market depth contributes to growth in aid-recipient countries indirectly as a channel for a better management of aid flows, which helps to enhance aid effectiveness.

The hypothesis is further confirmed when the model specification is modified by having aid interact with different levels of financial market depth. First, we create dummy variables to distinguish observations according to whether they are associated with *low financial market development*, *average financial market development,* or *high financial market development*, respectively.[23] Financial market development is characterized as low (high) when the financial market depth indicator is at least one standard deviation below (above) the sample mean. When the financial market depth indicator is within the one-standard-deviation band around the sample mean, financial market development is characterized as "average."[24] Second, to test the differential growth effects of aid flows with regard to the levels of financial market development, we have the dummy variables representing the above-mentioned three groups interact with the interaction term of aid flows and financial market depth. The results are reported in Table 5 for each of the three indicators of financial markets depth. The results of all the regressions support the hypothesis of a differential effect of aid on growth according to the level of financial development, reinforcing the threshold story mentioned above. Results in column (1) suggest that, if the local financial market's size, as measured by *LLY*, is above the range characterized as average, aid flows have a positive and significant effect on economic growth. The results indicate specifically that, during the period covered by the analysis, for an economy whose M2 as a share of GDP is at least 47.8 percent—one standard deviation above the sample mean—a 1 percentage point increase in the aid ratio increases growth by an annual average

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[23]A similar type of analysis is used in Servén (2003).

[24] The financial development indicators are all in natural logs, as is common in the literature. The average of the natural log of liquid liabilities measure of financial market development is 3.37, while the standard deviation of this measure is 0.50. This suggests that the share of liquid liabilities is below 17.8 percent of GDP for the low financial market development group, above 47.8 percent for the high financial market development group, and between 17.8 percent and 47.8 percent for the average financially developed group. The average of the log of the private sector credit measure of financial market development is 3.15, while the standard deviation of this measure is 0.72.

of at least 0.135 percentage point. In the aid recipient economies whose M2s as a share of GDP are within or below one standard deviation of the mean, aid has no significant effect on economic growth.[25]

Column (2) of Table 5 reports results for the growth effects of aid associated with different levels of financial market depth, measured in relation to private sector credit in the aid-recipient economies. The results suggest that the marginal impact of aid flows on growth is negative and significant in the economies with low financial market development, positive and significant in the economies with average financial market development, and insignificant in the economies with high financial market development. The results provide further supporting evidence for the differential effect of financial development on aid effectiveness. However, when financial development is measured by the level of private sector credit, the finding regarding the economies with high financial market development differs from that reported in column (1) and could be interpreted as suggesting that too much private sector credit need not necessarily be reflective of a well-developed financial market. This interpretation is in line with the crony capitalism and excessive credit boom phenomena proposed in the economic crisis literature as factors contributing to instability and macroeconomic mismanagement.[26] In fact, for an economy with a financial development level that is more than one standard deviation above the mean level of development—in other words the share of private sector credit in GDP is over 48.0 percent—an increase in aid flows has no significant growth effects. Whereas, for an economy in which the share of private sector credit in GDP is between 11.3 percent and 48.0 percent, a 1 percentage point increase in the aid-to-GNI ratio raises growth by an annual average of 0.07 percentage point during the period covered by the analysis. For the economies with low financial market development, in which the share of private sector credit in GDP is below 11.3 percent, a 1 percentage point increase in aid flows reduces growth by about 0.26 percentage point on average per year.[27]

In column (3) of Table 5, when financial development is measured by *BANKCR*, aid itself has a positive impact on growth, as is found in Tables 4a and 4b. The impact of financial market development in enhancing aid effectiveness is confirmed. However, as in column (2), only credit levels characterized as "average" contribute positively and significantly to aid effectiveness. Higher levels affect aid effectiveness negatively and

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[25] With aid itself not significant, 0.135 is obtained by multiplying the natural log of 47.8 by the coefficient of the interaction term, 0.035 (see Table 5).

[26] This issue especially attracted attention after the East Asian crisis (Wei, 2001, p.16).

[27] For the average financially developed, we assume a mid-range level of 29.65 percent (average of 48 and 11.3) whose natural log is 3.39. This, together with the 0.23 coefficient on aid and the 0.09 coefficient on the relevant interaction term (Table 5, column (2)), yields a marginal growth impact of aid 0.07. For economies with low financial market development, the natural log of the 11.3 percent upper bound is 2.42. This, together with the coefficients on aid and on the relevant interaction term, yields a negative growth impact of 0.26 percentage point at least.

significantly, another indication that credit may be too excessive—that is, rather than indicating financial development, it may be a sign of problems in the banking sector that weaken economic performance.

