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**FOREIGN AID AND THE FISCAL BEHAVIOUR OF THE GOVERNMENT  
IN PAPUA NEW GUINEA**

**By  
Aaron Batten**

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**ACRONYMS**

ABS	Australian Bureau of Statistics
ADB	Asian Development Bank
ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criterion
AusAID	Australian Agency for International Development
BCL	Bougainville Copper Limited
BPNG	Bank of Papua New Guinea
BRA	Bougainville Revolutionary Army
DCT	Development Cooperation Treaty
ECP	Enhanced Cooperation Package
FRM	Fiscal Response Model
GDP	Gross Domestic Product
GFS	Government Financial Statistics
GoPNG	Government of Papua New Guinea
HQIC	Hannan-Quinn Information Criteria
IMF	International Monetary Fund
IRF	Impulse Response Function
PNG	Papua New Guinea
OECD	Organisation for Economic Cooperation and Development
DAC	Development Assistance Committee
SAP	Structural Adjustment Program
SGP	Strongim Gavman Program
SWAp	Sector-wide Approach
US	United States
VAR	Vector Autoregressive
VAT	Value Added Tax
VEC	Vector Error Correction
VECM	Vector Error Correction Model

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## EXECUTIVE SUMMARY

Foreign aid in Papua New Guinea (PNG) has been heavily criticised on the grounds that it has undermined incentives for domestic revenue collection, encouraged irresponsible expenditure behaviour and high levels of public debt, and contributed to the poor composition of government spending towards wasteful expenditure items.

This paper seeks to determine what impact foreign grants have had on the fiscal behaviour of the PNG Government. The approach combines a historical analysis of fiscal and aid outcomes since independence with the use of a dynamic Vector Error Correction Model (VECM) to estimate a simultaneous system of fiscal equations between 1974 and 2008. Results show that foreign grants have indeed lowered domestic revenue collection but they have also been an important source of debt reduction. In some circumstances aid has improved the composition of government expenditure but the revenue and debt repayment effects mean that it has had a weak effect on increasing overall expenditure levels. Preliminary results also suggest that these effects vary considerably according to how aid is delivered, comparing budget support vis-à-vis project and program aid delivery.

The key policy implication of this analysis is that the impact of aid on increasing aggregate expenditure in service delivery sectors depends first and foremost on the behaviour of the PNG Government, not on the grant allocations of donors. As donors continue to attempt to influence the financing of additional service delivery expenditure, their central concern must therefore remain focused on establishing a cooperative dialogue regarding the PNG Government's budgetary priorities. Delivery of aid which is integrated into national budgetary systems and which aligns itself with national expenditure plans is likely to be much more effective at improving the composition of government expenditure than aid which is delivered to finance donor priorities.



## SECTION 1: INTRODUCTION

For much of the post-independence era PNG's fiscal policy has been categorised by persistent deficit financing and growing public debt. Excessive levels of Government spending have added to economic volatility and led to three economic crises, each requiring donor-financed bail out packages to prevent the economy from becoming bankrupt. Declining per capita expenditure levels in key service delivery sectors have also meant that since independence resources for items such as health, education and infrastructure have been falling (Batten 2009).

Numerous authors have argued that foreign aid has contributed to, rather than alleviated these adverse fiscal policy settings. Windybank and Manning (2003:12) conclude that sustained financial assistance from Australia encouraged successive governments in Papua New Guinea (PNG) to "live beyond their means, encouraging irresponsible policies and postponing the need for reform". Hughes (2003:25) argues that foreign aid allowed the PNG government to continue funding unproductive consumption activities whilst ignoring important social investments. This is also believed by many to have contributed to a bloated public sector which soaks up scarce financial resources.

Switching from untied budget support to the delivery of aid through project and, more recently, program aid, has been a key method used by Australia to try and improve the development impact of its assistance to PNG. As Feeny (2003:91) notes, "[t]he Australian policy of phasing out aid provided as budget support in favour of project aid has ensured that aid is now used for important projects in the health and education sectors."

Changing aid modalities have, however, not been accompanied by significant improvements in the composition or conduct of PNG fiscal policy outcomes. These views were expressed in an AusAID report (2003:27) which highlighted that "...analysis of the PNG Government's own funding for different sectors confirms that government funding for key sectors such as infrastructure, health and education was higher when PNG was receiving budget support than in more recent times."

Claims surrounding the adverse impact of foreign grants on PNG fiscal outcomes can be easily rebuffed by arguing that the situation would have been worse had the system of grant aid not been in place at all.

This paper seeks to address these issues by firstly providing a historical analysis of the relationship between foreign aid and fiscal policy outcomes in PNG since independence. Some of the core issues which are identified in this historical analysis are then estimated in the second section of the paper with the use of a Vector Error Correction Model (VECM). This model allows aid and fiscal aggregates to interact in a dynamic manner both contemporaneously and with a number of lags. The core questions which are addressed include:

- i) whether grant aid has tended to lower the PNG Governments domestic revenue raising efforts;
- ii) whether grant aid has encouraged the PNG Government to be less fiscally responsible and accumulate higher levels of foreign debt;

## 2 *Foreign Aid and the Fiscal Behaviour of the Government in PNG*

- iii) whether grant aid has encouraged a deterioration in the composition of government expenditures away from key service delivery sectors; and
- iv) whether budget support vis-à-vis project and program aid have had differential effects on any of the above.

Empirical studies on the impact of aid on PNG's fiscal performance have been hampered by a chronic lack of consistent data on fiscal outcomes. As such this paper also conducts an extensive data collection exercise, drawing on a data set from 1974 — 2008. This covers the entire post-independence period and gives sufficient degrees of freedom to conduct a dynamic analysis of PNG's fiscal behaviour as it is affected by inflows of foreign aid.

This analysis reveals a number of important insights regarding the interplay between foreign aid and public sector fiscal behaviour. The key findings include evidence that grant aid has been an important source of debt reduction during this period. Grant aid has however tended to erode the domestic tax base which has limited its ability to increase aggregate expenditure levels. Preliminary evidence also suggests a significant portion of budget support was actually spent on key development sectors, although it also undermined domestic revenue collection. The policy implications of these findings are discussed in the final section.

## **SECTION 2: POST-INDEPENDENCE FOREIGN AID AND FISCAL TRENDS IN PNG**

### **2.1 Background**

PNG has stood at the centre of the Australian aid program since the program began as a system of government-to-government grants following World War Two (ABS 2001). By the time PNG gained independence in 1975, Australia was transferring over K900 million (in real 1999 terms) under a program of direct budget support. This was equal to almost K500 per capita and comprised over half of the PNG Government's total revenue. Since then, PNG has received 61 percent of total Australian aid flows. In 2007, Australia gave PNG some K650 million (in real 1999 terms). Since independence Australia has accounted for just over 87 percent of PNG's total aid receipts.

Despite high levels of foreign assistance, PNG's economic and social performance has languished in the post-independence era (Batten 2008). Even with the exploitation of substantial mineral and natural resources, per capita incomes have continued along a long-term decline (See Appendix A, Chart 5: GDP and GDP Per Capita 1974–2008). The proportion of the population living on less than US\$1 a day increased from 25 to 40 percent over the last decade, whilst health and education indicators have declined, lagging behind both global averages and those of PNG's Melanesian neighbours. This data corroborates substantial anecdotal evidence which suggests that the quality of government services — such as rural health posts, primary and secondary schooling, and basic infrastructure — has continued to deteriorate throughout the post-independence era. These effects have been particularly pronounced in rural areas where approximately 80–85 per cent of the population lives.

This situation raises a number of important questions regarding the contribution of Australian and other donor aid to PNG's overall development performance. There have been a number of previous studies seeking to answer this question. Some have argued that the rate of decline would have been much higher had the Australian aid program not been present. For example, an internal report by AusAID (2003) titled, *The Contribution of Australian Aid to PNG Development (1975–2000)* argues that the aid it has given to the education sector has been central to the isolated gains made in literacy and school enrolment rates. It also posits that aid funds have prevented the collapse of the health system and maintained funding levels for essential road and air infrastructure.<sup>1</sup>

In contrast, other authors have suggested that the very presence of aid is one cause of the decline in post-independence economic and fiscal performance. Windybank and Manning (2003:12) have argued that Australian aid enabled successive PNG governments to “live beyond their means, encouraging irresponsible policies and postponing the need for reform.” They also suggest that Australian aid has not only perpetuated poor policies but also encouraged PNG's dependence on financial assistance as the expansive aid program became a surrogate government. This argument was also supported by Hughes (2003) and Hughes and Windybank (2005)

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<sup>1</sup> In spite of these achievements, the report still concedes that the aid program has been unable to convert this into per capita income growth.

who have argued that aid has failed in the Pacific region as a whole because it has supported irresponsible fiscal behaviour.

The OECD also undertook a Peer Review of Australian aid in 2004 (OECD DAC 2005). This Review gave Australia credit for evolving its aid program towards international best practice standards in its program design, administration and implementation. It also highlighted the need to employ a better framework for ensuring PNG Government funding for key service delivery sectors improves. The report argued that this was necessary because wide scale fungibility had been taking place, limiting the potential impacts of aid on improving sectoral outcomes (*ibid.*: 94).

This view was also highlighted in the Joint Review of Australian Aid Program to Papua New Guinea (Lepani *et al.* 2004). This report blamed many of the poor post-independence fiscal outcomes on the weaknesses in the existing performance monitoring system for jointly monitoring expenditure of total resources. This, it argued, arose largely as a result of a lack of constructive dialogue between the two governments regarding what public finances should be targeted at achieving.<sup>2</sup>

Broad claims surrounding the contribution of foreign aid to improved fiscal outcomes do, however, mask a number of significant changes both in how foreign aid has been given to PNG, and the response that this has elicited in terms of PNG's fiscal behaviour. The following section provides a brief overview of PNG's fiscal and foreign aid history, which identifies a number of key trends in both donor and government behaviour since independence. These trends are then used to generate a number of testable hypotheses surrounding the impact of foreign aid on PNG's fiscal management.

## **2.2 The Budget Support Era (1975–87)**

PNG began the post-independence era with a small, mostly agriculture-based economy with domestic revenues sourced from personal income taxes of the large expatriate population, a few larger companies and trade duties (Fallon 1992:10). During 1975–87, PNG was also heavily dependent on the receipt of financial assistance from foreign donors, mostly originating from its former colonial administrator Australia, in the form of budget support. The budget support approach emphasised the role of aid in alleviating the resource constraints facing the government as it had a limited domestic production base and a poor revenue raising ability. Channelling resources directly into PNG's budget system also had the added advantage of utilising and potentially strengthening the government's fiscal management processes, giving the newly independent government a high degree of control and ownership over of these resources. The importance of budget support to PNG's fiscal position during this period can be seen in Appendix A, Chart 6: Government Expenditure, Domestic Revenue and Total Aid Flows, which shows that in 1975 foreign financial support was equivalent to just over K900 million in real 1999 terms. This funding was approximately 20 percent larger in per capita terms than total domestic revenue collection.

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<sup>2</sup> Most recently, Heinecke *et al.* (2008) have argued that whilst in some cases Australian technical and financial assistance has led to observable improvements in the performance of government in PNG, insufficient attention has been placed on providing support which encourages a requisite demand for reform, and this has been limiting the overall effectiveness of the program.

In the years following independence, PNG began to reduce its reliance on foreign aid as a source of government revenue. After peaking in 1975, real levels of foreign aid per capita declined at an average rate of 8 percent per annum between 1975 and 1982. This decline occurred in tandem with a growth in domestic revenue collection from K365 per capita in 1975, to K450 per capita in 1982. Nevertheless, foreign assistance was still a dominant source of finance for government expenditure during this period, with grants averaging 38 percent of total revenue.

Despite growing domestic revenues, the rapid decline in foreign financial support in this period meant that the PNG Government faced immediate difficulties in trying to maintain fiscal balance (Hinchliffe 1980:820). Adding to these pressures was also the rapid growth in the cost of the bureaucracy, which occurred from increasing minimum wage levels (to compensate for the high rates of inflation induced by the 1973 oil price shock) and a continuing decentralisation of government service delivery — following the establishment of provincial governments in 1977. BPNG (1978), for example, estimates that in 1978, up to 58 percent of government expenditure went on salary and wages costs.

A growing bureaucracy, pressure on the newly formed government to improve service delivery, and declines in budget support, all combined to cause a large and persistent fiscal gap in the late 1970s (Lim 1987). During this period, total expenditures equalled just over 30 percent of GDP, whilst domestic revenue equalled 10 percent of GDP, leaving a 20 percent fiscal gap.

Foreign grants covered the majority of this gap, averaging 15 percent of GDP, and these grants underwrote the costs of the growing bureaucracy. However, with expenditures exceeding revenues by an average of 4–5 percent of GDP, the budget remained in deficit for the rest of the decade which led to steadily increasing public debt (Appendix A, Chart 7: Budget Balance (1975–2009)).

These fiscal pressures also led to some significant changes in the composition of government expenditures. In particular, whilst health and education spending remained relatively constant throughout this period, the rapid increase in general government expenditure corresponded with a significant drop in infrastructure investment — which fell from a peak of K130 per capita in 1974 to K60 per capita in 1982 (Appendix A, Chart 8: Government Expenditure by Sector).<sup>3</sup>

PNG entered the 1980s facing a number of severe external shocks to its economy. The tripling of oil prices following the global oil price shock in 1979 led to a rapid decline in the economy's terms of trade and a subsequent deterioration of its balance of payments position. The emergence of a global recession in 1980 then caused a considerable drop in the prices of many of PNG's key agricultural export commodities. The revenue impact of this was also augmented by a period of reduced output from the Bougainville mining operations which had been making a large

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<sup>3</sup> Sectoral expenditure figures represent a substantial data collection exercise undertaken with data from the IMF International Finance Statistics (2008) and the PNG Department of Treasury and Finance (explained in detail in Appendix B). These figures are expressed in per capita terms to reflect the government's financial ability to deliver a comparable set of services to the entire population in the post-independence period. Government expenditures include those components of foreign aid which are channelled through PNG budgetary processes.

contribution to government revenues since 1974 (Wolfers 1981). This effect can be seen in Appendix A, Chart 5: GDP and GDP Per Capita 1974–2008, which shows real GDP per capita declining below its 1975 level in the early 1980s.

