Does Foreign Aid Induce Population Growth?

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Abstract

Using a panel of 136 countries in the period 1973-2004 we show that increases in foreign aid induce

population growth. The evidence also points out different impacts across regions and depending on whether

one considers multinational or bilateral aid. These results may help explaining the puzzling lack of effect

of foreign aid on economic growth. When decomposing the source of change in population growth, we also

find some evidence that foreign aid reduces mortality rate and increases life expectancy. These findings have

important policy implications. First, even when foreign aid is not effective in promoting economic growth,

measured by GDP per capita, it does not necessary imply that foreign aid is completely ineffective in improving

welfare of citizens in the recipient countries. Second, if our analysis is right, in designing foreign aid policy to

reduce economic poverty, in additional to addressing government failure, policy makers may also want to pay

some attention to the so-called "Malthusian trap." (JEL F35, I31, J11)

PRELIMINARY, PLEASE DO NOT CITE

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1

1 Introduction

Over the last five decades, the West has spent more than \$2 trillion on foreign aid. Even so, the Millennium Project urged industrialized nations to double their aid to poor countries. There is, however, little robust evidence that foreign aid helps economic growth. No matter which dataset or econometric technique is used, the estimated impact of aid on growth appears at best to be small, positive, but insignificant. As Rajan and Subramanian (2007) suggest, the next natural step is to try to explain this puzzling observation: "...our findings force us to ask what aspects of aid offset what ought to be the indisputable growth enhancing effects of resource transfers."

A public choice theory argument is sometimes suggested to explain the ineffectiveness of foreign aid: aid is ineffective because it leads to corruption and other rent-seeking activities. Such a government failure explanation has important policy implications. It points to policy prescription which addresses governance, and with institution which induces "good" policies and minimizes rent dissipation, foreign aid will be effective.

We acknowledge this government failure argument in understanding the effect of foreign aid. Nonetheless, economic performance, measured by GDP per capita, is a ratio of income and population. A lack of economic growth can be therefore due to either a sluggish improvement in total income, or an accelerated population growth. In this paper, we propose an alternate explanation of the ineffectiveness of foreign aid based on the effect that aid has on the recipient's population growth. We postulate that recipient countries react to the inflow of resources according to the Malthusian mechanism: increases in wealth are translated into increases in population. This obviously implies that income per capita does not increase- and may indeed fall- as a consequence of foreign aid inflows. If our argument has any merit, the policy implications will be very different from those according to a purely government failure story. First, when designing foreign aid policy, policy makers may want to pay some attention to the Malthusian poverty trap. Second, to evaluate the effectiveness of foreign aid, it may not be wise to focus solely on the impact on growth measured by change in per capita GDP. As a matter of accounting, population growth can be driven by increase in fertility or decrease in mortality. To the extent that foreign aid helps to reduce mortality and to improve life expectancy, it may be a mistake to conclude that aid is completely ineffective if the ultimate goal of foreign aid is to improve the well-beings of the citizens in recipient countries.

The paper is organized as follows. Section 2 presents a literature review on the economic effect of foreign aid. Section 3 describes the datasets used in the empirical exercise. The empirical strategy and results are displayed in Section 4, while Section 5 concludes.

2 Literature Review

There is an extensive and recent literature that has tried to evaluate the effectiveness of foreign aid on the growth prospects of recipient countries. An excellent review of this studies can be found in Clemens, Radelet, and Bhavnani (2004). Instead of replicating it, we focus here on some recent papers that are most relevant to our work.

Boone (1996) argues that poverty and ineffectiveness of foreign aid reflect government failure and what aid does is nothing but to increase the size of government. Svensson (2000) shows that foreign aid leads to more corruption in the public sector, although Tavares (2003) finds the opposite. In a recent empirical study which is highly influential, Burnside and Dollar (2000) conclude that the effectiveness of aid is an increasing function of the quality of economic policy of the recipient country, so that aid has little effect on growth only in the presence of poor policies. Because ineffectiveness of aid is due to government's failure in implementing good policies, their research suggests that aid could be more effective when if it is conditioned on good policy. This conclusion is, however, challenged by Easterly (2003). In particular, Easterly (2003) finds that their conclusion that aid boosts growth in good policy environments is not robust to different definitions and measurement of growth, aid, and policy. Similarly, instead of the quality of policy, Dalgaard, Hansen and Tarp (2004) argues that the effectiveness of aid is related to climate. The most recent studies also lead to mixed results with respect to the government failure. Chatterjee, Giuliano, and Kaya (2007) suggest that the lack of correlation between foreign aid and growth may be due to the fungible nature of the former. Rajan and Subramanian (2007), however, find no evidence that aid works better in better policy or geographical environments, or that certain forms of aid work better than others. The results from this long literature therefore suggests that government failure may not be the only reason for the ineffectiveness of aid to promote economic growth.