The results presented in Table 5 support the idea of a positive impact of financial development on aid effectiveness. Nonetheless, as the thresholds of almost 48 percent for the M2-to-GDP or PSC-to-GDP ratios are not only much higher than the ones associated with the results in Tables 4a and 4b but also far above the actual levels of many developing countries, it would be useful to examine how, at and around the median, financial market depth affects aid effectiveness. To conduct the test, we first create, for each measure of financial market depth, two dummy variables: one for levels of financial market depth below the median, and another for levels that are at least equal to the median. Second, the dummy variables are allowed to interact with the aid-financial markets interaction term. The results are presented in Table 6.

All the regressions in Table 6 confirm the positive impact of financial development on aid effectiveness. In column (1), where financial market depth is measured by the M2-to-GDP ratio, the positive impact of aid on growth is higher and more significant for economies with M2-to-GDP ratios at least equal to the sample median, 27.91 percent. In the regression in column (2), where financial market depth is measured by the PSC-to-GDP ratio, the median is not a threshold. There is almost no difference in either the magnitude or the significance of the marginal contribution of aid to growth between economies with financial market development levels below the median or otherwise. Nonetheless, as aid itself has a negative and significant impact on growth and the interaction terms are positive and significant, there is a threshold of almost 17.64 percent of the PSC-to-GDP ratio from which the marginal impact of aid on growth becomes positive. In column (3), where financial markets depth is measured by *BANKCR*, as in previous tables, aid itself has a positive impact on growth. While financial market depth reinforces this positive impact unambiguously, the impact is greater and more significant in economies with *BANKCR* below the sample median. This is another indication that, when credit is used to measure financial markets' depth, more is not necessarily better.[28] The findings highlighted above support the hypothesis of this study; nonetheless, it is important to test the robustness of the results.

B. Robustness Check

Several studies in the aid effectiveness literature suggest that aid effectiveness does not depend on the local conditions but rather on the level of aid flows. Lensink and White (2001) and Hansen and Tarp (2000), among others, find that there is a nonlinearity in aid flow effects, referred to as "diminishing returns to aid." In other words, above a threshold level of official assistance returns to additional aid become negative. In order to ensure that the interaction term included in the above regressions does not capture the possible

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[28] It suggests that besides the size of the financial sector, the efficiency and quality of financial intermediation may have an impact on aid effectiveness. The efficiency aspects of financial intermediation are beyond the object of our analysis.

diminishing returns to aid flows, and to further test the robustness of our results, we include aid-squared as an additional regressor. We run the following regression:

$$Growth_{it} = \beta_{0i} + \beta_1 \log(IGDP_{it}) + \beta_2 Aid_{it} + \beta_3 Finance_{it} + \beta_3(Aid_{it} * Finance_{it}) + \beta_5(Aid_{it})^2 + \beta_6 Controls_{it} + v_{it} \quad (3)$$

As seen in Table 7, including the aid-squared term does not alter the results. As the aid-financial market depth interaction term remains positive and significant in all regressions, the results confirm that the interaction term does not proxy for the diminishing returns to aid effectiveness but rather illustrates the role financial market development plays in boosting recipient countries' capacity to absorb aid flows effectively. The results do not suggest, contrary to Lensink and White (2001) and Hansen and Tarp (2000) and the like, that the evidence for diminishing returns to aid flows is robust. Instead, they provide evidence that local conditions, captured by the depth of financial markets in this case, play a more robust role than the level of aid flows. However, although the positive sign of the quadratic aid term in column (1) counters the notion of diminishing returns to aid, the likelihood of diminishing returns should not be disregarded, in light of the joint significance tests in regressions where the quadratic term is negative, albeit not significant.

We test for the joint significance of (i) aid and aid squared, (ii) the interaction term and aid flows, (iii) the interaction term and financial market depth, (iv) the interaction term and aid-squared, and (v) the interaction term, aid, and aid squared. The results are reported in the last five rows of Table 7, respectively. As in the regressions excluding the quadratic aid term, we find that aid and the aid-finance interaction term are jointly significant across all financial market measures. The same result holds for the joint significance of the interaction term and aid-squared. The interaction term and financial market depth measures are found to be jointly significant across all measures of financial markets as well.