These pressures posed some significant fiscal challenges for the government. GDP growth was again negative in 1980, recording a decline of 2.3 percent, and inflation levels had jumped to 12 percent. Reduced Australian budgetary support also led to grant revenue declining to approximately 31 percent of total revenue. Combined with almost static domestic revenue collection between 1980 and 1982, this led to a tight fiscal constraint of any attempts by the government to fund new expenditures.

Some non-priority expenditure cuts were made during this period, mainly in areas related to capital projects and ongoing maintenance costs, with their share of total expenditure dropping from 15 to 12 percent between 1980 and 1982 (BPNG 2007). In contrast, other recurrent costs such as wages and salaries continued to grow. This meant that despite stagnant funding levels to development priority areas such as health and education, the fiscal gap increased dramatically in 1981 and 1982, with the budget recording deficits of 5.9 and 5.1 percent of GDP, respectively.<sup>4</sup>

In 1982, the PNG Government commissioned the Garnaut and Baxter Review (1983) which sought to assess the country's macroeconomic policy settings, focusing in particular on the country's fixed exchange rate system. Motivated in part by the upcoming floating of the Australian Dollar in 1983, the Review supported the continuation of a pegged exchange rate, or hard Kina policy for PNG (*ibid.*). However, the Review also emphasised that to maintain a pegged exchange rate, the government would have to reduce its overall expenditure levels and increase fiscal discipline in order to correct the macroeconomic imbalances which had opened up during the early 1980s. Central to this task would be efforts to reduce the price of labour relative to other tradable goods, which as a result of minimum wage increases had been growing strongly since independence. This wage adjustment was aimed at offsetting the contractionary effects on employment which would occur from a reduction in the level of government expenditure.

The PNG Government chose not to implement any wage growth constraints (Imbun 2005:231). Instead it chose to re-orient its macroeconomic and fiscal policy towards a more sustainable footing by trying to improve fiscal discipline and devaluing the Kina to encourage greater international competitiveness.<sup>5</sup> This included a fiscal stabilisation policy which targeted a restraint on expenditure growth leading to an overall cut in expenditures of just over 5 percent in real terms for the 1983 budget (Hegarty and King 1983:224). This allowed the government to reign in the large fiscal gap which had opened up in the immediate post-independence period, however, the budget continued to remain in deficit, averaging 0.2 percent of GDP between 1983 and 1987.

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<sup>4</sup> Public employment numbers continued to increase during this period reaching upwards of 50,000 in 1982 and soaking up approximately 33 percent of total budget expenditures (Hegarty and King 1983:165).

<sup>5</sup> In terms of the US Dollar, this led to a drop in the exchange rate from K1.36/\$US in 1982, to parity in 1985.

### 2.3 The Bougainville Crisis and the First Donor Bail-Out (1988–93)

By the end of 1988, the economy and its fiscal management began to deteriorate (Fallon 1992:10). A drop in agricultural prices led to lower government revenues, while foreign financial assistance continued to decline, falling from 34 percent of total revenues in 1983 to just under 20 percent in 1989.<sup>6</sup> The economy also contracted by 1.4 percent in 1989 and by just under 3 percent in 1990 — which contributed to the budget deficit increasing from 1.15 percent of GDP in 1989 to 3.5 percent of GDP in 1990.

This deteriorating economic performance also gave rise to a growth in criticism of Australia's program of direct budget support. Primarily, critics began to argue that budget support had insulated successive PNG governments from making difficult decisions on revenue raising or prioritising the expenditure of their own domestic resources on key development sectors (Callick *et al.* 1990:81). Large inflows of unconditional Australian aid also began to be linked to PNG's booming government sector which since independence had been soaking up an increasing proportion of government expenditure.<sup>7</sup> In turn, this drew a large proportion of the limited supply of educated and entrepreneurial citizens into the bureaucracy rather than towards more productive sectors of the economy that would be more conducive to wealth creation.<sup>8</sup>

Growing expectations regarding PNG's ability to obtain fiscal self reliance from the expanding mining sector during the 1980s, combined with perceptions of fiscal mismanagement (May 2001; Standish 1999) then led Australia to initiate a shift in its aid delivery away from direct budgetary support. This approach was formalised with the signing of a new Development Cooperation Treaty (DCT) between the two governments in 1989 which sought to gradually increase the proportion of funds given to earmarked activities through project aid.<sup>9</sup>

It was also during the late 1980s when the PNG Government was plunged into its first major crisis in the form of the conflict in Bougainville. A struggle for greater compensation and less environmental damage by local residents from the Panguna Copper Mine, run by Bougainville Copper Limited (BCL), evolved into an island-wide struggle for independence. In 1989, the Bougainville Revolutionary Army (BRA) closed the mine by launching a secessionist war (Masono 2006:35).<sup>10</sup> By the

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<sup>6</sup> This decline occurred in line with the 1985 Aid Agreement between Australia and PNG which agreed on a gradual reduction of 3 percent per annum in real terms in the total amount of Australian funding.

<sup>7</sup> The World Bank (1999:129), for example, estimates that despite numerous attempts at downsizing the public service, by 1990 total wage spending comprised 40.1 percent of recurrent government expenditure and 33.9 percent of total expenditure.

<sup>8</sup> More recently, Hughes (2003) and Hughes and Windybank (2005) have also supported this view, arguing that budgetary support was widely used to fund higher levels of general government consumption and had underwritten the government's inability to prioritise resources away from inefficient or ineffective government activities.

<sup>9</sup> Specifically, this Treaty committed Australia to providing K750 million of assistance over the following five years. Whilst this maintained nominal levels of budgetary assistance (in effect declining by the rate of Australian inflation), all further increases in financial assistance were agreed to occur through project aid (GoA and GoPNG 1989).

<sup>10</sup> It was not until 1997 that a degree of peace was officially restored following the government's controversial hiring of the Sandline mercenary group to remove the leadership of the BRA and secure control over the mine (May 2006:160). Later in 1997, peace talks commenced, brokered by Australia

time of its closure half way through a 30-year lifespan the Panguna mine was generating approximately 35 percent of the country's total exports, 15 percent of government revenue and 8 percent of GDP (Stein 1991:7). As a result, the abrupt cessation of activities had a large destabilising effect on the economy. The effects on the fiscal position of PNG were also compounded by a large drop in cocoa production on the island, also caused by the associated conflict, as well as a large drop in the country's terms of trade for a number of other agricultural products such as coffee, copra and palm oil (Batten 2008). In total, domestic revenue collection declined by 15 percent in per capita terms between 1989 and 1990, and then by a further 4 percent between 1990 and 1991 (Appendix A, Chart 6: Government Expenditure, Domestic Revenue and Total Aid Flows).

Increasing military obligations arising from the Bougainville conflict also placed pressures on the expenditure side of the government's fiscal envelope. Following a small 1.5 percent contraction between 1989 and 1990 amid the drop in revenue, expenditures increased by 12 percent between 1990 and 1991. When combined with the loss in revenue, this led both to a sharp deterioration in the fiscal balance, with the budget deficit increasing from 1.15 percent of GDP in 1989 to 3.5 percent of GDP in 1990. The government's total outstanding debt also rapidly increased, rising in real terms by 14 percent between 1989 and 1990, from K3.2 billion to K3.7 billion.<sup>11</sup>

Further compounding these fiscal pressures was an escalation by Australia of the rate at which it sought to shift the aid program from direct budgetary support to project aid. This stemmed largely from the continuation of the Bougainville crisis, and the Australian Government's desire not to be seen as funding conflict-related expenditures through its aid program (Tulip 2005:1).<sup>12</sup> As shown in Appendix A, Chart 9: Budgetary Support and Project and Program Grants (1974–2008), in the four years following the signing of the original 1989 DCT, the amount of budgetary support dropped rapidly, declining from K140 per capita to K24 per capita, a decline of 82 percent. When combined with the 18 percent decline in per capita domestic revenue generation which occurred throughout this period (falling from K600 per capita to K490 per capita), it meant that at the peak of the Bougainville crisis the PNG Government was increasingly left to finance key sectors with its own resources.

This initiated a number of fiscal responses by the PNG Government. In the first instance was a dramatic increase in levels of borrowing to maintain expenditures in the areas of the budget no longer financed by donors, particularly those related to defence. Therefore, despite falling domestic and budgetary support revenues, there was a large increase in aggregate expenditure levels during this period (Appendix A, Chart 7: Budget Balance (1975–2009)).

Another important feature of this rapid shift away from budget support was that despite aid being increasingly tied to specific development activities, the amount of

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and New Zealand, which eventually led to the establishment of the Autonomous Bougainville Government.

<sup>11</sup> These developments did, however, have little impact on revenue collection as they were only in the early stages of production.

<sup>12</sup> This policy was formalised in a revised DCT signed by the two governments in 1992, which, whilst offering comparable levels of financial support, committed Australia to a complete phasing-out of budget support by the end of the decade in favour of project aid.

aggregate funding for development items such as health and infrastructure remained relatively unchanged between 1989 and 1991, whilst per capita funding for education actually fell. In contrast, funding for the general expenditure category increased rapidly. This illustrates a period of extreme aid fungibility where the PNG Government was forced to withdraw resources from the sectors where donor funding was still present, in order to fund activities related to the Bougainville crisis.

The government's growing levels of deficit financing throughout the crisis also continued to stimulate domestic demand. This contributed to higher levels of import growth, raising the country's already high current account deficit. Under a fixed exchange rate regime, the loss of foreign exchange earnings from the Bougainville mining operations, combined with public sector debt reaching 47 percent of GDP in 1990, meant that the government was facing a considerable shortage of foreign exchange reserves at the end of the decade.

Donors responded to this situation in 1990 by issuing a US\$50 million loan through the International Bank for Reconstruction and Development to cover the government's foreign exchange requirements (World Bank 1990). As part of the conditions associated with this package, PNG was required to adopt its first Structural Adjustment Program (SAP). Under the requirements of the SAP, the government adopted a stabilisation package which devalued the Kina by 10 percent and committed to restrain wage growth, reduce recurrent expenditures and undertake a number of structural reforms aimed at trade liberalisation and the privatisation of state owned entities (*ibid.*). These moves, combined with the commencement of production at the Misima mine and the further development of the Porgera mine, were enough to keep the economy out of sustained recession, with GDP growth rebounding strongly in 1991 following two years of successive contraction in 1989 and 1990.

Following the 1990 SAP agreement, the economic fundamentals of the economy showed signs of improvement. The economy expanded by 9.5 percent in 1991, 13.8 percent in 1992 and by 18.2 percent in 1993. This economic recovery was largely a result of increased resource extraction from new mines that opened in the 1980s, such as Ok Tedi and Misima (BPNG 1998). This improvement in revenue was then enhanced by a substantial increase in resource prices, creating PNG's first major commodity boom. Domestic revenue increased dramatically, growing by almost 40 percent between 1991 and 1995. These rapid revenue increases more than compensated for the further decline in foreign budgetary support which in real per capita terms had decreased by 70 percent between independence and 1995.

In 1993, continued slow progress towards achieving development outcomes and rapidly expanding revenue streams from resource extraction led the government to adopt a premeditated rebuttal of the attempts at fiscal restraint committed to in the 1990 SAP (BPNG 2007).<sup>13</sup> On the revenue side, the government also sought to stimulate the supply side growth of the economy by lowering personal income and

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<sup>13</sup> As quoted in the 1993 budget by the Wingti Government which came to office in July 1992: 'The 1993 budget heralds in something of a new era in fiscal policy in that the revenue and balance of payments constraints have to some extent been relaxed, at least in the short term. The relaxation occurs as a result of receipt from 1993 of very rapidly improving revenues from mining and especially petroleum. Recognition of the new situation has led the government to believe that a somewhat more aggressive fiscal policy is now appropriate' (BPNG 2007).

company tax rates (BPNG 1998). This aggressive fiscal approach led to a planned budget deficit of 3.3 percent of GDP in 1993. However, despite revenue growth of just over 18 percent between 1992 and 1993, continued expenditure overruns by numerous government departments meant the government still failed to remain within its target, recording a final deficit outcome equal to 5.5 percent of GDP.

#### **2.4 Currency Crisis and the Second Donor Bail-Out (1994–97)**

Given PNG's reliance on imports for consumption and investment goods, the stimulatory impact of the government's unrestrained expenditure again led to a significant increase in the demand for foreign exchange during the early 1990s. By the end of 1993, foreign exchange reserves were enough to cover only 1.6 months of total imports (BPNG 2007). Following a considerable drop in global oil prices as well as declining output levels in mining and agriculture, there was a revenue shortfall in 1994, which was in contrast to 1993 (Mawuli 1997:14). This forced the government to undertake unprecedented levels of domestic borrowing to maintain funding for its planned development expenditures. By the middle of the year, the deficit had already exceeded its yearly target, reaching K277 million (*ibid.*:12), and public debt continued to increase rapidly (King and Sugden 1996:17).

The combination of rapidly accumulating debt and dwindling foreign exchange supplies led to another balance of payments crisis towards the end of 1994, as investors withdrew resources and the government struggled to find new creditors.<sup>14</sup> The loss of foreign exchange reserves also forced the Bank of Papua New Guinea to move from a fixed peg to a floating exchange rate regime in October 1994 as it could no longer intervene to defend the value of the Kina (Bowman 2005:5).

Following the election of a new government in September 1994<sup>15</sup> and after that government made a commitment to restoring fiscal discipline, Australia offered loan facilities to the PNG Government if it agreed to another set of SAP conditions set by the World Bank. This caused a degree of political strain between Australia and PNG.<sup>16</sup> However, upon PNG's agreement, the IMF offered US\$111 million in loan facilities to help the government restore macroeconomic stability (IMF 1995:2). The SAP conditions imposed by the World Bank targeted a number of reforms, again focusing on restructuring the public sector, imposing greater constraints on expenditure levels and promoting faster rates of trade liberalisation and tax reform.

The government made some initial attempts at implementing the conditions of the SAP by reining in expenditure and undertaking some modest reforms in import liberalisation and revenue collection (IMF 1998). However, following another short period of fiscal austerity in 1995 and 1996, the reform process halted as a combination of both internal and external factors again shook the economy in 1997. This included

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<sup>14</sup> Treasury T-Bill Rates, for example, reached up to 21 percent in order to attract more capital to fund public debt (Mawuli 1997:12).

<sup>15</sup> This coalition government was led by Sir Julius Chan.

