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Abstract

A debate has emerged over the optimal delivery of official development assistance (ODA) to developing countries: through grants or through concessional loans. The argument remains inconclusive theoretically as well as empirically. This paper presents an endogenous growth model with a good governance factor, in which public spending is financed through grants and loans and the donor community is able to influence a recipient country's growth path by choosing a combination of these two aid instruments. The model indicates that in terms of enhancing growth, grants and loans are complementary. Empirically, it is found that while an increase in the concessionality attached to ODA loans can facilitate recipient countries' economic development, grants may not be useful in stimulating growth. It is also found that grants and loans are in fact complementary with an optimal grant-loan ratio of 1 to 0.4.

Keywords: foreign aid, economic development, concessional loans, grant element, cross-country IV regression

JEL classification: C11, F35, O11

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1. Introduction

A debate has emerged concerning the utility of grants and loans in the delivery of official development assistance (ODA), but the relative value of each delivery instrument is still inconclusive in both theoretical and empirical contexts. Theoretically, the response of recipient countries to foreign aid as well as hold-up problems faced by donors may be the key to determining whether grants or concessional loans are more conducive to economic growth. Empirical study on this topic is lacking and the research conducted tends to be affected by specifications and the scope of the data. As such, this paper constructs an analytical model relating foreign aid to growth, through which donors can maximize a recipient country's economic growth by selecting a specific combination of grants and loans from a dynamic perspective. In addition, several of the analytical model's predicted implications are tested empirically by performing instrumental variable (IV) regressions.

Globally, 40-50 billion U.S. dollars of bilateral and multilateral official resources, including grants, technical assistance and loans flow into developing countries every year (Figure 1). These official resource inflows, though surpassed by private sector inflows such as foreign direct investment, continue to be crucial sources of external financing for developing countries, typically being used to finance economically and socially essential public spending. The benefit of these official resource inflows cannot be underestimated, even if the amount of such aid has continued to level off over the past decade.

As emphasized by Klein and Harford (2005), an important policy question that is attracting increased attention in the international donor community is how to deliver large amounts of aid to developing countries most effectively. In particular, whether it makes any difference to provide donor funding through pure grants or through concessional loans, in cases where the grant equivalence is the same, is a question that must be addressed as there seems to be different perspectives among aid-providing countries. Figure 2 shows the breakdown in the provision of grants and official loans (including other long-term capital) for OECD member countries from 1999 to 2003.[1] While some countries such as Japan and Spain tend to provide aid in the form of concessional loans, other countries such as Netherlands and Sweden put more emphasis on the provision of grants.

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[1] Data are on a commitment basis. For analytical purposes, the other forms of foreign aid are ignored.

Theoretically, there would be no difference in the effectiveness of grants and loans if capital markets were perfect since recipient governments can always borrow additional funds with reasonable conditions on the market if the grant equivalence of donors' funding is not enough to finance a development project. In reality, however, capital markets are never perfect and most developing countries have little access to international capital markets. According to Moody's ratings list, two-thirds of the bonds listed by low and medium-income countries' governments are rated "Ba" or below, reflecting the speculative element of these bonds.

Capital market imperfection fundamentally differentiates grants from concessional loans, thereby creating different economic growth implications for each of the two aid instruments. First, unlike grants, ODA loans, amplifying a small amount of grant equivalence through preferable lending conditions such as low interest rates and long repayment and grace periods, can finance large-scale development projects, requiring a large initial investment. A typical example is a network infrastructure project such as electricity and water distribution utilities. This idea of loans being a more aid-effective instrument may be supported by Murphy *et al.*'s (2000) big push theory. Grants, on the other hand, may support relatively small-scale projects such as the provision of medical equipment to hospitals and the establishment of primary schools. This difference can be interpreted to mean that as long as there is a wide spectrum of development projects in terms of scale and scope, there is a need for both loans and grants in development assistance. In that sense, the focus should be grants *and* loans rather than grants *versus* loans. Thus, the analytical model and empirical work presented in this paper cast a light on the degree of complementarities between grants and loans.

Second, ODA loans must of necessity involve a long-term relationship between recipient governments and donors, thereby creating an incentive issue for recipients. While it may be presumed that grants merely finance domestic tax reductions, loans tend to motivate recipient governments to increase their revenues and strengthen budgetary discipline. This perspective is related closely to the foreign aid fungibility argument (e.g., Devarajan and Swaroop, 1998). If grants are more fungible than loans and a recipient's public expenditure management is poor, such grant assistance may not be cost effective. Gupta *et al.* (2003), in addressing the effect of aid decomposition from this fungibility viewpoint, find that concessional loans are associated with higher domestic revenue mobilization but that grants are completely offset by a decline in revenue. This implies that loans are more effective in terms of a recipient governments' fiscal response.

Finally, the long-term recipient-donor relationship inherent in ODA loans may induce a moral hazard problem for the former and a hold-up problem for the latter. Once loan assistance is

committed, the donor has little effective external leverage to ensure that loan repayments are made in the future (Bulow and Rogoff, 2005). In fact, recipient countries can always default on the loan's repayment. Obviously, on that basis, grants are superior to loans for avoiding future default risks.