Besides the level of aid, the aid effectiveness literature considers several other factors that can explain the nonlinearity of the aid-growth relationship and affect aid effectiveness. One strand of this literature argues that the exogenous external environment a country faces will influence aid effectiveness. In this vein, Guillaumont and Chauvet (2001) suggest that the worse the external environment, the greater the need for official assistance and the greater the effectiveness of aid flows. To test the robustness of the findings that development of the local financial market significantly improves the aid effectiveness when we also consider the possible role of external shocks on the effectiveness of aid, we estimate the following regression:

$$Growth_{it} = \beta_{0i} + \beta_1 \log(IGDP_{it}) + \beta_2 Aid_{it} + \beta_3 Finance_{it} + \beta_3(Aid_{it} * Finance_{it}) + \beta_5(Aid_{it} * PTOT) + \beta_6 Controls_{it} + v_{it} \quad (4)$$

where $PTOT_{it}$ represents the terms of trade (TOT) shock country i faces in period t, and is measured as the annual percentage change in the TOT averaged over five years. Columns (2), (4), and (6) in Table 8 show that the contribution of aid to economic growth is greater in countries that face negative external shocks, and also in economies with deeper financial markets. The latter result underscores the robustness of the main findings of this paper.

For further robustness checks, we include domestic investment as an additional control variable in the regressions, given the well-established strong correlation between

domestic investment and economic growth in the literature. The results, reported in Table 8, columns (1), (3), and (5), show that the aid-financial market interaction term remains significant when we control for domestic investment as well. As expected, domestic investment positively and significantly explains economic growth. Overall, and more important, we find that the role of local financial market depth in enhancing aid effectiveness prevails when we control for additional variables, an unequivocal support for the hypothesis this paper puts forth.

V. CONCLUSIONS

During the 1990s, the world development agenda put forth a set of Millennium Development Goals, aiming to reduce poverty by half over a 25-year period. Achieving this core target requires significant economic growth among the developing countries and increased support from their development partners. Such an important role for ODA raises two important questions: Does ODA contribute to economic growth—in other words, is aid effective in promoting growth? And are there conditions that can enhance its effectiveness? In an effort to provide further insights into this issue and in light of the literature on the possible adverse effects of aid on private sector development, this paper examines the impact of the depth of financial markets in aid-recipient economies on aid effectiveness.

The main conclusion of this paper is that ODA can generate positive growth effects, and that such growth effects are larger in countries with deeper local financial markets. Besides ODA's direct effect on growth, it has indirect (secondary) effects on recipient economies. Specifically, through its impact on domestic prices, interest rates, and the real exchange rate, ODA can have secondary adverse effects on private investment. We hypothesize that financial development has a positive impact on the overall effect of aid on growth. The empirical analysis provides unambiguous support for the idea that development of the local financial market enhances aid effectiveness. The results are robust for a wide range of financial market development indicators, and for an extensive set of control variables that include several variables pretested extensively in the growth literature.

Ultimately, these results suggest that, through its effect on growth, ODA can help poor countries achieve the development goals. However the magnitude of such effect depends on the local financial market depth, which can affect the capacity of the monetary authorities to manage aid flows appropriately. By showing that financial market depth can enhance aid effectiveness, the results of this paper provide an additional reason for encouraging the development of local financial markets in the developing world.

DATA APPENDIX

Countries in the Sample

Algeria, Antigua, Bahrain, Bangladesh, Barbados, Belize, Benin, Bhutan, Bolivia, Botswana, Brazil, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Chile, China, Colombia, Comoros, Republic of Congo, Costa Rica, Côte d'Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, Gabon, The Gambia, Ghana, Grenada, Guatemala, Guyana, Haiti, Honduras, India, Indonesia, Islamic Republic of Iran, Israel, Jamaica, Jordan, Kenya, Korea, Kuwait, Lesotho, Madagascar, Malawi, Malaysia, Mali, Malta, Mauritania, Mauritius, Mexico, Morocco, Nicaragua, Niger, Nigeria, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Rwanda, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Singapore, Sri Lanka, St. Lucia, St. Vincent and the Grenadines, Suriname, Swaziland, Syrian Arab Republic, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Uruguay, Venezuela, Zambia.

Data Sources and Description

The pool data consist of 5-year averages of nonoverlapping periods for each country included, covering 1970–99.

Aid flows (official development assistance): Aid is measured as a share of gross national income (GNI), and includes official development assistance. Net official aid records the actual international transfer by the donor of financial resources or of goods or services valued at the cost to the donor, less any repayments of loan principal during the same period. Grants by official agencies of the members of the Development Assistance Committee are included, as are loans with a grant element of at least 25 percent, and technical cooperation and assistance. The ratio is computed by using values in U.S dollars converted at official exchange rates. *Source*: *OECD.*

Initial GDP (IGDP): Real per capita GDP (in constant 1995 US dollar terms) during the first year of each 5-year period. *Source*: *World Bank, World Development Indicators.*

Growth (GRW): Annual percentage change of real per capita GDP (in constant 1995 US dollar terms). *Source*: *World Bank, World Development Indicators.*

Terms of trade shock (PTOT): Calculated as the annual percentage change in the terms of trade of goods. *Source*: IMF, *World Economic Outlook* (WEO), 2004.