<sup>16</sup> Woolner (1995:21) explains, for example, that Sir Julius Chan had initially been seeking soft loan options from donors and that the government only agreed to the SAP conditions following Australia's refusal to provide unconditional funds. Many domestic PNG leaders then saw themselves as bearing a perceived loss of face with intervention from the World Bank, and blamed Australia for a lack of support.

cyclones, an ongoing drought which had a severe effect on agricultural production as well the closure of the Ok Tedi and Porgera mines due to inadequate water supplies. These natural shocks were also compounded by the Asian financial crisis and the high costs and political instability caused by the Sandline intervention in Bougainville which seriously disrupted business, consumer confidence and macroeconomic stability (Curtin 2001). As a result, real GDP contracted by 6.3 percent in 1997.

This period of fiscal management also marked a considerable shift in the composition of government expenditure away from some key development items. Between the onset of the Bougainville conflict in 1989 and the 1994 foreign exchange crises, education funding dropped from K135 per capita in 1990 to K100 per capita in 1992. This was accompanied by a further halving of investment in infrastructure from K55 per capita in 1993 to just over K20 per capita in 1994. Cutbacks were also made in health, albeit at a more gradual rate from K60 per capita in 1993 to K35 per capita in 1996. In contrast, other general government expenditure increased rapidly from K400 per capita in 1990 to K550 per capita in 1993, which again reflected in part the growing need to fund the government's military operations in Bougainville.

## **2.5 Public Debt Crisis and Changing Aid Modalities (1998–2002)**

Following the elections in June 1997, a new government led by Prime Minister Bill Skate again made commitments to establish more responsible fiscal management. However, uncontrolled spending by a number of ministries (in particular again related to the Defence department) combined with declining government revenue from the effects of drought, and the flow-on effects from the 1997 Asian financial crisis, led to continued deficit financing of the budget. Fiscal discipline continued to slip over the next two years, and, as outlined in Duncan (2002:4), by 1999 “government expenditure was again out of control, the budget deficit was expected to increase sharply, international reserves had fallen sharply and the Kina had depreciated rapidly, and inflation and interest rates had also increased rapidly.” In effect this again brought the country to the brink of bankruptcy.

In August 1999 another government came to power under the leadership of Sir Mekere Morauta. This government also widely committed itself to a more conservative and restrained approach to fiscal policy, immediately adopting a range of measures to improve the transparency of expenditures and responsible payment and acquisition of debt (Standish 2001:286). The first step of the new government was to hand down a supplementary budget which tried to account for the full amount of Government liabilities accrued over the previous years. The situation was critical. Unpaid departmental spending (mainly defence, but also in health and many others) had accumulated to approximately 16 percent of the recurrent budget, or 10 percent of the total budget (BPNG 2007).

The government thus set out to undertake a significant reorganisation of fiscal policy, by increasing personal and corporate tax rates as well as replacing the pre-existing sales tax with an across-the-board value-added tax (VAT) in 1999 to broaden the revenue base — which had become increasingly reliant on commodity and resource revenues throughout the 1990s (BPNG 1999; BPNG 2000). These reforms reassured reluctant international donors of the government's commitment to more responsible fiscal and economic management and resulted in further loans. In mid

2000, the PNG Government received its third SAP loan from the World Bank and the IMF (IMF 2000).<sup>17</sup>

Continued fiscal pressure was, however, placed on the government from declining levels of real GDP by almost 2.5 percent in 2000 following only modest growth of 1.8 percent in 1999. This occurred in spite of relatively strong growth in the agricultural, fisheries and forestry sectors as it was counteracted by a drop in the mineral sector from declining crude oil and copper production (GoPNG, National Budget, 2001). The government also faced high inflation rates of 14.9 percent in 1999 and 15.6 percent in 2000. Despite the fact that this government was focused on the need for balanced budgets in order to curtail central government debt, the 1999 and 2000 final budget outcomes continued to record deficits of 2.7 percent and 1.9 percent of GDP, respectively.

The 1999–2000 public debt crises also had a number of important impacts on funding levels for key service delivery sectors. In 1999, the then Prime Minister Skate turned to a foreign adviser, Dr. Pirouz Hamidian-Rad, and his consultancy firm Ikub, to put together the 1999 budget (Standish 1999). In an attempt to reduce the size of the deficit, the 1999 budget adopted extensive cuts to many government departments<sup>18</sup>, abolishing 15 statutory bodies including a large number of research and educational institutions. It was widely reported during this time, for example, that a number of universities had lost up to 20 percent of their government grants, which led to the closure of entire teaching programs (*ibid.* 1999).

As a result, one of the most dramatic impacts of the 1999 fiscal crisis was to initiate a large decline in the funding of the education sector which fell from its high of K120 per capita in 1999 to a low of K35 per capita in 2004. Infrastructure funding also declined during this period from K45 per capita in 1999 to a low of K15 per capita in 2001, whilst health funding remained relatively constant at just under K40 per capita, albeit still following a path of long-term decline since the mid 1980s. Despite these cuts to education and infrastructure spending, reductions in other general government expenditure were not forthcoming. Indeed, between 1998 and 2000, expenditure in the general category actually rose substantially from K350 per capita to K425 per capita.

Government expenditure increased further in the lead-up to the 2002 election beginning another period of expenditure overshooting. With a contraction of the mining and oil sectors, real GDP growth declined by 0.15 percent adding further pressure to the fiscal position. Given the government's poor credit rating, the 2002 budget deficit had to be funded largely by domestic sources. When combined with foreign debt levels, this meant that total government debt reached a peak of just over 70 percent of GDP in 2002.

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<sup>17</sup> Whilst the IMF loan stipulated strict controls around fiscal and external account management, the terms of the World Bank's Structural Adjustment Program required the government to significantly cut public expenditure on wages and salaries and redirect its expenditure towards priority human development areas (IMF 2000).

<sup>18</sup> The 1999 budget, for example, demanded a 20 percent cut in public service employment numbers with the retrenchment of 7,000 public servants, well beyond the 2000 recommendation made by the World Bank. In the event, however, the large cost of carrying out these retrenchments remained unfunded and only limited reductions in public sector employment numbers took place (Standish 1999).

In response to a growing perception of deteriorating public sector capacity within the PNG bureaucracy and the continued weak demand for economic reform, the late 1990s also saw an expansion of Australian financial assistance given through bureaucratic support, or technical assistance programs (Appendix A, Chart 11: Foreign Grant Aid in PNG: Technical Assistance vs. Other Grants). The Australian aid program also began to respond to criticisms surrounding project aid which, due to its tighter expenditure requirements, had dramatically reduced PNG Government control and ownership over the aid program and had created various political tensions between the two governments (Dorney, 1998; AusAID 2003:51).<sup>19</sup> In particular, an increasing focus began to be placed on delivering program aid and sector wide approaches (SWAp), which attempted to correct many of the inadequacies of project-based aid by delivering resources through ‘single sector policy and expenditure programs, under [recipient] Government leadership, adopting common approaches across the sector, and progressing towards relying on Government procedures to disburse and account for all public expenditure’ (Hamblin 2006:1).

## **2.6 Commodity Boom and Economic Recovery (2003–08)**

On the back of a rise in global commodity and agricultural prices, the economic and fiscal situation improved dramatically from 2003. Strong resource and agricultural sectors flowed on to growth in a number of other industries such as construction and services. This contributed to a 46 percent increase in government revenues between 2003 and 2005 as well as a 120 percent growth in foreign exchange reserves. Real GDP growth was strong, recording 2.1 percent, 2.7 percent and 3.4 percent in 2003, 2004 and 2005, respectively. Inflation also scaled back to a moderate 2.1 percent growth and 1.7 percent growth in 2004 and 2005 following a high of 14.7 percent in 2002.

The culmination of Australia’s growing focus on technical assistance also occurred during this period, with the commencement of the Enhanced Cooperation Package (ECP)<sup>20</sup> in 2004. The implementation of this program followed the adoption of a more general interventionist approach to aid delivery by Australia within the South Pacific region in an attempt to strengthen law and order and to help improve the quality of economic and public sector fiscal management.<sup>21</sup> To achieve this, the ECP augmented AusAID’s pre-existing technical assistance programs by deploying more than 40 Australian government officials across a range of areas in the PNG bureaucracy, based mainly in central government agencies (Morauta 2005:160).

Whilst global commodity prices played a large part in the fiscal and economic progress made since 2002, the deployment of these officers coincided with some

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<sup>19</sup> AusAID (2003:51), for example, notes that project aid in PNG “had created parallel systems, led to negative institutional impacts in the areas of capacity building and priority setting, and reduced prospects for sustainability”. Likewise, Dorney (1998) argues that “[w]ith increasing numbers of Australian officials and consultants delving into all these areas of PNG government responsibility...the range of points of irritation had grown exponentially.”

<sup>20</sup> During April 2008, the ECP was renamed the Strongim Gavman Program (Tok Pisin for ‘strengthening’ or ‘empowering government’) or SGP.

<sup>21</sup> In its initial phase, the ECP also included the deployment of Australian Federal Police to Port Moresby. However, PNG’s Supreme Court ruled in May 2005 that the immunity granted to Australian ECP personnel from prosecution for any misconduct whilst on duty was not consistent with the PNG Constitution. As a result, over 150 Australian police were withdrawn from the program.

improvements in fiscal and economic management. The revenue windfalls of the 1990s, for example, had led to more than proportionate increases in spending, worsening fiscal outcomes and increasing government debt. In the present case, however, a significant proportion of the increased revenues were used to retire government debt — with total liabilities falling from 72 percent of GDP in 2002 to 47 per cent in 2005.<sup>22</sup> Also, for the first time in a number of years, the wages and salaries bill of national departments remained relatively constant, although continued growth over the previous decade meant that it was still consuming almost half of the government's total recurrent expenditures, at 49.3 percent (ADB, *Economic Trends and Prospects in Developing Asia: Papua New Guinea*, 2004).

Real GDP increased by 2.6 percent in 2006, which would have been higher but for a contraction in some agricultural exports which were adversely affected by bad weather.

Continued high prices for copper, gold and oil, as well as for palm oil and logs, then led to larger than expected revenue growth in 2006 and a 1 percent of GDP budget surplus — against an original deficit target of 0.6 percent of GDP (GoPNG, *National Budget 2007*). Total debt fell to just over 42 percent of GDP, whilst external debt was brought down to 21 percent of GDP.

Despite concerns over potentially high spending in the lead-up to the election, the government recorded another budget surplus equal to 1.7 percent of GDP in 2007 on the back of continued oil and mining revenues and a 6 percent real GDP growth rate. This allowed debt levels to fall further to 35 percent of GDP, underwritten by the paying down of external debt in particular. The surplus outcome did, however, mask an almost 20 percent increase in total expenditures for the year as the government sought to allocate additional resources towards investment priorities such as the rehabilitation of public infrastructure, direct investment in economic projects and the repayment of debt.

The impact of the increasing spending of these additional revenues on key development items was, however, limited by implementation issues. Many of the funds went largely unspent — eventually being allocated to various government trust accounts. For example, if unspent funds were treated as savings, the budget surplus in 2007 would have been equal to 11.4 percent of GDP (ADB 2008).

That said, some improvements in funding for key development sectors were made. Infrastructure spending increased from K25 per capita in 2004 to K65 per capita in 2007, health spending increased from K22 per capita in 2002 to K51 per capita in 2007, and education spending increased from a low of K30 per capita to K43 per capita in 2007. Nevertheless, despite comparable real per capita aggregate revenue and expenditure, the funding for these items still remained significantly below those experienced during the 1970s and 1980s and prior to the Bougainville crisis. In the case of education, funding was still half of what it was two decades prior in 1988.

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<sup>22</sup> This was also in compliance with the *Public Finances (Management) Act*, which stated that 90 percent of un-forecasted revenues were used to retire government debt (IMF 2006:31).

In contrast, the general expenditures category continued to increase dramatically reaching record levels with its rise from K315 per capita in 2002 to K570 per capita in 2007. Though, as mentioned above, a large portion of these additional revenues were allocated to debt repayment. These expenditure trends then remained relatively constant in 2008, with continued strong economic and revenue growth — spurred by real GDP growth reaching 6.6 percent from continued high export prices, and the improved level of business confidence arising from more sensible economic management.

## **2.7 Discussion**

By providing foreign financial assistance, both Australia and other donors have tried to influence the public expenditure outcomes of the PNG Government. The period of budgetary support attempted to alleviate the aggregate fiscal constraints facing PNG, in order to reduce its need for deficit financing whilst still allowing the government to make substantial investments in human and physical infrastructure. Frustration at the composition and quality of the PNG Government's expenditure then led to the implementation of earmarked forms of aid delivery such as project aid, and later, program aid. Whilst also alleviating the macro fiscal constraints, this was targeted at ensuring aid funds were spent on purposes in line with the donor's preferences. During the current decade, Australian aid has become increasingly focused on trying to improve the efficiency of the PNG public sector in using both donor and domestic resources to produce desirable social and economic outcomes. This has led to a growing use of technical assistance programs aimed at strengthening state institutions and bureaucratic capacity as well as an adoption of programmatic aid providing sectoral support more integrated with local PNG systems and processes.

The links between this financial support and PNG's fiscal behaviour, economic performance and social welfare outcomes have, however, not been as straightforward as both Australia and other donors may have liked. In terms of alleviating resource constraints, the historical analysis has shown that despite a substantial flow of foreign aid, a persistent lack of fiscal discipline has meant successive PNG Governments have continued to rely on high levels of deficit financing to meet their expenditure requirements in the post-independence period. This has led to the need for three donor bail-outs during the 1990s and early 2000s in order to prevent the collapse of the domestic economy.

The analysis has also shown that despite being a key motivation for switching between budgetary support and project aid, the switch in aid modalities has not led to any significant improvement in the composition of total government expenditures towards key development sectors. In fact, following the switch between the two aid modalities there has even been, in some cases, a further deterioration in the quality and composition of sectoral expenditure levels. This view is supported by AusAID (2003:27) which states that 'analysis of the PNG Government's own funding for different sectors confirms that government funding for key sectors such as infrastructure, health and education was higher when PNG was receiving budget support than in more recent times.'

Of course, domestic budgetary reallocations in response to an inflow of earmarked foreign assistance are not necessarily a problem. Even when aid finance is treated as

being fully fungible, if the recipient's public sector expenditure composition is satisfactory then the donor is likely to contribute to the alleviation of resource constraints in important sectors. However, as PNG continues to fall further behind, both in the region and globally, in achieving key welfare targets such as the MDGs, and as expenditure for key development sectors such as health, education and infrastructure continue to lag behind pre-Bougainville crisis levels, it is clear that the government's expenditure composition requires significant improvements if long-term welfare targets are to be achieved.

