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ACHIEVING GROWTH IN THE PACIFIC

Do Pacific countries receive too much foreign aid?

Simon Feeny and Mark McGillivray

School of Economics, Finance and Marketing, RMIT University
World Institute for Development Economics Research, United Nations University

International aid donors are substantially scaling up the level of foreign development aid. Official development assistance (ODA), the most widely accepted measure of foreign development aid, increased from US\$69.1 billion in 2003 to an estimated record high of US\$106 billion in 2005. The Organisation for Economic Cooperation and Development (OECD) estimates that its Development Assistance Committee (DAC) member countries will provide US\$130 billion in aid by 2010 (OECD 2006). The UN Millennium Project calls for further increases in foreign aid to US\$135m billion (UN Millennium Project 2005). Australia, the largest donor of aid to the Pacific, has pledged to double its foreign aid budget to \$4 billion by 2010, subject to 'the effectiveness of the application of additional resources' (AusAID 2005).

Pacific countries currently receive some of the world's highest levels of aid, relative to the size of their economies. Levels of aid that account for more than one-third of GDP are not uncommon. The rising global aid budgets and increasing assistance expected from emerging donors such as China, Taiwan and India imply that aid levels in the Pacific will increase. Increases in the incidence of relative and in some instances absolute poverty—in its economic and other dimensions—provide an a priori

case for increasing aid to the region. This case becomes stronger given the findings of recent empirical studies of aid effectiveness in the Pacific. These studies conclude that economic growth in the region would have been lower in the absence of aid (Gounder 2001; Feeny 2006a, 2006b; Sugden and Pavlov 2006).¹ While this does not suggest that all the region's problems can be fixed by aid and there are many aspects of aid delivery that require fundamental reforms, these findings are consistent with the view that poverty in the Pacific would be higher in the absence of aid and the region's poor economic performance should not be attributed to aid. This is also consistent with the findings of the majority of other studies that belong to the now rather large aid-growth empirical literature (for comprehensive surveys, see McGillivray et al. 2006; Addison et al. 2005; Clemens et al. 2004; McGillivray 2003; Morrissey 2001).²

While the preceding findings are good news for donor and recipient nations alike, it is also clear from aid-effectiveness research that there are limits to the amounts of aid recipient countries can effectively absorb. A consistent finding from the literature is that the aid-growth relationship is subject to diminishing and eventually negative returns (for example, Hansen and Tarp 2000,

2001; Lensink and White 2001; Dalgaard and Hansen 2001; Hudson and Mosley 2001; Dalgaard et al. 2004; Clemens et al. 2004). Estimates of the level of aid at which its incremental impact on recipient-country growth diminishes vary, depending *inter alia* on the time period and sample of countries under consideration; but it seems that this typically occurs at about 20 per cent of recipient GDP. In policy circles, it is also accepted that some recipient countries struggle to absorb the large amounts of foreign aid they receive efficiently. Indeed, the Paris Declaration on Aid Effectiveness in 2005 focused on the need for greater coordination and harmonisation of aid-donor activities to ensure that aid effectiveness in such countries was not hampered (OECD 2005).

This issue is of obvious importance to the Pacific, given the already high levels of aid provided and the prospects of even higher levels. Pacific countries have very small economies. It follows that what might seem to be a small or even inconsequential increment in aid in the context of the donor's budget can translate into an enormous increase in aid relative to the size of the country's GDP. This paper labels the level of aid that maximises its impact on economic growth as the 'growth-efficient' level.³ It estimates this level of aid using the findings reported in the recent aid-growth literature. These estimates are then compared with current aid allocations to Pacific countries. The paper proceeds by calculating the impact on growth that growth-efficient foreign aid allocations will provide.

Foreign aid to the Pacific

Table 1 provides aid amounts relative to GDP for Pacific countries in periods since 1980. Most aid to the region has been bilateral, with Australia being by far the largest donor.