Human capital (HK): Average years of secondary schooling in total population. *Source*: *Barro and Lee (1996), updated http://www.cid.harvard.edu/ciddata/ciddata.html*

Liquid liabilities (LLY): Money and quasi money as a share of GDP. Measures the total liquid liability in the system. *Source*: *World Development Indicators.*

Private sector credit (PSC): Credits by financial intermediaries, excluding the central bank and the development banks, to the private sector as a share of GDP. *Source*: *World Bank Financial Structure Database.*

Bank credit (BANKCR): Private sector credit extended by deposit money banks as a share of GDP. **Source**: *World Bank Financial Structure Database.*

Government consumption (GOV): General government final consumption expenditure in percent of GDP. **Source**: *World Bank, World Development Indicators.*

Institutional quality: Bureaucratic quality (*BURQ*), a continuous variable ranging from 0 to 4, with a higher score indicating a better quality. **Source: ICRG***.*

Population: Total population size. **Source**: *World Bank, World Development Indicators.*

Mortality rate: Rate of infant deaths per 1,000 live births. **Source**: *World Bank, World Development Indicators.*

Domestic Investment: Gross fixed capital formation, in percent of GDP. **Source**: *World Bank, World Development Indicators.*

Figure 1. Aid as a Share of Gross National Income, 1970–2000 (in percent)
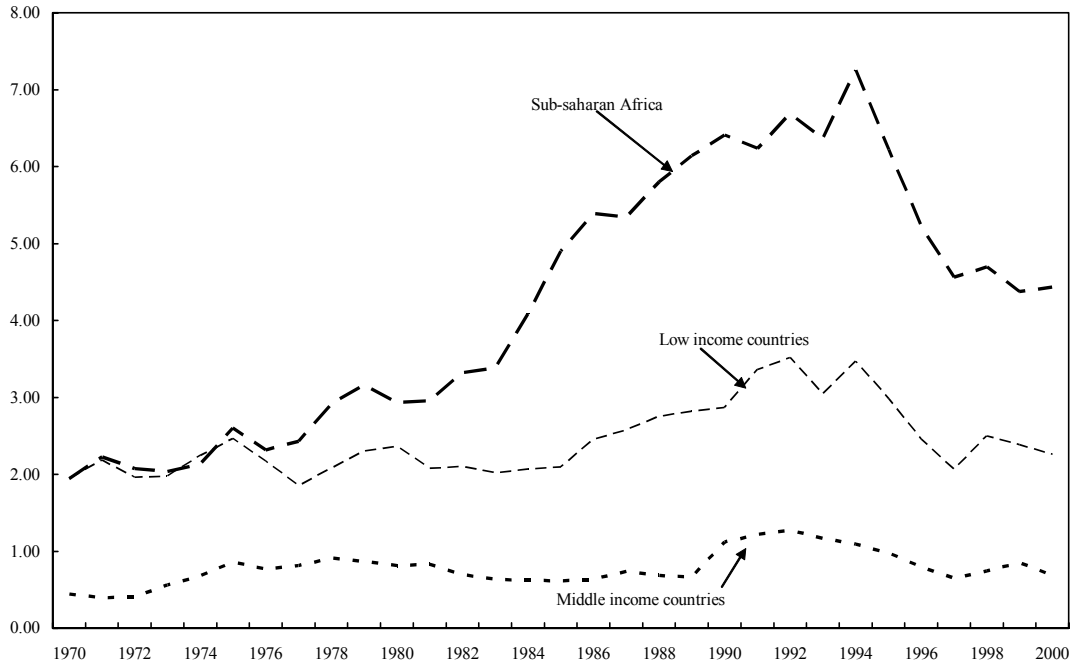
Source: World Development Indicators, World Bank, 2002.

Table 1. Descriptive Statistics for Aid, Growth, and Financial Development Indicators (In percent)			
Variable	Mean	Maximum	Minimum
Growth of real per capita GDP (in percent)	1.40	11.14	-8.99
ODA (in percent of GNI)	5.56	55.78	-0.07
Liquid liabilities (in percent of GDP)	31.58	116.51	8.13
Private sector credit (in percent of GDP)	27.87	148.05	1.92
Bank credit (in percent of GDP)	21.21	96.22	1.70

Note: The mean for each variable is the cross-sectional mean for the period 1980–99, complying with the final data set for which the regressions results in Tables 2–8 are reported. The maximum and minimum values are selected for the same period and from the final set of 46 countries over time and across countries.