This raises obvious questions about how the delivery of aid has encouraged the PNG Government to behave and what foreign aid has ultimately financed. It also raises the question of how this assistance has contributed to the capacity of the PNG public sector to utilise these resources effectively to achieve improvements in social welfare outcomes.

Despite being a central concern of nearly all assessments of aid effectiveness in PNG, to date no studies have attempted to measure the extent to which successive PNG governments have treated the delivery of project and program aid as an augmentation of their own resources or allowed donor funding to simply replace their pre-existing allocations. In addition, despite AusAID's own acknowledgement that sectoral funding outcomes have declined since the introduction of project aid, no studies have sought to measure the extent to which both types of aid have contributed to improving fiscal expenditure priorities. The following section seeks to address these questions.

### SECTION 3: LITERATURE REVIEW

Traditionally the impact of foreign aid on fiscal aggregates has been analysed with the use of Fiscal Response Models (FRMs). This approach is based on a utility-maximising government which sets itself targets for a variety of expenditure, revenue and borrowing outcomes. The government is assumed to maximise its utility by obtaining each one of these fiscal targets during each period. An inflow of aid is then assessed on the basis of its affect on each of the expenditure, revenue and borrowing targets subject to budget and expenditure composition restraints (see Heller, 1975; Binh and McGillivray, 1993; Franco-Rodriguez, McGillivray and Morrissey, 1998; McGillivray and Ahmed, 1999; Mavrotas, 2002; and Feeny, 2006).<sup>23</sup>

The FRM literature has however increasingly been shown to suffer from a number of limitations. Criticisms have included the over-simplification of government fiscal behaviour with utility based on a loss function; a number of studies recording estimates of the models structural parameters which are inconsistent with the theoretical model; and that in practice the fiscal target variables used to specify the government utility function are unobservable meaning that they have to be estimated from past values (White, 1994; McGillivray and Morrissey, 2001; Osei, Morrissey and Lloyd, 2003). Perhaps the most important limitation of FRM's however, is the implicit assumption that Government fiscal behaviour remains static. As argued in McGillivray and Morrissey (2001:30) in reality it would be expected for "the impact of aid on fiscal behaviour to change over time. Indeed, the rationale for attaching policy reform conditions to aid is to alter behavioural responses."

As a response to these criticisms, dynamic Vector Autoregressive (VAR) approaches have become an increasingly popular tool for modelling the relationship between aid and fiscal aggregates. This approach uses multivariate VAR models to estimate long-run (co-integrating) relationships between a system of fiscal variables (Fagernäs and Roberts 2004b).<sup>24</sup> In addition, given the 'atheoretical' nature of VAR models this means that it is not necessary to estimate unknown target values required for the structural representation of FRMs (Osei, Morrissey and Lloyd 2003:2).<sup>25</sup> This approach also facilitates the use of Impulse Response Functions (IRFs) to trace the dynamic effect on the system of an exogenous shock to one of the variables through deviations of the shocked time paths from the expected time path given by the model.<sup>26 27</sup>

<sup>23</sup> This literature has made a number of significant advancements since Heller (1975), including the specification of more realistic budget constraints and incorporating aid into the theoretical model as an endogenous rather than exogenous parameter (Franco-Rodriguez, McGillivray and Morrissey, 1998; McGillivray and Ahmed, 1999); analysing the impacts of disaggregated types of aid (Mavrotas 2002), and developing asymmetric utility specifications which allow for larger losses in utility from revenue under-shooting than over-shooting (Feeny 2006).

<sup>24</sup> See for example Johansen (1988), Johansen and Juselius (1990).

<sup>25</sup> In essence, assumptions about the exogeneity of each of the explanatory variables can also be tested within the VAR using the data, rather than imposed a priori, and can then be applied to simulate the effect of injections of aid via impulse response analysis.

<sup>26</sup> The final advantage of the VAR approach is that it provides a highly tractable framework unlike fiscal response models which require significant effort in determining the structural coefficient estimations from the reduced form parameters (Franco-Rodriguez 2000).

<sup>27</sup> This representation also treats aid and fiscal behavior as interdependent, where an adverse shock on the fiscal side will have follow up impacts on aid. For example, a fall in domestic revenue may generate the need to increase aid inflows. In exchange, there are also feedback effects from aid — the

Although still a relatively new component of the aid effectiveness literature, a number of country-level studies have recorded some important findings. Sugema and Chowdhury (2005) for example find that in Indonesia, project aid allocated to development activities has also been used to increase what they term ‘routine’ expenditures, suggesting that aid has been fungible across the two activities. These authors also find that aid flows have made the Indonesian government fiscally ‘lazy’ as the availability of aid has acted as a disincentive to mobilise domestic revenue through a more efficient and effective taxation system.

Fagnäs and Roberts (2004a) study Zambia between 1964 and 2001<sup>28</sup> showing that an injection of foreign aid is accompanied by sustained higher levels of both recurrent and capital expenditure levels. The authors also find that aid inflows have been associated with lower domestic revenue receipts as well as higher levels of domestic borrowing. This suggests that, rather than using aid funds to stabilise the economy, the government has tended to take the opportunity to relax fiscal and macroeconomic controls as aid has permitted public expenditures to rise well above levels able to be financed from domestic resources.

In contrast, Osei, Morrissey, and Lloyd (2003) find that for Ghana between 1966 and 1998 foreign aid has been associated with reduced domestic borrowing and increased tax effort, combining to increase public spending by more than the initial aid inflows. Fagnäs and Schurich (2004) also find similar results for their study of Malawi over the period 1970 to 2000 concluding that external finance has had a positive long-run impact on the Government’s development budget whilst having a negative impact on levels of domestic borrowing. Although in this case, the aid inflow is found to have had no impact on the domestic tax effort.

One limitation of the component of this literature assessing the impact of aid on ‘development-’ and ‘non-development-’ related expenditures has been its almost exclusively on recurrent and development (capital) budget classifications (see Fagnäs and Roberts 2004a; Fagnäs and Schurich 2004; and Sugema and Chowdhury 2005). In practice, development expenditures often involve a large portion of recurrent costs. Personal emoluments of teachers and doctors are a good example of this as is road maintenance. Likewise, development budgets are not necessarily comprised of expenditures which may be considered pro-poor or even pro-growth. This issue is raised in Feeny (2007) who argues that “donors financing items such as the wages of health and education workers is arguably no less developmental than the construction of schools and hospitals.” In addition, aid has also often led to a need for higher levels of ongoing recurrent expenditures, particularly in Melanesia which has received large proportions of foreign aid in the form of projects (*ibid.*: 448). As such this paper adopts an alternative method of allocating expenditure priorities, using a sectoral rather than functional basis. As shall be explained,

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availability of aid may reduce the need to adjust revenue sources or budgeted expenditures. Thus, rather than the uni-directional relationships posited by FRMs, aid and fiscal policy in the VAR framework interact in a dynamic manner.

<sup>28</sup> In this case the authors use a VAR rather than VECM approach as each of the fiscal aggregate variables were found to be stationary and hence there was no need to estimate a VECM model. Notably, in this case the impulse response analysis can only be used to examine the effects of a one-period increase in aid, whereas in the case of the VEC model used for Uganda and Malawi, only a permanent increase in the level of aid is feasible (as the model is run with differenced variables) (Fagnäs and Roberts 2004a:33).

‘development’ sectors are said to include, health, education, infrastructure and law and order.

Another limitation of both the VAR literature has been its treatment of aid as a homogenous good. As discussed, a key motivation for the shift in Australian financial assistance from budget support to project aid was a perception that untied financial support had been encouraging the growth of unproductive consumption expenditures and reduced the motivation for domestic tax collection. Scaling up the proportion of grants given as project based aid was thus seen by Australia, as a method of ensuring that allocated funds were used on pro-development activities rather than general government consumption. As such, this paper also seeks to address whether different types of aid delivery have led to different fiscal outcomes in post independence PNG.

**SECTION 4: THE MODEL**

The structural representation of the fiscal system can be derived easily from a utility maximising recipient government who derives benefit from allocating government funds across two expenditure priorities in each period  $t$ , those related to development activities,  $E_{D,t}$ , and other general government spending  $E_{G,t}$ . Assuming the government's preferences can be expressed with the familiar Cobb-Douglas utility function this can be written as:

$$U(E_{D,t}, E_{G,t}) = E_{D,t}^\alpha \cdot E_{G,t}^{1-\alpha} \quad (\text{Equation 1})$$

The budget constraint facing this recipient government is determined by its domestic resource collection,  $T_t$ , and foreign grant flows which for the purposes of this paper are said to comprise two types, untied budget support,  $BS_t$ , or as aid earmarked for expenditure on particular activities or sectors of the economy through project or program delivery mechanisms,  $PR_t$ . Shortfalls between expenditures and revenues are then captured by changes in the government's debt levels (borrowing) or alternatively the deficit/surplus,  $D_t$ . As such the budget constraint can be written as:

$$P_{D,t} \cdot E_{D,t} + P_{G,t} \cdot E_{G,t} - (T_t + BS_t + \phi PR_t) = D_t \quad (\text{Equation 2})$$

where the  $\phi$  parameter represents the amount of aid which the recipient government perceives it can use to free up its own revenues to spend on other priorities; that is, lowering taxation and borrowing or altering the expenditure composition between  $E_{D,t}$  and  $E_{G,t}$ .

The government maximisation problem can be written as:

$$\max_{(E_D, E_G) \in \Gamma(G)} U(E_{D,t}, E_{G,t}) \quad s.t. \quad (T_t + BS_t + \phi PR_t) + D_t - P_{D,t} \cdot E_{D,t} + P_{G,t} \cdot E_{G,t} = 0 \quad (\text{Equation 3})$$

which solves to give a system of interdependent fiscal equations relating foreign aid to expenditure levels, changes in public debt, and domestic revenue, according to:

$$\begin{aligned} E_D &= \omega(T, BS, PR, D) \\ E_G &= \tau(T, BS, PR, D) \\ T &= \eta(E_D, E_G, BS, PR, D) \\ D &= \kappa(E_D, E_G, T, BS, PR) \\ A &= \pi(E_D, E_G, T, D) \end{aligned} \quad (\text{Equation 4})$$

## SECTION 5: THE ESTIMATION METHOD

In the case that each variable is non-stationary, and integrated of the same order, typically I(1), this interdependent system of fiscal relationships can then be estimated within the VECM framework (Hamilton 1995:651). In this case, each of the variables are first differenced to establish stationarity and then applied to the VECM framework via Granger's representation theorem (Engle and Granger 1987). The linear combination of these variables are interpreted as long run static equilibrium relationships, (Johansen 1988; and Johansen and Juselius, 1990). Each equation is then estimated with an error correction term which represents the speed of adjustment to out of equilibrium movements in any of the fiscal variables.<sup>29</sup>

For the purposes of estimation, external financing of the budget deficit is taken as the excluded variable from the system of equations. This is to avoid the estimation of an identity which would render any of the VECM results meaningless (Fagernas and Roberts 2004c:38). For this purpose, the choice was made to exclude the external loan financing component of the budget deficit. This choice reflects that aid flows to PNG have been largely dominated by foreign grants rather than loans and are likely to continue doing so into the future, hence the results will have more practical policy implications. As such, the first basic model to be estimated in this paper thus relates total grant flows with domestic revenue, total expenditure and domestic borrowing via:

$$\begin{aligned}
 \Delta DR_t &= c_{10} + \sum_{k=1}^r \alpha_k \varphi_{k,t-1} + \sum_{i=1}^n \alpha_{1i} \Delta DR_{t-i} + \sum_{i=1}^n \alpha_{2i} \Delta Y_{t-i} + \varepsilon_{DR_t} \\
 \Delta DB_t &= c_{20} + \sum_{k=1}^r \alpha_k \varphi_{k,t-1} + \sum_{i=1}^n \alpha_{3i} \Delta DB_{t-i} + \sum_{i=1}^n \alpha_{4i} \Delta Y_{t-i} + \varepsilon_{DB_t} \\
 \Delta GR_t &= c_{30} + \sum_{k=1}^r \alpha_k \varphi_{k,t-1} + \sum_{i=1}^n \alpha_{5i} \Delta GR_{t-i} + \sum_{i=1}^n \alpha_{6i} \Delta Y_{t-i} + \varepsilon_{GR_t} \\
 \Delta EX_t &= c_{40} + \sum_{k=1}^r \alpha_k \varphi_{k,t-1} + \sum_{i=1}^n \alpha_{7i} \Delta EX_{t-i} + \sum_{i=1}^n \alpha_{8i} \Delta Y_{t-i} + \varepsilon_{EX_t}
 \end{aligned} \tag{Equation 5}$$

where  $DR_t$  is domestic revenue collection at time  $t$ ,  $DB_t$  is domestic financing of the budget deficit (domestic borrowing),  $GR_t$  is grant revenue and  $EX_t$  is total government expenditure. For expositional simplicity  $Y_{t-i}$  equals a vector of the other three non-dependant variables such that for the  $DR_t$  equation  $Y_{t-i} = DB_t$ ,  $GR_t$  and  $EX_t$ , where  $i$  is the number of lags chosen within the model. The  $\varphi_{k,t-1}$  term represents the cointegrating equation residuals so that the  $\alpha_k$  terms represent each of the adjustment coefficients. The optimal lag lengths of the model are shown by  $r$  and  $n$ , and chosen by standard diagnostic tests. Each of the error terms is assumed to have the normal white noise characteristics.

The estimated coefficients of VECM do not however incorporate the full flow on effects of changes in each of the variables, given that they are linked both with a lag and contemporaneously. The coefficient of a shock to aid on government revenue, for

<sup>29</sup> The larger the coefficient, the greater the adjustment of the dependant variable to the deviation from a long-run equilibrium in the previous period (Dolado, Gonzalo, and Marmol 2001:638)

example, will capture the direct impact but will not capture the possible effect that this aid shock might have if it leads to an increase in expenditure and the subsequent impact that higher expenditures might have in turn on revenue collection and so on.

