

Papua New Guinea: Selected Issues and Statistical Appendix

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PAPUA NEW GUINEA

Selected Issues and Statistical Appendix

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Approved by the Asia and Pacific Department

January 26, 2006

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I. GROWTH ACCOUNTING AND MEDIUM-TERM GROWTH PROSPECTS IN PAPUA NEW GUINEA¹

A. Introduction

1. **Papua New Guinea has experienced decelerating and volatile growth rates since independence in 1975.** While economic cycles have generally paralleled the many mineral sector booms and busts, the downward trend in growth rates may reflect other factors. This paper explores the trends underlying Papua New Guinea's historical growth experience and considers what implications these might have for the medium term outlook. The analysis begins with a review of the changes in the production structure, followed by a look at trends in GDP and GDP per capita over time. The subsequent sections considers investment trends and international comparisons. The penultimate two sections discuss the empirical results of the estimated sources of growth for the aggregate economy and their implication for medium-term growth under alternative scenarios. The last section concludes the paper.

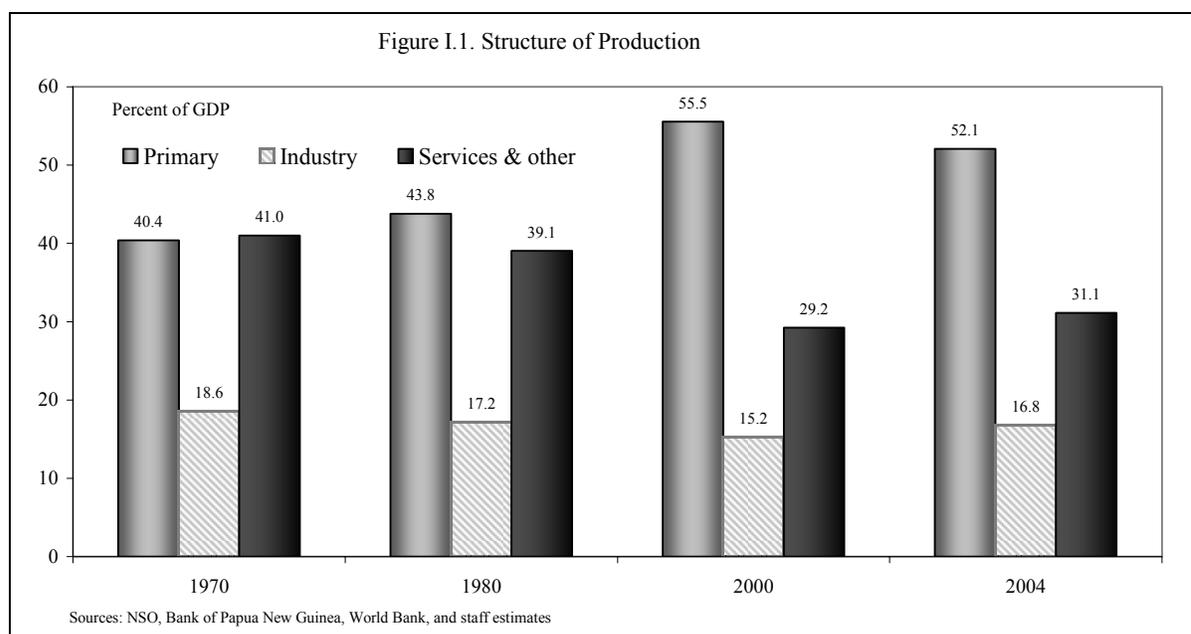
B. Structure of The Economy

2. **Papua New Guinea's economy is dominated by a large labor-intensive agricultural sector and a capital-intensive oil and minerals sector.** The formal sector consists of enclave extractive industries (mining, petroleum, and logging), cash crop production, and a small, import-substituting manufacturing sector. The informal sector is largely subsistence agriculture. Over the years, Papua New Guinea's uneven and volatile growth rates have been accompanied by structural transformation (Figure 1). Unlike the trend observed in many developing countries, the share of the primary sector in GDP which includes the mineral sector, has increased steadily since 1975, while those of the tertiary and secondary sectors have declined. At the same time, while the share of the secondary sector generally increases over time in most mineral and petroleum producing countries, it has declined steadily in Papua New Guinea, an indication of the enclave nature of the extractive sector.

3. **The importance of the agriculture sector is currently about the same as at independence, reflecting structural impediments which have deterred more rapid growth.** In the 1970s, the agricultural sector (including forestry and fishery) accounted for about 40 percent of GDP. The GDP share of agriculture declined to about 30 percent in 1985 before increasing again to about 38 percent in 2002–04, due to increases in the share of fisheries and forestry. Both of the latter are marked by the presence of large, foreign-owned enterprises. The main agricultural sector, including the cash and subsistence crops, is dominated by small farmers and has been hurt by the deterioration of physical infrastructure and of weak law and order.