Table 2a. Growth Effects of Aid as a Share of GNI—Basic Regressions		
Dependent variable: Growth of Real Per Capita GDP		
Alternative Financial Market Depth Measures		
LLY	PSC	BANKCR
(1)	(2)	(3)
Initial GDP		
-6.03***	-5.77***	-5.81***
0.000	0.000	0.000
Terms of trade shock		
0.03**	0.03***	0.03**
0.013	0.001	0.0184
Human capital		
0.82***	1.10***	0.83
0.03	0.000	0.039
Financial market		
0.80*	0.65**	0.60
0.093	0.014	0.106
Government consumption		
-1.78***	-2.00***	-2.62***
0.004	0.002	0.000
Institutional quality		
0.92***	1.03***	1.03**
0.000	0.000	0.000
Aid		
0.05**	0.05**	0.09**
0.042	0.0394	0.006
No. of countries	44	44	42
No. of observations	179	179	168
No. of time periods	4	4	4
R-squared	0.71	0.72	0.72

Notes: Panel regressions using WLS. White heteroskedasticity-consistent p-values are reported below the coefficient values. ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent, respectively. All regressions are based on fixed effects and, hence include a constant term for each cross section.

Column (1) refers to the results when financial market depth is measured by broad money-to-GDP ratio (LLY). The results in columns (2) and (3) refer to those when financial market depth is measured by private sector credit as a share of GDP (PSC) and bank credit as a share of GDP (BANKCR), respectively.

Institutional quality is measured as the bureaucratic quality measure of the ICRG. Terms of trade shock (PTOT) is measured as the annual percentage change in the terms of trade for goods. Government consumption, human capital, and financial market development indicators are logged and lagged one period.

Table 2b. Growth Effects of Aid as a Share of GNI: Basic Testing of the Financial Market Channel			
Dependent Variable: Growth of Real Per Capita GDP			
	Alternative Financial Market Depth Measures		
	LLY	*PSC*	*BANKCR*
	(1)	(2)	(3)
Initial GDP	-5.87***	-5.77***	-5.75***
	0.000	0.000	0.000
Terms of trade shock	0.03**	0.04***	0.04***
	0.013	0.001	0.000
Human capital	0.82***	1.00***	0.90**
	0.023	0.001	0.013
Financial market	0.40	0.03	-0.01
	0.383	0.93	0.98
Government consumption	-1.73***	-2.29***	-2.74***
	0.003	0.000	0.000
Institutional quality	0.97***	1.07***	1.09***
	0.000	0.000	0.000
Aid	-0.23***	-0.27***	0.24***
	0.006	0.000	0.000
Aid*financial market	0.08***	0.10***	0.10**
	0.001	0.000	0.023
No. of countries	46	46	45
No. of observations	179	179	168
No. of time periods	4	4	4
R-squared	0.71	0.71	0.74
Notes: See Table 2a.			

Table 3a. Determinants of Aid Flows			
Dependent Variable: Official Development Assistance in Percent of GNI			
	Alternative Financial Market Depth Measures		
	LLY	*PSC*	*BANKCR*
Initial GDP	-6.24***	-7.43***	-6.18***
	0.000	0.000	0.000
Terms of trade shock	0.03	0.04	0.042
	0.37	0.218	0.241
Human capital	2.10***	2.02***	2.160***
	0.005	0.007	0.008
Financial market	-0.51	1.26**	-0.052
	0.371	0.034	0.933
Government consumption	3.78***	4.00**	5.04***
	0.000	0.000	0.000
Institutional quality	0.53	0.39	0.564
	0.161	0.268	0.128
Population	1.64	1.20	0.303
	0.263	0.321	0.841
Mortality rate	2.58***	2.43***	2.08**
	0.001	0.000	0.025
No. of countries	46	46	43
No. of observations	179	179	168
No. of time periods	4	4	4
R-squared	0.85	0.91	0.94
Notes: See Table 2a			

Table 3b. Testing the Endogeneity of Aid Flows		
Dependent Variable: Growth of Real Per Capita GDP		
	Alternative Financial Market Depth Measures		
	LLY	*PSC*	*BANKCR*
	(1)	(2)	(3)
Initial GDP	-16.80***	-20.29***	-20.49***
	0.000	0.000	0.000
Terms of trade shock	0.08***	0.09***	0.11***
	0.000	0.000	0.000
Human capital	3.13***	3.23***	3.35***
	0.000	0.000	0.000
Financial market	-0.26	2.81***	0.49
	0.639	0.000	0.21
Government consumption	4.95***	5.98***	9.13***
	0.000	0.001	0.000
Institutional quality	1.66***	1.46***	1.86***
	0.000	0.000	0.000
Aid	-1.56***	-1.75***	-2.06***
	0.000	0.000	0.000
Residual	1.59***	1.79***	2.12***
	0.000	0.000	0.000
No. of countries	46	46	45
No. of observations	179	179	168
No. of time periods	4	4	4
R-squared	0.77	0.77	0.94

Notes: See Table 2a.