In a seminar work on the relationship between population dynamics and economic growth, Becker, Murphy, and Tamura (1990) demonstrate the coexistence an undeveloped Malthusian steady state equilibrium characterized

 $^{^{1}}$ The government failure argument has a long history. Some important early contributors include Bauer (1971) and Friedman (1958).

by high fertility and low human capital, and a sustained high-growth steady state with low fertility and abundant human capital. More recently, Galor and Weil (1996, 2000), Moav (2005), and Galor (2005) have shown the important role played by the demographic transition from high to low population growth in the long run take-off of the West. However, Easterly (2006) claims that little is known about the relation between foreign aid and population growth: "...the large literature on aid effectiveness pays virtually no attention to the effect of aid on fertility, and such a role for aid is not emphasized by the current discussion of the classic aid narrative...".

This paper tries to fill this gap by formally analyzing the relationship between flows of foreign aid and population growth. To our knowledge, the only paper that considers this question is Azarnert (2004). Using a simple panel regression framework with a sample of 43 Sub-Saharan countries, he shows that foreign aid has a positive effect on population and fertility of the recipient country. Our paper extends the analysis to 136 countries in different continents and distinguishes between the effects of bilateral and multilateral aid. More important, to show that there is a causal effect of foreign aid on population growth, we also adopt an instrumental variable (IV) method. The IV method has been used in the cross-country aid-growth literature. Burnside and Dollar (2000), for example, use population and arms imports as instruments for foreign aid. Following Tavares (2003), Chatterjee, Giuliano, and Kaya (2007) instrument aid by geographic and cultural proximity variables such as geographical distance between aid donor and recipient, and dummies for whether the donor and the recipient share common land border, same religion, and same official languages. Rajan and Subramanian (2007) add colony status, both current and historical, as instruments. Our IV strategy follows this existing approach, and we explore two other potential instruments. Alesina and Dollar (2000) show that in additional to colonial past, political alliances also affects foreign aid. In another interesting recent paper, Kuziemko and Werker (2006) find that nonpermanent membership of the U.N. Security Council significantly affects foreign aid from the United States and the United Nations. We explore in this paper these exogenous variations in foreign aids.

3 Data

The main variable of interest in this study is foreign aid. Information on this variable is available from the Organisation for Economic Co-operation and Development's (OECD) International Development Statistics (IDS)

online databases.² These datasets further characterize the type of aid depending on whether it is bilateral (originated in one country or institution) or multilateral (originated in several countries or institutions). Data on population and real GDP per capita is obtained from the Penn World Tables.³ Fertility, mortality, and life expectancy data are taken from the World Banks Health, Nutrition and Population dataset.

Summary statistics for foreign aid are displayed in Table 1 of the Appendix. It is important to notice that multilateral aid has a considerable amount of missing values, especially in the initial years (see column 2 of Table 1). Figure 1 shows the evolution of total foreign aid over time during the period 1973-2004. The most remarkable pattern is that the amount of aid has grown at a more or less constant rate and it has experienced a huge increase in 2003 and 2004. When we divide aid in bilateral and multilateral (Figure 2) the trend is quite similar although the big jump in 2003 and 2004 is mainly due to an increase in bilateral aid.

As can be seen in the Appendix, the list of countries (most of them developing ones) included in the study are very diverse. One way to classify them into meaningful categories is to use the six geographical categories defined by the World Bank: East Asia and Pacific, Europe and Central Asia, Latin America & the Caribbean, Middle East and North Africa, South Asia, and Sub-Saharan Africa. Figures 3 and 4 show the amount of aid received by each region during the period 1973-2004. Sub-Saharan Africa is clearly the region that receives most of the total aid, followed by East Asia and the Pacific. It is interesting to notice that although the amount of bilateral aid is similar between these two regions, Sub-Saharan African countries receive a much larger amount of multilateral aid.

4 Empirical Results

4.1 Fixed-Effect Panel Method

We start by calculating the unconditional correlation between population growth, and total, bilateral, and multilateral aid. These coefficients are 0.17, 0.16, and 0.21 respectively, and they are all significant at the 1% level.