Cordella and Ulku (2004), in modeling a recipient country's efforts and incentive to make its foreign debt repayments, show that the impact of concessionality on growth is negative in countries with good policies and positive in those with bad policies. This implies that loan assistance is more suitable for developing countries with sound policies in place, for the underlying reason that recipient countries with better policies are able to achieve structural adjustment at lower costs. Defaults, thus, are less attractive to them.

Unfortunately, however, Cordella and Ulku's model is very static, and not necessarily straightforward enough to apply in empirical research. In addition, Cordella and Ulku interpret the difference between grants and loans as one of differing degrees of concessionality. Therefore, grants and loans are placed on a continuum of aid concessionality, also referred to as the grant element. If a loan is attached to 100 percent concessionality, it should be equivalent to grants. Nevertheless, as shown in Figure 3, even though it is theoretically true, the degree of concessionality does not appear continuous, particularly for a grant element of over 80 percent. Figure 3 depicts the frequency of the average grant element among developing countries for the past decade. No country received official loans with more than an 80 percent grant element on average. This is a natural consequence of the practical differentials between grants and loans, as mentioned above.

This paper considers a more dynamic analytical model based on the endogenous growth literature, in which grants and loans are defined as completely different development assistance instruments. A degree of concessionality attached to loans is also incorporated in this model. Moreover, the model takes into account some elements of recipient governments' policy aspects, or more precisely corruption.

This reference to corruption follows the recent development in the literature that examines the relationship among policies, aid and growth. One of the pioneer studies in this area is Burnside and Dollar (2000), which has influenced the international donor community to a large extent. It has also provoked some academic criticism in terms of their estimation method (e.g., Easterly *et al.*, 2004).[2] In examining the growth impact of policies on developing counties with a panel of 56 countries

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[2] Easterly *et al.* (2004), using the same specification as Burnside and Dollar (2000), but simply adding more data through 1997, show that the significance of the key interactive variable coefficient between aid and good policy is lost. This implies that regardless of public policies, foreign aid is not effective in stimulating economic development.

from 1970 to 1993, Burnside and Dollar find that aid has a positive impact on growth when good policies exist. Following this, Sawada *et al.* (2004) also investigate aid and policy effects on growth by decomposing aid inflows into grants and concessional loans. Their finding that loans are associated with higher growth rates in countries with good policies is interesting and consistent with the above-mentioned study by Gupta *et al*. (2003).

Nevertheless, as Easterly (2003) notes, the lack of clear theoretical models relating aid and policies to growth hampers solid empirical analysis, and empirical definitions of aid, good policies and growth remain open to debate. The model presented in this paper clearly indicates that economic growth is affected by the recipient government's consumption, including corrupt spending, but not directly affected by corruption per se. Moreover, donors can influence the growth path by selecting a certain assistance package combining both grants and loans. Importantly, the subsequent empirical work maintains a direct and consistent connection with the theoretical implications of how foreign aid is related to recipient countries' policies and economic growth.

The following sections are organized as follows: In Section 2, an analytical framework based on the endogenous growth model with foreign aid is presented, and its implications are examined. In Section 3, data and econometric issues are described. Finally, in Section 4, the estimation results are presented and several policy implications are discussed.

2. Analytical framework

The model is based on a simple endogenous model with exogenous foreign aid and a factor of public sector corruption included. Suppose that a government that receives official grants and loans maximizes the following utility function:

$$\int_0^\infty \left\{ \lambda \frac{c_p^{1-\sigma}}{1-\sigma} + (1-\lambda) \left[\mu \frac{c_g^{1-\phi}}{1-\phi} + (1-\mu) \frac{b^{1-\phi}}{1-\phi} \right] \right\} e^{-\rho t} dt \tag{1}$$

under the conditions:

$$\dot{k} = (1-\tau)y - c_p - c_g - b - nk \tag{2}$$

$$y = k^\alpha g^\beta l^\gamma \tag{3}$$

$$\tau y = (1-\theta)l . \tag{4}$$

c_p and c_g are private and government consumption per capita, respectively. b is public corrupt spending per capita. ρ is a time discount factor, and σ and ϕ determine the elasticities of substitution between consumption at any two points in time, which are constant and equal to $\dfrac{1}{\sigma}$ and $\dfrac{1}{\phi}$ for private and public consumption, respectively. Since it is empirically well known that the inter-temporal elasticity of private consumption is very low, it may be reasonable to assume that σ is large enough so that $\sigma > \phi$.

The utility function shown in Equation (1) implies that this government is also a representative consumer as well. The weight of private and public consumption is determined by a parameter denoted as λ, which may reflect a degree of political preferences for governmental activities, including citizens' ideological orientation toward a small government. If λ is unity, the economy is purely private-sector driven, not leaving any ordinary activities for the government. On the contrary, if λ is zero, the government completely crowds out private consumption like that in a socialist economy. In other words, $(1-\lambda)$ can be interpreted as the extent of governmental distortions of markets and private business decisions. μ represents a degree of good governance on the part of the government. Given a certain level of government size associated with λ, if μ is equal to unity, there is no corruption; the government is absolutely efficient. On the contrary, if μ is zero, government spending is totally unproductive and wasteful, perhaps due to extra remuneration stemming from inefficient and dawdling public work and the additional cost of public procurement caused by corruption.