Other major donors include Japan, France, the United States and New Zealand. Of all Pacific countries, Solomon Islands received the most aid relative to its GDP in 2004; it received aid to the value of 50.6 per cent of GDP. The comparatively large level of aid to Solomon Islands in 2004 is explained by the Regional Assistance Mission to the Solomon Islands (RAMSI), initiated in 2003 after civil and political unrest. Marshall Islands, Federated States of Micronesia (FSM), Palau, Nauru, Tuvalu and Kiribati also received levels of aid in excess of 25 per cent of their GDP in 2004. Kiribati has received some of the highest levels in the world relative to its GDP; in 1990, it received aid in excess of 70 per cent of its GDP.

In ratio terms, the level of aid flows to Pacific countries has, on average, fallen in recent decades (Table 1). In 1980, aid accounted, on average, for 30 per cent of GDP. This figure had fallen to 23 per cent by 2004. Only four of the 13 countries listed in Table 1 received more aid relative to GDP in 2004 than in 2000. The recent pledges of increased aid to the region from Australia were in part a response to these declines. This should not imply, however, that aid to the Pacific is small in comparison with other parts of the world. Pacific countries receive some of the highest levels of aid relative to GDP—far higher than the international average. In 2004, foreign aid to developing countries averaged 1.3 per cent of gross national income (GNI).

Growth-efficient foreign aid

It is intuitive and sensible to expect that there are constraints on the amount of aid that can be absorbed efficiently. In recent years, aid-effectiveness studies have embraced this expectation by allowing for a non-linear relationship between foreign aid and growth. They typically estimate the

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following equation

$$g_i = \alpha + \beta_1 a_i + \beta_2 a_i^2 + \beta_3' Z_i + \mu_i \quad i = 1, \dots, n \quad (1)$$

in which g_i is per capita GDP growth in aid-receiving country i , a_i is aid relative to GDP in that country, Z_i is a vector of additional variables, μ_i is a residual, α is a constant and β_1 , β_2 and β_3 are coefficients. All variables are for a given period, t . The vector of additional variables typically includes the initial level of GDP per capita, measures of ethnic fractionalisation, the number of assassinations, institutional quality, macroeconomic policy indicators and regional dummies. The expected signs of β_1 and β_2 are positive and negative, respectively. Given these expectations, the hypothesised relationship between aid and growth described by Equation 1 is represented in Figure 1.

The figure depicts the expected relationship between aid provided to a recipient (a_i) and the growth in the recipient's per capita income (g_i). The incremental impact of foreign aid on growth is positive at all levels of aid up to a_i^* . From Equation 1, it follows that

$$a_i^* = \frac{-\beta_1}{2(\beta_2)} \quad (2)$$

This level is interpreted in the literature as the saturation level of aid. It can be interpreted as the unconstrained optimal level according to an allocation strategy that attempts to maximise rates of current per capita income growth in recipient countries. Put differently, it is the amount of aid that donors should provide to each recipient country if maximising current

Table 1 Ratio of foreign aid to GDP for Pacific countries (per cent)

	1980	1990	2000	2004
Cook Islands	..	19.0	5.3	4.2 ^a
Fiji	3.0	3.8	1.8	2.4
Kiribati	68.6	71.2	36.8	27.0
Marshall Islands	..	..	58.3	47.2
Micronesia (Federated States of)	..	..	47.1	38.1
Nauru	..	0.3	12.2	35.7 ^a
Palau	..	..	33.6	15.4
Papua New Guinea	12.8	12.8	8.1	6.8
Samoa	16.6	23.7	11.9	8.5
Solomon Islands	38.4	21.7	22.9	50.6
Tonga	31.5	26.3	12.3	9.1
Tuvalu	42.6 ^b	53.5	32.9	42.6 ^b
Vanuatu	38.8	33.0	18.7	11.9
Average	30.0	26.5	23.2	23.0