These flow on effects of changes in foreign financial assistance are captured with the use of IRFs (Pesaran and Shin 1998). IRFs have the advantage of showing the complete time profile of the effect of a shock to one variable (this study will focus on shocks to aid flows) both on the contemporaneous and future values of all of the other endogenous fiscal aggregate variables. In doing this, they capture both the direct and feedback effects caused by the endogeneity of the variables over time (Osei, Morrissey and Lloyd 2003:13).

The impulse is made through the residual in the aid equation with a one standard error shock. Given that the VECM is estimated in first differences, a shock or impulse to aid is expected to have a persistent impact on the levels of other variables, as the shock itself is permanent in nature (Pesaran and Shin 1998). Whilst the shocks are permanent, provided that they meet standard stability requirements, the impulse responses are eventually expected to converge to a level that is consistent with the estimated long-run, co-integrating relationship estimated in the VECM.<sup>30</sup>

Like FRMs, the VECM procedure also has limitations. This includes the potential to over-parameterise the model with limited degrees of freedom given that each of the variables are deemed to affect each other both contemporaneously and with lags (Fagernas and Roberts 2004a:31). Results obtained with both VAR and VECM have also been shown to be sensitive to the number of lags chosen for the analysis (Stock and Watson 1993), although this can be minimised with the application of a number of tests to determine appropriate lag length. Another limitation of this approach is the lack of confidence intervals for the IRFs. As such, the impulse responses can only be generally interpreted as indicative of the actual impact which may be within a range of that estimated (Fagernäs and Schurich 2004:24).

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<sup>30</sup> A limitation of the impulse response function approach is the potential under-identification of the estimated system given that all effects of omitted variables are thus assumed to be incorporated in the innovations. In this light, the coefficient estimates are likely to represent granger causality rather than pure causality (Engle and Granger 1987).

## **SECTION 6: DATA COLLECTION**

### **6.1 Measuring Aid**

Given that primary interest of this analysis is on the impact of aid on aggregate fiscal performance the decision is made to use those aid flows which appear ‘on-budget’. In PNG, public sector officials are typically unlikely to be aware of the amount of spending in off-budget aid activities and it is therefore assumed that they do not incorporate them into their expenditure and revenue raising decisions. In addition, a large portion of PNG grant aid is received by various Non-government Organisations and other aid charities so would be unlikely to affect budgetary decisions. An underlying assumption of this paper then is that public sector agencies and officials respond to ‘on-budget’ aid flows rather than ‘off-budget’.

This paper draws on grant aid data (disaggregated between budget support and project/program aid) collected from official PNG Government Budget Documents from 1974 to 2008. This 35-year data set matches or exceeds the degrees of freedom offered in most other papers within the literature.

### **6.2 Measuring Development and Non-Development Expenditures**

This paper focuses on the classification of Government expenditure according to its function. This requires an extensive data collection exercise. In the first instance the IMF Government Financial Statistics (GFS) (2008) database was used to allocate spending to each of the four development expenditure categories, health, education, infrastructure and law and order, with all remaining spending being placed into the ‘general’ category.

Secondly, to fill in a number of years of missing data, the functional allocations from Volume II of the PNG National Budget were also used to allocate recurrent expenditures into the same classification system as used in the IMF GFS database. These data were then added to the expenditure from the IMF dataset and classified into two categories, ‘development’ expenditures and ‘general’ expenditures.

A difficulty of this approach is that functional allocations are not available for Development Budget expenditures. As such, these expenditures were allocated from Departmental records available in Volume III of the Budget documents. In this case, development expenditures for departments involved in the delivery of each one of the four development categories were added to the recurrent budget allocations to generate total development and general expenditures. A full listing of both Recurrent and Development Budget allocations can be found in Appendix B.

### **6.3 Measuring Domestic Revenue and Public Debt Levels**

For consistency, domestic revenue and public debt data is also taken from PNG National Budget documents. Domestic revenue includes all revenue derived from company, personal and value-added taxes as well as import and excise duties. Public debt includes the sum of all domestic and foreign debt liabilities owed by the Government to both private and concessional lending sources. All variables are measured in constant 2006 Kina and taken as a percentage of GDP.

## 6.4 Descriptive Statistics

**Table 1: Summary Statistics for Key Variables**

Variable	Description: <i>All Variables expressed as a percent of GDP</i>	Obs	Mean	Std. Dev.	Min	Max
ex	Total Expenditures	35	31.365	3.710	24.248	38.634
ex_d	Total Development expenditures	35	11.683	2.491	7.352	15.949
ex_g	Total General Expenditures	35	19.683	3.558	13.407	28.668
dr	Domestic Revenue	35	22.038	4.927	10.472	33.169
gr	Grant Revenue	35	7.682	3.434	2.448	14.672
gr_bs	Grant Revenue – Budget Support	35	5.728	5.035	0.000	14.672
gr_pr	Grant Revenue – Program Support	35	1.954	2.618	0.000	8.406
pd	Public Debt	35	43.784	12.715	24.779	71.771
db	Domestic financing of budget deficit	35	0.284	3.089	-8.716	5.956

Table 1 provides the descriptive statistics of each of these variables along with their respective abbreviations. The average level of total government expenditures in post independence PNG is 31 percent of GDP of which approximately 12 percent of GDP has been allocated to what have been termed development expenditures with the remaining 20 percent of GDP being allocated to the general category. PNG's deficit bias can be seen by comparing the sum of average domestic revenue and grant revenue levels with total expenditure levels, which leaves a difference of approximately 2 percent of GDP. The average level of public debt is 43 percent of GDP, peaking at almost 72 percent of GDP in 2002. This largest decline in domestic debt liabilities which occurred in a single year is 8.7 percent of GDP whilst the biggest increase in domestic borrowing is 6 per cent GDP. Of this Government debt 67 percent has been held by foreign creditors on average whilst the remaining 33 percent has been held domestically.

**SECTION 7: ESTIMATION RESULTS**

The first step in the analysis is to establish whether the variables are stationary or non-stationary. For this purpose the Augmented Dickey-Fuller (ADF) and Phillips-Perron tests are used. The two tests produce supporting results. The ADF test results are presented in Table 2.<sup>31</sup> The results show that all the variables are found to be stationary at the 95 percent significance level in their first difference form with the assumption of a constant only. All variables are non-stationary and integrated of order 1, I(1). It is therefore appropriate to estimate models that include variables in their first differenced form through the VECM procedure.

**Table 2: Stationarity Test for Key Fiscal Variables**

Variable	ADF Test Stat	ADF Critical Value	ADF <i>p-value</i>	ADF Test Stat after 1 <sup>st</sup> Diff	ADF Critical Value after 1 <sup>st</sup> Diff	ADF <i>p-value</i> after 1 <sup>st</sup> Diff	Stationary
ex	-2.242	-2.975	0.191	-6.120	-2.978	0.000	I(1)
ex_d	-1.605	-2.975	0.481	-6.815	-2.978	0.000	I(1)
ex_g	-1.565	-2.975	0.501	-5.637	-2.978	0.000	I(1)
dr	-2.073	-2.975	0.255	-6.872	-2.978	0.000	I(1)
gr	-2.060	-2.975	0.260	-5.776	-2.978	0.000	I(1)
gr_bs	-1.802	-2.975	0.379	-4.143	-2.978	0.001	I(1)
gr_pr	-0.896	-2.975	0.789	-7.090	-2.978	0.000	I(1)
db	-1.543	-2.975	0.512	-4.784	-2.978	0.001	I(1)

Appropriate lag length is chosen on the basis of the Akaike Information Criterion (AIC) and Hannan-Quinn Information Criteria (HQIC) (Gujarati 2003:537). In the current case, both AIC and HQIC are minimised with the use of 2 lags. The Johansen trace statistic test is then used to determine the co-integrating rank of the model.<sup>32</sup> The trace test rejects the null hypothesis of no co-integrating vectors but fails to reject the null hypothesis of 1 co-integrating vector. That is to say, that there exists one linear combination of the variables. The results of the co-integrating relationship amongst the variables within the VECM framework are presented in Table 3.

**Table 3: Co-integrating Relationships for Model I**

Normalised on Domestic Borrowing	Coefficients
<b>DB</b>	1
<b>GR</b>	1.715*** (0.377)
<b>DR</b>	0.973*** (0.227)
<b>EX</b>	-1.097*** (0.241)
Standard errors in parenthesis. * p<.1; ** p<.05; *** p<.01. Johansen normalisation restriction imposed on domestic borrowing.	

<sup>31</sup> Phillips-Perron tests available upon request.

<sup>32</sup> This process is based on Johanson’s trace test statistic which states that if the test statistic is greater than the Johanson critical value, the null hypothesis that there are  $\nu$  co-integrating vectors is rejected in favour of the alternative that there are more than  $\nu$  (Johanson, 1988; Maddala and Kim, 1998:211). All test results available upon request or can be found in Batten (2009).

In accordance with the VECM procedure the co-integrating relationship is normalised, in this case with domestic financing of the fiscal deficit taking on a unitary value (Lutkepohl 1991). A number of important results are found. Grant revenue has a highly significant positive coefficient estimate, suggesting that over the long term it has tended to act as a substitute for government borrowing. Similarly, higher levels of domestic revenue collection are also associated with reduced levels of public debt. Lastly, the expenditure variable is negative and also highly significant indicating that higher long run levels of government expenditure have been associated with higher levels of public debt.

Table 4 presents the results of the VECM coefficients. The estimated coefficients for the error correction term reveal which of the variables adjust to correct imbalance in the fiscal situation whilst the variable coefficients show the short-run effects of changes in the explanatory variables on the dependant variable.

**Table 4: VECM Results for Model I**

	1/D DB	2/D DR	3/D GR	4/D EX
<b>L.DB</b>	0.081 (0.203)	-0.076 (0.150)	0.066 (0.078)	-0.163 (0.165)
<b>L.GR</b>	-0.285 (0.570)	-0.571 (0.421)	0.093 (0.220)	-1.175** (0.462)
<b>L.DR</b>	-0.130 (0.367)	-0.173 (0.271)	0.157 (0.142)	-0.497 (0.299)*
<b>L.EX</b>	-0.144 (0.306)	-0.005 (0.226)	0.023 (0.118)	0.381 (0.250)
<b>L.<math>\pi</math></b>	-0.751** (0.317)	-0.049 (0.234)	-0.105 (0.122)	0.438* (0.258)
<b>NormalityTest (Jarque-Bera) <math>\chi^2</math> (Prob&gt; <math>\chi^2</math>)</b>	0.965 (0.617)	3.805 (0.149)	0.057 (0.971)	1.509 (0.470)
<b>All- Normality <math>\chi^2</math> (Prob&gt; <math>\chi^2</math>)</b>	3.937 (0.137)	<b>Autocorrelation <math>\chi^2</math> (Prob&gt; <math>\chi^2</math>)</b>	<b>- Lag 1 - 10.747 (0.824)</b>	<b>- Lag 2 - 13.020 (0.671)</b>
p<.1; ** p<.05; *** p<.01. All the estimations are made with an unrestricted constant in the model. Autocorrelation tests H <sup>0</sup> : no autocorrelation at lag order. As such fail to reject the null hypothesis of no autocorrelation.				

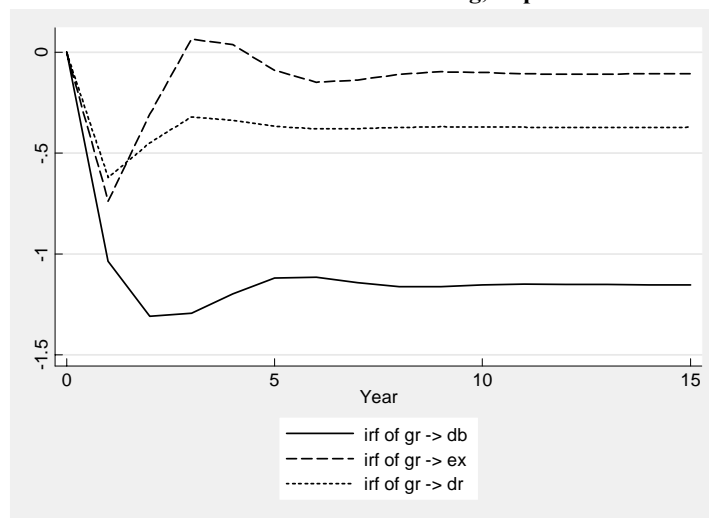
The Jarque-Bera method is used to test for normality assumptions. This technique tests the null hypothesis that the data are from a normal distribution, with a rejection of the null indicating that the data are not from a normal distribution (Jarque and Bera 1980).<sup>33</sup> In each case, the test fails to reject the null hypothesis at a 95 percent confidence level. Similarly the tests for residual autocorrelation in each of the equations as well as for the entire model fail to reject the null hypothesis of no autocorrelation.

<sup>33</sup> This null hypothesis is a joint hypothesis of the skewness being zero and the excess kurtosis being zero, since samples from a normal distribution have an expected skewness of 0 and an expected excess kurtosis of 0 (which is the same as a kurtosis of 3). As the definition of *JB* shows, any deviation from this increases the *JB* statistic (Jarque and Bera 1980).

Adjustment to fiscal imbalances have occurred primarily through changes in the expenditure equation, and to a lesser extent domestic financing of public debt. In both these cases the lagged error correction terms,  $L.\pi$ , are significant, whereas the domestic revenue and grant revenue coefficients are insignificant at a 90 percent confidence level. As discussed, these variables capture the adjustment of the relevant variables towards the long-run equilibrium. Hence in this representation, expenditure levels and following this debt levels are the key variables which adjust in the short term to correct imbalances in the budget according to Equation (6). As shall be discussed, this is an intuitive result with expenditure being one of the most flexible and easily adjustable fiscal instruments at the government's disposal. The lagged grant revenue variable is also significant but negatively signed. This suggests that in the short term at least grant revenues have tended to replace rather than augment domestic expenditure levels.

Whilst the VECM results estimate the direct impacts between each of these variables, in practice, there are likely to be important flow on effects occurring within the budgetary cycle. The total long term impact of an increase in grants is now assessed with the use of the IRF analysis discussed. This approach captures both the direct and indirect effects as well as those attributed to the error correction mechanism.