As usual, y denotes GDP per capita, and n is the population growth rate. k, g, and l are private capital, public investment associated with grant assistance, and public spending financed by concessional loans. Equation (3) implies that presumably grants and loans are both productive. ODA loans are characterized by two parameters: gross loan amount, l, and concessionality, θ, and a grant equivalent of the loans can be written by θl. θ indicates a degree of concessionality attached to the loans, which is defined between zero and one, and the government has to repay a fraction of loans $(1-\theta)$ by domestic taxation, of which the average rate is denoted by τ. The fraction depends on the granted concessionality. If θ is zero, the recipient country must repay in full. On the other hand, if θ is large enough, the government's repayment would be ignorable. It is

noteworthy, however, that the model clearly differentiates grants from very concessional loans at least on the expenditure side, even though the concessionality is close to unity.

For simplicity, in the above model, interest payments associated with foreign loans are ignored, and government spending financed by domestic tax revenue is not taken into account.

Then, a steady state of growth rate is given by:

$$\frac{\dot{y}}{y} = \left(\frac{s_p}{\sigma} + \frac{1-s_p}{\phi}\right)\left[(1-\tau)\left(\frac{\alpha}{1-\gamma}\right)\left(\frac{\tau}{1-\theta}\right)^{\frac{1-\alpha}{\alpha}}(gl)^{\frac{\beta}{\alpha}} - n - \rho\right] \qquad (5)$$

where s_p is the private consumption share to total consumption, that is $s_p = \dfrac{c_p}{c_p + c_g + b}$. This growth equation indicates that economic growth is essentially a function of the average tax rate, grants and loans received from the donor community, concessionality attached to the loans, population growth, and the share of private consumption. A variety of implications of the relationship between aid, policies and growth can be derived from this equation.

Firstly, economic development is affected by the average tax rate (τ). If the tax rate is high enough, additional taxation slows growth. From Equation (5), more precisely, if $\tau > 1 - \alpha$, then $\dfrac{\partial \dot{y}/y}{\partial \tau} < 0$. This is the same effect as expected in a simple endogenous growth model where a permanent increase in government taxes and purchases reduces economic growth (e.g., Romer, 1996).

Secondly, Equation (5) implies that official grants and loans are both conducive to growth, that is $\dfrac{\partial \dot{y}/y}{\partial g} > 0$ and $\dfrac{\partial \dot{y}/y}{\partial l} > 0$. Moreover, an increase in the degree of concessionality also results in higher growth since $\dfrac{\partial \dot{y}/y}{\partial \theta} > 0$.

Finally, it is of particular interest that economic growth does not depend on the degree of the recipient's good governance (μ) or corruption ($1 - \mu$) per se, but does rely on the share of private consumption to total domestic consumption (s_p). This might explain the reason for the lack of a direct relationship between policies and growth in the existing literature (e.g., Easterly *et al*., 2004). By Equation (5), it can be shown that if $\sigma > \phi$, an increase in private consumption would impede economic growth, that is $\dfrac{\partial \dot{y}/y}{\partial s_p} < 0$. The interpretation of this is very straightforward; the increased

private-sector consumption reduces the amount of national resources that could otherwise be invested in capital to achieve further future growth, no matter if government consumption is justifiable or wasteful.

Now, given a steady state of growth in Equation (5), the development assistance strategy of the donor community is investigated. Suppose that the donor community maximizes the growth rate by choosing a package of grants and loans, given a fixed total amount of money to be used for foreign aid denoted by $\overline{A}$.[3] That is:

$$\max_{g,l,\theta} \left(\frac{s_p}{\sigma} + \frac{1-s_p}{\phi} \right) \left[(1-\tau) \left(\frac{\alpha}{1-\gamma} \right) \left(\frac{\tau}{1-\theta} \right)^{\frac{1-\alpha}{\alpha}} (gl)^{\frac{\beta}{\alpha}} - n - \rho \right] \tag{6}$$

subject to

$$g + \theta l \leq \overline{A}. \tag{7}$$

Equation (7) merely means that the sum of grants and a grant equivalence of loans is less than the total available resources of the donor community.

Then, the optimal amounts of grants and gross loans are $g^* = \dfrac{\overline{A}}{2}$ and $l^* = \dfrac{(1-\alpha+\beta)\overline{A}}{2\beta}$, respectively. Equivalently, the optimal combination can be written as:

$$l^* = \frac{(1-\alpha+\beta)}{\beta} g^*. \tag{8}$$

Proposition: If the donor community maximizes the recipient country's economic growth, grants and gross loans must increase at a one-$\left(\dfrac{1-\alpha+\beta}{\beta} \right)$-ratio as the aid resources increase.

Apparently, the proposition implies that grants and concessional loans are complementary in order to achieve optimal growth. From a policy viewpoint, importantly, it can be interpreted to mean that

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[3] One may think that the foreign aid objective is not necessarily to maximize the recipient countries' economic growth. As shown by Alesina and Dollar (2000), there may be significant differences in the behavior of different donors. Foreign aid flows tend to be determined by national security problems, international politics, and historical relationships with developing countries. Nevertheless, there is broad agreement within the donor community that the primary objective of foreign aid is to assist developing countries' economic growth.

there is the need for coordination among multilateral and bilateral donors to satisfying this condition as a whole.

