The Impact of Foreign Aid on the Rural Sector in Melanesia

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Executive Summary

This report investigates aid effectiveness in Melanesian countries. Melanesia consists of Fiji, Papua New Guinea, the Solomon Islands, Vanuatu and New Caledonia. Most aid effectiveness studies have examined the impact of aid on economic growth. This report departs from these studies by investigating the impact of foreign aid on the rural sector. The focus on the rural sector is important in the case of Melanesia. The relationship between economic growth and poverty reduction in Melanesian countries is believed to be weak. Moreover, the majority of people in Melanesia live in rural areas, reliant on agriculture for their livelihoods.

The report investigates the impact of foreign aid on the rural sector through the econometric analysis of data for the period 1980 to 2001. Following the approach of recent studies, the report disaggregates foreign aid to investigate whether different types of aid impact differently on the rural sector. The report also investigates whether aid effectiveness is contingent upon a number of recipient characteristics. These include the recipient's macroeconomic policy environment, and whether they are experiencing export price shocks or environmental shocks.

Results from the analysis are sensitive to model specification but provide evidence that the rate of inflation, real exchange rate appreciation, negative export price shocks, and environmental shocks all have a negative impact on the rural sector. However, results across a number of specifications fail to provide any evidence that foreign aid has impacted on the rural sector in Melanesia. The report proceeds by following previous studies in investigating the impact of aid on economic growth. Results indicate that trade has a positive impact on economic growth and environmental shocks and periods of political instability have a negative impact. Moreover, results also provide some evidence to suggest that foreign aid has been effective at spurring economic growth in Melanesian recipients. Disaggregating the aid variable revealed that aid grants, bilateral aid and technical assistance impact positively on economic growth.

The report recognises that the analysis is limited by data availability and quality. The report also provides a number of reasons why positive impacts of foreign

aid are very difficult to identify using the standard approach of empirical studies. Since a large amount of aid flows are not provided to impact directly on the rural sector or on economic growth, they should not be evaluated using this criterion. Moreover, a large proportion of foreign aid flows will only impact on the rural sector (and economic growth) in the long-run and should not be evaluated after just a few years of their disbursement. Data availability prevents an analysis of short-run versus long-run foreign aid and investigating long-run aid effectiveness is empirically very difficult.

Despite the limitations of the econometric analysis, the report argues that there is a strong case for greater assistance to rural areas. Other policy implications include continuing to help Melanesian recipients provide up-to-date, reliable and accurate statistics to help track development progress and for donors to report aid flows at a greater degree of disaggregation. Future research should investigate the impact of foreign aid on the recipients' real exchanges rates and on the dynamics of aid, examining how long different types of assistance take to have their desired impact.

I. Introduction

Although it is generally agreed that poverty reduction is the main objective of foreign aid programs, the aid effectiveness literature has focused on evaluating the impact of foreign aid on economic growth. There are two reasons for this focus. Firstly, economic growth is often perceived to be the primary driver in poverty reduction. Secondly, there are very little data available relating to measures of poverty. The consensus of the recent aid effectiveness research is that, on average, aid is effective at spurring economic growth and therefore poverty reduction by association in recipient countries.

This report examines the impact of foreign aid on the rural sector in Melanesia. This group of countries includes Papua New Guinea, the Solomon Islands, Fiji, Vanuatu and New Caledonia. Very little empirical research has focused on evaluating aid effectiveness to the region and Melanesian countries are often excluded from the analyses of previous aid effectiveness studies due to the paucity of their data. There are a number of reasons why evaluating aid effectiveness in Melanesia should focus on the rural sector. Firstly, the majority of people in Melanesia live in rural areas, reliant on agriculture for their livelihoods. Secondly, the majority of the poor (and very poor) are found in rural areas. Thirdly, this sector is most susceptible to external shocks such as natural disasters and to falls in the prices of key exports. Fourthly, the political will to assist those in rural areas is sometimes weak with politicians favouring development in urban areas and finally, it is often argued that the relationship between economic growth and poverty reduction in Melanesian countries is particularly weak.

The analysis undertaken in this report disaggegates foreign aid into its various components to investigate whether different types of aid impact differently on the rural sector. These disaggregations include aid grants and loans, bilateral and multilateral aid, and technical and non-technical assistance. The issue of aid disaggregation has been largely neglected by the previous aid effectiveness literature. The report also follows the recent literature by investigating whether the effectiveness of aid is contingent upon certain characteristics of Melanesian recipients. It investigates whether aid effectiveness is contingent upon the macroeconomic policy

environment and whether a recipient is experiencing environmental and export price shocks.

The approach and methodology of the report are subject to a number of limitations. These relate in particular to data availability and quality. Results from the econometric analysis of the data are sensitive to model specification but overall they fail to provide evidence that foreign aid has impacted on the rural sector in Melanesia. However, there is some evidence to suggest that foreign aid has been effective at spurring short-run economic growth in Melanesian recipients. The report provides a number of reasons why positive impacts of foreign aid are very difficult to identify using the standard approach of empirical studies but argues that there is a strong case for directing greater amounts of aid to the rural sector. A number of areas for future research are identified.

The remainder of this report is structured as follows. Section II provides a brief overview of the rural sector in Melanesian countries. Section III discusses the relationships between foreign aid, economic growth and the rural sector. Section IV provides a summary of the recent aid effectiveness literature, focusing on studies since the publication of the World Bank's (1998) influential publication entitled *Assessing Aid*. Section V discusses the data used in this investigation and presents the empirical model. Section VI provides and interprets the results from estimating the model while Section VII concludes with the policy implications arising from the research and identifies areas for future consideration.

II. An Overview of the Rural Sector in Melanesia

Although there are some important differences between the rural sectors of Melanesian countries, some generalisations can be made. Table 1 provides some statistics relating to the rural sector, the importance of agriculture and the amount of foreign aid provided to Melanesian countries. With the exception of New Caledonia, the majority of the population of Melanesian countries reside in rural areas. The sector is predominantly reliant on subsistence and semi-subsistence agriculture although a smaller, commercial agricultural sector also exists. Agricultural exports are an important source of income, particularly for the Solomon Islands and Vanuatu. Melanesian rural sectors are constrained by low prices, price instability, natural

disasters, access to credit and financial services, limited market access, little scope for economies of scale and communal land tenure systems.

Table 1: Foreign Aid, the Rural Sector and Agriculture in Melanesia

	Fiji	New Caledonia	Papua New Guinea	Solomon Islands	Vanuatu
Population (thousands) (2001)	823	217	5,254	431	201
Rural population (% of total) (2001)	50	22	82	80	78
Foreign aid (% of GDP) (2001)	2	13[a]	7	20	13
Agriculture (% of GDP) (2001)	17	5[b]	25	44	15
Agriculture exports (% of total) (2001)	30	5	12	73	50

Sources: World Bank *World Development Indicators* (2004), New Caledonia Institute of Statistics and Economic Studies (ITSEE), OECD's *International Development Statistics* (2004), Food and Agricultural Organisation (FAO) database (2004).
[a] 2000, [b]1999

Sugar and subsistence agriculture are the most important activities to the rural sector in Fiji. The contribution of the agricultural sector has remained fairly stable during the last two decades accounting for approximately 20 per cent of GDP. The rural sector is dominated by small farmers, the majority of which are Indo-Fijians operating on leased land. The sugar industry accounts for 50 per cent of the total arable land and accounts for over 30 per cent of exports. The economy is largely reliant on the sugar industry which was badly hit by a drought in 1998. Moreover, Fiji is set to lose its preferential trading status with the EU harming the sugar industry further. The garment industry gained importance during the 1990s but will also be harmed if preferential treatment from Australia and New Zealand is lost.

New Caledonia is not a typical Melanesian country. The economy is predominantly dependent on Nickel production and exports rather than on agricultural output. Nickel exports often account for 90 per cent of total exports. Only about 22 per cent of the population live in rural areas and the agricultural sector is small relative to other sectors of the economy.

In Papua New Guinea approximately 82 per cent of the country's population live in rural areas and about 95 per cent of the poor are located in rural areas. The majority of the rural sector are involved in subsistence and semi-subsistence

agriculture. Coffee is the main source of income for more than half the population of the rural sector. The main export crops are coffee, palm oil, coconuts and coconut products, cocoa, and logs. The agricultural sector accounts for approximately 25 per cent of the country's GDP but has stagnated over the last 10 years. The country also has high deposits of copper, gold, oil and gas and the country's exports are dominated by mineral exports.

In the Solomon Islands the agricultural sector is by far the largest sector of the economy and its share has risen in recent years. Economic growth is largely driven by the agricultural sector. Agricultural exports account for almost three-quarters of total exports and important exports include logs, palm oil and copra. The rural sector is largely dependent upon subsistence agriculture and cash cropping in small-holder systems. Cash crops rely heavily on inter-island shipping services. Fish (and the sale of the fishing licenses overseas) are also important to the Solomon Islands. Most of the people are reliant on copra throughout the country. In recent years, the Asian crisis impacted heavily of the export of logs and the livestock and palm oil industries were decimated during the recent conflict. Gold mining was expected to rise rapidly but production ceased in 2000 due to the political situation.