**Chart 1: Model I IRF – Domestic Borrowing, Expenditure and Domestic Revenue**



**Source:** Author's Calculations

Chart 1 illustrates the impact of an increase in grants on domestic financing of public debt, expenditures and domestic revenue collection. Here the one standard deviation shock to grants leads in the first instance to a unanimous decline in all three of the response variables. Following this the effect of the grant impulse continues to have a sustained negative impact on levels of domestic revenue mobilisation. This suggests that grant aid has acted as a substitute for domestic revenue collection, with a one standard deviation impulse to aid leading to an approximately half sized fall in taxation receipts after 5 years. The negative impact of grants on spending is short lived, with the effect eventually stabilising after approximately 5 years at a near zero value, after a short positive period. The concurrent negative impact of aid on domestic borrowing however suggests that a large portion of the grant impulse is also allocated

towards lowering domestic financing requirements of the fiscal deficit. In this sense, once all of the knock on effects within the fiscal system have stabilised, the shock to grants acts primarily to replace domestic revenue collection and lower public debt levels, rather than augment levels of government expenditure.

### 7.1 Model II – Fiscal Aggregates and Expenditure Composition

The second model considers the impact of grant revenues and domestic revenues on the composition of fiscal expenditures between the development and general expenditure categories. Where  $EX\_D_t$  is the development expenditures category,  $EX\_G_t$  is the general expenditures category, and all the other variables are as previously defined. The AIC and HQIC again suggest that the model should again be estimated with two lags, whilst the Johansen procedure rejects the null hypothesis of no co-integrating vectors but fails to reject the null hypothesis of one co-integrating vector. The co-integrating relationships amongst the variables, after again being normalised on domestic borrowing within the VECM framework, are defined in Table 5.

**Table 5: Co-integrating Relationships for Model II**

Normalised on DB	Coefficients
DB	1
GR	1.310*** (0.335)
DR	0.609 (0.206)***
EX_D	-1.107*** (0.244)
EX_G	-0.508* (0.270)
Standard errors in parenthesis. * p<.1; ** p<.05; *** p<.01. Johansen normalisation restriction imposed on domestic borrowing.	

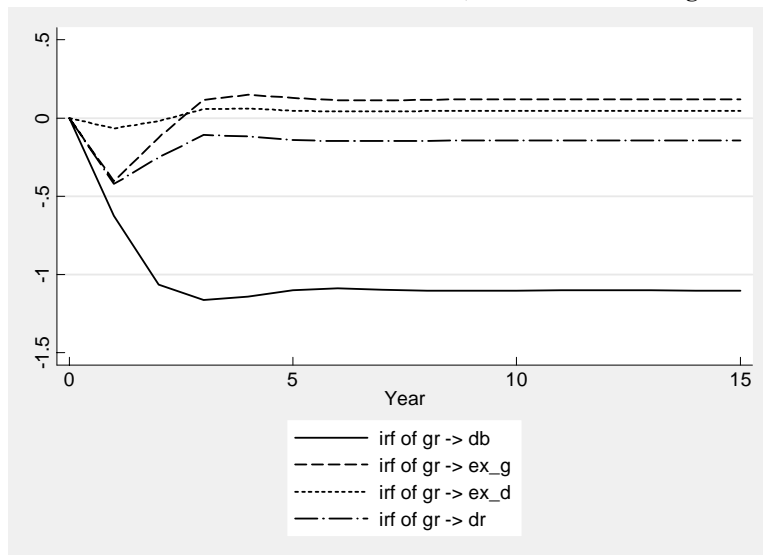
The results support those obtained for the co-integrating relationships in Model I. Both grant and domestic revenues have a highly significant negative association with long run levels of public debt. In addition, both of the expenditure variables have a highly significant positive relationship with long run levels of public debt. In short, over the long term more fiscal resources contribute to lower levels of borrowing whilst higher levels of spending have had a positive relationship with debt levels. The short-run VECM coefficients are now presented in Table 6.

**Table 6: VECM Results for Model II**

	1/ <b>D GR</b>	2/ <b>D DB</b>	3/ <b>D DR</b>	4/ <b>D EX D</b>	5/ <b>D EX G</b>
<b>L.DB</b>	0.053 (0.078)	0.046 (0.199)	-0.135 (0.152)	-0.009 (0.088)	-0.188 (0.133)
<b>L.GR</b>	0.223 (0.235)	0.023 (0.601)	-0.539 (0.459)	-0.220 (0.267)	-0.658* (0.400)
<b>L.DR</b>	0.162 (0.145)	-0.064 (0.372)	-0.269 (0.284)	0.027 (0.165)	0.614 (0.248)**
<b>L.EX_G</b>	0.112 (0.131)	0.130 (0.336)	0.125 (0.257)	0.073 (0.149)	0.452** (0.224)
<b>L.EX_D</b>	-0.192 (0.204)	-0.690 (0.523)	-0.187 (0.399)	-0.119 (0.232)	0.014 (0.349)
<b>L.π</b>	0.0358 (0.040)	0.251** (0.103)	-0.046 (0.079)	-0.059 (0.046)	0.099 (0.069)
<b>Normality Test (Jarque-Bera)</b> $\chi^2$ (Prob> $\chi^2$ )	1.712 (0.424)	0.167 (0.920)	2.133 (0.344)	2.004 (0.367)	2.897 (0.234)
<b>All Normality</b> – $\chi^2$ (Prob> $\chi^2$ )	8.913 (0.540)	<b>Autocorrelation</b> $\chi^2$ (Prob> $\chi^2$ )	<b>- Lag 1 –</b> 28.882 (0.268)	<b>- Lag 2 –</b> 25.746 (0.421)	
p<.1; ** p<.05; *** p<.01. All the estimations are made with an unrestricted constant in the model. Autocorrelation tests H <sup>0</sup> : no autocorrelation at lag order. As such fail to reject the null hypothesis of no autocorrelation.					

As in the previous model, the adjustment parameter in the public debt equation is significant and positively signed. This suggests that the PNG Government has tended to favour varying levels of public debt in order to adjust to short term fiscal imbalances. The implication here is that government has found it easier, or has been more willing, to incur variations in levels of domestic debt than it has for each of the other fiscal aggregates. This may have occurred, for example, by absorbing shortfalls in domestic revenue collection by increasing the deficit rather than reigning in expenditure levels.

Each of the long term relationships between the fiscal and aid variables are now again shown with the use of generalised and cumulative impulse response functions which illustrate the full knock on effects of an aid impulse. Chart 2 shows the impact of a one standard deviation shock to grant revenue on domestic revenue, domestic borrowing and both of the expenditure categories.

**Chart 2: Model II IRF – Domestic Revenue, Domestic Borrowing and Government Expenditures**

**Source:** Author's Calculations

The results for domestic financing of public debt and domestic revenue are comparatively similar to those established within Model I. A one standard deviation shock to grant aid leads to a decline both in levels of domestic borrowing and in domestic revenue mobilisation. Again this suggests that while a portion of aid is treated as a substitute for further government borrowing that it has also encouraged the PNG Government to place a lower tax burden on its domestic constituents.

Both the general and development expenditure variables also follow a similar time path to that shown for total expenditures in Model I with an initial small decline followed by an eventual stabilisation at approximately zero. In this case however, both the variables are slightly positive although this effect is too small to be deemed significant in the absence of reliable confidence intervals.

Also of note is the larger initial decrease in the general expenditure category than the development expenditure category, suggesting that in the short term at least the provision of foreign grants helps to improve the composition of PNG Government expenditures towards key development items. Over time however the two shocks converge both stabilising at a near zero but still positive value after approximately 5 years.

An explanation for this result is that initially, aid is effective at improving the composition of government expenditures towards key development sectors. Conditionality and incentive effects help to constrain general expenditures whilst a large portion sticks to the development category. Then over time, the recipient bureaucracy incorporates these additional financial flows into its budgetary decision making process. Following this, a reallocation of domestic funds occurs which means aid funds lead to relatively even increases across all types of government expenditure. In essence, donor attempts to improve the composition of PNG expenditures are successful in the short, but not the long term.

**7.2 Model III – Fiscal Aggregates, Expenditure Composition and Aid Modalities**

The third model now separates the grant aid variable into two components, budget support and project or program aid to determine whether they have had differential impacts on the contribution of grant aid to each of these fiscal relationships where  $GR\_BS_t$  is grant revenue given in the form of budget support and  $GR\_PR_t$  is grant revenue given in the form of project and program aid. All other variables are as defined previously.

The HQIC criteria suggests that the model should be estimated with only a one year lag structure, whilst the AIC suggests that it should be estimated with a three year lag. The decision is made to use the one year lag structure both to preserve degrees of freedom within what is potentially an over-paramatised model, given the limited degrees of freedom available and the six explanatory variables. This decision was also made on the basis that the one lag model produces a trace test statistic supporting one co-integrating relationship amongst the variables, whilst the three lag model suggests that there are three.<sup>34</sup> Nevertheless, without any base results to compare them to, the impacts of budget support vis-à-vis project and program aid on each of these fiscal variables should still be taken as preliminary rather than conclusive.

**Table 7: Co-integrating Relationships for Model III**

<b>1/Normalised on Domestic Borrowing</b>	<b>Coefficients</b>
<b>DB</b>	1
<b>GR_BS</b>	2.546*** (0.843)
<b>GR_PR</b>	-1.353 (1.009)
<b>DR</b>	1.902*** (0.560)
<b>EX_D</b>	-3.364*** (0.811)
<b>EX_G</b>	-0.515 (0.606)
Standard errors in parenthesis. * p<.1; ** p<.05; *** p<.01. Johansen normalisation restriction imposed.	

The co-integrating relationship is again normalised on domestic financing of increases in domestic debt. In this case, disaggregating the grant aid variable suggests the budget support component has been the major contributor to reduced levels of domestic borrowing, with the project aid variable recording an insignificant long run co-integrating coefficient. Both expenditure categories also again have negative coefficient estimates, supporting the results of the previous two models that higher levels of spending have a positive relationship with domestic borrowing. Also in line with the previous two models, higher levels of domestic revenue have a negative relationship with debt levels. This indicates that increases in domestic resources are not entirely allocated to higher levels of expenditures, but rather to also lower

<sup>34</sup> This provides some evidence that the three lag model adds to the problems of inconsistency in results when VECM models suffer from over-paramatisation.

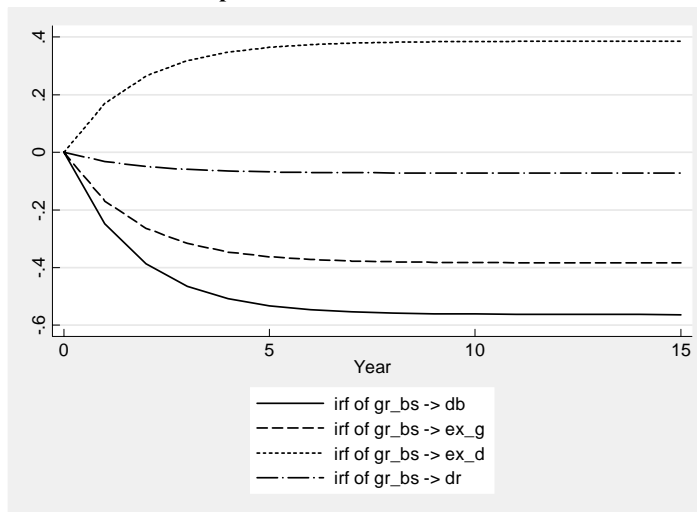
domestic borrowing. Table 8 presents the VECM coefficients to analyse the short run dynamics of the model.

**Table 8: VECM Results for Model III**

	1/D_DR	2/D_GR_BS	3/D_GR_PR	4/ D_DB	5/D_EX_D	6/D_EX_G
<b>L.<math>\pi</math></b>	-0.012 (0.047)	-0.027** (0.013)	0.044** (0.020)	-0.097 (0.067)	0.067*** (0.025)	-0.066 (0.043)
<b>Normality Test (Jarque-Bera)</b>						
Chi-2 (Prob>Chi2)	0.692 (0.707)	2.825 (0.243)	1.191 (0.551)	1.250 (0.535)	0.677 (0.712)	0.117 (0.943)
<b>All Normality</b>		<b>Autocorrelation</b>	<b>- Lag 1 -</b>	<b>- Lag 2</b>		
Chi-2 (Prob>Chi2)	6.753 (0.873)	Chi-2 (Prob>Chi-2)	34.343 (0.547)	- 37.930 (0.381)		
*p<.1; ** p<.05; *** p<.01. Autocorrelation tests H <sup>0</sup> : no autocorrelation at chosen lag order. As such fail to reject the null hypothesis of no autocorrelation.						

Given the model is estimated with one lag only the error correction terms are presented. These coefficients once more reveal that expenditures have been a key adjustment mechanism within this system of fiscal equations. It also appears that the majority of this adjustment has occurred through the development expenditure variable, recording a highly significant positive coefficient estimate whilst the general expenditure variable is insignificant. In addition, with the disaggregation of aid flows the estimation results show that both project aid and budget support have responded to short term imbalances in PNG's fiscal position. For instance, this may occur when shortfalls in domestic revenue and looming public debt crisis are met with injections of additional donor assistance. Chart 3 now shows the impact of a one standard deviation shock to budget support on each of the fiscal variables.

**Chart 3: Model III IRF – Impact of Budget Support on Domestic Revenue, Domestic Borrowing and Government Expenditures**

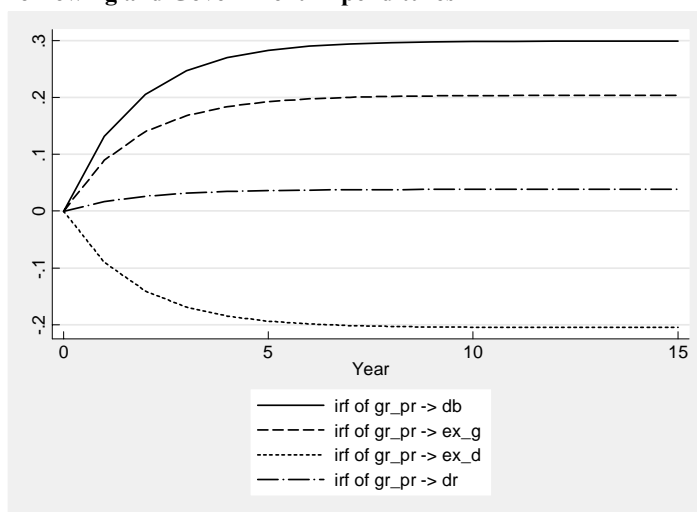


**Source:** Author's Calculations

As in the previous two models, the shock to foreign grants (in this case in the form of budget support) has an unambiguous negative relationship with levels of domestic borrowing. In this case however, rather than eroding tax collection, budget support is shown to have an almost benign impact on levels of domestic revenue. The IRF also shows that an injection of budget support has a significant impact on improving the composition of government spending by increasing the amount of funds going to key development sectors whilst reducing the amount of spending in the general expenditure category. This will be discussed in more detail shortly.