To investigate empirically the relationship among grants, loans, good governance and growth as predicted above, two linear regression models are considered. The first is a growth equation associated with Equation (5):

$$\frac{\dot{y}}{y} = \kappa_0 + \kappa_1 g + \kappa_2 l + \kappa_3 \theta + \kappa_4 \tau + \kappa_5 s_p + \kappa_6 n + X'\kappa_7 + \varepsilon_1 \tag{9}$$

where X is a set of exogenous variables to control for heterogeneity across countries. The second is a grant-loan equation derived from Equation (8):

$$l = \pi_0 + \pi_1 g + X'\pi_2 + \varepsilon_2. \tag{10}$$

It is noteworthy that no interaction term between grants and loans is included in Equation (9) by way of a theoretical prediction, and their complementarities must be captured only by the grant-loan equation.

3. Data and econometric issues

The current analysis uses data from 61 countries, for which the latest macroeconomic statistics including fiscal data is available. A list of sample countries is shown in Table 1. It includes 24 low income countries, 24 lower-middle income countries, and 13 upper-middle countries.

A critical problem in using cross-country data is the difficultly in quantifying enormous cultural and institutional differences among countries. In order to partly accommodate this problem, income-group and region-specific fixed effects are incorporated in the empirical models. Obviously, regardless of foreign aid, it is commonly agreed that Asian developing countries exhibit distinctive growth performance. Sub-Saharan Africa tends to be in strong contrast to the situation in Asia. Moreover, while middle income countries may have a relatively low growth rate, low income countries sometimes attain marked economic growth. Thus, these income-group and regional dummy variables are useful to controlling for certain heterogeneity across countries.

For the growth equation, the dependent variable is the average growth rate of real GDP per capita from 1998 to 2002, and for the grant-loan equation, it is the average gross official loans per capita for the same period. Taking the average values aims to avoid measurement errors due to short-term economic fluctuations. In the growth equation regression, six endogenous variables are

taken into account. Firstly, grants are defined as the average amount of annual official grants per capita in U.S. dollar terms for the period. Secondly, loans are similarly defined as the average amount of annual gross official loans per capita. Taking gross data is consistent with the above theoretical framework. Thirdly, the concessionality attached to the loans is measured by the period average of the so-called grant element, which is defined by the weighted average of grant equivalent associated with public loans during the year. Fourthly, the average tax rate is measured by total tax revenues divided by GDP in a particular year during the period since the time-series data on government finance is limited. Fifthly, the share of private consumption comes from the national accounts data and is defined as a period average from 1998 to 2002. Finally, the average population growth rate for the period is used for the population growth n.

The selection of exogenous control variables in X follows the standard growth literature, such as Mankiw *et al.* (1992), and Barrow and Sala-i-Martin (1995). Although any aggregated variables are potentially considered to be endogenous in this type of analysis, it is economically reasonable to assume that at least initial economic conditions are exogenous. To control for the differences in initial state conditions across countries, this paper employs the initial accumulation of human capital and GDP per capita just before the sampling period. The initial human capital is measured by the percentage of gross secondary school enrolment to the official school age population in 1997,[4] and GDP per capita is in U.S. dollar terms for 1997.[5] In fact, according to the Hausman exogeneity test, the hypothesis that these two variables (i.e., initial human capital and initial GDP) are exogenous cannot be rejected.[6]

All the macroeconomic data used for this study were taken from the International Monetary Fund's *International Finance Statistics* and *Government Finance Statistics* and the World Bank's *World Development Indicators* and *Global Development Finance*.

Table 2 shows the summary statistics. The average growth rate of the sample countries is about 1%. The average grants per capita vary largely, from US$0.68 to over US$150 with a mean of US$24, and the gross loans per capita also have a significant variation with a mean of about US$13. The attached grant element is on average 48% with a maximum of 81% and a minimum of 16%. The mean of the average tax rate is 16%. Population growth is commonly moderate across the

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[4] For several countries, the human capital variable in 1996 is used due to a lack of available data.
[5] The secondary school enrollment ratio is the number of children of official school age (as defined by the national education system) enrolled in school to the population of the corresponding official school age.
[6] In the Hausman test, the χ^2 statistics are estimated at -0.89 for the growth model and -0.22 for the grant-loan equation. These negative test statistics can be interpreted as strong evidence that the null hypothesis cannot be rejected.

sample countries, but several countries have a high rate of population growth measuring more than 3%. The initial conditions in terms of human capital and national income have considerable variations as well.

The most important econometric issue in estimating Equations (9) and (10) with aggregated cross-country data is how to deal with biases caused by measurement errors and endogeneity. Particularly, in the current analysis, while growth is affected by grants and loans, these foreign assistance instruments are simultaneously determined so that they are provided according to the macroeconomic performance and policy efforts of recipient governments. Consequently, the independent variables may be contemporaneously correlated with the error term. In the following analysis, the five-year lagged values of the independent variables are used as a set of instrumental variables, since there is usually no correlation between the disturbance and the lagged values.[7] For the original variables for the period from 1998 to 2002, the lagged equivalents from 1992 to 1996 are used as instruments.