Approximately 80 per cent of the population of Vanuatu live in rural areas dependent on agriculture for a living. The rural sector is primarily engaged in subsistence and cash crop farming of copra, taro, yams, coconuts, cocoa and kava. In recent years agriculture has accounted for up to 85 per cent of total export earnings. Major agricultural exports include copra, beef, cocoa and more recently kava. The agricultural sector's share of GDP has declined fairly steadily from 25 per cent in 1980 to about 15 per cent in 2001.

III. The Relationships between Foreign Aid and the Rural Sector

Foreign aid can have direct impacts on the rural sector and indirect impacts. Foreign aid can impact directly on the rural sector by assisting growth in agricultural output by providing agricultural research, education and training, irrigation and extension facilities and flood control schemes. Providing access to credit in rural areas will also help expand agricultural production. Foreign aid will also impact positively on the long run productivity of the rural sector by ensuring the availability of basic

social services such as education, health and sanitation facilities in rural areas. Further, the construction of rural roads will allow the cost effective transportation of goods and can assist in building important linkages with marketing centres and other rural communities. A good transportation network will ensure that domestically produced agricultural products reach the market, reducing dependency on more expensive imported foodstuffs.

In Melanesian countries, pro-poor growth will equate to growth in the rural or agricultural sector. Evidence that agricultural growth is more effective at reducing poverty than manufacturing growth in agriculturally dependent countries is provided by Ravallion and Datt (1996) and Bourguignon and Morrison (1998). If agriculture is the primary occupation of the population, agricultural growth is likely to lead to higher output, greater employment opportunities and increases in incomes. However, foreign aid can still have an indirect impact on the rural sector by increasing overall economic growth, or growth in the non-agricultural sectors of the economy.

There is widespread agreement that general economic growth benefits the poor (Bell and Rich, 1994, Ravallion and Datt, 1994, Ravallion and Chen, 1997, Dollar and Kraay, 2000). Economic growth will benefit those in rural areas through increases in the demand for labour and agricultural output. Growth will also lead to larger tax revenues and higher government expenditures, which might include transfers to the least well off as well as increasing access to services such as health and education. If economic growth is driven by the non-agricultural sector or by projects in urban areas, the rural sector can still benefit from receiving internal remittances. Incomes earned in the urban sector of the economy are often sent back to family or clan members in rural areas in Melanesian countries.[2]

However, economic growth does not guarantee access to health, education and a clean water supply or a better standard of living for those living in some, usually remote, areas. Moreover, if economic growth is largely driven by urban areas, the extent to which to which it will impact on the rural sector will depend on rural-urban

[2] External remittances, or money sent back from overseas are large for Fiji but are not significant for other Melanesian countries. However, internal remittances are believed to be important for all Melanesian recipients. Unfortunately accurate data on such remittances do not exist.

linkages. If these linkages are well-established and well-functioning, then urban led growth can stimulate rural development through increased employment and higher incomes. However, poor transportation networks and law and order problems can prevent the rural sector from benefiting from urban-based growth. Further, an urban bias of large labour intensive projects is likely to encourage rural-urban migration and could lead to urban unemployment, with the associated problem of poor law and order in cities. Rural-urban migration in Melanesia is driven by the greater cash generating opportunities in urban areas and by far better access to basic services such as health and education in these areas.

The high prevailing rate of income inequality in Melanesian countries is also likely to affect the impact that growth has on poverty reduction. Inequality can lead to political instability, social tensions and conflicts that reduce growth by deterring foreign and domestic investment, increasing the cost of doing business and reducing the security of property rights. There is strong evidence of a causal link between the initial level of inequality and growth. Empirical studies find a negative impact of high inequality on growth (Galor and Zeira, 1993, Persson and Tabellini, 1994, Alesina and Rodrik, 1994). Moreover, there is evidence that in countries with initially high levels of inequality, economic growth is less effective at reducing poverty (Bigsten and Levin, 2001, Lustig *et al*, 2002). Foreign aid can therefore potential improve the impact of growth on poverty by reducing the degree of inequality in Melanesian countries. Finally, foreign aid might have a negative impact on the rural sector if it induces real exchange rate appreciation and 'Dutch Disease' effects. This issue is discussed further in the conclusion to this paper.

IV. Previous literature

Up to the late 1990s, there was a widespread perception that foreign aid was ineffective at spurring macroeconomic growth in developing countries. However, the World Bank (1998) report *Assessing Aid* reignited the aid effectiveness debate. Burnside and Dollar (1997, 2000) provide the background studies to the report, which concludes that aid effectiveness is contingent on the macroeconomic policy environment of recipients. Aid is effective at spurring growth in countries with good policies but has little impact in countries with a poor macroeconomic policy environment. The report proceeded by recommending a policy of selectivity whereby

donors only provide foreign aid to countries with good policies already in place. Collier and Dollar (2001, 2002), other World Bank researchers, confirm the Burnside and Dollar finding. They argue that foreign aid should be reallocated to countries with high rates of poverty, which are pursuing good policies.

The *Assessing Aid* report has been highly influential and has stimulated a number of responses from the academic community. Since the publication of *Assessing Aid* two major strands of the aid effectiveness literature have developed. The first strand finds that foreign aid is effective irrespective of the policy environment and other country characteristics (Hansen and Tarp, 2000, 2001, Dalgaard and Hansen, 2001, Guillaumont and Chauvet, 2001, Hudson and Mosley, 2001, Lensink and White, 2001, Lu and Ram, 2001, Dayton- Johnson and Hoddinott, 2003, Moreira, 2003, Dalgaard *et al*, 2004). Most notably, Hansen and Tarp (2001) show that the results of the Burnside and Dollar research are entirely conditional on the omission of five countries from the analysis, deemed as outliers.

The second strand of the literature also finds that aid is effective but that its effectiveness is contingent upon certain country characteristics. McGillivray (2003) summarises these studies. For example, studies have found that aid effectiveness is contingent upon vulnerability to external shocks (Guillaumont and Chauvet, 2001, Collier and Dehn, 2001), political stability (Chauvet and Guillaumont, 2002), post-conflict periods (Collier and Hoeffler, 2002), the level of democracy (Svensson,1999, Islam, 2003), institutional quality (Burnside and Dollar, 2004), whether the recipient is located in the tropics (Dalgaard *et al*, 2004) and the degree of aid fungibility (Pettersson, 2004).

Roodman (2004) applies a battery of diagnostic tests to the specifications of a number of these studies, testing the strength of each. The results from this extensive testing lends most support to the Dalgaard *et al* (2004) study which finds that on average aid works but not in countries located in the tropics. Weakest support is found for the Burnside and Dollar finding that aid effectiveness is contingent upon the policy environment. Moreover, Easterly (2003) shows that the Burnside and Dollar result is not robust to changes in other plausible definitions of aid, policies and growth and Easterly *et al* (2003) find that the Burnside-Dollar finding is not robust when they

add additional years and countries to their sample.[3] The debate over the importance of policy for aid effectiveness continues. There are also questions regarding what good polices are, how they should be defined and when policies become 'good'.

Of most importance to this report are the second strand studies by Guillaumont and Chauvet (1999, 2001) and Collier and Dehn (2001). These studies investigate whether aid effectiveness is contingent on the level of structural vulnerability and export price shocks. These issues are the focus of this report since they are of particular relevance to the countries under consideration. Melanesian countries are highly vulnerable to external shocks such as falls in the prices of primary commodities and climatic factors, in particular, cyclones and droughts.

Guillaumont and Chauvet (2001, 2002) argue that in countries which are vulnerable to external shocks, foreign aid contributes to the sustainability of growth and policy reforms. Foreign aid can cushion the impact of shocks on economic growth and can also allow policy reforms to continue. Guillaumont and Chauvet (2001) use the instability of agricultural production as a proxy for climatic shocks, and the instability of export earnings and the trend in the terms of trade to capture trade shocks. Population is also included since small countries are more likely to be susceptible to external trade shocks. Following the Burnside and Dollar studies, Guillaumont and Chauvet (2002) measure macroeconomic policy using inflation, the budget deficit, and trade openness. Foreign aid is found be more effective in countries subject to external shocks in their studies.

Collier and Dehn (2001) argue that foreign aid is more effective in countries which are experiencing negative external trade shocks. They hypothesise that aid can cushion the impact of shocks by acting as a buffer, reducing both the proportionate and absolute change in foreign currency inflows. Shocks are obtained from a model forecasting export prices. In this model the change in each country's export price index is regressed against a constant, a linear time trend, the change in the price index lagged one period, and the level of the price index lagged two periods. The residuals

[3] Note that these latter two studies do not find any evidence of a positive and statistically significant impact of foreign aid on growth. However, there focus is on the fragility of the Burnside and Dollar result rather than investigating aid effectiveness directly.

from this regression are then normalised. The shock variable is defined as those values which exceed a critical value associated with the 2.5 percent most extreme observations in the tails of the residual distribution.