¹ Prepared by Ebrima Faal.

4. **The mining sector's share of GDP increased from negligible levels in the 1970s to about 30 percent in the early 1990s, before slipping to about 13 percent during 2003–04.** The sector is overwhelmingly foreign-owned, though the government holds equity in some projects, and developments largely track events in the global mineral sector. However, domestic law and order issues played a role in sector developments when the Bougainville copper and gold mine (at one time providing about one-third the country's income) was closed in 1989 due to violent disputes with landowners. The early 1990s were a mineral boom period, when a number of new mines began production. Currently, significant new developments are occurring with the Ramu Nickel Project, and the Papua New Guinea-Queensland gas project, which will entail collecting and processing gas in the highlands fields and transporting it by pipeline to markets in Queensland, Australia.



5. **The manufacturing sector has been shrinking.** This sector includes food, soft drinks, beer, food canning, tobacco processing, and furniture making. Small-scale engineering and metal processing, clothing and other light industries are also present. The sector is dominated by firms geared to the domestic market. Its expansion has been hampered by a range of structural impediments, including the shortage of entrepreneurial, managerial, and labor skills, complicated regulations, high utilities and transportation overheads, and the high cost of labor relative to productivity. Its contribution to GDP has varied in the range of 5 to 11 percent since the 1970s, and is now about 6 percent.

6. **The output of the construction sector is characterized by sharp year-to-year variations reflecting the impacts of large individual projects.** The sector grew rapidly in the early 1970s, with the establishment of the Bougainville mine, followed by a declining trend over the 1980s as many planned major infrastructure projects were not carried out. The contribution of the sector settled at around 5 percent of GDP during the first half of the 1990s. Construction sector activity picked up since the recovery began in 2002 as

housing construction has increased. Significant future expansion is expected with the commencement of the Ramu-Nickel and Papua New Guinea-Queensland Gas projects.

7. **The services sector accounted for more than 40 percent of GDP during the 1970s and the 1980s, then has declined steadily to 29 percent in 2004.** This sector includes economic activities such as transportation and communications, which have sharply deteriorated over time, as well as community and personal services, which are sensitive to weaknesses in law and order and governance.

C. Trends in GDP and Per Capita GDP Growth

8. **Papua New Guinea experienced a decelerating trend in growth rates until the early part of this decade** (Figures 2 and 3). Between 1960 and 1975, Papua New Guinea's economy grew at an average annual rate of over 5.5 percent, reflecting rapid growth in public expenditure and the establishment of the Bougainville copper mine in 1968.² With population growth of about 1 percent annually, per capita real GDP improved significantly. Economic growth began to slow in the late 1970s and early 1980s due to the first oil price shock and a slowdown in overall productivity growth associated with the repatriation of Australian expatriates in the period around independence in 1975 (see Jarrett and Anderson (1989)).