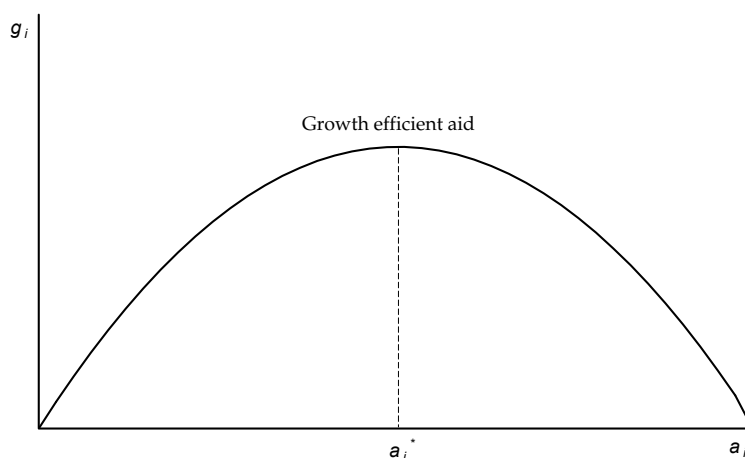
^a Figures relate to 2003.

^b Figures relate to 2002.

Notes: Foreign aid is defined as ODA. Data are unavailable for the remaining three Pacific ODA-eligible countries (Niue, Tokelau and Wallis and Futuna).

Sources: Organisation for Economic Cooperation and Development (OECD), 2006. *International Development Statistics Online Database*, Organisation for Economic Cooperation and Development, Paris; World Bank, 2006. *World Development Indicators*, World Bank, Washington, DC; Asian Development Bank (ADB), 2005. *Key Indicators of Developing Asian and Pacific Countries*, Asian Development Bank, Manila.

Figure 1 Aid, economic growth and per capita income



income growth is their only objective and if the size of their total aid budget allows them to do so. This paper calls this level the 'growth-efficient' level of foreign aid. The negative incremental impact on growth beyond this level of aid is rightly associated with absorptive-capacity constraints within recipient countries. It is obvious from Figure 1 that if donors want to maximise g_i , they should provide aid up to and not beyond a_i^* .

Although the impact of aid on growth is a key issue for aid effectiveness, the main criterion for assessing aid ought to be its contribution to poverty reduction. Economic growth should be seen as the means by which aid can reduce poverty and not as an end in itself.⁴ This paper acknowledges that the level of aid that maximises per capita income growth is not necessarily the level of aid that maximises growth's incremental impact on poverty reduction. Although there is ambiguity about the precise link between growth and poverty reduction, it is assumed for the purpose of this paper that this link is positive at all levels at which

the relationship between aid and growth is positive.

Moreover, there are many determinants of poverty reduction in addition to economic growth. Aid can influence many of these determinants and it follows that the level of aid that maximises its impact on poverty reduction is not necessarily that which maximises its impact on economic growth. Donors might, for example, want to target particularly poor groups. They might also want to support particular public expenditure that has a poverty-alleviation orientation. Such interventions might do a lot for poverty reduction, but might not be optimal in terms of current growth at the national level. Alternatively, donors might want to establish preconditions for growth and poverty reduction in periods later than the current one, on the grounds that growth in the short run might not be sustained in the long run. They might, for example, want to prevent a country sliding back into armed conflict. Donors might also wish to rebuild physical and human infrastructure in countries in which these variables have

reached a critically low level. It would seem that these arguments are applicable in the case of Solomon Islands.

Considerations such as those just outlined might well provide a case for deviating from the growth-efficient amount of aid as defined above. Given, however, that any significant deviation from the growth-efficient level represents an opportunity cost in terms of growth forgone, donors need to examine closely any large deviations if they are concerned about growth, seeking to ascertain whether they can be justified on valid poverty-reduction criteria. Continuing aid allocations to a country well in excess of the growth-efficient amount would appear to be difficult to justify, and might be interpreted as an indicator of a failed or failing recipient-level aid program.⁵