An important issue addressed by the recent aid effectiveness literature is the issue of aid disaggregation. Recent studies have disaggregated foreign aid into its various components to investigate whether different types of aid impact differently on growth. For example, Ram (2003, 2004) uses the same dataset of Burnside and Dollar (2000) and identifies large differences between the impacts of bilateral and multilateral aid, unconditional on policy. Bilateral aid is found to have positive and statistically significant impact on growth while multilateral aid is found to have a negative impact. Using total aid disguises the two counteractive impacts. Further, Cordella and Dell'Aiccia (2003) find evidence that budget support aid is preferable when donors preferences are closely aligned with those of the recipient while project aid is preferable if they differ.

Another useful contribution to the aid effectiveness literature examines the issue of aid disaggregation further. Clemens *et al* (2004) disaggregate total aid into 'short-impact' and 'long impact' aid variables. Short-impact aid relates to aid flows that can be expected to increase GDP per capita within approximately four years. This time period was chosen since most studies use cross-country data with observations averaged over a four or five year period. Clemens *et al* (2004) argue that such aid includes budget support and project aid for infrastructure or to support transportation, communications, energy, banking, agriculture and industry. Long-impact aid relates to aid flows that might be expected to increase GDP per capita but which is unlikely to do so within four years of its disbursement. It is argued that such aid includes technical cooperation, social sector investments in health, education, population control and water. Clemens *et al* (2004) also categorise some flows as 'humanitarian' which relate to emergency assistance and food aid. Humanitarian aid is not expected to impact on growth.

A problem with the approach of Clemens *et al* (2004) is that disaggregated aid disbursements (Official Development Assistance) by purpose are not available from the Development Assistance Committee (DAC) of the Organisation for Economic

Cooperation and Development (OECD). There have been recent attempts to compile detailed disaggregated disbursements for the 1990s but these data do not include all donors. Aid disbursements are disaggregated into grants and loans and by source (for example, bilateral and multilateral donors) but are not available by specific purpose.

However, aid commitment data, disaggregated into 233 distinct purposes are available since 1973 from the DAC. Further, each purpose is allocated one of four prefix codes entitled 'investment project', 'other resource provision including commodities and supplies', 'technical cooperation', and 'program aid/cash'. Clemens *et al* (2004) categorise aid flows into short-impact and long-impact using this information. Firstly, the 233 purpose codes are assigned to one of the categories: short-impact, long-impact and humanitarian. Secondly, all aid for 'technical cooperation' is classified as long-impact aid while all 'program aid/cash ' is classified as short-impact aid. Thirdly, the remaining two prefix codes are categorised according to their purpose codes assigned to them in the first stage. The final step of the classification procedure is to assume that the fraction of disbursement in each of the three aid categories is equal to the fraction of commitments in each category in each period.

Clemens *et al* (2004) find that approximately 45 per cent of total aid flows can be classified as short-impact. They proceed by finding a positive and statistically significant association between short-impact aid and economic growth using panel data averaged over a four-year period. Moreover the impact is found to be about two or three times larger than in studies using aggregate aid and is not conditional on the quality of institutions or policies.

Most empirical studies have found that foreign aid is effective at increasing growth but with diminishing returns. This means that foreign aid is effective at increasing growth up to a certain threshold level where aid has a negative impact on growth thereafter. Estimates of this threshold level vary considerably but indicate that aid flows start to exhibit negative returns when they reach somewhere between 15 to 45 per cent of recipient GDP. Given the large amounts of aid (relative to GDP) provided to Melanesian countries, this finding is of particular relevance to the current study.

Surprisingly little empirical research has been carried out which investigates the effectiveness of aid in Melanesia and the Pacific. Hughes (2003) argues that foreign aid is, in part, responsible for the poor economic performance of countries located in the Pacific and their high prevailing rates of poverty. However, the paper also lacks any rigorous empirical analysis of aid effectiveness. Moreover, studies by Gounder (2001, 2002) using time-series data indicate that aid has been effective at increasing growth in the cases of Fiji and the Solomon Islands. In summary, the consensus of the academic literature research is that aid is on average effective at spurring economic growth, albeit with diminishing returns. However, there are likely to be recipient specific characteristics that determine the degree of foreign aid effectiveness.

V. Empirical model and data

The results and conclusions from this report are based on the econometric analysis of data for Melanesian recipients. The analysis is to some extent constrained by the availability and reliability of the data. The current study aims to follow the model specifications used in the recent aid effectiveness literature. However, data availability has prevented some explanatory variables being used in the analysis of the report. These variables include indicators of ethnic fractionalisation, governance, institutional quality and human capital. However, in the current study, the five Melanesian countries under consideration are fairly similar in their characteristics. Even if data relating to these variables were available for Melanesian countries there impact would be very difficult to detect in an empirical investigation unless they varied extensively across country or time. This is unlikely to be the case concerning these variables.[4]

There are also some concerns regarding data accuracy. As noted earlier in the report, the rural sector in Melanesia is primarily involved in subsistence and semi-subsistence living. Household income and subsistence data are estimated when compiling a country's national accounts. The data relating to household and subsistence income and production is usually based on infrequent and sometimes

[4] For example, indices of political and civil rights were obtained for Fiji, Papua New Guinea, the Solomon Islands and Vanuatu from Freedom House. Data are not available for New Caledonia. However, coefficients on these variables were never statistically significant when applied to the four countries for which data are available, due to relatively little variation across both time and country.

outdated surveys carried out with the assistance of the World Bank or the Asian Development Bank. Estimates are updated on an annual basis according to population growth, rural-urban migration and natural disasters. Although there are reasons to be cautious about using data from Melanesia (and other developing countries) there is no reason to believe that the data are systematically biased in any particular way. However, it is noted that the noise or inaccuracy of the data might prevent the analysis from identifying important relationships.

Following the recent aid effectiveness literature, the following empirical model is specified and estimated:

$$g_{i,t} = \beta_0 + \beta_A AID_{i,t} + \beta_P^{'} P_{i,t} + \beta_{AP}^{'} AID_{i,t} P_{i,t} + \beta_z^{'} Z_{i,t} + \mu_{i,t} \quad (1)$$

where g is a proxy for rural sector consumption growth, *AID* is the ratio of Official Development Assistance (ODA) to GDP, P is a vector of variables which might be important for rural sector growth and for aid effectiveness and the *AID.P* interaction term is included to investigate whether aid effectiveness is contingent upon such factors. Z represents a vector of control variables that are potentially important in explaining changes in the dependent variable. Panel data is used with subscripts i and t representing country and time respectively. The data include annual observations for the five Melanesian recipients, covering the period 1980 to 2001. It is almost a balanced panel although some data were unavailable for New Caledonia for a couple of years. The model is estimated using OLS and the fixed and random effects approaches.

A number of comments on the specification of the empirical model are warranted. Two variables are used to proxy for growth in the consumption of the rural sector. The first is real growth in the value of agricultural GDP per capita. Agricultural GDP consists of forestry and fishing as well as the cultivation of crops and livestock production. It includes the contribution of subsistence agriculture. The rationale for this proxy is that the vast majority of the rural sector are reliant on agriculture for their livelihood. Increases in agricultural GDP per capita are very likely to be associated with improvements in the well-being of the rural sector.

The second proxy for improvements in the rural sector is real growth in household consumption, (defined as the market value of all goods and services purchased by households) per capita. The rationale for this proxy is that the majority of households in Melanesia are located in the rural sector. It is recognised that these variables are not perfect proxies for rural sector growth but they are important departures from traditional GDP growth variables. They are also the best proxies available for the study given data constraints.

Official Development Assistance (ODA) is the standard definition of foreign aid and is adopted in this report. Foreign aid is expressed as a ratio to GDP. Data come from the DAC of the OECD. Foreign aid is also disaggregated into aid grants and aid loans, bilateral and multilateral aid, and technical and non-technical assistance. Ideally the approach of Clemens *et al* (2004) would be followed whereby short-impact and long-impact aid variables are constructed and employed in the empirical model. Unfortunately this approach is very problematic in the case of Melanesian countries.

The reason is that New Zealand does not report its aid commitment data by sector to the DAC and France and Japan report only some of their data. Although this might not be a grave area of concern in a cross-country study including up to one hundred developing country recipients it is a major problem to the current study. Since these three countries are important donors to the region, overall coverage ratios are low for the recipients involved and it is virtually impossible to get a sectoral breakdown of foreign aid to Melanesian countries.