Chart 4 shows the impact of a one standard deviation shock to grant revenues in the form of project and program aid. In contrast to budget support, the project aid impulse leads to higher levels of spending in the general but not development expenditure category. In fact, the project aid impulse leads to a small decline in the amount of government funds allocated to key development activities. Also in contrast to budget support, the project aid impulse raises levels of public debt, with the effect stabilising after approximately 7 years, with a close to zero long run impact on domestic revenue collection.

**Chart 4: Model III IRF – Impact of Project and Program Aid on Domestic Revenue, Domestic Borrowing and Government Expenditures**



Source: Author’s Calculations

One explanation for this is that project aid has encouraged the PNG Government to undertake more than proportional resource allocations away from donor financed development sectors and towards general government consumption expenditure. This effect may be akin to what McGillivray and Morrissey (2001) refer to as ‘aid illusion’. This is the situation where with imperfect information flows and weak expenditure management systems aid inflows can be accompanied with misperceptions or ‘illusions’ regarding either their real or nominal value, and the spending conditions attached (McGillivray and Morrissey 2001:3). In the case of PNG for example, imperfect budgetary processes may overvalue the contribution of aid to a specific project. In addition, the presence of increased donor activity within a sector too may also encourage the PNG Government to believe it can concentrate more of its own resources elsewhere. Higher levels of expenditure for general consumption activities may then subsequently drive the need to increase the Government’s recourse to domestic borrowing to fund its deficit financing.

Another explanation for this effect is that the large increase in project and program aid during the 1990s coincided with the deteriorating fiscal discipline of government and a rapid build up in public debt. This in turn may have forced the PNG Government to extract additional resources from key development sectors, which the VECM results show are a key adjustment mechanism to fiscal imbalances.

## SECTION 8: CONCLUSION

This paper analysed the impact of foreign grant aid on the fiscal behaviour of the PNG Government since independence. The analysis drew upon the VECM approach to estimate these relationships which was found to be appropriate with the use of Grangers representation theorem and the non-stationary nature of the data. This approach offered a number of advantages over traditional fiscal response models which have had difficulties in determining appropriate target variables and which are limited in their ability to consider long run dynamics. This is the first study to apply these methods to the case of PNG with an extensive data collection exercise allowing the analysis of the relationships between grant aid, domestic debt, domestic revenue and development expenditure allocations. This is also the first such study to use this approach to consider the potentially divergent impact of budget support grants vis-à-vis project aid grants on the fiscal behaviour of government. In doing this a number of important results are found.

Firstly, there is consistent evidence that expenditure and domestic debt have acted as key shock absorbers within the PNG fiscal system, whereas domestic revenue collection and grant aid have tended to be independent of the prevailing fiscal situation. In particular, the PNG Government appears to have been most willing to adjust levels of expenditure in a number of key development sectors in response to fiscal imbalances. This suggests for example that during periods of expenditure contraction the PNG Government has tended to prioritise less what have been termed development related expenditures whilst maintaining those classified in the general category.

Secondly, aid has had an unambiguous negative effect on the accumulation of additional domestic debt. A positive shock to grant aid lowers domestic borrowing in both the short and long term. This suggests that foreign grants have acted as an important substitute to government borrowing across the post independence period.

Grant aid has however also been associated with lower long term levels of domestic revenue mobilisation. As a result of the PNG Government's preference for using aid grants to substitute for public debt and to replace domestic revenue collection, its net effect on aggregate expenditure levels has been close to zero. Preliminary evidence was also presented to suggest that these effects have varied considerably across different types of grant aid delivery. Budget support in particular has a strong relationship with the lower domestic revenue and lower domestic borrowing effects, although it also supports higher rates of expenditure in the development expenditures category. In addition to the grant inflow, this was financed from budget supports impact on lowering the proportion of funds being allocated to general government spending items. Project aid on the other hand has a strong positive relationship with higher rates of general government expenditure which also corresponds with a positive impact on domestic debt and revenue levels, although both of these are comparatively small.

These results add further insights into a number of the contentions discussed at the beginning of this paper. The accusation that, grant aid, and in particular budget support, has undermined the PNG Government's incentive to expand its own tax collection appears well founded. Higher levels of grants are strongly associated with

lower levels of domestic revenue mobilisation, reflecting a preference by the PNG Government to continue drawing on foreign resources rather than tax its own constituents. Another explanation for this may also be due to some of the conditionality effects of aid which at various stages during the 1990s in particular pushed the PNG Government towards external sector liberalisation and as such may have contributed to a decline in tax revenues in the form of trade tariffs and excise duties.

The claim that grants have supported higher overall levels of unproductive government expenditure is however, not supported by the data. The PNG Government has displayed a clear preference for using additional grant resources to lower its levels of domestic borrowing rather than funding new expenditure items.

History may also play an important role in explaining some of these results. Development expenditures were indeed highest when budget support was at its peak during the late 1970s and throughout the 1980s. Subsequently with the onset of project and program aid during the 1990s they began a long term decline reaching a peak low during the late 1990s when the economy was facing its third fiscal crises of the decade. Hence the positive impact of budget support and the negative impact of project aid on development expenditures. Likewise this shift in aid modalities also corresponded with a large increase in the accumulation of public debt following the onset of the Bougainville crisis in 1989 and the lax fiscal discipline of the 1990s.

Some caveats are worth noting about the reliability and usefulness of these results. As discussed, the VECM approach has a number of limitations including the potential to over-parameterise the model which can lead to sensitive results in terms of lag length. This is particularly the case for Model III which included six endogenous variables each interacting contemporaneously and with one lag for a 35-year sample. This level of disaggregation in both the expenditure and aid variables may place an excessive burden on the explanatory power of the data. It is for this reason that these results are referred to as preliminary. Nevertheless, whilst aware of the constraints, the consistency of the results across all three specifications adds a degree of confidence in the core findings of this paper.

The results reveal that there is much scope for foreign financial resources to be managed more effectively by both donors and the PNG Government. PNG's continued narrow tax base adds significance to the tendency of grant aid to lower the Government's domestic revenue collection efforts. Higher priority should be placed on supporting taxation collection in addition to the current focus on the expenditure side of fiscal operations. The preference for using grant inflows to lower domestic borrowing requirements rather than spending also highlights the impact of aid on increasing the aggregate availability of domestic resources depends first and foremost on the behaviour of the PNG Government, not on the priorities of donors.

As donors continue to attempt to influence the financing of additional service delivery expenditure in PNG, their central concern must therefore remain focused on establishing a cooperative dialogue over the PNG Government's budgetary priorities. It is through the quality of their advice and the persuasion of their arguments, rather than the spending power of their chequebooks, that donors are likely to exert the most influence over public sector expenditure management in PNG.

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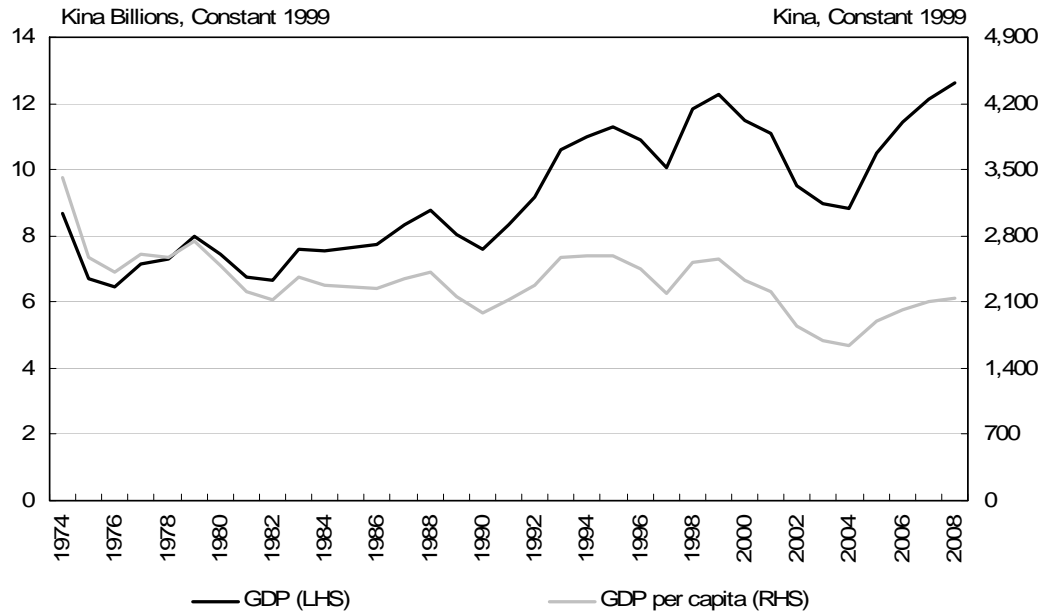
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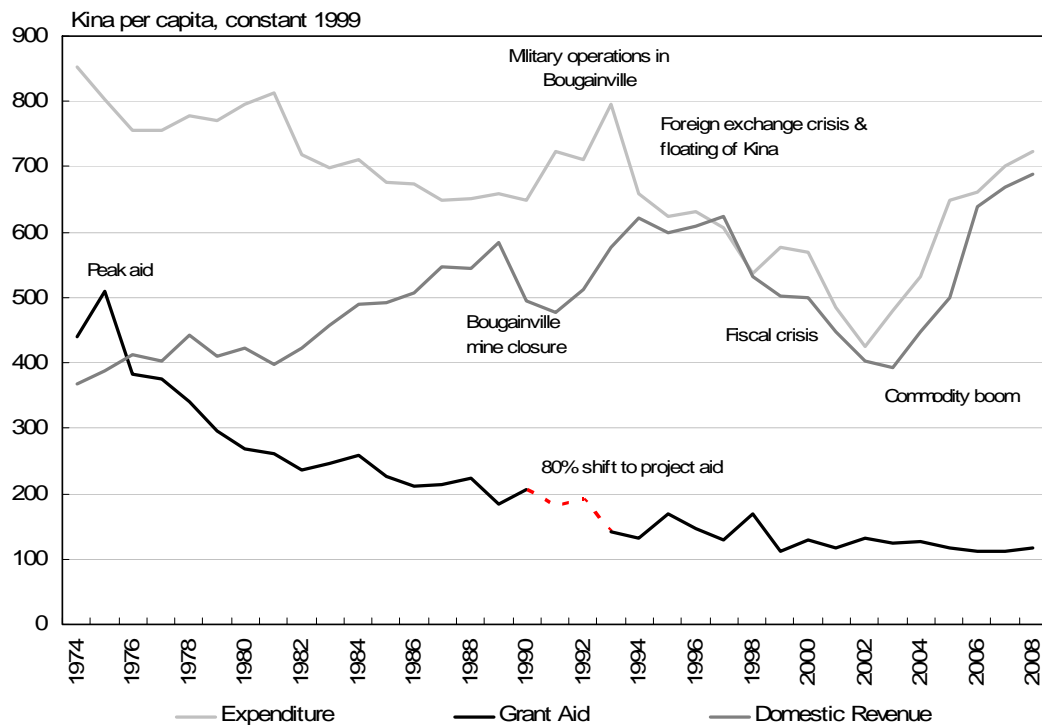
**APPENDIX A: FISCAL HISTORY CHARTS**

**Chart 5: GDP and GDP Per Capita (1974–2008)**



**Source:** Government PNG Budget Documents (various years), see Appendix B.

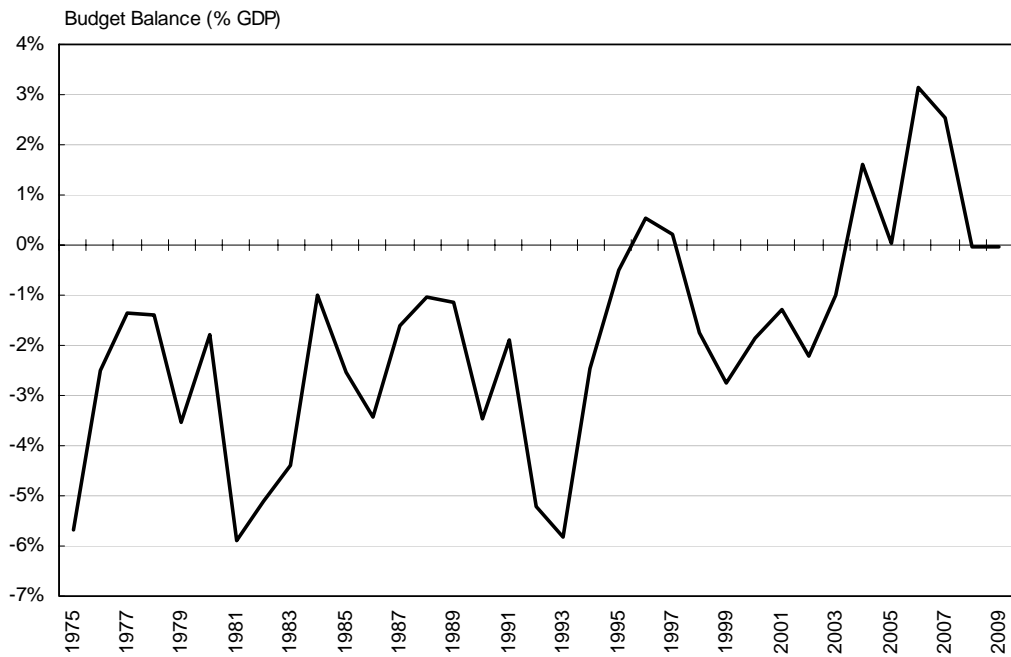
**Chart 6: Government Expenditure\*, Domestic Revenue and Total Aid Flows**



**Source:** Government PNG Budget Documents (various years), see Appendix B.

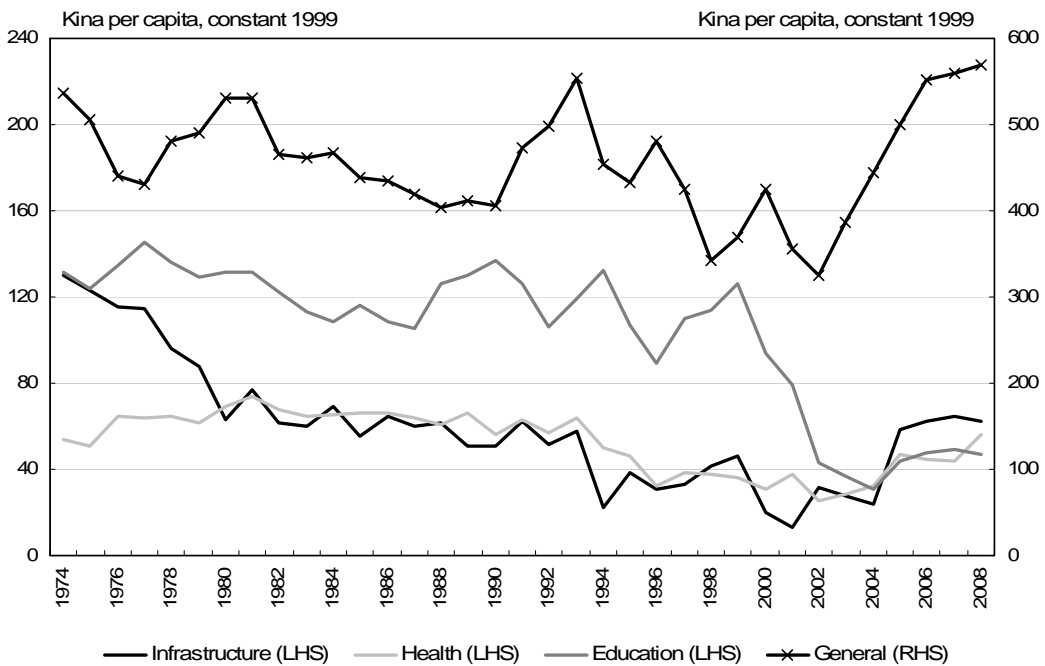
\* Excluding debt repayment.