Table 4a. Growth Effects of Aid as a Share of GNI: Financial Markets Channel with Instruments for Aid			
Dependent Variable: Growth of Real Per Capita GDP			
	Alternative Financial Market Depth Measures		
	LLY	*PSC*	*BANKCR*
	(1)	(2)	(3)
Initial GDP	-2.25***	-2.47***	-5.64***
	0.000	0.000	0.000
Terms of trade shock	0.05***	0.06***	0.05***
	0.008	0.003	0.006
Human capital	0.76**	0.91***	0.96**
	0.04	0.009	0.007
Financial market	-0.37	-0.53	-0.25
	0.528	0.27	0.542
Government consumption	-3.00***	-3.36***	-3.69***
	0.000	0.000	0.000
Institutional quality	0.95***	0.98***	1.07***
	0.000	0.000	0.000
Aid	-0.23**	-0.28***	0.25***
	0.023	0.000	0.000
Aid*financial market	0.09***	0.11***	0.09**
	0.001	0.000	0.019
No. of countries	43	43	42
No. of observations	171	171	157
Joint significance tests			
Interaction and aid flows	33.49*** (0.000)	30.86*** (0.000)	31.02*** (0.000)
Interaction and financial markets	15.73*** (0.000)	17.19*** (0.000)	6.13** (0.047)
Interaction, aid, and financial markets	37.54*** (0.000)	33.36*** (0.000)	32.60*** (0.000)

Notes: Panel regressions using WTSLS. Considering aid as endogenous, the regressions are estimated with instrumental variables (IV) using as instruments one-year lags of natural logarithms of population, infant mortality rates, human capital, government consumption, and the financial market indicator, as well as initial GDP, institutional quality, terms of trade shocks.

White heteroskedasticity-consistent p-values are reported below the coefficient values. ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent, respectively. All regressions are based on fixed effects and hence include a constant term for each cross section.

The first column refers to the results when financial market depth is measured by the broad money- to-GDP ratio (*LLY*). The results in column (2) refers to those when financial market depth is measured by private sector credit as a share of GDP (*PSC*). The results in column (3) refer to those when financial market depth is measured as bank credit as a share of GDP (*BANKCR*).

Institutional quality is measured as the bureaucratic quality measure of the *ICRG*. Terms of trade shock (*PTOT*) is measured as the annual percentage change in the terms of trade for goods. Government consumption, human capital, and financial market development indicators are logged and lagged one period.

The chi-squared test statistic results for the joint significance of variables are reported in the table, followed by the associated p-values. All chi-squared test statistics reported above are significant at the 5 percent level. "Interaction" is aid times the relevant financial market depth indicator.

Table 4b. Growth Effects of Aid as a Share of GNI: Financial Markets Channel with an Additional Instrument for Aid			
Dependent Variable: Growth of Real Per Capita GDP			
	Alternative Financial Market Depth Measures		
	LLY	*PSC*	*BANKCR*
	(1)	(2)	(3)
Initial GDP	-5.87***	-5.79***	-5.75***
	0.000	0.000	0.000
Terms of trade shock	0.03**	0.04**	0.04***
	0.030	0.01	0.013
Human capital	0.83**	1.03***	0.90**
	0.011	0.001	0.005
Financial market	0.40	0.03	-0.01
	0.382	0.929	0.98
Government consumption	-1.73***	-2.31***	-2.74***
	0.001	0.000	0.000
Institutional quality	0.97***	1.06***	1.09***
	0.000	0.000	0.000
Aid	-0.23**	-0.26**	0.24***
	0.017	0.024	0.000
Aid*financial market	0.08***	0.10***	0.10**
	0.002	0.005	0.016
No. of countries	46	46	43
No. of time periods	4	4	4
No. of observations	179	179	168
Joint significance tests			
Interaction and aid flows	20.38*** (0.000)	17.79*** (0.000)	21.15*** (0.000)
Interaction and financial markets	13.76*** (0.001)	10.66*** (0.005)	8.16** (0.02)
Interaction, aid, and financial markets	25.01*** (0.000)	21.37*** (0.000)	24.31*** (0.000)

Notes: Panel regressions using WTSLS. Considering aid as endogenous, the regressions are estimated with all the instrumental variables (IV) used in Table 4a plus the one-year lag of the aid-financial market interaction term.