The coverage of ODA commitments by sector to total commitments reported to the DAC for the Melanesian recipients over the sample period are provided in Table A3 of the appendix. Although coverage for Papua New Guinea is fairly good, coverage is poor for the other Melanesian countries and is particularly poor for New Caledonia due to the lack of commitment data reported by France.[5] It is argued that

[5] Despite these problems, a short-impact aid variable was created following the methodology of Clemens *et al* (2004). Not surprisingly the coefficient attached to this variable was not significant across a number of different specifications due to the measurement error associated with its construction.

the level of aid disaggregation available for this study is an important limitation of the research and is an issue which is discussed further in Section VII.

Following World Bank research, three macroeconomic variables are included in the empirical model: the rate of inflation, the budget balance (as a ratio to GDP) and trade which is defined as the sum of imports and exports as a ratio to GDP. Since there is no strong reason to construct a composite index of these three variables, they are employed individually in most specifications. An index is only constructed when the foreign aid variable is interacted with policy for the sake of comparison with World Bank findings.

Rather than follow Guillaumont and Chauvet (2001) by using instability of agricultural production as a proxy for climatic shocks, this report uses a more reliable proxy. An environmental (or climatic) shock variable is defined as a dummy variable taking the value of one in years which Melanesian recipients experienced a major environmental shock such as a volcanic eruptions, cyclones, earthquake or droughts. The shock must affect at least five per cent of the population. Data are from the International Disaster Database administered by the Office of US Foreign Disaster Assistance (OFDA) and the Center for Research on the Epidemiology of Disasters (CRED).

Negative and positive price shocks are included as explanatory variables to capture trade shocks. A negative price shock is defined as a 35 per cent or greater decline in the real price of a major export commodity of a Melanesian recipient, while a positive price shock is defined as a 35 per cent or greater increase. Data are from the IMF's international financial statistics database. A political instability variable is also included which is a dummy variable taking the value of one when a country experiences a coup or period of major civil unrest.

Control variables include growth in the population of the rural sector and the change in the real effective exchange rate (REER) The REER provides a measure of a country's export competitiveness. It is scaled in such a way that a fall in the REER represents a depreciation and could benefit the rural sector by raising the demand for agricultural production and exports. However, if inputs into agricultural production

are imported then a devaluation might harm the rural sector by making these goods more expensive.[6] Full variable definitions and data sources are provided in the appendix of this report.

The vast majority of aid effectiveness studies have excluded investment as an explanatory variable. The reason is that since a fairly large proportion of foreign aid is used to finance domestic investment, a problem of 'double counting' will be introduced by including both foreign aid and investment as explanatory variables in the empirical model.[7] The consequence of double counting will lead to a biased (downwards) coefficient on the aid variable and will lead researchers to incorrectly conclude that aid does not impact on growth (Gomanee *et al*, 2002). Moreover, comprehensive investment data for all of the Melanesian countries are not available. For these reasons, this report follows the majority of aid effectiveness studies by not including an investment variable as an explanatory variable in the empirical model.[8]

The use of annual data is an important departure from existing aid effectiveness studies. Most existing aid effectiveness studies using cross-country data have used data averaged over several four or five-year periods. Studies adopt this approach to smooth out large annual fluctuations. There are however, advantages of using annual data rather than averaged data. If there are a small number of recipients under consideration it is possible to control for large annual fluctuations in growth rates by including dummy variables to capture the impact of the specific shocks the countries have experienced. This would be a very labourious exercise when samples

[6] The number of hectares of arable land per capita and the number of tractors per hectare were also included as explanatory variables. These data are available from the UN's Food and Agricultural Organisation (FAO). However, these variables are only estimated every five years and exhibit very little variation over time. Since the coefficients attached to these variables were not found to be statistically significant across a number of specifications, they were subsequently excluded from the analysis.

[7] It is also recognised that including both the aid variable and the real exchange rate might also be problematic given a potential relationship between the two. However, results change little when either of the variables are excluded from the regression equations.

[8] Using the investment data that are available, results from further regression analysis finds fairly strong evidence that foreign aid is an important determinant of investment in Melanesia. Note that this finding in itself is very encouraging. Investment is usually found to be a robust determinant of economic growth in empirical studies thereby indicating that aid is likely to have a positive impact to economic growth in Melanesia. However, it should also be noted that investment is widely cited as being unproductive in most of the Melanesian recipients under consideration.

include large numbers of developing countries and would require extensive knowledge of their experiences with natural disasters and political coups, for example.

Moreover, using annual data, there is less concern regarding the endogeneity of foreign aid. Studies note that foreign aid might be an important determinant of growth and the rate of growth might also partially determine the allocation of foreign aid. This implies that there are econometric problems employing aid in the regression equation. Rather than use foreign aid itself, studies have had to instrument for aid or simultaneously estimate an aid equation to obtain more accurate parameter estimates. A criticism of these studies is that results and conclusions are highly sensitive to the choice of instruments used. However, in the current study, since the impact of foreign aid on growth is unlikely to be instantaneous and recognising potential joint causality, the foreign aid variable (and it various components) is lagged in all specifications. This ensures that foreign aid is an exogenous variable. This practice would be far less viable in studies using data averaged over five year periods.

It is also recognised that foreign aid might take more than one year to impact on economic growth. The aid variable was therefore lagged a number of times in model specifications to allow for this. Econometrically it is problematic to include a number of lags and this issue is discussed further in Section VII. For the sake of comparison and to test the robustness of results, this report also follows the approach of previous studies by averaging data. Given the small number of countries under consideration and the relatively short sample period, the data can only be averaged over a maximum period of three years.

It is noted that there are also potential problems of endogeneity regarding the macroeconomic variables. For example, although the three macroeconomic variables might be important determinants of growth, it could also be that growth determines the levels of the variables. In some specifications these three variables are lagged or omitted in an attempt to control for this problem. Results from these specifications are consistent with those reported in the proceeding section and with the conclusions reached in this report.

VI. Results and interpretation

The first set of results relates to the estimation of the model using growth in real agricultural GDP per capita as the proxy for rural sector consumption. Table 2 provides the results from this estimation without the inclusion of interaction terms but with foreign aid disaggregated into its various components. Model 1 employs total foreign aid, Model 2 uses aid grants and aid loans, Model 3 uses bilateral and multilateral aid and Model 4 employs technical and non-technical assistance. The models include year dummies to pick up the impact of business cycle effects. Table A1 in the appendix provides the results from these specifications when year dummy variables are excluded. Results are sensitive to the inclusion of year dummy variables. One reason for this is that the year dummies variables will pick up some of the effects from the other explanatory variables. However, it is also important to control for these effects in order to pick up meaningful results on some explanatory variables.

These specifications favour OLS as the method of estimation. None of the individual country effects were statistically significant when the fixed and random effects approaches to estimation were adopted. The resulting R^2s from the estimation of these models indicates that between 36 to 38 per cent of the variation of the dependent variable is being explained by the explanatory variables. Although these values might appear low, there are actually very typical of aid effectiveness studies using cross-country data.

The three macroeconomic policy variables are employed in the model. Results provided in Table 2 indicate that the rate of inflation has a negative impact of the agricultural sector although the coefficients are not quite statistically significant at conventional levels of confidence. However, when year dummies are excluded, the coefficients attached to this variable become statistically significant. These results are provided in Table A1 of the appendix and provide evidence that price increases in goods such as fuel, electricity or fertiliser retard agricultural growth and are likely to have a negative impact on the rural sector. The coefficients on the other two macroeconomic policy variables are not statistically significant.

Table 2: Dependent Variable: Real Growth in Agricultural GDP Per Capita

Explanatory variable	Model 1	Model 2	Model 3	Model 4
Intercept	-1.435	-2.163	-2.296	0.347
	(0.15)	(0.22)	(0.24)	(0.04)
Inflation	-3.302	-3.055	-3.027	-3.210
	(1.63)	(1.42)	(1.47)	(1.58)
Budget balance	-0.069	-0.113	-0.214	-0.220
	(0.20)	(0.31)	(0.55)	(0.60)
Trade	0.001	0.001	0.002	-0.018
	(0.03)	(0.02)	(0.04)	(0.33)
Real Exchange Rate	-0.362*	-0.363*	-0.355*	-0.394*
	(1.80)	(1.79)	(1.76)	(1.94)
Environmental Shock	-8.657**	-8.621**	-8.285**	-8.878**
	(2.60)	(2.57)	(2.46)	(2.67)
Negative Price Shock	-3.493	-3.493	-3.179	-3.946
	(0.80)	(0.79)	(0.72)	(0.90)
Positive Price Shock	2.512	2.570	2.172	1.979
	(0.67)	(0.68)	(0.57)	(0.52)
Instability	-4.338	-4.268	-3.349	-4.462
	(0.90)	(0.88)	(0.67)	(0.93)
Rural Population Growth	-0.186	-0.189	-0.108	0.115
	(0.21)	(0.21)	(0.12)	(0.13)
Foreign Aid (-1)	0.092			
	(0.61)			
Grants (-1)		0.125		
		(0.71)		
Loans (-1)		-0.138		
		(0.22)		
Bilateral (-1)			0.218	
			(1.00)	
Multilateral (-1)			-0.2484	
			(0.56)	
Technical Assistance (-1)				0.338
				(1.30)
Non-technical (-1)				-0.172
				(0.63)
R2	0.36	0.36	0.37	0.38
N	103	103	103	103

Notes: Year dummy variables are included. *t*-statistics in parenthesis. * and ** indicate statistical significance at the 10 and 5 per cent level of confidence respectively.