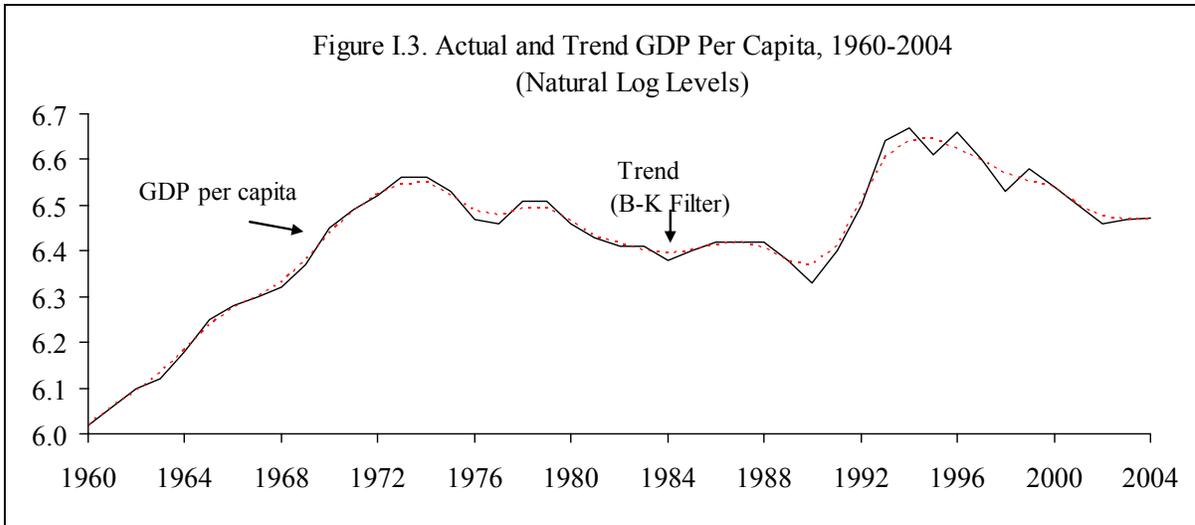
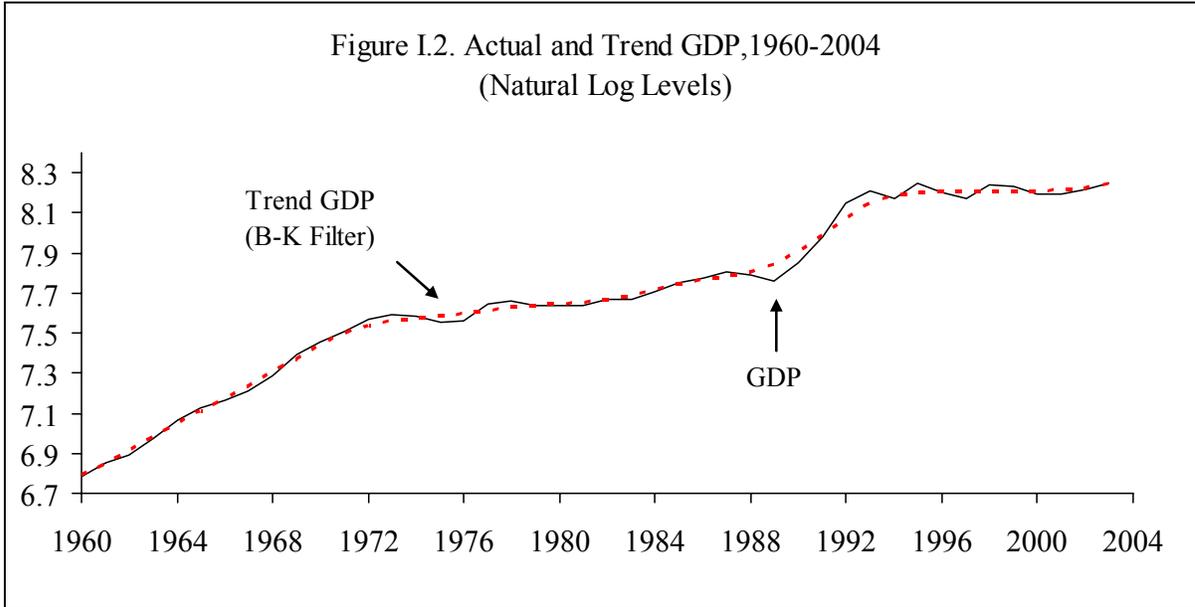
9. **A dependence on commodity exports is reflected in Papua New Guinea's vulnerability to economic shocks.** Strong commodity prices in 1985–88 for Papua New Guinea's mineral and agricultural exports led to higher production and improvements in infrastructure spending with the result that real GDP growth resumed for a brief period. The recovery was short-lived, however, as economic growth declined sharply in 1989 with the closure of the Bougainville mine and a significant decline in minerals prices.³ Over the period 1991–94, the adverse effects of the mine closure on GDP and income growth were partly offset by a boom in other parts of the mineral sector, including petroleum.

10. **By 1994, however, macroeconomic imbalances that had been building since the late 1980s—spurred by an unsustainable fiscal expansion during the early 1990s and weak mineral prices—led to a balance of payments crisis and sharp declines in GDP growth.** With support from the IMF and other donors, the government adopted economic and structural policies that included significantly curtailed public expenditure, a devaluation of the kina, and abandonment of the 'hard kina' policy that had been in place since 1975. Economic growth recovered briefly with some expansion in mining output, but fell in 1997 as the economy was adversely affected by severe drought, lower external demand due to the Asian crisis, low prices for mineral exports, and growing law and order problems. The decline in economic activity and exports led to a further deterioration of the fiscal position,

² The paper uses the Baxter-King (BK) Filter (1995) to estimate trends.

³ The Bougainville mine is still closed as of late 2005.

resulting in heavy public borrowing from the central bank to finance the large budget deficits, significant loss of international reserves, a protracted depreciation of the kina, and sharp increases in inflation. Real GDP grew by less than 1 percent in 1996–2002 and GDP per capita growth decelerated sharply.