²In particular, we use the data from the Development Assistance Committee (DAC) database.

³In the empirical exercise we eliminate some observations that are clear outliers in terms of population growth.

Consider next the following equation

$$n_{rt} = \delta_r + \beta_1 \ln y_{rt} + \beta_2 \ln a_{rt} + \varepsilon_{rt} \tag{1}$$

where n_{rt} represents population growth of recipient country r at period t, δ_r is a country fixed effect, a and y are foreign aid receipts relative to GDP and initial real–per capita GDP respectively and ε_{rt} is a standard error term. We estimate (1) including time effects (year dummies).

Table 3 shows the results. In the first specification we use total foreign aid (its log) as a right-hand side variable. Its coefficient is positive and significant at the 1% level. As mentioned above, foreign aid comes in two forms: bilateral and multilateral. We next run the previous regression including both types of aid as regressors. The results suggest that both forms of aid induce population growth and the magnitude of the impact is similar (see specifications (2) and (3) in Table 3). This is also true when we include both variables in the same regression (specification (4)). GDP per capita always enters the regression negatively.

Next we exploit the geographical variation in my sample of countries to explore whether the results obtained in the previous regression are driven by a specific region. In order to do this we interact a dummy variable for each of the six regions with each of the three foreign aid variables. We then use these variables as regressors in:

$$n_{rt} = \delta_r + \beta_1 \ln y_{rt} + \sum_{i=1}^{6} \gamma_i D_i \ln a_{irt} + \varepsilon_{rt}$$
 (2)

where D_i is a dummy variable for region i = 1, ..., 6 and γ_i is its associated coefficient.

The results of estimating (2) with time effects are displayed in Table 4. Total aid has a significant positive impact on population growth in Sub-Saharan Africa, Europe and Central Asia and South Asia, and has a negative (and also significant) impact in Middle East and North Africa. Bilateral aid affects population growth positively in the same three regions and it has a negative impact in Latin American and the Caribbean and in the Middle East and North Africa. The impact of multilateral aid is only significantly positive in Sub-Saharan Africa and South Asia. When we include both bilateral and multilateral aid, bilateral has a positive impact in Sub-Saharan Africa and South Asia, and again, it affects population growth negatively in Latin America and the Caribbean. Multilateral aid has also a positive impact only in South Asia.

The results of these regressions can be summarized as follows. First, there seems to exist a genuine positive effect of foreign aid in the recipient's population growth. This effect is present in the two forms of foreign aid, although bilateral aid seems to matter more than multilateral. Second, this effect is significant and positive in four of the six world regions. Only in one case the effect is negative. Finally, when one considers both types of aid at the regional level, bilateral aid has a strong positive effect in Sub-Saharan Africa and South Asia and it has a negative impact (although much smaller) in Latin America and the Caribbean. Multilateral aid seems to have a strong positive effect only in South Asia. Note that the magnitude of the coefficients in this regression is quite large. Specification (4) implies that in Sub-Saharan Africa, a 10% increase in bilateral aid is associated with a 0.01% increase in population growth. In South Asia the increase in population growth associated with bilateral and multilateral aid are 0.02% and 0.01% respectively.

@ David, when we are confident about our estimate, I think it is useful to say something about the magnitude of the effect. Is 0.01% small? Since I mention the government failure as a common alternative explanation, it would be nice at the end to say how important is our Malthusian trap argument in accounting for the result.

4.2 Instrumental Variable Estimates

Our fixed effect estimator helps to control for country-specific factors affecting both foreign aid and population growth. While the fixed effects estimation is useful in removing the influence of long-tern influences of both foreign aid and population growth, it does not necessarily identify the causal effect of foreign aid on population growth. For instance, aid may go to countries that have just experienced wars, natural disasters, or epidemics, which have direct impact on population. This potential source of bias tends to generate a negative correlation between aid and population growth, and hence understates the true causal effect of aid on population growth.