**Chart 7: Budget Balance (1975–2009)**



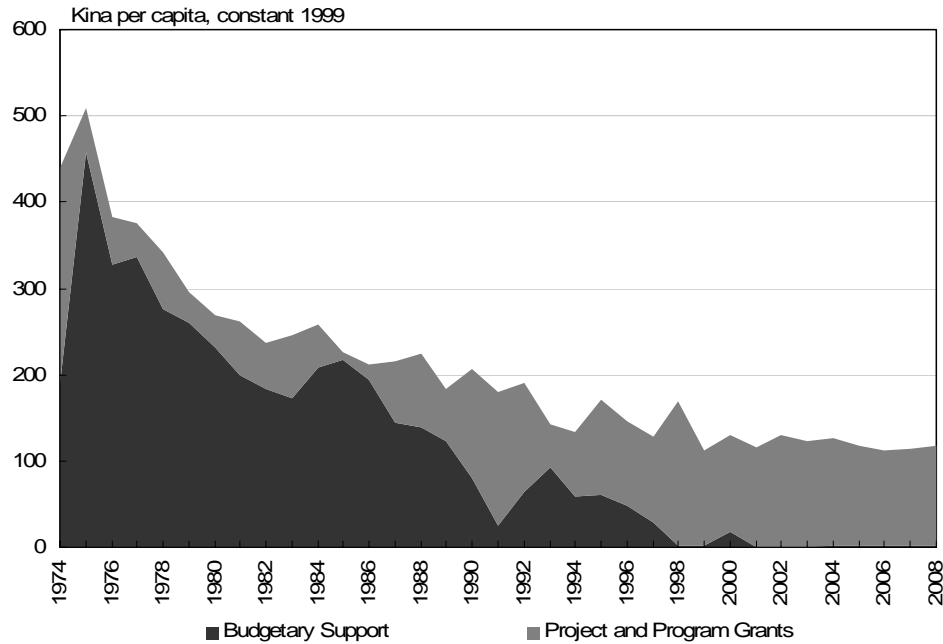
Source: IMF GFS (2008) and GoPNG (2008, 2009).

**Chart 8: Government Expenditure by Sector — Infrastructure, Health, Education and General**



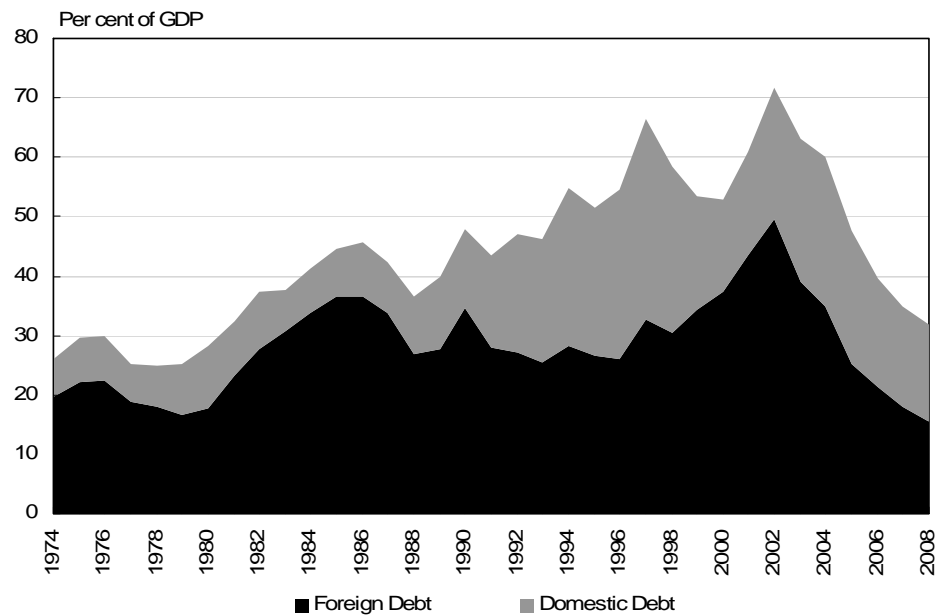
Source: Government PNG Budget Documents (various years), see Appendix B.

**Chart 9: Budgetary Support and Project and Program Grants (1974–2008)**



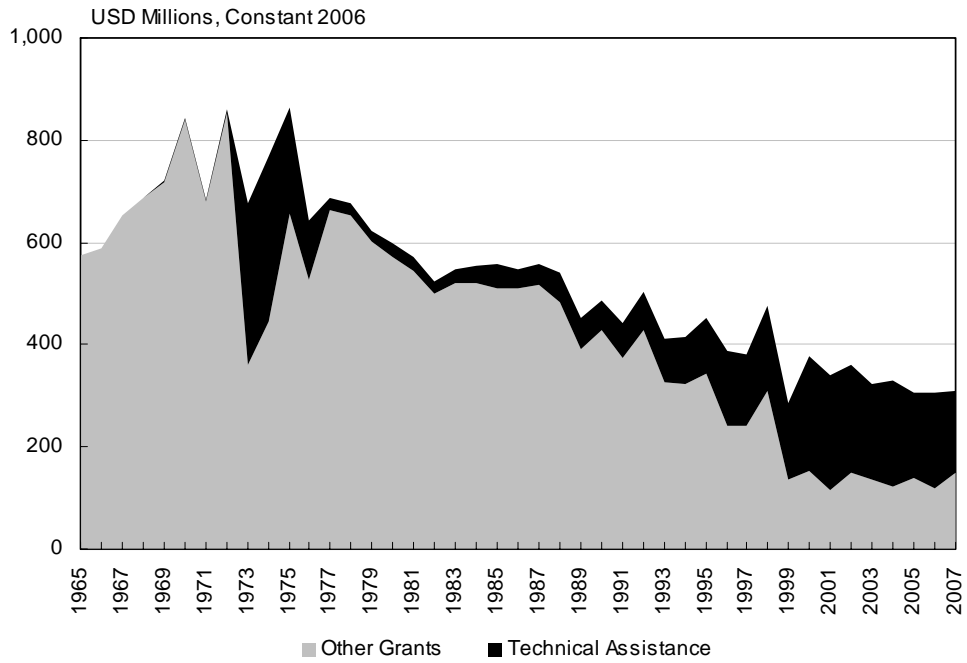
Source: Government PNG Budget Documents (various years), see Appendix B.

**Chart 10: Public Debt—Foreign vs. Domestic (1974–2008)**



Source: Government PNG Budget Documents (various years), see Appendix B.

**Chart 11: Foreign Grant Aid in PNG: Technical Assistance vs. Other Grants**



**Source:** Figures reported by Australia to OECD DAC (2008).

**APPENDIX B: DATA COLLECTION AND CLASSIFICATION**

Expenditure allocations between 1974 and 2002 were made in accordance with the IMF Government Financial Statistics Database (IMF GFS 2008). In this case, expenditures were classified into 5 categories. These included health, education, law and order, infrastructure and other. The classifications used from the IMF database to allocate these expenditures are shown below.

**Table 9: Categorisation of IMF GFS Data into Expenditure Categories**

Category	IMF GFS Code (Table 7)	
<b>1. Health</b>	11. Health	
<b>2. Education</b>	13. Education	
<b>3. Law and Order</b>	4. Public order and safety	
<b>4. Infrastructure</b>	6. Agriculture, forestry, fishing and hunting	7. Fuel and energy
	8. Mining, manufacturing and construction	9. Transport
<b>5. General</b>	8. Recreation, culture, and religion	6. Housing and community amenities
	2a. Public Debt Transactions	10. Social Welfare and Protection
	3. Defence	11. Other Non-Allocated Expenditures
	5e. Other Economic Affairs and Services	2b. General public services (less Public debt transactions)

The most recent 2008 version of the IMF database only covers up to 2002. As a result another data collection effort was undertaken decomposing recent government expenditures into each of the 5 classifications listed above. This involved allocating expenditures from both the Recurrent and Development budgets.

Recurrent expenditures were allocated according to Volume II, Part 1, Table 2 of the Budget which calculates recurrent expenditures on a functional basis. These expenditures were first allocated according to the IMF categories and then allocated into each of the 5 expenditure categories as shown in Table 9. Table 10 shows the allocation rules used for the transfer from Budget to IMF classifications.

**Table 10: Allocation of Recurrent Budget Expenditures to IMF Classifications**

IMF Classification	Budget Volume II, Part 1, Table 2 Classification Code
<b>General public services</b>	<b>11, 13, 14, 15, 19, 41, 51, 52, 53</b>
<i>Public debt transactions</i>	51, 52, 53
<b>General public services (less Public debt transactions)</b>	<b>11, 13, 14, 15, 19, 41</b>
<b>Defence</b>	<b>18</b>
<b>Public order and safety</b>	<b>17</b>
<b>Economic affairs</b>	<b>12, 31, 32, 33, 34, 35, 36, 39</b>
<i>Agriculture, forestry, fishing, and hunting</i>	31
<i>Fuel and energy</i>	33
<i>Mining, manufacturing, and construction</i>	35
<i>Transport and Communications</i>	36
<i>Other Economic Affairs</i>	12, 32, 34, 39
<b>Housing and community amenities</b>	<b>24, 25</b>
<b>Health</b>	<b>22</b>
<b>Recreation, culture, and religion</b>	<b>27, 28</b>
<b>Education</b>	<b>16, 21</b>
<b>Social protection</b>	<b>23</b>
<b>Other expenditure</b>	<b>42</b>

Development Budget expenditures are not calculated on a functional basis. As such this component of the Budget was allocated to each of the 5 categories through Departmental allocations from both the National Department and Statutory authority Tables from Volume II, Part 1, Section III of the Budget Documents. The following allocation rules were used.

**Table 11: Allocation of Development Budget Expenditures**

<b>Category</b>	<b>National Department (N) or Statutory Authority (S)</b>
<b>1. Health</b>	240: Dept of Health (N)
	241: Hospital Management Services (N)
	519: National AIDS Secretariat (S)
	520: Institute of Medical Research (S)
<b>2. Education</b>	235: Dept of Education (N)
	236: Commission for Higher Education (N)
	512: Uni PNG (S)
	513: Uni Tech (S)
	514: Uni Goroka (S)
	515: Uni Vudal (S)
<b>3. Law and Order</b>	226: Dept of Corrective and Institutional Services (N)
	228: Dept of Police (N)
	223: Judiciary Services (N)
<b>4. Infrastructure</b>	258: Dept of Information and Communication (N)
	259: Dept of Transport (N)
	264: Dept of Works and Implementation (N)
	540: Water and Sewerage Board (S)
	567: National Road Authority (S)
<b>5. General</b>	All Remaining National Department and Statutory Authority Development Budget Expenditures

**APPENDIX C: ADDITIONAL TABLES****Table 12: Selection Order Criteria for Model I**

Selection Order Criteria		
lag	AIC	HQIC
0	18.469	18.770
1	18.108	18.651
2	17.580*	18.606*
3	18.252	19.036

**Table 13: Co-integration Tests for Model I**

Maximum Rank I	H <sup>0</sup> : Number of Co-integrating Vectors (v)	Trace Statistic	95% Critical Value	Eigenvalue
0	None	46.547*	47.21	.
1	At most 1	21.928	29.68	0.536
2	At most 2	10.168	15.41	0.307

\*denotes rejection of the null hypothesis that there are  $r$  co-integrating vectors at 5 per cent significance level.

**Table 14: Selection Order Criteria for Model II**

Lag	AIC	HQIC
0	24.159	24.3926
1	21.660	21.785
2	17.595*	18.219*
3	17.947	19.076

**Table 15: Co-integration Tests for Model II**

Maximum Rank	H <sup>0</sup> : Number of Co-integrating Vectors (v)	Trace Statistic	95% Critical Value
0	None	64.998*	68.52
1	At most 1	39.132	47.21
2	At most 2	20.828	29.68
3	At most 3	6.673	15.41

\* Rejection of the null hypothesis at a 95 percent confidence level.

**Table 16: Selection Order Criteria for Model III**

lag	AIC	HQIC
0	27.917	28.197
1	21.745	23.707*
2	21.190	24.833
3	19.489*	24.814

**Table 17: Co-integration Tests for Model III**

Maximum Rank	Number of Co-integrating Vectors (v)	Trace Statistic	95 % Critical Value
0	None	77.580*	94.15
1	At most 1	49.746	68.52
2	At most 2	29.269	47.21
3	At most 3	16.7014	29.68

\* Rejection of the null hypothesis at a 95 percent confidence level.