Empirical estimates and simulations

The empirical aid-effectiveness literature has increasingly relied on panel data econometrics, due in large part to the realities of developing-country data, which, in the majority of cases, do not permit robust time series analysis. The limitations of such an approach are well known and a degree of caution must be exercised in interpreting the results from it. The aid-growth literature is clearly no exception to this.⁶ A remarkable consistency has, however, emerged from studies conducted since the late 1990s. Almost all—which number more than 50—conclude that growth would be lower in the absence of aid. This is in contrast with studies published earlier, which were often either inconclusive or contradictory. Any objective reading of the above-cited aid-growth literature surveys, which are extremely comprehensive in their coverage, will attest to this.⁷ Moreover, it is also clear from the recent literature that the

econometrically more rigorous studies—those providing the most robust results—show that the cross-country relationship between aid and growth is as depicted in Figure 1. Among the studies that find evidence of such a relationship are Durbarry et al. (1998), Hansen and Tarp (2000, 2001), Lensink and White (2001), Dalgaard and Hansen (2001), Hudson and Mosley (2001), Dalgaard et al. (2004), Roodman (2003), Clemens et al. (2004) and Sugden and Pavlov (2006). The last of these studies looked at aid and growth in seven of the 16 Pacific aid-receiving countries (Cook Islands, Fiji, Kiribati, Samoa, Solomon Islands, Tonga and Vanuatu) in the period 1982–2002. All of these studies estimate an equation of the general form of Equation 1.

The tasks of this paper are to estimate a_i^* —the growth-efficient level of foreign aid—for recipient countries in the Pacific and then compare this level with the amounts of aid that these countries have been receiving. The first of these tasks can be accomplished in three ways: first, by obtaining estimates of a model of the form of Equation 1 using a more comprehensive data set than those used in pre-existing Pacific aid-growth studies and derive a_i^* from these estimates. Second, derive values of a_i^* from pre-existing Pacific aid-growth studies. Third, derive values of this variable from studies that utilise a larger cross-country sample of countries that includes Pacific countries and countries from other parts of the world.

The first option is ruled out on the grounds that the data required do not exist. The second was considered at length. Ideally, given the caution that should be exercised with panel-data econometrics, a reasonably large number of studies that provide roughly consistent results are needed. Precisely how large this number should be is a matter of judgment, but it is certainly greater than one. In the case of the

Pacific, however, there is only one study that provides the information necessary to derive a_i^* : Sugden and Pavlov (2006). Although not reported in that paper, the value of a_i^* corresponding to its econometric estimates is 48 per cent. Empirically advanced studies that have a comprehensive but not region-specific focus, which use the same measure of aid used by Sugden and Pavlov (2006), provide results that correspond with an average value that is less than half this level. It needs to be emphasised that such a contrast does not necessarily imply that the analysis of Sugden and Pavlov (2006) is flawed or that the value of a_i^* consistent with its results is necessarily wrong and should be ignored. While we do in part rely on it below, combined with simple intuition, it might be suggested that this value is too high to serve as a regional average.

This leaves the third option: to derive values of this variable from studies that are comprehensive but not regionally specific in terms of their country coverage. We initially turned to the nine studies listed above, immediately preceding Sugden and Pavlov (2006). From these studies we selected the following six: Hansen and Tarp (2000, 2001), Dalgaard and Hansen (2001), Dalgaard et al. (2004), Roodman (2003) and Clemens et al. (2004). These studies are widely regarded as being the most sophisticated, given the econometric techniques employed, *inter alia* allowing for the potential endogeneity of aid, and provide extensive robustness testing. Estimates of the values β_1 and β_2 , from Equation 1 and the corresponding growth-efficient levels of aid are shown in Appendix Table A1. Each of these estimates is significantly different from zero, based on appropriate hypothesis tests.