The endogeneity problem of foreign aid is well recognized in the aid-growth literature. Our baseline instrumentation strategy is adopted from a recent paper Rajan and Subramanian (2007). In particular, the aid supply equation from a donor d to a recipient r is written as

$$a_{drt} = \alpha_0 + \alpha_1 com lang_{dr} + \alpha_2 curcol_{dr} + \alpha_3 com col_{dr} + \alpha_4 com coluk_{dr} + \alpha_5 com col fra_{dr}$$
$$+ \alpha_6 com colspa_{dr} + \alpha_7 com colpor_{dr} + \alpha_8 \ln(pop_d/pop_r)$$

 $+\alpha_{9} \ln(pop_{d}/pop_{r})comcol_{dr} + \alpha_{10} \ln(pop_{d}/pop_{r})comcoluk_{dr}$ $+\alpha_{11} \ln(pop_{d}/pop_{r})comcolfra_{dr} + \alpha_{12} \ln(pop_{d}/pop_{r})comcolspa_{dr}$ $+\alpha_{13} \ln(pop_{d}/pop_{r})comcolpor_{dr} + v_{drt}$

where comlang is a dummy for whether the donor and recipient share a common language; curcol is a dummy for whether the recipient is currently a colony of the donor; comcol is a dummy for whether the recipient was ever a colony of the donor. The next four are dummies for colony origin: France, Portugal, Spain, and United Kingdom. Finally, pop_d/pop_r measures the relative initial population size.

The estimated aid \hat{a}_{drt} will then be aggregated to obtain the estimated total aid received for country r, $\hat{\alpha}_{rt} = \sum_{d} \hat{a}_{drt}$. Rajan and Subramanian (2007) show that the first-stage relationship between the above instruments and aid is strongly positive.

Rajan and Subramanian (2007) provide various robustness checks of the validity of the instrument. We can further test it by adding a dummy for political alliances as an instrument, as Alesina and Dollar (2000) find that the status of political alliances significantly affects foreign aid. Alternatively, we adopt a different IV strategy suggested by Tavares (2003). Finally, we can also explore the variation of nonpermanent membership of the U.N. Security Council as an instrument, as Kuziemko and Werker (2006) find that it significantly affects foreign aid from the United States and the United Nations.

RESULTS COMING SOON

4.3 Fertility, Mortality, and Life Expectancy

We have established a robust causal effect of foreign aid on population. Because the evolution of population dynamics depends on changes in fertility rate and mortality rate, in this section we disaggregate the effect on population change and also look into the impact of foreign aid on life expectancy. Such a distinction of the source of population growth is important in terms of evaluating the effectiveness of foreign aid. For example, if the increase in population is due to lower mortality and hence life expectancy becomes higher, even though foreign aid has no effect on economic growth, it may be effective in raising the welfare of the citizens in the recipient countries.

RESULTS COMING SOON

5 Conclusions

This paper studies the relationship between foreign aid and population growth in the recipient country. We find that there is indeed a positive and strong relationship between both variables. This is true both at the world level and when one considers six different world regions: East Asia and Pacific, Europe and Central Asia, Latin America & the Caribbean, Middle East and North Africa, South Asia, and Sub-Saharan Africa. We also analyze the distinctive impact that bilateral and multilateral aid may have and we find that bilateral aid is mostly responsible for this positive relationship. In Sub-Saharan Africa and in South Asia a 10% increase in bilateral foreign aid is associated with an increase in population growth of 0.01% and 0.02% respectively.

The next natural step would be to disentangle the specific objectives of bilateral and multilateral foreign aid and its link with population growth. The Malthusian model suggest that if this aid directly translates into individuals increases in wealth, those individuals will choose to increase their fertility rates as long as they view children as normal goods. In order to identify which aid projects are more likely to generate such behavior one needs a further understanding of the nature of these programs.

Appendix

List of countries by geographical region:⁴

East Asia and Pacific (25): American Samoa, Bangladesh, Brunei, Cambodia, China, Fiji, Hong Kong, Indonesia, Kiribati, Korea Dem. Rep., Korea Rep., Lao PDR, Macao, Malaysia, Micronesia Fed. Sts, Mongolia, Palau, Papua New Guinea, Philippines, Singapore, Solomon Islands, Thailand, Tonga, Vanuatu, and Vietnam.

Europe and Central Asia (20): Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Croatia, Cyprus, Georgia, Kazakhstan, Kyrgyz Republic, Macedonia FYR, Malta, Moldova, Serbia and Montenegro, Slovenia, Tajikistan, Turkey, Turkmenistan, Ukraine, and Uzbekistan.

Latin America & the Caribbean (34): Antigua & Barbuda, Argentina, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Chile, Colombia, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Netherlands Antilles, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, and Venezuela.

Middle East and North Africa (19): Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Tunisia, United Arab Emirates, and Yemen.

South Asia (7): Afghanistan, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

Sub-Saharan Africa (47): Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Dem Rep., Congo Rep., Cote d'Ivoire, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, and Zimbabwe.