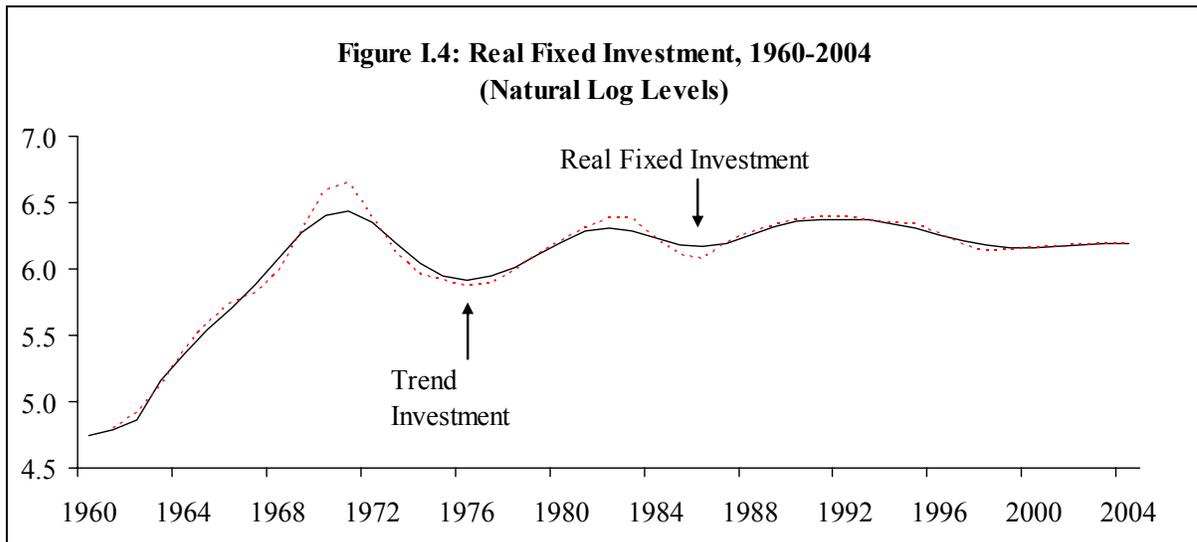
D. Investment

11. **Investment in Papua New Guinea is largely concentrated in the mining sector.** Gross capital formation averaged about 21 percent of GDP during 1984–2004, although it fluctuated considerably over the years. High investment activities during 1976–85 were associated with mining and mining-related construction. The sharp drop in aggregate investment in the mid-1980s was due mainly to the completion of major construction activity

at the Ok Tedi mine, but gross domestic investment increased sharply from 1990 onwards, due to an upsurge in construction activity on the large Kutubu and Porgera mining projects (Figure 4).

12. **Public investment, low by global standards, has nonetheless had a stimulative impact on private investment.** Higher investment in the construction sector resulted from the publicly funded construction of a new airport and the Poreporena Highway in Port Moresby. Investment in the manufacturing sector is not high except in some protected industries.

13. **Foreign investors have played a significant role.** Australia is the largest foreign investor in both mining and nonmining sectors of Papua New Guinea. Development of new mines such as OK Tedi (copper and gold), Hides (gas), Kutubu (oil), Lihir (gold), Porgera (gold), and Misima (gold) have also attracted US, UK, and Canadian mining interests. Malaysia has become a significant investor in fisheries, timber, and other trade and construction sub-sectors. Real gross fixed capital formation fell to 13.7 percent of GDP in 1998 compared with 21 percent in 1984 due mainly to outflow of foreign capital since 1994 when macroeconomic performance decline sharply (Curtin, 2001), although it has since recovered.



E. International Growth Comparison

14. **Table 1 presents purchasing-power-parity-based (PPP) estimates of growth in GDP per capita for Papua New Guinea and selected Asian countries.**⁴ Within the region, Papua New Guinea's per capita growth rate of about 3.5 percent during 1960–75 was behind only Thailand and Malaysia. After independence, Papua New Guinea's growth rate fell to negative 1.4 percent during 1976–85, and was the weakest performance of the comparator group. PPP-based GDP per capita for Papua New Guinea recovered briefly during 1986–95, before declining by around 5 percent from 1996–2004, a significantly worse performance than the comparator countries despite the impact of the Asian crisis on those countries.

Table I.1. Papua New Guinea: Average GDP Per Capita Growth Rates For Selected Countries, 1961-2000 (PPP-based, in percent)				
	1961-75	1976-85	1986-95	1996-2000
Papua New Guinea	3.4	-1.4	1.8	-4.8
Developing Countries				
Bangladesh	-0.4	1.9	2.4	2.8
Fiji	2.8	0.8	2.0	1.1
Nepal	0.8	1.3	2.2	3.3
Emerging Market Economies				
Indonesia	2.8	4.9	4.8	0.2
Malaysia	3.6	4.2	4.8	2.7
Thailand	4.7	4.6	7.5	0.5
Advanced Economies				
Australia	2.6	1.7	2.0	2.8
New Zealand	1.9	0.6	0.8	1.6

Sources: Alan Heston, Robert Summers and Bettina Aten, Penn World Tables Version 6.1, WEO and Staff estimates.