The studies referred to in Table A1 use two different measures of aid: ODA and effective development assistance (EDA). Official development assistance is the sum of official grants and the full amount of

concessional loans, while EDA is the sum of the former and the grant equivalent of the latter.⁸ Since the focus of the present study is ODA, we further narrow the selection of studies to Hansen and Tarp (2000, 2001), Roodman (2003) and Clemens et al. (2004). The average values of a_i^* that correspond to the estimates of β_1 and β_2 obtained by these studies vary from 24 to 17, in the respective cases of Hansen and Tarp (2000) and (2001). We note that these differences can be attributed to different time periods and samples of countries, and also to model specification differences. The bottom line is, however, that they are to be expected and do not point to grounds on which we would clearly reject each of these estimates. Nor, equally, is there any reason to assume that one of these studies has more accurately estimated the relationship between aid and growth than the other studies. For these reasons, we take the average of the estimate of a_i^* that corresponds with two-stage least squares (2SLS) and instrumental variable (IV) estimates of β_1 and β_2 obtained by these studies. These estimates are preferred as they have been obtained after controlling for possible endogeneity of aid receipts. This average, shown in the second-last row of Table A1, is 20.2 per cent. This is the estimate of a_i^* against which real aid levels to the Pacific are compared.⁹ We emphasise that this is an approximation of the level of ODA, as a percentage of GDP, which maximises the contribution of aid to per capita income growth in the Pacific. It must also be interpreted as a regional average—a point we return to below.

Table 2 shows the differences between the level of aid Pacific countries received in 2004 and the chosen value of a_i^* . It also provides the estimated impact of aid on growth (growth due to aid) at the real amounts and the estimated opportunity costs, in terms of growth forgone, of deviating from the growth-efficient amount.¹⁰ Two

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observations emerge from Table 2. The first is that the average amount of ODA to the region would appear to be broadly consistent with a current income growth maximisation strategy. This observation is based on the similarity of the real level of aid to the region relative to GDP, which is 23 per cent, and on the recognition that a_i^* , the estimated growth-efficient amount, is an approximation. The difference between these amounts is only 2.8 percentage points. The estimated regional per capita income growth due to aid is 2.64 per cent. The estimated growth rate of providing a_i^* to each country is only 0.33 per cent higher.

The second observation from Table 2 is that while the overall level of aid to the region appears to be about right, the allocation among countries is not. The contribution of aid to growth becomes

negative if more than twice the growth-efficient amount is allocated.¹¹ This is the case for Marshall Islands, Solomon Islands and Tuvalu. Solomon Islands is by far the most 'over-aided' country from a growth perspective, receiving ODA in 2004 equivalent to 50.6 per cent of GDP—more than 30 percentage points in excess of the growth-efficient amount. Solomon Islands would still be over-aided in this sense even with the growth-efficient amount consistent with Sugden and Pavlov (2006), which is 48 per cent. The estimated opportunity cost of the ODA allocation—the forgone income growth from not providing the growth-efficient amount of 20.2 per cent—is 5.55 percentage points. This is shown in last column of Table 2. The equivalent opportunity costs of ODA to Marshall Islands and Tuvalu are 4.44 and 3.14 percentage points, respectively. Three

Table 2 Impact of growth-efficient aid, 2004

	Real aid (a_i)	a_i^*	Difference ($a_i^* - a_i$)	Impact of a_i on g_i	Impact on g_i at a_i^* (g_i^*)	Difference ($g_i^* - g_i$)
Cook Islands ^a	4.2	20.2	16.0	0.87	2.61	1.74
Fiji	2.4	20.2	17.8	0.52	2.61	2.09
Kiribati	27.0	20.2	-6.8	2.06	2.61	0.55
Marshall Islands	47.2	20.2	-27.0	-1.83	2.61	4.44
Micronesia (Federated States of)	38.1	20.2	-17.9	0.50	2.61	2.11
Nauru ^a	35.7	20.2	-15.5	0.95	2.61	1.65
Palau	15.4	20.2	4.8	2.19	2.61	0.41
Papua New Guinea	6.8	20.2	13.4	1.30	2.61	1.31
Samoa	8.5	20.2	11.7	1.54	2.61	1.06
Solomon Islands	50.6	20.2	-30.4	-2.94	2.61	5.55
Tonga	9.1	20.2	11.1	1.62	2.61	0.98
Tuvalu ^b	42.6	20.2	-22.4	-0.54	2.61	3.14
Vanuatu	11.9	20.2	8.3	1.93	2.61	0.68
Region	23.0	20.2	-2.8	2.28	2.61	0.33

^a real aid data relate to 2003

^b real aid data relate to 2002

Note: Aid is expressed as a percentage of GDP.