4. Estimation results and policy implications

Both growth and grant-loan equations are estimated by the Ordinary Least Squares (OLS) and Instrumental Variables (IV) techniques and the results are shown in Table 3. In the growth regression, the OLS estimates indicate that grants tend to be negatively associated with growth, while gross official loans have a positive impact on growth.[8] The results are similar to those of Gupta *et al.* (2003). However, the significance of these coefficients considerably drops in the IV estimation, implying that foreign aid and economic growth are likely to be determined endogenously and raising the possibility of bias within the OLS estimates. This evidence seems to be somewhat consistent with the previous literature, such as Easterly *et al.* (2004), that foreign aid does not enhance recipient countries' growth.

On the other hand, one important positive finding is that regardless of the lack of solid growth influence associated with grants and gross loans, the estimation results clearly show a positive coefficient of the grant element. This result is robust in both OLS and IV regressions. Therefore, in

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[7] In fact, it has been found that the correlation of the residuals in the growth regressions at two periods is not crucially high; the simple correlation is 0.40 for the growth equation. For the grant-loan equation, similarly, the correlation is estimated at 0.39. Thus, the lagged values are considered as valid instruments in the following analysis.

[8] The negative effects of grants on growth may be interpreted as a lack of incentive mechanisms for developing countries with abundant grants to engage in structural adjustment necessary for faster economic growth.

addition to the evidence above, the implication is that while the gross amount of ODA loans may not matter in aid effectiveness, the concessionality attached to the loans plays an important role in facilitating the recipient countries' economic development. At the operational level, the grant element can be raised either by lowering interest rates or by extending repayment and grace periods.[9]

It is also of particular interest that while an increase in the concessionality of loans leads to higher growth, grants are not an effective instrument for development assistance. This is the exact point that this paper's theoretical model takes into consideration. Even if loan concessionality (θ) approaches unity, it does not necessary mean that loans and grants are identical. It may be useful to recall that many developing countries have no access to international capital markets. Therefore, an important policy implication of foreign aid related to growth is this: ODA loans with a high degree of concessionality are more effective than grants in assisting recipient countries' economic growth. This may be concluded by the fact that the incentives and commitment of the recipient governments matter, and their policy efforts to accelerate growth, mobilize domestic revenue and stabilize macroeconomic conditions for ensuring repayments can actually result in faster economic development.

Regarding other explanatory variables in the growth equation, the share of private consumption has a significant negative coefficient, thus implying that a large amount of private sector consumption results in a reduction of the national resources available for future investment. This may contradict existing evidence that a greater volume of government consumption leads to a lower growth rate (e.g., Barro, 1997). Nevertheless, there are measurement error issues. While the above empirical model specifies the relative size of government in the economy as the share of government consumption to total domestic consumption, Barro's model defines it by the ratio to GDP, adding that government consumption is nonproductive. First, it is not always true that all government consumption is unproductive since certain current expenditures are needed for productive capital investment to enable future growth acceleration. Rather, our theoretical model reveals that regardless of the productivity of government consumption, larger private consumption tends to slow economic growth. Second, as far as the relative extent of government distortions in

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[9] From the broader viewpoint, one might think that a certain combination of grants and commercial loans – loans with zero concessionality – would be substitutable for concessional loans on the country level. The average concessionality of grants and commercial loans could have the same effects as concessional loans. However, it is important to recall that grants may not be an effective aid tool, as shown, and the governments of developing countries may not have full access to commercial credit. Therefore, these may limit the substitutability of combined grants and commercial loans for concessional loans.

the national economy is concerned, it should be measured by the level of government consumption relative to private consumption, as in this paper. Otherwise, capital investment might exaggerate the degree of market distortions.[10]

The tax rate is negatively associated with economic growth, just as earlier growth studies such as Davoodi and Zou (1998) indicate. This supports the conventional theoretical prediction that an increase in public purchases slows overall economic development. While the education level does not explain economic growth so much, the heterogeneity in income levels at the initial stages strongly influences subsequent economic development. The negative coefficients associated with initial GDP per capita imply that a certain convergence in national incomes may be realized. Concurrently, however, the estimation results also indicate that low income countries tend to record lower GDP growth rates. This means that even though the difference in initial per capita income levels is controlled, there is a systematic difference in growth paths between low and middle income countries. Low income countries may face institutional and socioeconomic obstacles in achieving high economic development.

Finally, the estimated grant-loan equation indicates that loans and grants are complementary to one another. The coefficients associated with grants per capita are significantly positive at 0.3 to 0.4 in both OLS and IV regressions. This therefore implies that under the assumption that the donor community maximizes the aid recipient countries' economic growth by choosing aid decomposition, an optimal ratio of grants to loans is about 1 to 0.4. However, one may claim that this is not realistic and that there is sometimes a considerable lack of donor coordination in development assistance, and as such the estimated ratio may not be optimal. Nevertheless, it is important to recall that theoretically, there must be an optimal combination between grants and loans, and the recent coordination efforts within the donor community can be understood as one of the processes to achieve the optimal aid composition.