F. Growth Accounting and Total Factor Productivity

15. **The growth accounting approach is used in this section to provide some insights on historical growth trends and medium-term growth prospects for Papua New Guinea.** Assumptions of constant returns to scale and competitive factor markets make it possible to calculate the growth rate of output implied by the growth of physical and human capital. This section estimates how much of the growth in output in Papua New Guinea is associated with

⁴ GDP per capita (PPP US\$) accounts for price differences between countries. In principle, at the PPP rate, 1 PPP dollar has the same purchasing power in the domestic economy as 1 U.S. dollar has in the U.S. economy.

growth in physical capital and labor inputs, and how much is due to technology, institutional change, and other factors.

16. **The results from the growth accounting exercise indicate that both factor accumulation and productivity contributed to GDP growth.** Table 2 shows the resulting contributions of the three factor inputs from 1965 to 2004. From 1965 to 1975, real GDP grew at an average rate of 5.6 percent, while TFP rose by 2 percent. From 1976 to 2004, after independence, real GDP growth slowed to 2.3 percent. Most of the decline in output growth is explained by a significant slowdown in the capital input and to a lesser extent by lower TFP growth—indeed, the contributions of the capital input and TFP to output growth slowed to an average rate of 0.3 percentage points over this period.

Table I.2. Papua New Guinea: Sources of Growth, 1965-2004				
	1965-1975	1976-2004	1986-2004	1996-2004
Real GDP growth	5.6	2.3	3.0	0.8
Factor growth rates (percent)				
Capital	6.9	1.6	1.0	0.3
Labor	1.9	2.4	2.5	2.6
TFP	2.0	0.1	1.0	-1.0
Contributions (percentage points)				
Capital	2.3	0.5	0.3	0.1
Labor	1.3	1.6	1.7	1.7
TFP	2.0	0.1	1.0	-1.0
Memorandum items:				
Potential output growth	5.3	2.3	2.7	0.6
Trend TFP growth	1.7	0.1	0.7	-1.2

Sources: NSO, IFS, and staff estimates.

17. **The decline in the contribution of capital during the latter period reflected the slowing of investment since independence in 1975, except during the booms in mineral production, when investment usually spiked up.** The increased pace of investment during the boom periods was not sustained, as governance, law-and-order and other structural issues discouraged investment flows to other sectors. The performance during the 1996–2004 sub-period was even more disappointing, with TFP contributing negatively to GDP growth.⁵ The results emphasize the role of factor inputs as the main engines of growth, with the labor input

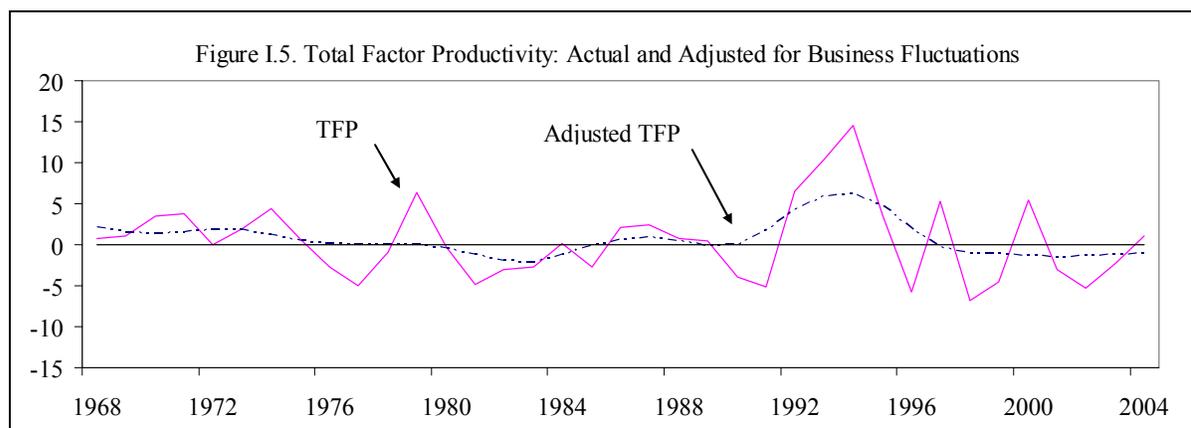
⁵ The national accounts include an estimate of output of the informal sector, but the official “formal sector” employment measures exclude the self-employed, family workers, and jobs in the informal sector. We use the more comprehensive measure—the economically active labor force—in our analysis to try to capture the contribution of workers in the latter categories.

in particular, providing the largest contribution of growth since independence in 1975. The implication is that Papua New Guinea's GDP growth has been achieved largely by adding labor to production. On average, no productivity improvements have been achieved since independence.

18. **A key weakness of the growth accounting framework relates to the interpretation that the measured residual from the growth accounting exercise represents TFP growth.** In practice, in addition to providing a measure of gains in economic efficiency, the residual may also reflect a number of other factors, including institutional changes, external shocks, changes in government policies, political disturbances and conflicts, and measurement errors. This limitation is particularly relevant for Papua New Guinea, which has experienced law-and-order problems, conflicts, and external shocks.