Sources: Organisation for Economic Cooperation and Development (OECD), 2006. *International Development Statistics Online Database*, Organisation for Economic Cooperation and Development, Paris; World Bank, 2006. *World Development Indicators*, World Bank, Washington, DC; Asian Development Bank (ADB), 2005. *Key Indicators of Developing Asian and Pacific Countries*, Asian Development Bank, Manila.

of the remaining 10 Pacific countries listed in Table 2 are also over-aided from a pure growth perspective. They are Kiribati, Federated States of Micronesia and Nauru, which received ODA allocations that were 6.8, 17.9 and 15.5 percentage points, respectively, above the estimate of a_i^* . The forgone growth associated with these allocations is 0.55 (Kiribati), 2.11 (Federated States of Micronesia) and 1.65 percentage points (Nauru).

The seven countries that have received less than the estimated value of a_i^* are Cook Islands, Fiji, Palau, Papua New Guinea, Samoa, Tonga and Vanuatu in 2004 (or 2003 in the cases of Cook Islands and Nauru). Fiji, Cook Islands and Papua New Guinea were the most under-aided in 2004. The opportunity costs of this under-aiding in terms of growth forgone in these three countries were 2.09 (Fiji), 1.74 (Cook Islands) and 1.31 per cent (Papua New Guinea). The main point to be made here, however, is that aid can be scaled up to these countries and the dividend would be higher growth due to aid (although recent events in Fiji clearly mitigate against this—a point we return to below).

Policy implications

It is helpful to consider the policy implications of the results shown in Table 2. We focus initially on those countries that receive in excess of the growth-efficient amount. These results do not necessarily indicate that aid in 2004 was harmful to the countries that received more than the growth-efficient volume. Nor do they necessarily provide a sufficient case for reducing aid levels. There could be important non-growth considerations that justify the high levels of aid provided. There might well be valid developmental reasons other than growth promotion for the scale of 2004 aid allocations to these countries. RAMSI

would appear to provide an example. Stopping Solomon Islands from sliding back into armed conflict and establishing the preconditions for future growth and poverty reduction are valid reasons to trade off current economic growth. The case for keeping aid well above the growth-efficient level would, however, either be difficult to sustain or would be a sign of a failing aid program.

Donors might also have additional information on the relationship between aid and growth that is recipient-country specific. That the growth-efficient levels depicted above are derived from average behavioural relationships drawn from cross-country data provides a powerful, additional case for deviations above them.¹² Given, however, that any deviation from growth-efficient levels represents an opportunity cost in terms of forgone current growth, donors should examine closely any large deviations to ascertain whether they can be justified on alternative criteria. This is perhaps the fundamental message coming from the results shown in Table 2 concerning the countries receiving more than the growth-efficient amount.

Donors supporting the Pacific countries that receive well in excess of the growth-efficient amount face two policy choices. The first is to reallocate aid within the region, taking aid away from the countries receiving more than the growth-efficient amount and giving it to those that receive less than this amount. This is doubly beneficial: increasing growth to levels that would not otherwise be the case in both groups of countries. The second policy choice is to keep aid levels largely unchanged to these countries and attack those factors that cause diminishing returns in the aid-growth relationship that cause the aid-growth curve to bend downwards. There will always be limits to the amounts of aid recipient countries can efficiently

absorb. Donors can, however, attempt to increase absorptive capacities through a variety of means, such as by enhancing the capabilities of public sector officials dealing with aid, promoting greater accountability and transparency of aid activities, ensuring greater alignment of donor and recipient priorities, reducing the fragmentation and proliferation of aid-funded activities and, where appropriate, allocating aid via different channels within recipients and not relying primarily on the public sector. Such channels include the private sector and civil society organisations (Collier 2002; McGillivray 2003). Donors can also address the well-known problems of Dutch disease. Large amounts of foreign aid can lead to a loss in the export competitiveness of recipients. Project aid directed towards the traded goods sector can help mitigate this impact of aid.