Results from Table 2 also indicate that an appreciation of the real exchange rate is associated with lower growth in the agriculture sector. This result indicates that the sector is responsive to changes in the real exchange rate and that an appreciating currency will harm the sector by increasing the prices of agricultural exports which more than offsets the cheaper imported inputs into agricultural production. Conversely the agriculture sector responds favourably to a depreciation of the exchange rate by increasing output. Although the coefficients on this variable are no longer statistically significant when year dummies are included, the coefficient on this variable is always negative.

Results provide strong evidence that environmental shocks such as droughts, earthquakes, cyclones and volcanic eruptions have a large and negative impact on growth in agricultural GDP per capita. Results indicate that such environmental shock lower the rate of growth in agricultural GDP by between eight and nine per cent. Although the magnitude of these shocks appears to be lower in specifications when year dummies are included, there is reasonably strong evidence that shocks which impact on at least five per cent of the population of Melanesian countries have a large negative impact on the rural sector.

Although the coefficients attached to the price shock variables always exhibit their expected sign, it is only in the specifications which do not include year dummies that the impact of negative price shocks is statistically significant. The fact that farmers operating in Melanesia have received price support from their own governments, might cushion the impact of any such shock therefore weakening the evidence from the empirical analysis that negative price shocks impact on the rural sector. Moreover, export price shocks could also be cushioned by the provision of STABEX by aid donors although if this was the case, a positive and statistically significant coefficient on the aid variable would be expected.[9] There is no evidence that the agricultural sector responds to positive price shocks.

[9] STABEX is a stabilisation scheme offered by the EU to African Caribbean and Pacific (ACP) States. The scheme began in the late 1970s and entails financial transfers to the governments of ACP countries to compensate them for large falls in their export earnings. The basic principle is that STABEX transfers replace the amounts which would have been paid to producers if normal market conditions had prevailed. Donors recognised the difficulties encountered by agricultural sectors of these countries due to falls in their export earnings whether these were due to falling world prices, natural disasters or a combination of the two. Fluctuations in export earnings disrupt investment planning, public finances

There are no results from these specifications to suggest that rural population growth or political instability impact on agricultural growth. When year dummies are excluded form the model, the coefficient on the political instability variable is large and negative but is not statistically significant. This finding provides evidence that the agricultural sector is largely insulated from periods of political instability. The result that growth in the rural population is not found to be an important determinant of growth in the agricultural sector is surprising given that agriculture is labour intensive in Melanesian countries.

Overall, results across specifications indicate that the rate of inflation, real exchange rate appreciation, negative price shocks, and environmental shocks have a negative impact on the rural sector. None of the coefficients attached to the foreign aid variables are statistically significant across the specifications, indicating that foreign aid has not had any discernible impact on the rural sector of Melanesian countries. This result is consistent across a wide variety of different specifications and methods of estimation. Results remain unchanged for different lag lengths of the foreign aid variable and unchanged if a foreign aid squared variable was included to capture diminishing returns. There is still no evidence that foreign aid impacts on growth in the agricultural sector when the data are averaged over a three-year period.

Moreover, results provided by specifications which included aid interaction terms failed to provide further insights into the impact of foreign aid on the rural sector. The aid variable was interacted with a composite policy index, the environmental shock variable and the price shock variables. Results failed to provide any evidence that the impact of foreign aid on the agricultural sector is conditional on these factors.

The second set of model specifications uses growth in the real value of household consumption per capita as the proxy for the rural sector. However, despite trying numerous different combinations of variables using a wider variety of specifications and estimation methods, it appears that there is too much noise in the

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and lead to deteriorations in the balance of payments situation. Recently STABEX has been replaced by FLEX.

dependent variable to identify any meaningful underlying economic relationships. The results from the exercise are confined to Table A2 in the appendix. The only statistically significant result indicates that increases in the budget balance of Melanesian countries are associated with increases in the growth rate of household consumption per capita. Further analysis using this variable as a proxy for the rural sector was not undertaken.

This finding is in itself of some interest. It is surprising that no statistically meaningful relationship between growth in household consumption and any of the other explanatory variables was identified. The most likely explanation is that data collected on household consumption is not frequently and accurately collected but estimated from the collection of other data. Given the infrequency of many household surveys in Melanesia, it is of little surprise that the data are unreliable.

Given the finding that the large amounts of foreign aid provided to Melanesia have not had any discernible impact on the rural sector, this report proceeds by following the majority of existing aid effectiveness studies by investigating the impact of foreign aid on economic growth. Results are provided in Table 3. The fixed effects specification is the preferred method of estimation given that the individual country effects are jointly statistically significant across the specifications. This is what one would expect *a priori* and might indicate that national accounts data are more accurate or contain less noise than the data for individual sectors of the economy.

Results with no year dummies included are provided. They indicate that all three macroeconomic variables are important for economic growth although the coefficients on these variables are not always statistically significant in all of the specifications. There is strong evidence that both environmental shocks and periods of political instability have a large and negative impact on economic growth while growth in the rural population has a positive impact.[10] Table 3 also indicates that positive price shocks are associated with increases in economic growth.

[10] For the sake of comparison, exactly the same explanatory variables were used in the model to investigate the impact of aid on economic growth than in the model explaining the impact of aid on the rural sector. However, if total population growth is used instead of rural population growth, results remain unchanged. Increases in population growth are associated with increases in economic growth.

Importantly, foreign aid has a positive and statistically significant impact on economic growth in Melanesian countries. However, although the result is statistically significant, the impact is quite small. Results from Model 1 indicate that a 1 per cent increase in the ratio of ODA to GDP increases economic growth by approximately 0.23 per cent. Results from disaggregated aid imply slightly larger impacts.

Results from Model 2 indicate that aid loans have not impacted on economic growth but that a one per cent increase in the ratio of aid grants to GDP is associated with a 0.25 per cent increase in economic growth. The finding that aid loans have not had a positive impact is an area of concern. Since aid loans have to be repaid, it is important that are invested wisely and it is hope that they should lead to economic growth. However, results indicate that this has not been the case in Melanesian countries. A one per cent increase in the ratio of bilateral aid to GDP is associated with a 0.34 per cent increase in economic growth, while multilateral aid is found to have no impact on growth. The finding that bilateral aid impacts on growth rather than multilateral aid indicates that the conditionality often attached to multilateral aid has not been effective at spurring growth in Melanesian countries.

The finding that it is technical rather than non-technical assistance is effective at spurring economic growth in Melanesian countries is surprising. A one percent increase the ratio of technical assistance to GDP is associated with a 0.51 per cent increase in growth. Technical assistance is expected to have long-run impact on economic growth rather than a short run impact. The likely explanation for the finding is that technical assistance inflates the economy in the short run due to the large amounts of money spent by consultants in recipient countries. An alternative explanation is that there is a favourable investment response to large amounts of technical assistance to recipient public sectors.

Table 3: Dependent Variable: Real Growth in GDP Per Capita

Explanatory variable	Model 1 FE	Model 2 FE	Model 3 FE	Model 4 FE
Intercept	-6.138 (1.39)	-6.749 (1.43)	-5.909 (1.34)	-5.494 (1.24)
Inflation	-1.772 (1.54)	-1.756 (1.52)	-1.919* (1.66)	-2.014* (1.76)
Budget balance	0.308* (1.66)	0.297 (1.58)	0.258 (1.36)	0.235 (1.21)
Trade	0.077* (1.72)	0.082* (1.75)	0.068 (1.52)	0.064 (1.42)
Real Exchange Rate	-0.052 (0.60)	-0.054 (0.61)	-0.046 (0.52)	-0.048 (0.55)
Environmental Shock	-3.667** (2.35)	-3.646** (2.32)	-3.615** (2.32)	-3.714** (2.39)
Negative Price Shock	-0.970 (0.51)	-0.970 (0.51)	-0.758 (0.40)	-0.908 (0.48)
Positive Price Shock	3.635** (2.31)	3.624** (2.29)	3.519** (2.23)	3.326** (2.09)
Instability	-9.454** (4.00)	-9.399** (3.95)	-9.064** (3.79)	-9.700** (4.10)
Rural Population Growth	1.482** (2.42)	1.496** (2.43)	1.392** (2.26)	1.254** (1.96)
Foreign Aid (-1)	0.226* (1.84)			
Grants (-1)		0.245* (1.84)		
Loans (-1)		0.096 (0.27)		
Bilateral (-1)			0.335** (2.13)	
Multilateral (-1)			0.011 (0.05)	
Technical Assistance (-1)				0.514* (1.94)
Non-technical (-1)				0.122 (0.83)
R2	0.35	0.35	0.36	0.36
N	104	104	104	104

Notes: *t*-statistics in parenthesis. * and ** indicate statistical significance at the 10 and 5 per cent level of confidence respectively.