19. **Another problem with the growth accounting framework estimates is that it does not properly decompose growth stemming from the exploitation of natural resources or for different types of factor inputs.** Due to data limitations, our analysis did not attempt to consider separately the mining and non-mining sectors nor to control for changes in the quality of human capital. There are several types of labor and capital. If data are available, aggregated factor inputs can be decomposed to measure sectoral factor inputs. For example, the aggregated figure of labor inputs can be decomposed to determine how labor quality changes affect TFP growth in a given sector. The same method can be applied for capital. However, as the necessary data on capital are not available, this paper focuses only on the adjustments for business fluctuations.

20. **To remove the effect of business fluctuations from the estimates of TFP growth, TFP was adjusted using the Baxter-King filter.** Annual TFP estimates from 1968 to 2004, together with the business-fluctuation-adjusted TFP, are shown in Figure 5. In most of the years, TFP fell below zero. Positive estimates are seen in the period before 1975 and in 1990–96.



G. Implications For Medium-Term Growth

21. **Some possible medium-term growth scenarios for Papua New Guinea using the production function and the results of the growth accounting exercise are considered in this section.** The baseline scenario assumes no new significant hydrocarbon or mineral projects, i.e., it excludes the prospective Highlands-Queensland gas pipeline. The degree of structural reforms is assumed to be continuous but modest in line with past performance. The medium-term projections assume that growth in the capital stock is consistent with keeping the capital-output ratio constant at 2.3. Hence, the capital contribution is higher as the economy moves from a low- to a higher-growth scenario, because more investment is needed to maintain the fixed capital-ratio with faster growth. The labor force grows by 2.4 percent, and a baseline scenario assumes trend TFP growth of 0.5 percent, broadly in line with trend TFP growth over the last 2 decades. The latter is above the average pace since 1976, but below that in the 1960s and early 1970s. Potential output is derived as the sum of trend TFP and the contributions of the capital and trend labor inputs.

- Based on these assumptions, under the baseline scenario, projected GDP would grow at an average rate of 3 percent during 2005–10, while potential output grows by 2.7 percent (Table 3). Per-capita incomes would improve marginally, but not enough to have an impact on poverty reduction.
- The alternative ‘high reform’ scenario shows the TFP growth that would be needed to support GDP growth of 5 percent over the medium term—about 2.5 percentage points higher than actual growth over 1976–2004. The implied trend TFP growth rate of 3 percent appears optimistic, given Papua New Guinea’s experience. Significant improvements in governance and law-and-order, and acceleration of key reforms under the MTDS would be important factors that could lead to TFP growth at this level. Per-capita incomes would start to recover under this scenario, growing at a rate of 2.5 percent per annum.
- The ‘low reform’ scenario extrapolates the experience observed over the period from 1996–2004 of low TFP, resulting in GDP growth of only 1.0 percent. Under this scenario, per capita incomes would continue to decline with negative growth rates and poverty would increase with continued population growth.

Table I.3. Papua New Guinea: Medium-Term Growth Projections, 2005-10 Alternative TFP Growth Rates			
	Low scenario	Baseline	High scenario
Real GDP growth	1.0	3.0	5.0
	Factor contributions (in percentage points)		
Capital	0.5	0.5	0.5
Labor	1.5	1.5	1.5
TFP	-1.0	1.0	3.0
Memorandum items:			
Potential GDP growth	0.7	2.7	4.7
Trend TFP	-1.3	0.7	2.7
Source: Staff estimates.			

22. **A similar analysis is done for the amount of investment required for higher growth.** This study shows that a target of 5 percent GDP growth over the medium to long term, assuming depreciation of the capital stock by 5 percent, would imply that the minimum gross rate of investment needed for sustained growth would be about 23 percent of GDP. Similarly, a 7 percent target would require an investment rate of 27 percent of GDP. In reality, the actual rate of investment has averaged only 17 percent since 1985 (Table 4).

Table I.4. Papua New Guinea: Real GDP Growth and Real Investment			
Assumptions			
Steady state capital-output ratio	2.3	2.3	2.3
Depreciation (in percent)	5	5	5
Target growth rate	3	5	7
Required investment to GDP	18	23	27
Memorandum items:			
Investment to GDP			
1976-2004	19		
1986-1995	17		
1996-2004	13		
Source: Author's estimates.			

H. Summary and Conclusions

23. **This paper has examined Papua New Guinea's historical economic growth patterns through a simple growth accounting framework.** The analysis shows that swings in growth are mostly accounted for by a significant slowdown in the capital input and lower TFP growth. It also suggests that raising real GDP growth will require increases in both investment levels and productivity. With a ratio of investment to GDP of 13 percent during the last decade, significantly higher productivity growth and investment will be needed to sustain GDP growth rates at 5 percent or higher. The historical performance also indicates that, in the absence of structural reforms and strong institutions, higher rates of productivity growth would be hard to achieve. This implies that Papua New Guinea should: (i) push forward with its implementation of structural reforms to improve governance and remove impediments to private sector investment; and (ii) maintain strong capital formation by increasing public investment and improving the focus of these investments to promote a crowding-in of private investment, especially in the non-mineral sector.