Donors face more straightforward policy options for the Pacific countries that currently receive less than the growth-efficient amount. Aid to these countries can be scaled up—substantially so in a number of cases. As a result, the incremental contribution to growth will increase, albeit by successively smaller amounts, provided the growth-efficient volume is not exceeded. A number of caveats need to be added though. Recipient-specific information relating to the aid–growth relationships might provide a telling case against such increases. There might also be a compelling non-growth case against allocating more aid to some countries. Both of these criteria seemingly apply to Fiji, for example, given recent events in that country. Moreover, while increasing aid to a country increases its incremental contribution to growth, this clearly does not mean that donors should not attempt to increase absorptive capacity by attacking the factors mentioned above. If current levels of aid to all countries are to be maintained, however, the priority attached to increasing

absorptive capacity in countries receiving more than the growth-efficient amount is greater in those countries.

Conclusion

This paper has estimated the growth-efficient level of foreign aid that equates to the level of aid that maximises its impact on the rate of per capita income growth in recipient countries. Using findings from well-cited studies, the paper estimates that the average growth-efficient aid level is when it accounts for 20.2 per cent of a recipient's GDP. In 2004, six Pacific countries received aid levels in excess of the growth-efficient level. Three received more than twice this amount, suggesting that the impact of aid on per capita income growth is negative. While there might well be valid developmental criteria for such aid allocations, or recipient-specific information on the link between aid and growth that might justify such amounts, donors supporting these countries do need to look very carefully at these levels to ensure that forgone growth can be justified—that the opportunity cost in terms of growth forgone is outweighed by other benefits. The remaining countries appear to be under-aided so that aid to them can be scaled up, with a corresponding increase in the incremental contribution of aid to growth.

Notes

- ¹ Feeny (2006b) finds no evidence of foreign aid impacting on the rural sector in Melanesian countries, proxied by agricultural GDP growth; however, foreign aid is found to impact positively on overall economic growth.
- ² See Paul (2006) for a survey of the theoretical literature.
- ³ This is similar to the term 'poverty-efficient aid', coined by Collier and Dollar (2002). A poverty-efficient aid allocation is one in which more aid is provided to poor countries with good macroeconomic policies than to others.
- ⁴ The same can be said for many other outcomes against which aid has been evaluated, such as its impact on recipient-country public expenditure, conflict resolution, macroeconomic adjustment and community empowerment. While important, these outcomes should be seen as means to the more fundamental end of reducing poverty.
- ⁵ As is clear below, estimates of the parameters of Equation 1 are obtained using cross-country data. As such, the estimates, and the growth-efficient aid allocations they provide, are a cross-country average that applies to the typical recipient. Donors might have aid-growth information on specific recipients that could provide a case for deviations from the average growth-efficient amounts.
- ⁶ Criticisms specific to the aid-growth literature include treating aid from different donors as analytically equivalent, and not being able to take into account changes in the composition of aid over time. See Roodman (2003) for a methodological critique of some recent studies.
- ⁷ This is not to say that the literature is unanimous in this finding, as a minority of recent studies fail to find a positive association between aid and growth (Brumm 2003; Easterly 2003; Ovaska 2003; Rajan and Subramanian 2005). These studies are, however, very much in the minority and have been heavily criticised on methodological grounds. Nor is it to say that there are no remaining controversies in what has been a controversial literature. There is, in particular, much continuing debate and uncertainty about the conditions under which aid works best, and the literature is sadly deficient in this regard (McGillivray et al. 2006; Clemens et al. 2004; McGillivray 2004).
- ⁸ It remains a matter of speculation why the growth-efficient level of EDA is less than equivalent level of ODA.
- ⁹ It is also worth noting that the average corresponding with all nine studies cited above, which corresponds with 20.7, is only slightly higher than this value. Similarly, the average obtained of all estimates—be they obtained by the OLS, 2SLS or IV estimates of the four selected studies—using ODA as the aid variable, is 21 and that obtained from OLS is 22.6 (see Table A1).
- ¹⁰ The coefficients used in calculating the impact of aid on growth shown in Table 2 have been calculated at β_1 and β_2 values of 0.230 and -0.005695 respectively. They are based on the second set of Hansen and Tarp (2000) IV regression results, albeit with a miniscule adjustment to ensure that they are consistent with aid's contribution to growth being maximised at a_i^* . These results were used, given that they yield a value of a_i^* that is closest to 20.2 of all those in Table A1 that have been obtained from either 2SLS or IV estimation.
- ¹¹ The level of aid at which its marginal impact on per capita income growth falls to zero is $-\beta_1/\beta_2$. This level of aid is twice the growth efficient level provided by Equation 2.
- ¹² Collier and Dollar (2001, 2002) make this point in the context of their 'poverty-efficient' aid allocations. Note that these allocations are also derived from estimates of an aid-growth model. According to that model, and those of Burnside and Dollar (1997, 2000), the impact of aid on growth is conditional on a state's Country Policy and Institutional Assessment (CPIA) score, and this relationship applies to all countries irrespective of how high or low this score might be. This result has since been disputed in the literature, with the majority of subsequent studies failing to find such a link. This is not to say that policies or institutions are irrelevant to aid effectiveness; merely, they appear not to matter in the way depicted by the above studies. McGillivray and Feeny (2006), for instance, find that policies and