⁴The following countries are not included in the list provided by the World Bank and are added by the author. East Asia and Pacific: Brunei, Cayman Islands, Cook Islands, French Polynesia, Korea Rep., Macao, Montserrat, Nauru, St. Kitts-Levis, St. Lucia, St. Vincent & the Grenadines, Suriname, Tokelau, Turks & ..., Tuvalu, Virgin Islands, Wallis & Futuna, New Caledonia, and Niue. Europe and Central Asia: Cyprus, Malta, Slovenia, Yugoslavia. Latin America & the Caribbean: Anguilla, Antigua & Barbuda, Bahamas, Bermuda, and Netherlands Antilles. Middle East and North Africa: Bahrain, Afghanistan, Gibraltar, Israel, Kuwait, Palestinian Auth. Areas, Saudi Arabia, Qatar, United Arab Emirates. Sub-Saharan Africa: Reunion, St. Helena.

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<u>Table 1:</u> Aggregate Summary Statistics (in thousands)

foreign aid	observations	mean	std deviation	min	max
Total	4115	255930	525488	0.41	9551093
Bilateral	4085	186414	429727	0.41	94321113
Multilateral	3278	88973	172381	2.4	1602250

<u>Table 2:</u> Summary Statistics per Region (in thousands)

region	foreign aid	observations	mean	std deviation	min	max
Sub-Saharan	Total	1452	222322	328440	2	5855411
Africa	Bilateral	1451	136867	229972	2	5144366
	Multilateral	1368	90802	132296	8.6	1197384
Middle East	Total	472	307371	757977	0.4	9551093
& North	Bilateral	472	281755	736757	0.4	9432113
Africa	Multilateral	267	45284	67792	2.6	600329
East Asia &	Total	639	406292	720329	0.9	4132614
Pacific	Bilateral	638	325573	596275	0.9	3752178
	Multilateral	446	116379	234362	2.4	1388847
Europe and	Total	270	201863	312389	3.5	2545722
Central Asia	Bilateral	265	146313	246297	3.5	1900334
	Multilateral	189	83227	111069	30	694012
South Asia	Total	222	702184	1026530	29.9	7164012
	Bilateral	222	432905	710734	29.9	6307109
	Multilateral	188	317978	395428	5.3	1602250
Latin	Total	1060	108730	177658	0.8	1575702
America &	Bilateral	1036	84208	148136	0.8	1306565
the	Multilateral	820	34061	60926	5.6	567622
Caribbean						

Table 3: Pooled fixed effects

	(1)	(2)	(3)	(4)
total foreign aid	0.0002***	-	-	-
_	(0.00008)			
bilateral foreign aid	-	0.0002***	-	0.0003***
_		(0.00008)		(0.0001)
multilateral foreign aid	-	-	0.0003***	0.0002***
_			(0.00008)	(0.00008)
GDP pc	-0.001***	-0.001***	-0.002***	-0.002***
_	(0.0004)	(0.0004)	(0.0005)	(0.0005)
Observations	3665	3639	2972	2946

*,**,***: significant at the 10%, 5%, and 1% respectively Standard errors in brackets

Table 4: Fixed effects for Different Regions

		(1)	(2)	(3)	(4)
	total foreign	0.0007***	-	-	-
	aid	(0.0001)			
Sub-Saharan	bilateral	-	0.0008***	-	0.001***
Africa	foreign aid		(0.0001)		(0.0002)
	multilateral	-	-	0.0004***	-0.00001
	foreign aid			(0.0001)	(0.0001)
	total foreign	-0.00002	-	-	-
East Asia and	aid	(0.0002)			
Pacific	bilateral	-	-0.0000	-	0.0005
	foreign aid		(0.0002)		(0.0003)
	multilateral	-	-	0.0003	0.0002
	foreign aid			(0.0002)	(0.0002)
	total foreign	0.0007***	-	-	-
	aid	(0.0002)			
Europe and	bilateral	-	0.0007***	-	0.0008
Central Asia	foreign aid		(0.0002)		(0.0005)
	multilateral	-	-	0.0002	0.00008
	foreign aid			(0.0003)	(0.0003)
	total foreign	-0.0001	-	-	-
	aid	(0.0001)			
Latin America	bilateral	-	-0.0002*	-	-0.0003**
and the	foreign aid		(0.0001)		(0.0001)
Caribbean	multilateral	-	-	0.0002	0.0002
	foreign aid			(0.0001)	(0.0001)
	total foreign	-0.0006***	-	-	-
Middle East	aid	(0.0002)			
and North	bilateral	-	-0.0006***	-	-0.0004
Africa	foreign aid		(0.0002)		(0.0004)
	multilateral	-	-	-0.0003	-0.0002
	foreign aid			(0.0002)	(0.0002)
	total foreign	0.002***	-		
	aid	(0.0003)			
South Asia	bilateral	_	0.002***	-	0.002***
	foreign aid		(0.0003)		(0.0005)
	multilateral	_	-	0.002***	0.001**
	foreign aid			(0.0004)	(0.0004)
Observations		3665	3639	2972	2946