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[10] This point can be verified easily by considering the following example. Suppose that one country has a private consumption-government consumption-investment ratio of 70-30-0, while another country has a ratio of 30-30-40. Under Barro's measurement, these two countries have the same amount of government (unproductive) activities in the economy. However, that is not the case. The former country instead has fewer distortions resulting from government spending. Thus, the ratio of government consumption to GDP may not be a good proxy in this context.

5. Conclusion

There has been a debate on how to deliver foreign development assistance to developing countries: through grants or through concessional loans. The argument remains inconclusive theoretically as well as empirically. This paper presents an endogenous growth model with a governance factor, in which public spending is financed through grants and loans and the donor community can influence a recipient country's growth path by choosing a grant-loan package. The model indicates that economic growth is a function of the average tax rate, grants and gross loans received from donors, the concessionality attached to the loans, population growth and the share of private consumption, but it does not depend on a good governance or corruption parameter. Moreover, the model demonstrates that there exists an optimal combination of grants and loans to enhance growth, indicating their complementarity.

Empirically, it is indeed found that while an increase in the concessionality attached to ODA loans can enhance a recipient countries' economic growth, grants may not be useful in stimulating growth. This can be interpreted as evidence that concessional loans are superior to grants in terms of recipient countries' efforts to achieve economic growth, fiscal discipline and domestic revenue mobilization. Importantly, this paper also finds that grants and loans are actually complementary with an optimal grant-loan ratio of 1 to 0.4. Hence, this implies that the donor community needs to consult with one another beyond differences in foreign aid strategy to ensure the best combination of grants and loans for each recipient country. In this regard, the importance of foreign aid coordination cannot be overemphasized.

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Table 1: Sample Countries

	Period average (1998-2002)				Period average (1998-2002)		
	GDP per capita growth rate (%)	Grants per capita (US$)	Gross official loans per capita (US$)		GDP per capita growth rate (%)	Grants per capita (US$)	Gross official loans per capita (US$)
Albania	10.54	71.53	37.07	Madagascar	-1.67	18.00	10.42
Algeria	1.93	5.30	5.09	Malaysia	0.01	3.85	5.40
Argentina	-4.01	2.99	1.95	Maldives	3.59	73.09	35.69
Azerbaijan	8.88	11.32	13.83	Mauritius	4.14	25.18	20.64
Belize	2.33	94.21	70.46	Mexico	1.71	1.64	0.14
Bolivia	0.13	61.68	29.25	Mongolia	1.63	53.35	38.25
Brazil	0.36	2.06	1.02	Morocco	1.92	16.33	9.91
Burundi	-0.01	15.19	4.22	Nepal	1.15	12.18	6.81
Cameroon	2.36	24.49	15.43	Nicaragua	2.89	93.59	47.57
Chile	1.11	5.33	1.12	Niger	0.36	18.02	8.16
China	6.82	0.68	1.37	Nigeria	-0.59	1.20	0.65
Colombia	-1.29	8.19	0.82	Oman	1.01	14.86	9.56
Republic of Congo	0.05	24.81	2.61	Pakistan	0.72	3.27	8.49
Costa Rica	2.49	15.05	4.30	Panama	1.85	12.95	5.16
Cote d'Ivoire	-1.84	30.45	18.46	Paraguay	-2.21	13.81	8.12
Croatia	2.68	19.32	1.88	Peru	0.06	14.79	7.82
Dominican Republic	4.20	14.13	8.55	Senegal	1.89	40.56	20.57
Egypt	2.54	23.89	4.25	Sierra Leone	-0.74	31.64	15.20
El Salvador	0.94	30.91	8.35	Sri Lanka	2.06	10.32	21.38
Ethiopia	1.91	8.88	0.05	Thailand	0.50	4.01	13.03
Guatemala	0.73	22.48	3.87	Togo	-2.44	15.42	7.39
Guinea	1.55	28.39	14.83	Tunisia	3.17	18.85	27.99
India	3.63	0.85	1.80	Turkey	-0.48	3.90	4.25
Indonesia	-1.38	3.48	6.40	Uganda	3.05	25.27	10.37
Iran	2.85	1.74	0.60	Uruguay	-3.34	8.01	0.70
Jamaica	-0.12	34.99	14.22	Vanuatu	-2.54	151.91	39.60
Jordan	0.85	91.61	21.04	Venezuela	-3.64	1.93	0.60
Kenya	-1.24	12.21	6.96	Vietnam	4.91	6.09	12.45
Kyrgyz Republic	2.04	18.45	28.15	Republic of Yemen	1.80	10.52	15.97
Lebanon	-0.22	40.85	24.65	Zimbabwe	-5.00	16.40	4.44
Lesotho	-0.18	25.67	13.08				