institutions matter at only critically low CPIA scores. It is on these grounds, and because of the general lack of poverty data of any quality for fragile states, that this paper preferred to use the growth-efficient, rather than the Collier and Dollar poverty-efficient, aid levels.

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Appendix

Table A1 Results of selected aid-growth studies

Study, estimation technique and aid variable	β_1	β_2	a_i^*
Hansen and Tarp (2000)			
Table 4, Column 3, OLS, ODA	0.166	-0.003	27.7
Table 4, Column 4, OLS, ODA	0.165	-0.004	20.6
Table 4, Column 5, OLS, ODA	0.182	-0.004	22.8
Appendix B, Column 3, IV, ODA	0.236	-0.005	23.6
Appendix B, Column 4, IV, ODA	0.230	-0.005	23.0
Appendix B, Column 5, IV, ODA	0.265	-0.005	26.5
Hansen and Tarp (2001)			
Table 1, Column 1.1, IV, ODA	0.238	-0.754	15.8
Table 1, Column 1.2, IV, ODA	0.241	-0.763	15.8
Table 3, Column 3.1, fixed effects, OLS, ODA	0.117	-0.301	19.4
Roodman (2003)			
Table 4: reproduction of Hansen and Tarp (2001), 2SLS, ODA	0.250	-0.010	12.5
Table 12, with population included, 2SLS, ODA	0.520	-0.010	26.0
Clemens et al. (2004)			
Table 4, Column 5, 2SLS, ODA	0.960	-0.059	18.1
Dalgaard and Hansen (2001)			
Table 4, Column 7, IV, EDA	1.327	-0.126	5.3
Table 4, Column 8, IV, EDA	1.352	-0.127	5.3
Dalgaard et al. (2004)			
Table 1, Column 3, 2SLS, EDA	1.350	-0.130	5.2
Table 1, Column 6, 2SLS, EDA	2.470	-0.100	4.3
Average OLS, IV and 2SLS, ODA			21.0
Average OLS, ODA			22.6
Average IV and 2SLS, ODA			20.2
Average IV, EDA			5.0

Note: ODA is official development assistance; EDA is effective development assistance; OLS is ordinary least squares; IV is instrumental variables; and 2SLS is two-stage least squares.