A. Growth Accounting

24. **The framework assumes that output (Y) follows a Cobb-Douglas production function and is measured as deflated value added.** Inputs are aggregated into the two primary inputs labor (L) and capital inputs (K) with factor shares in total costs of $\alpha = S_K$ =share of capital and $1-\alpha = S_L$ =share of labor. The Solow (1956) growth accounting equation can then be stated as:

$$Y_t = A_t K_t^\alpha L_t^{1-\alpha} \quad (1)$$

Under this process, labor and capital contribute to value-added growth with contributions measured as the rate of change of each input times its share in total costs. The change in value added not explained by these contributions is attributed to total-factor productivity growth, captured by the variable A. In practice, the rate of change of A is measured as a residual, by subtracting the contributions of labor and capital from the rate of output growth.

$$\text{Output growth} = g = S_k * \Delta K + S * \Delta L + \text{growth rate of TFP} \quad (2)$$

Rearranging equation 2, yields TFP as

$$\text{TFP growth} = A = \Delta GDP_t - S_K * \Delta K_t^* - S_L * \Delta L_t^* \quad (3)$$

25. **The growth accounting exercise was performed over the 1960–2004 period assuming a Cobb-Douglas production function with output elasticities of capital and labor of 0.33 and 0.67 respectively.**⁶ Capital stock is derived from national accounts data on gross fixed investment using the perpetual inventory method, with an assumed depreciation rate of 5 percent (see Annex I.2.). It is assumed that the capital output ratio in 1960 is 2.3. The labor input is the labor force proxied by data on the economically active population. All data except for capital, which is derived, are from IFS or from the National Statistical Office. TFP is derived as a residual.

⁶The assumption of fixed weights of 0.67 for labor and 0.33 for capital is consistent with those of other researchers. See for example Bosworth (1998), Santaella (1998), and Loayza, Fajnzylber and Calderon (2002).

B. Calculating the Capital Stock

Data on capital stock (K) are not published and has to be estimated. The most common method for its calculation is the so-called ‘permanent inventory method’, which can be described briefly with the equation:

$$K_t = I_t + (1 - \delta)K_{t-1} \quad (1)$$

Equation (1) allows for recursive substitution back in time and also in the future. For example, if the formula is rewritten for period (t - 1), then:

$$K_{t-1} = I_{t-1} + (1 - \delta)K_{t-2} \quad (2)$$

Substituting (2) in (1) yields:

$$K_t = I_t + (1 - \delta)I_{t-1} + (1 - \delta)^2 K_{t-2} \quad (3)$$

The process can be replicated back to some definite time so that in general,

$$K_{t-1} = \sum_{i=0}^{n-1} (1 - \delta)^{n-i} I_{t-i} + (1 - \delta)^n K_{t-n} \quad (4)$$

where n is the definite time under consideration, from which the initial capital stock is taken. It can be shown that even with $n \rightarrow \infty$, the expression for the amortized value of the initial capital stock never becomes exactly zero, i.e. this way of calculation implies ‘eternal life’ for some part of the capital stock. For the purposes of our analysis the capital has to have a finite life – i.e. to depreciate entirely for a finite number of years. The latter is also required from a practical point of view, since after a specified period of time the capital stock loses its ability to create new value. For this reason the following variant of equation (4) has been used here to the calculation of the capital stock.

$$K_{t-1} = \sum_{i=0}^{n-1} (1 - i\delta)I_{t-i} + (1 - n\delta)K_{t-n} \quad (5)$$

Equation (5) implies a constant and an even (linear) reduction of the value of the initial capital, as well as of the value of investments that are made between the initial and the present moment. Also, in such a way one allows for full depreciation of a capital unit for $1/\delta$ periods.

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II. DETERMINANTS OF PRODUCTIVITY IN PAPUA NEW GUINEA¹

A. Introduction

1. **Papua New Guinea's economic growth performance since independence has not been as strong as in comparator countries** (see Chapter I, Table I.1). The preceding Chapter I discussed how the low growth rates experienced may be accounted for by both a significant slowing of capital inputs and falling total factor productivity (TFP) growth. Recent empirical studies suggest that a key distinguishing factor between high-growth and low- or negative-growth countries may be differences in TFP, which is affected by the quality of a country's economic, social, and political institutions.² Using time series analysis, this chapter investigates some determinants of productivity growth that may explain the poor performance of real GDP and TFP growth in Papua New Guinea. The second part of the paper then attempts to test for and evaluate some of these factors and their relationship to TFP.