White heteroskedasticity-consistent p-values are reported below the coefficient values. ***, **, and * denote significance at 1 percent, 5 percent, and 10 percent, respectively. All regressions are based on fixed effects and hence include a constant term for each cross section.

The first column refers to the results when financial market depth is measured by the broad money-to-GDP ratio (*LLY*). The results in column (2) refers to those when financial market depth is measured by private sector credit as a share of GDP (*PSC*). The results in column (3) refer to those when financial market depth is measured as bank credit as a share of GDP (*BANKCR*).

Institutional quality is measured as the bureaucratic quality measure of the *ICRG*. Terms of trade shock (*PTOT*) is measured as the annual percentage change in the terms of trade for goods. Government consumption, human capital, and financial market development indicators are logged and lagged one period.

The chi-squared test statistic results for the joint significance of variables of interest are reported in the table, followed by the associated p-values. All chi-squared test statistics reported above are significant at the 5 percent level.

"Interaction" is aid times the relevant financial market depth indicator.

Table 5. Growth Effects of Aid as a Share of GNI— Financial Markets Channel with Differentiated Levels of Financial Development			
Dependent Variable: Growth of Real Per Capita GDP			
	Alternative Financial Market Depth Measures		
	LLY	*PSC*	*BANKCR*
	(1)	(2)	(3)
Initial GDP	-5.85***	-5.72***	-5.66***
	0.000	0.000	0.000
Terms of trade shock	0.04***	0.04***	0.042**
	0.006	0.003	0.022
Human capital	0.83**	1.00***	0.98***
	0.013	0.001	0.003
Financial market	0.68	0.14	0.16
	0.132	0.670	0.685
Government consumption	-1.72***	-2.66***	-2.63***
	0.001	0.000	0.000
Institutional quality	0.86***	1.06***	0.96***
	0.000	0.000	0.000
Aid	0.05	-0.23**	0.22***
	0.72	0.013	0.001
Aid*financial mrkt* low financial mrkt dummy	-0.04	-0.014**	0.018
	0.147	0.04	0.578
Aid*financial mrkt* avg. financial mrkt dummy	-0.013	0.087***	0.072*
	0.768	0.003	0.089
Aid*financial mrkt* high financial mrkt dummy	0.035**	0.016	-0.127**
	0.012	0.336	0.028
No. of countries	44	44	42
No. of observations	179	179	166
No. of time periods	4	4	4
Joint significance tests			
Interaction terms and aid flows	24.7***(0.000)	35.20***(0.000)	54.27***(0.000)
Interaction terms and financial markets	21.65***(0.000)	34.60***(0.000)	14.74***(0.005)
Interaction terms, financial markets, and aid flows	29.50***(0.000)	40.76***(0.000)	59.77***(0.000)
See notes Table 4a.			

Table 6. Growth Effects of Aid as a Share of GNI— Impact of Financial Markets at Median			
Dependent Variable: Growth of Real Per Capita GDP			
	Alternative Financial Market Depth Measures		
	LLY	PSC	BANKCR
	(1)	(2)	(3)
Initial GDP	-5.63***	-5.78***	-5.44***
	0.000	0.000	0.000
Terms of trade shock	0.034**	0.037**	0.036**
	0.04	0.011	0.017
Human capital	0.78**	0.98***	0.812**
	0.018	0.001	0.015
Financial market	0.44	-0.02	0.071
	0.343	0.957	0.864
Government consumption	-1.71***	-2.25***	-2.69***
	0.003	0.000	0.000
Institutional quality	0.96***	1.07***	0.97***
	0.000	0.000	0.000
Aid	-0.18	-0.29***	0.257***
	0.157	0.002	0.000
Aid*financial mrkt*LLY below median	0.065*	...	...
	0.093	...	...
Aid*financial mrkt*LLY median	0.073**	...	...
	0.022	...	...
Aid*financial mrkt* PSC below median	...	0.10***	...
	...	0.000	...
Aid*financial mrkt*PSC median	...	0.10***	...
	...	0.000	...
Aid*financial mrkt* BANKCR below median	...	...	0.101**
	...	...	0.013
Aid*financial mrkt*BANKCR median	...	...	0.085**
	...	...	0.054
No. of countries	43	43	42
No. of observations	179	179	166
No. of time periods	4	4	4
Joint significance tests			
Interaction terms and aid flows	21.06***(0.000)	20.91***(0.000)	40.0***(0.000)
Interaction terms and financial markets	15.14***(0.002)	18.66***(0.000)	10.1***(0.005)
Interaction terms, financial markets, and aid flows	25.96***(0.000)	25.97***(0.000)	46.3***(0.000)
See notes Table 4a.			