Results from the specifications when year dummies are included are similar to those reported without them. However, the coefficients attached to the positive price shock variables are no longer significant and the coefficients attached to the macroeconomic policy variables exhibit greater statistical significance. Results still provide evidence that bilateral aid and technical assistance impact favourably on growth. The coefficients on the total aid and aid grants variables become statistically insignificant but regain their significance if they are lagged one more year. Further evidence of an impact of aid on economic growth is provided by the results when the data are averaged over a three-year period. The positive impact of foreign aid on economic growth is no longer sensitive to the inclusion of period dummies when the data are averaged. Results relating to the other explanatory variables remain unchanged although there is some evidence that real exchange rate appreciation impacts negatively on the rate of economic growth.

Table 4 presents the results when aid interaction terms are included in the empirical model. The aid variable is interacted with a policy index and the environmental shock variable. Since negative price shocks were not found to have an impact on economic growth, the aid variable was not interacted with this variable. Model 1 interacts foreign aid with a composite macroeconomic policy index following the approach of Burnside and Dollar (2000). A number of econometric difficulties were experienced when estimating models with interaction terms included. In Model 1, the coefficients on the aid, policy and aid policy interaction terms are all statistically insignificant due to the collinearity between these variables. This makes evaluating the impact of policy on aid effectiveness difficult. Excluding the aid or policy variable to avoid the problem of collinearity results in model specification. Experimentation with the lagging and omitting variables provided little evidence that aid effectiveness in Melanesia is contingent on macroeconomic policies.

Table 4: Dependent Variable: Real Growth in GDP Per Capita

Explanatory variable	Model 1 FE	Model 2 FE
Intercept	-5.805* (1.94)	-6.009 (1.31)
Inflation	-	-2.378** (2.04)
Budget Balance		0.292 (1.57)
Trade		0.082* (1.80)
Policy	0.895 (0.44)	-
Real Exchange Rate	-0.40 (0.46)	0.014 (0.12)
Environmental Shock	-4.106** (2.58)	-4.399 (1.48)
Negative Price Shock	-1.085 (0.57)	-1.210 (0.64)
Positive Price Shock	3.929** (2.49)	3.203** (2.05)
Instability	-9.225** (4.10)	-9.662** (4.12)
Rural Population Growth	1.297** (2.18)	1.503** (2.45)
Aid (-1)	0.128 (0.95)	0.263** (2.18)
Aid (-1)*Policy	0.014 (0.44)	
Aid(-1)*Environmental Shock		-0.076 (0.35)
Change Aid(-1)*Environmental Shock		0.122** (2.40)
R2	0.33	0.39
N	104	104

Notes: *t*-statistics in parenthesis. * and ** indicate statistical significance at the 10 and 5 per cent level of confidence respectively.

Model 2 follows the approach of Collier and Dehn (2001) by including two aid interaction terms. The first is the lagged level of aid with the environmental shock variable since the initial level of aid could potential cushion the shock. The second is the interaction of the change in aid with environmental shocks to examine whether an increase in aid assists in buffering the effects of the shock. The coefficient on the change in aid environmental shock interaction variable is positive and statistically significant indicating that increasing foreign aid during the period of an environmental shock can help in mitigating its negative impact on economic growth. Note that the coefficient on the shock variable is not significant due to the problem of collinearity.

In summary, results suggest that the rate of inflation, changes in the real exchange rate, environmental shocks and negative price shocks impact on the agricultural sector while macroeconomic policy, rural population growth, environmental shocks, political instability and positive price shocks impact on economic growth. Moreover, results from the estimation of numerous model specifications using a variety of techniques provide no evidence that foreign aid has impacted on the rural sector of Melanesian countries but provide some evidence that foreign aid has impacted positively on economic growth and might be effective at mitigating the effects of environmental shocks. There are a number of possible explanations why this research report has not identified an impact of foreign aid on the rural sector.

The first is that the rural sector are not benefiting from foreign aid programs due to their urban bias. Most aid projects are national in nature and based in urban areas. Although the rural sector could benefit from such projects, urban-rural linkages in Melanesian countries are not necessarily well established and functioning. Although some aid projects are directed to the rural sector, the benefit might not be large enough to be picked up in the empirical analysis.

The poor quality of the data employed in the analysis of this report might be preventing the identification of important underlying economic relationships. The positive impact of foreign aid on the rural sector might be one of these relationships. The fairly low R^2s indicate that there is a large amount of variation not explained by

the explanatory variables particularly when year dummies are excluded from the empirical models. The sensitivity of the results to model specification also raises questions regarding the reliability of the data.

A further problem relates to the donor data used in this study. Specifically, to the level of aid disaggregation which is currently available. Empirical investigations of aid effectiveness should only be employing that part of foreign aid which is expected to increase growth in the short run in empirical models. If total aid is used, there will be a high degree of measurement error in the aid variable. The serious consequence of employing total aid in empirical models is that the coefficient on the aid variable will be biased downwards. A large part of foreign aid is provided for long-term development projects and is not expected to impact on the rural sector or on economic growth in the short run.

AusAID's activities aimed at improving governance or investments in the health and education sectors are unlikely to have short run impacts. The benefits from such projects might take up to ten years to have substantial impacts. Conversely, aid to build infrastructure for example roads, or used for irrigation systems or electricity generators should impact on growth almost immediately. These aid flows are the amounts which should be employed in empirical studies. Unfortunately this level of aid disaggregation is not currently available for Melanesian countries and provides an explanation of why the positive impacts of aid on economic growth identified in this report are found to be very small.

If a total aid variable is used in empirical research, any long-term relationship between aid and growth is going to be hard to capture. It is econometrically problematic to include a number of lagged aid terms in an empirical model. With very long lags it is also very difficult to isolate the impact of foreign aid relative to other potential factors. The issue of dynamics in the aid growth relationship has been a neglected issue by the aid effectiveness literature.

VII. Conclusion and Policy Implications

This report has investigated the impact of foreign aid to Melanesia by examining annual panel data for the period 1980 to 2001. The focus of the report was

whether foreign aid has impacted on the rural sector of this region. Results provide evidence that foreign aid has had no impact, either positive or negative, on the rural sector of Melanesia over the sample time period. There is however, some evidence that foreign has impacted positively on economic growth in these countries.

The most obvious policy recommendation arising from the findings of this report is to direct a greater proportion of foreign aid to the rural sector. It is recognised that improving governance is an important priority in Melanesian countries and that some foreign aid is already directed to rural areas. Examples include the Community Peace and Restoration Fund in the Solomon Islands and the Village Health Workers Project in Vanuatu. Further, the large amounts of foreign aid directed to the health and education sectors should have impacts on the rural sector in the long run. It is also recognised that aid projects in remote rural areas are less economical than those based in urban areas. However, given the importance of agriculture to Melanesian economies, the fact that the majority of the region's poor live in rural areas and the vulnerability of the sector to price shocks and environmental disasters, there is a strong case for greater assistance to rural areas.

Results from disaggregating the foreign aid variable in the empirical analysis also revealed some important policy recommendation. Findings indicated that aid grants should be favoured over aid loans and that bilateral aid is more effective at spurring economic growth than multilateral. Although, Australia provides all of its aid in the form of grants, this is not the case for other donors. Results suggest that aid loans are not invested wisely in these countries and that conditionality often attached to multilateral aid has been ineffective. There is also evidence that suggests technical assistance is beneficial to economic growth, even in the short term.[11]

A number of limitations of the research have been highlighted and discussed which relate to the data used in the study. A resulting policy implication is to continue helping Melanesian recipients provide up to date, reliable and accurate statistics to help track development progress, formulate policy advice and ensure that results from

[11] This result is encouraging given that technical assistance has been such major component of the recent Enhanced Cooperation Program (ECP) to Papua New Guinea and the Regional Assistance Mission to the Solomon Islands (RAMSI).

this type of research can provide more value to policymakers in the future. It is recognised that extensive agricultural censuses and household surveys are expensive in such fragmented countries. However, more accurate data for the rural sector is vital to more accurate track progress in these countries and assist in development planning.