Table 2: Summary Statistics

	Mean	Std. Dev.	Max	Mini
GDP per capita growth rate	1.09	2.76	-5.00	10.54
Grants per capita	24.13	28.32	0.68	151.91
Gross loans per capita	12.83	13.57	0.05	70.46
Grant element	47.69	21.20	15.88	81.03
Average tax rate	15.69	10.15	0.00	56.60
Share of private consumption	82.55	7.01	60.00	93.10
Population growth rate	1.83	0.76	0.02	3.28
Initial human capital	48.66	22.29	6.64	88.87
Initial GDP per capita	1808.30	1804.99	113.00	8447.00
Regional dummy				
East Asia & Pacific	0.11	0.32	0.00	1.00
South Asia	0.08	0.28	0.00	1.00
Sub-Saharan Africa	0.28	0.45	0.00	1.00
Income group dummy				
Low income countries	0.39	0.49	0.00	1.00
Lower middle income countries	0.39	0.49	0.00	1.00
Higher middle income countries	0.21	0.41	0.00	1.00

Table 3: Estimation Results

	Growth equation		Grant-loan equation	
	OLS	IV	OLS	IV
Grants per capita	-0.0334 *	-0.0257	0.3910 ***	0.3665 ***
	(0.0187)	(0.0453)	(0.0728)	(0.0727)
Gross loans per capita	0.0638 **	0.0072		
	(0.0273)	(0.0994)		
Grant element	0.0690 **	0.1003 *		
	(0.0305)	(0.0508)		
Average tax rate	-0.0366 *	-0.0893 *		
	(0.0216)	(0.0451)		
Share of private consumption	-0.0740 *	-0.1522 **		
	(0.0436)	(0.0699)		
Population growth	-1.5191 ***	-1.8543 **		
	(0.5550)	(0.8283)		
Initial human capital	-0.0292	-0.0456	0.1280 *	0.1172 *
	(0.0290)	(0.0335)	(0.0681)	(0.0669)
Initial GDP per capita	-0.0011 ***	-0.0013 ***	-0.0018 *	-0.0020 *
	(0.0003)	(0.0004)	(0.0010)	(0.0010)
East Asia & Pacific	-1.6138	-2.2284 *	0.1573	0.2381
	(1.2698)	(1.2712)	(3.8123)	(3.5744)
South Asia	-0.2750	-0.7759	0.8432	0.6353
	(1.1119)	(1.0895)	(3.9791)	(4.1331)
Sub-Saharan Africa	-2.2786	-3.3179 *	-3.4824	-3.8388
	(1.4756)	(1.7090)	(3.7156)	(3.8522)
Low income countries	-5.8139 ***	-7.3446 ***	-0.4856	-1.1768
	(2.0705)	(2.4711)	(6.7180)	(7.0684)
Lower middle income countries	-2.5972 **	-3.5200 **	-5.6111	-5.9291
	(1.2799)	(1.5370)	(5.7127)	(5.9466)
Constant	14.8511 ***	24.2547 ***	3.7431	5.6337
	(5.5216)	(8.4576)	(7.8174)	(8.3651)
Obs.	61	61	61	61
F statistics	3.33	3.20	7.98	6.95
R-squared	0.4915	0.4004	0.7029	0.7007