Table 7. Growth Effects of Aid as a Share of GNI— Financial Markets Channel and Diminishing Returns			
Dependent Variable: Growth of Real Per Capita GDP			
	Alternative Financial Market Depth Measures		
	LLY	PSC	BANKCR
	(1)	(2)	(3)
Initial GDP	-3.05***	-2.62***	-0.49**
	0.000	0.000	0.068
Terms of trade shock	0.057***	0.06***	0.06***
	0.003	0.003	0.007
Human capital	0.79**	0.89***	0.76**
	0.03	0.010	0.051
Financial market	0.32	-0.48	-0.85*
	0.573	0.312	0.063
Government consumption	-3.59***	-3.48***	-3.91***
	0.000	0.000	0.000
Institutional quality	1.00***	1.00***	0.96***
	0.000	0.000	0.000
Aid	-0.35***	-0.29**	0.40***
	0.003	0.005	0.000
Aid*financial market	0.09***	0.11***	0.13***
	0.001	0.000	0.003
Aid-squared	0.002**	0.0006	-0.001
	0.05	0.635	0.438
No. of countries	43	43	43
No. of observations	171	171	161
No. of time periods	4	4	4
Joint significance tests			
Aid and aid squared	9.59*** (0.008)	8.57** (0.014)	24***(0.000)
Interaction and aid flows	11.34***(0.003)	13.36***(0.001)	13.35***(0.001)
Interaction and financial markets	15.52***(0.000)	14.59***(0.001)	9.55***(0.008)
Interaction and aid-squared	15.10***(0.001)	15.28***(0.001)	9.25***(0.01)
Interaction, aid, and aid-squared	34.55***(0.000)	30.16***(0.000)	41.32***(0.000)

Notes: See notes to Table 4a.
The chi-squared test statistic results for the joint significance of variables of interest are reported in the table, followed by the associated p-values. All chi-squared test statistics reported above are significant at the 1-percent or 5-percent level.

Table 8. Robustness of Growth Effects of Aid as a Share of GNI — Financial Markets Channel and Vulnerability to Exogenous Shocks						
Dependent Variable: Growth of Real Per Capita GDP						
	LLY		PSC		BANKCR	
	(1)	(2)	(3)	(4)	(5)	(6)
Initial GDP	-6.88***	-5.79***	-6.34***	-5.58***	-6.54***	-5.62***
	0.000	0.000	0.000	0.000	0.000	0.000
Terms of trade shock	0.04**	0.07**	0.05***	0.08***	0.05***	0.09***
	0.014	0.016	0.002	0.005	0.004	0.002
Human capital	1.08***	0.87***	1.36***	1.01***	1.56***	1.06***
	0.001	0.005	0.000	0.000	0.000	0.000
Financial market	1.18***	0.41	-0.35	-0.02	-0.33	0.09
	0.005	0.347	0.438	0.952	0.444	0.801
Government consumption	-1.96***	-1.54***	-1.95***	-1.99***	-2.61***	-2.30***
	0.000	0.005	0.001	0.001	0.000	0.000
Institutional quality	0.19	0.96***	0.40*	1.06***	0.31	1.06***
	0.405	0.000	0.087	0.000	0.187	0.000
Aid	-0.19*	-0.17	-0.33***	-0.29***	0.20***	0.21***
	0.097	0.12	0.000	0.001	0.005	0.000
Aid*financial market	0.06**	0.07**	0.11***	0.11***	0.09**	0.08*
	0.05	0.024	0.000	0.000	0.035	0.056
Aid*terms of trade shock	…	-0.004	…	-0.004*	…	-0.006**
	…	0.16	…	0.095	…	0.038
Domestic investment	0.25***	…	0.23***	…	0.25***	…
	0.000	…	0.000	…	0.000	…
No. of countries	43	43	43	43	42	42
No. of observations	179	179	179	179	168	165
No. of time periods	4	4	4	4	4	4
Joint significance tests						
Interaction term and aid	5.15*	17.41***	21.10***	26.10***	11.14***	21.85***
	(0.076)	(0.000)	(0.000)	(0.000)	(0.004)	(0.00)
Interaction term and fin. Market	21.50***	8.12**	26.84***	21.20***	4.72*	5.74*
	(0.000)	(0.017)	(0.000)	(0.000)	(0.09)	(0.057)
Interaction term, aid, and financial market	22.57***	21.02***	27.07***	32.68***	11.46***	25.54***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.01)	(0.000)
Notes: See Table 4a.						

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