This type of research would also benefit greatly from foreign aid donors reporting aid flows to the DAC with a far greater level of disaggregation. Foreign aid is highly heterogeneous, consisting of vastly differing types of goods, services and technical assistance. Moreover, foreign aid can sometimes be delivered using various combinations of projects and programmes which makes a clear distinction very difficult. Some aid flows are not provided to impact directly on the rural sector and should not be evaluated using this criterion. Moreover, a large proportion of foreign aid flows will only impact on the rural sector (and economic growth) in the long-run and should not be evaluated after just a few years of their disbursement. Ideally researchers should be employing highly disaggregated aid flows into their empirical models in order to provide reliable results, conclusions and policy recommendations. Highly disaggregated aid flows would also assist recipient countries with their development and budget planning. Given the highly diverse nature of aid and its impact over varying time periods, it is not surprising that studies of this type fail to find large, positive impacts of aid on the rural sector or on overall economic growth.

This report has found some evidence that real exchange rate appreciation is harmful to the agricultural sector and to economic growth. An important area of future research is to investigate the relationship between foreign aid and the real exchange rate. A small strand of the aid effectiveness literature examines this issue by recognising that large amounts of foreign aid can have inflationary impacts on the economy and provide incentives to move away from the rural sector to the production of goods in the non-tradeable sector.

Finally, identifying the time lags which foreign aid has in impacting on economic growth and the rural sector is an important area for future research. Different types of foreign aid will impact on growth over very different periods. The amount of foreign aid received in previous years or the ‘stock’ of foreign aid might also be important for its effectiveness. Finding appropriate econometric techniques to

control for the dynamics of aid remains an important area for future research. The compilation of an aid database to Melanesian countries which provides an accurate disaggregation of the sectors to which aid is disbursed and the time it is expected to impact would be a very useful start.

References

Alesina, A. and D. Rodrik 1994) "Distributive Politics and Economic Growth", *Quarterly Journal of Economics*, 109, 465-90.

Asian Development Bank (various), *Key Indicators of Developing Asian and Pacific Economies*, Asian Development Bank Manila.

Bell, C. and R. Rich 1994, "Rural Poverty and Agricultural Performance in Post-Independence India", *Oxford Bulletin of Economics and Statistics*, 56, 2, 111-33.

Bigsten, A. and J. Levin 2001, "Growth, Income Distribution and Poverty: A Review", UN/WIDER Discussion Paper 2001/129, United Nations University.

Bourguignon, F. and C. Morrisson 1998, "Inequality and Development: The Role of Dualism", *Journal of Development Economics*, 57, 233-57.

Burnside, C. and D. Dollar 1997, *Aid, Policies and Growth*, Policy Research Working Paper 1777, World Bank, Washington.

Burnside, C. and D. Dollar 2000, 'Aid, policies and growth', *American Economic Review*, 90, 847–868.

Burnside, C. and D. Dollar 2004, 'Aid, policies and growth: Revisiting the Evidence' World Bank Policy Research Paper O-2834, World Bank, Washington.

Central Bank of the Solomon Islands (various), *Quarterly Economic Review*, Solomon Island Printers Limited, Honiara

Chauvet, L. and P. Guillaumont 2002, 'Aid and Growth Revisited: Policy, Economic Vulnerability and Political Instability', paper presented at the Annual Bank Conference on Development Economics, ABCDE-Europe, *Towards Pro-Poor Policies*, Oslo, June 24-26, 2002.

Clemens, M., S. Radelet and R. Bhavani 2004, 'Counting Chickens When They Hatch: The Short-Term Effect of Aid on Growth', Center for Global Development Working Paper Number 44.

Collier, P and D Dollar 1999, Aid Allocation and Poverty Reduction, World Bank Policy Research Working Paper No 2041, World Bank, Washington.

Collier, P and D Dollar 2002, 'Aid allocation and poverty reduction', *European Economic Review*, 26, 1475–1500.

Collier, P and J Dehn 2001, *Aid, Shocks, and Growth*, World Bank Policy Research Working Paper No 2688, World Bank, Washington.

Collier, P and A Hoeffler 2002, *Aid, Policy, and Growth in Post-Conflict Societies*, Policy Research Working Paper No 2902, World Bank, Washington

Cordella, T and G. Dell'Ariccia 2003, Budget Support verus Project Aid, Working Paper 03/88, International Monetary Fund.

Dalgaard, C-J and H Hansen 2001, 'On aid, growth and good policies', *Journal of Development Studies*, 37, (6), 17–35.

Dalgaard, C-J, H. Hansen and F. Tarp 2004, 'On the Empirics of Foreign Aid and Growth', *Economic Journal*, 114, 191-216.

Dayton-Johnson, J and J. Hoddinott 2003, 'Aid, policies and growth redux', Dalhousie University Halifax

Dollar, D. and A. Kraay (2000), "Growth is Good for the Poor", Policy Research Working Paper No. 2587, World Bank, Washington.

Easterly, W 2003, 'Can Foreign Aid But Growth?', *Journal of Economic Perspectives*, 17, 23-48.

Easterly, W, R Levine and D Roodman 2003, 'New data, new doubts: Revisiting "Aid, polices and growth"', Working Paper 26, Center for Global Development, Washington DC.

Galor, O. and J. Zeira 1993, "Income Distribution and Macroeconomics", *Review of Economic Studies*, 60, 35-52.

Gounder, R 2001, 'Aid–growth nexus: Empirical evidence from Fiji', *Applied Economics*, 33, 1009–1019.

Gounder, R 2002, 'Empirical evidence of the relationship between foreign aid and economic growth: The case of the Solomon Islands', in B Mak Arvin (ed.), *New Perspectives on Foreign Aid and Economic Development*, Praeger, Westport.

Gomanee, K, S Girma and O Morrissey 2002, Aid and Growth in Sub-Saharan Africa: Accounting for Transmission Mechanisms, CREDIT Research Paper 02/05, Centre for Research in Economic Development and International Trade, University of Nottingham, Nottingham.

Guillaumont, P and L Chauvet 2001, 'Aid and performance: A reassessment', *Journal of Development Studies*, 37(6), 66–87.

Hansen, H and F Tarp 2000, 'Aid effectiveness disputed', *Journal of International Development*, 12, 375–398.

Hansen, H and F Tarp 2001, 'Aid and growth regressions', *Journal of Development Economics*, 64, 547–570.

Hudson, J and P Mosley 2001, 'Aid, policies and growth: In search of the Holy Grail', *Journal of International Development*, 13, 1023–1038.

Hughes, H 2003, 'Aid has failed the Pacific', Issue Analysis No 33, Centre for Independent Studies, Sydney.

Islam, Muhammed 2003, 'Political regimes and the effects of foreign aid on economic growth', *Journal of Developing Areas*, 37, 35-53.

Lensink, R and O Morrissey 2000, 'Aid instability as a measure of uncertainty and the positive impact of aid on growth', *Journal of Development Studies*, 36(3), 31–49.

Lensink, R and H White 2000, 'Assessing aid: A manifesto for the 21st century?', *Oxford Development Studies*, 28(1), 5–18.

Lensink, R and H White 2001, 'Are there negative returns to aid?', *Journal of Development Studies*, 37(6), 42–64.

Lu, S and R Ram 2001, 'Foreign aid, government policies and economic growth: Further evidence from cross-country panel data for 1970 to 1993', *International Economics*, 54, 15–29.

Lustig, N., O. Arias and J. Rigolini (2002), "Poverty Reduction and Economic Growth: A Two-Way Causality. Inter-American Development Bank", Sustainable Development Department Technical Papers Series, Washington.

McGillivray, M 2003, 'Aid effectiveness and selectivity: Integrating multiple objectives into aid allocations', *DAC Journal*, 4, (3), 23–36.

Moreira, S. B. 2003, 'Evaluating the Impact of Foreign Aid on Economic Growth: A Cross-Country Study (1970-1998)', presented at the 15th Annual Meeting on Socioeconomics, Aix-en-Provence, France, June 26-28.

National Statistics Office (various), *National Accounts of Vanuatu*, Statistics Office, Port Vila.

Persson, T. and G. Tabellini 1994, "Is Inequality Harmful for Growth?", *American Economic Review*, 84, 600-21.

Pettersson, J. 2004, 'Foreign Aid Fungibility, Growth, and Poverty Reduction, Working Paper, Dept. of Economics, Stockholm University.

Ram, R. 2003, 'Roles of Bilateral and Multilateral Aid in Economic Growth of Developing Countries', *Kyklos*, 56, 95-110.

Ram, R 2004, 'Recipient country's "policies" and the effect of foreign aid on economic growth in developing countries: Additional evidence', *Journal of International Development*,16, 201–11.

Ravallion, M. and G. Datt 1994, "Growth and Poverty in India", Poverty and Human Resource Division, World Bank, Washington.

Ravallion, M. and G. Datt 1996, "How Important to India's Poor is the Sectoral Composition of Economic Growth", *World Bank Economic Review*, Vol.10, pp.1-25.

Ravallion, M. and S. Chen 1997, "What Can New Survey Data Tell Us About Recent Changes in Distribution and Poverty?", *World Bank Research Observer*, 11, 357-382.