<u>Table ##</u>: The effect of total foreign aid on different variables

Dependent variable	Coefficient on log of total aid	Number of observations
Population growth	0.009**	3279
	(0.004)	207
Adult mortality female	0.057	395
	(5.23)	
Adult mortality male	1.25	395
	(4.83)	
Death rate	-0.12***	1519
	(0.04)	
Infant mortality	-0.269	682
_	(0.339)	
Life expectancy female	0.07	1297
	(0.09)	
Life expectancy male	0.04	1297
	(0.08)	
Life expectancy total	0.056	1297
	(0.09)	
Survival 65 female	-0.509	218
	(0.705)	
Survival 65 male	-0.312	218
	(0.507)	
Total fertility rate	0.008	1404
_	(0.01)	
Under 5 mortality	-0.971	604
·	(0.665)	

Total Foreign Aid

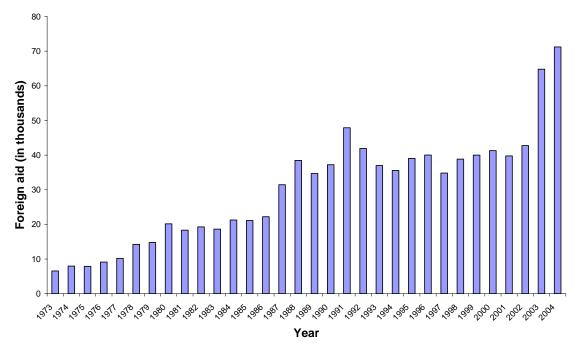


Figure 1

Bilateral and Multilateral Aid

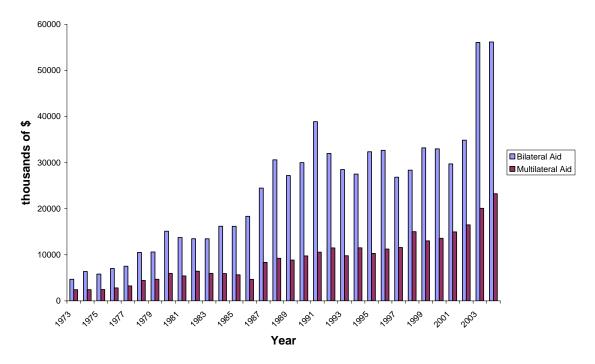


Figure 2

Total Foreign Aid per Region

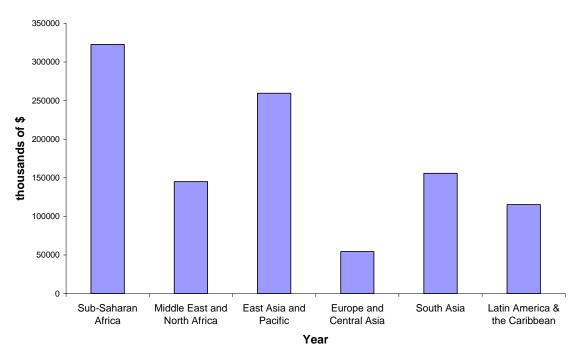


Figure 3

Foreign Aid per Region

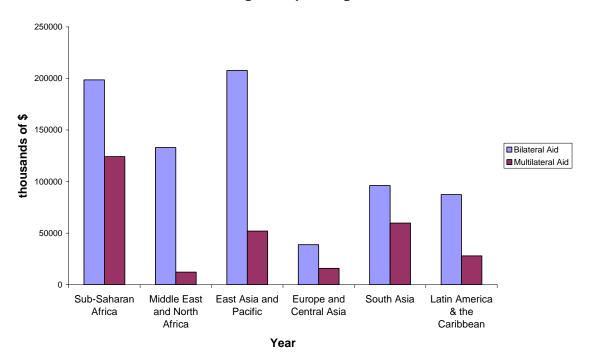


Figure 4