Note: The dependent variables are GDP per capita growth for the growth equation model and the amount of gross loans per capita for the grant-loan equation model, respectively. The White-heterooscedasticity consistent standard errors are shown in parentheses; * 10% level significance; ** 5% level significance; *** 1% level significance.
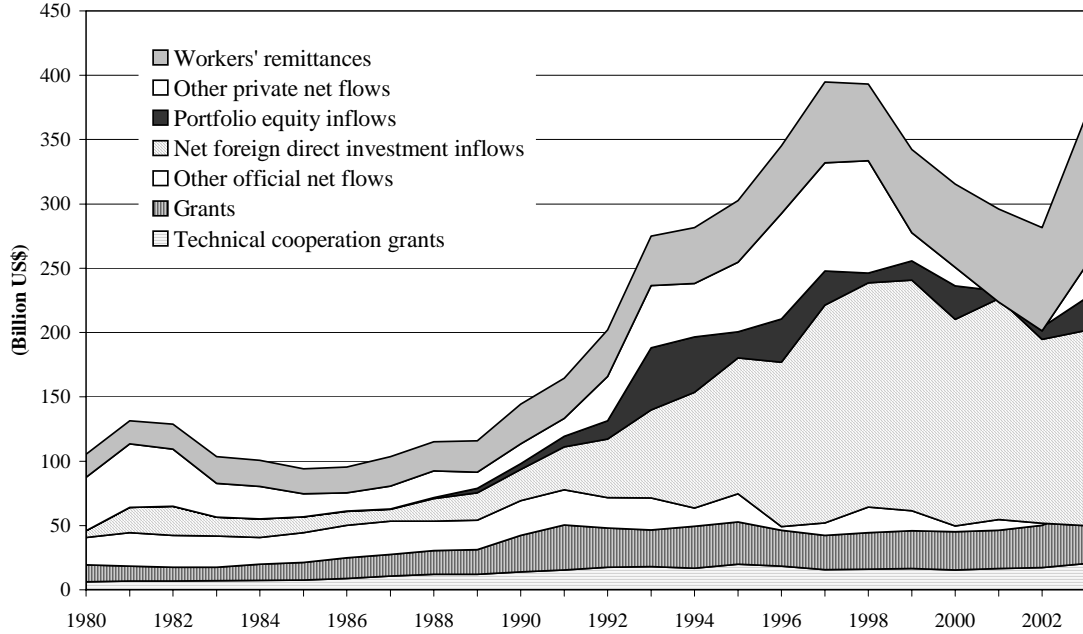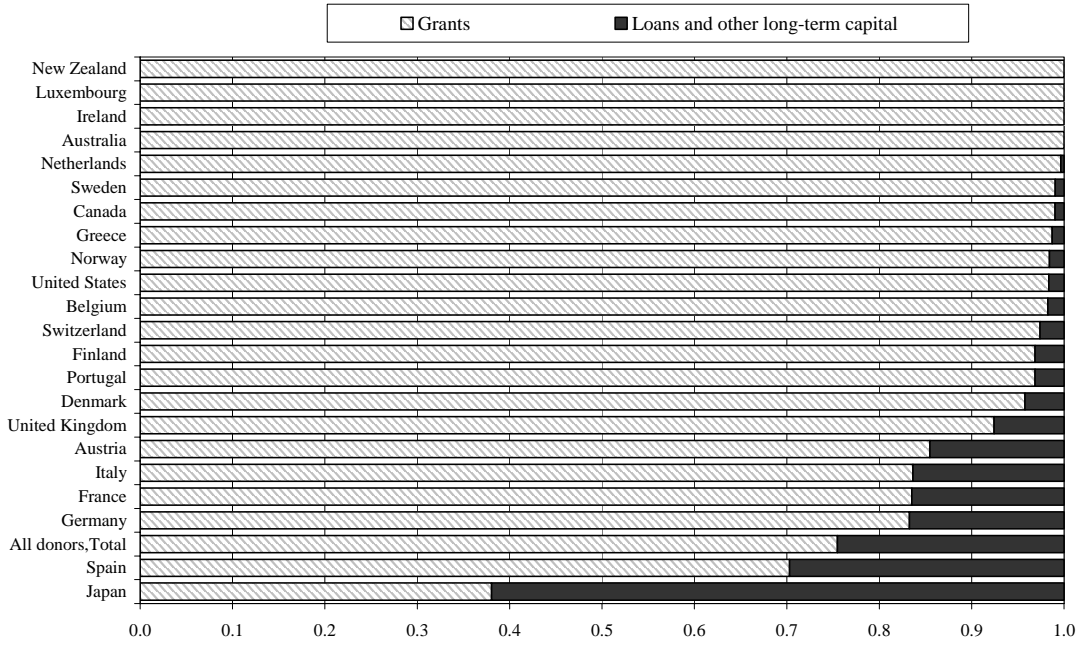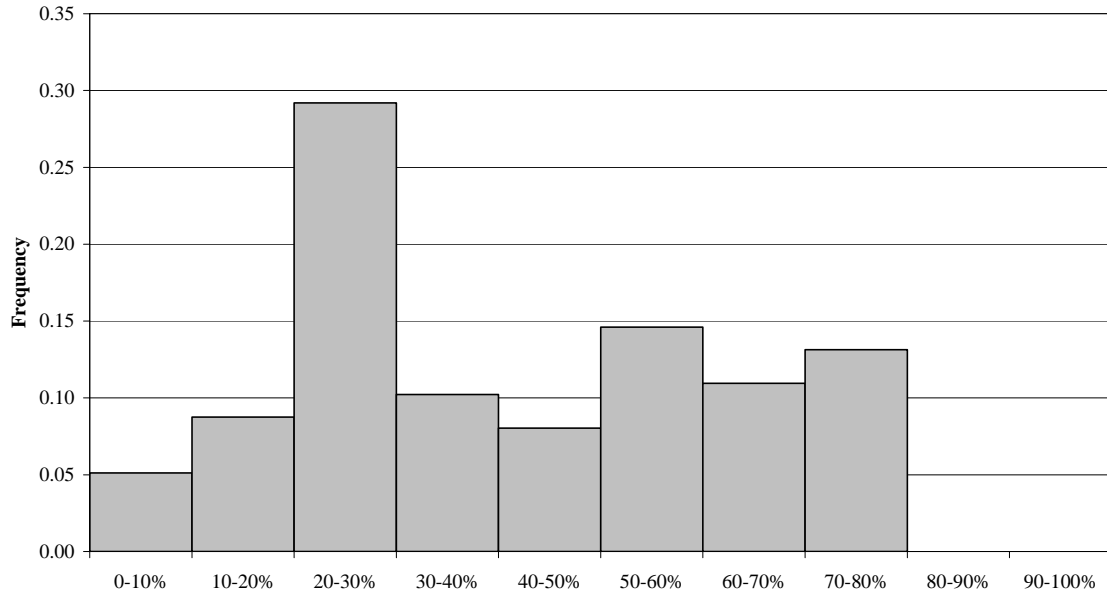
Figure 1: External Financing for Developing Countries

Source: *Global Development Finance 2004*

Figure 2: Composition of Official Development Assistance by Donor

Source: OECD DAC, *International Development Statistics.*

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Figure 3: Average Grant Element of Official Development Assistance (Period Average: 1992-2001)

Source: *Global Development Finance 2004.*