Roodman, D. 2003, 'The Anarchy of Numbers: Aid, Development, and Cross-Country Empirics', Center for Global Development Working Paper 32, Washington.

Roodman, D. 2004, 'The Anarchy of Numbers: Aid, Development, and Cross-Country Empirics', Center for Global Development Working Paper 32, Washington.

Svensson, J. 1999, 'Aid, growth and democracy', *Economics and Politics*, 11(3), 275–297.

World Bank (1998), 'Assessing Aid: What Works, What Doesn't and Why?', Oxford University Press, New York

Appendix

Table A1: Dependent Variable: Real Growth in Agricultural GDP Per Capita

Explanatory variable	Model 1	Model 2	Model 3	Model 4
Intercept	10.10*	9.393	7.291	11.064*
	(1.76)	(1.58)	(1.23)	(1.94)
Inflation	-3.601**	-3.381*	-3.313*	-3.193*
	(1.99)	(1.80)	(1.84)	(1.76)
Budget balance	-0.314	-0.357	-0.541	-0.501
	(1.00)	(1.09)	(1.59)	(1.51)
Trade	-0.037	-0.036	-0.032	-0.060
	(0.74)	(0.72)	(0.65)	(1.15)
Real Exchange Rate	-0.213	-0.217	-0.218	-0.235
	(1.29)	(1.31)	(1.33)	(1.43)
Environmental Shock	-4.698	-4.715	-4.750*	-5.449*
	(1.62)	(1.62)	(1.65)	(1.87)
Negative Price Shock	-6.673*	-6.742*	-6.215*	-7.144**
	(1.89)	(1.90)	(1.77)	(2.04)
Positive Price Shock	2.565	2.621	2.519	2.245
	(0.84)	(0.85)	(0.83)	(0.74)
Instability	-6.607	-6.417	-4.627	-6.873
	(1.57)	(1.51)	(1.06)	(1.64)
Rural Population Growth	0.053	0.060	0.111	0.345
	(0..06)	(0.07)	(0.13)	(0.40)
Foreign Aid (-1)	0.030			
	(0.21)			
Grants (-1)		0.067		
		(0.42)		
Loans (-1)		-0.248		
		(0.41)		
Bilateral (-1)			0.238	
			(1.26)	
Multilateral (-1)			-0.532	
			(1.43)	
Technical Assistance (-1)				0.367
				(1.46)
Non-technical (-1)				-0.301
				(1.22)
R2	0.16	0.16	0.18	0.18
N	103	103	103	103

Notes: *t*-statistics in parenthesis. * and ** indicate statistical significance at the 10 and 5 per cent level of confidence respectively.

Table A2: Dependent Variable: Growth in Household Consumption Per Capita

Explanatory variable	Model 1	Model 2	Model 3	Model 4
Intercept	-4.144	0.232	-8.437	-0.882
	(0.58)	(0.04)	(0.92)	(0.16)
Inflation	0.765	1.212	1.259	0.865
	(0.40)	(0.58)	(0.67)	(0.44)
Budget balance	0.739**	0.660**	0.479**	0.577**
	(2.81)	(2.18)	(1.89)	(2.40)
Trade	0.039	0.039	0.039	0.018
	(1.01)	(0.99)	(1.03)	(0.41)
Real Exchange Rate	-0.216	-0.217	-0.209	-0.253
	(1.34)	(1.31)	(1.25)	(1.55)
Environmental Shock	-3.675	-3.607	-3.064	-3.941
	(1.36)	(1.34)	(1.08)	(1.46)
Negative Price Shock	3.884	3.876	4.532	3.461
	(1.06)	(1.05)	(1.19)	(0.97)
Positive Price Shock	0.630	0.719	0.189	0.170
	(0.20)	(0.23)	(0.06)	(0.05)
Instability	-1.459	-1.325	0.221	-1.640
	(0.38)	(0.34)	(0.06)	(0.44)
Rural Population Growth	-0.003	-0.005	0.100	0.293
	(0.00)	(0.01)	(0.13)	(0.37)
Foreign Aid (-1)	-0.040			
	(0.32)			
Grants (-1)		0.021		
		(0.14)		
Loans (-1)		-0.456		
		(0.96)		
Bilateral (-1)			0.188	
			(1.00)	
Multilateral (-1)			-0.640	
			(1.56)	
Technical Assistance (-1)				0.223
				(0.97)
Non-technical (-1)				-0.317
				(1.32)
R2	0.32	0.33	0.35	0.34
N	104	104	104	104

Notes: Year dummy variables are included. *t*-statistics in parenthesis. * and ** indicate statistical significance at the 10 and 5 per cent level of confidence respectively.

Data Definitions and Sources

Real Growth in Agricultural Gross Domestic Product Per Capita Agricultural GDP comprises forestry, hunting, and fishing as well as the cultivation of crops and livestock production. Growth rates are based on constant (1995) local currency. Sources include the Asian Development Bank, the World Bank, the National Statistics Office of Vanuatu, New Caledonia Institute of Statistics and Economic Studies (ITSEE), Central Bank of the Solomon Islands, United Nations National Accounts Main Aggregates database.

Real Growth in Household Consumption Per Capita Household consumption is the market value of all goods and services, including durable products (such as cars, washing machines, and home computers) purchased or received as income in kind by households and non-profit institutions. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings. Growth rates are based on constant (1995) local currency. Sources include the Asian Development Bank, the World Bank, the National Statistics Office of Vanuatu, New Caledonia Institute of Statistics and Economic Studies (ITSEE), Central Bank of the Solomon Islands, United Nations National Accounts Main Aggregates database.

Real Growth in Gross Domestic Product (GDP) Per Capita Total value of all goods and service produced. Growth rates are based on constant (1995) local currency. Sources include the Asian Development Bank, the World Bank, the National Statistics Office of Vanuatu, New Caledonia Institute of Statistics and Economic Studies (ITSEE), Central Bank of the Solomon Islands, United Nations National Accounts Main Aggregates database.

Foreign Aid defined as the ratio of Official Development Assistance (ODA) to GDP. To be classified as ODA, flows must meet the following three criteria: (i) provided by the official sector; (ii) have the promotion of economic development and welfare of developing countries as their main objective and; (iii) are concessional in nature. Data are from the OECD's International Development Statistics database.

Climatic Shock is defined as an earthquake, volcanic eruption, drought, flood, or wind storm which affected at least five per cent of the population. Data come from the International Disaster Database administered by the Office of US Foreign Disaster Assistance (OFDA) and the Center for Research on the Epidemiology of Disasters (CRED).

Negative/Positive Price Shock is defined as 35% fall in the real (US) dollar value of a commodity which is a major export of a recipient country. Commodity price data were obtained from the International Monetary Fund's (IMF) International Financial Statistics.

Inflation is the log of the percentage change in a country's Consumer Price Index (CPI) available from the World Bank's World Development Indicators.

Budget Balance is current and capital revenue and official grants received, less total expenditure and lending minus repayments. Data are from the World Bank's World Development Indicators.

Trade is the sum of imports and exports expressed as a ratio to GDP. Data come from the World Bank's World Development Indicators.

Policy Index a composite index based on the rate of inflation, the budget deficit and the ratio of trade to GDP.

Growth in Rural Population is annual growth in the rural population expressed as a percentage. Data come from the World Bank's World Development Indicators.

Political Instability is a dummy variable taking the value of 1 when a country experiences a coup or a period of major civil unrest. Authors own calculations.

Real (Effective) Exchange Rate is defined as the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs. Data come from the World Bank's World Development Indicators for Fiji, Papua New Guinea and the Solomon Islands. Authors own calculations for New Caledonia and Vanuatu.

Table A3: Sectoral ODA Commitments to Total ODA Commitments (%)

Year	Fiji	Papua New Guinea	New Caledonia	Solomon Islands	Vanuatu
1980	23	85	7	59	64
1981	46	95	9	35	43
1982	47	90	12	67	42
1983	68	91	11	49	60
1984	38	94	11	48	28
1985	35	80	8	27	40
1986	43	79	0	29	62
1987	50	82	4	75	39
1988	43	116	1	65	50
1989	14	65	1	54	70
1990	30	74	11	53	26
1991	46	134	9	57	47
1992	48	51	9	69	48
1993	43	81	11	76	56
1994	47	85	9	62	62
1995	33	4	9	50	36
1996	65	93	10	73	79
1997	53	87	8	64	64
1998	78	90	3	82	87
1999	61	97	6	88	65
2000	46	89	7	81	72
2001	118	103	14	108	88
2002	71	104	12	102	88
Average	**50**	**86**	**8**	**64**	**57**

Source: DAC International Development Statistics Annual Aggregates Online Database and the CRS Database on Aid Activities. The Table compares the amount of foreign aid reported by the CRS in disaggregated commitment form to the total ODA commitments reported by the DAC. Values exceeding 100 per cent, indicating under-reporting of aid commitments to the DAC by donor countries.