B. Factors Affecting TFP Growth

2. **The authorities' Medium-term Development Strategy (MTDS) highlights the need to improve institutions to raise growth and targets measures to remove impediments that hinder achievement of that goal.** Papua New Guinea has already made important efforts to remove structural impediments that hold back its potential for more rapid growth. The reforms of the early 1990s, including the floating of the kina, initially led to a recovery in investment and growth. More recent reforms undertaken include price and trade liberalization, tax reform, investment policy reform, improvements in public expenditure management, pension reform, privatization, financial sector reform, and decentralization of financial responsibilities from the national to the provincial and district levels—in addition to the restoration of macroeconomic stability. However, although a full analysis is beyond the scope of this paper, it is recognized that many of the reforms remain incomplete or have not been sufficiently profound. Therefore, as noted in the MTDS, additional reform is needed to bring growth rates up to the higher level required to sustain improvements in per capita GDP and to reduce poverty. The following discussion highlights several key areas for further reform.

Governance

3. **Recent empirical studies have shown that poor governance deters investment, undermines competition, encourages rent-seeking behavior, and distorts public expenditure in an economy, and as a result, affects its productivity.** Rent-seeking activities are reportedly high in many areas in Papua New Guinea, particularly in the

¹ Prepared by Ebrima Faal.

² See Tanzi and Davoodi (1997), and Mauro (1997).

resource-based sectors as in many other resource-rich countries. Political interference in the civil service and politicization of decision-making hampers effective public administration. In addition, an unstable political environment increases uncertainties for economic actors. No government has survived a full five-year term in office, although the current Somare government has a good chance of being the first government since independence to complete a full term in office. The short political cycles have increased incentives for rent-seeking behavior, while political uncertainty has made it difficult for firms to commit to long-term investment plans since the policy environment is generally viewed as fluid. Recent reforms of the political system, including the *Organic Law on the Integrity of Political Parties*, are expected to bring some stability to the political process in coming years. The following table ranks some political risks factors for Papua New Guinea relative to other countries in the region.

COUNTRY	Corruption	Bureaucracy quality	Ethnic tensions	Law and Order	Socioecon conditions	Government Stability	Internal Conflict
Papua New Guinea	1.0	2.0	2.0	2.5	3.5	7.0	10.0
Indonesia	1.0	2.0	2.0	3.0	5.5	7.0	8.5
Bangladesh	1.5	2.0	2.5	2.5	2.5	10.0	6.5
Mongolia	2.0	2.0	5.0	4.0	3.0	7.0	11.0
Sri Lanka	2.5	2.0	1.5	3.0	3.5	6.0	6.0

Source, ICRG, 2005. First 3 columns ranked 0-6, 2nd 3 columns ranked 0-12; the lower the number, the higher the risk.

4. **Governance issues are also reflected in the ease with which the private sector can conduct business.**³ Surveys of the private sector in Papua New Guinea by the Institute of National Affairs (INA) revealed that employers rated crime, corruption, and political instability as the biggest impediments to doing business (Manning (1999), Levantis and Manning (2002)). The average company reported spending about 10 percent of its revenue on private security and losses from theft. The surveys conclude that irregular applications of law and regulations, sudden changes in public policy, and bribes to corrupt official were major costs drivers and significant obstacles to investment. The World Bank's Doing Business survey reports that, although Papua New Guinea compares well to others in the region overall, on key factors that would deter the start-up of new activity, such as the environment for starting and closing a business, Papua New Guinea compares less poorly with its main trading partners and the region.

³ An empirical analysis of transition economies in Eastern Europe and Central Asia showed that investment levels in countries with high levels of corruption were 6 percent lower on average than in countries with medium levels of corruption (21 percent and 27 percent respectively), see World Bank (2000). The same survey revealed that firms operating in environments with high levels of administrative corruption performed significantly more poorly than firms in countries with moderate levels of corruption did.

Table II.2. Papua New Guinea: The Business Environment (2005)			
	Papua New Guinea	East Asia & Pacific	Singapore
Starting a Business			
Number of Procedures	8.0	8.2	6.0
Time (days)	56.0	52.6	6.0
Cost (percent of income per capita)	30.2	42.9	1.1
Minimum capital (percent of income per capita)	0.0	109.2	0.0
Registering Property			
Number of Procedures	4.0	4.0	3.0
Time (days)	72.0	51.0	3.0
Cost (percent of property value)	5.2	4.3	2.8
Dealing with Licenses			
Number of Procedures	20.0	18.0	11.0
Time (days)	218.0	160.2	129.0
Cost (percent of income per capita)	124.5	137.4	24.0
Enforcing Contracts			
Number of Procedures	22.0	27.0	23.0
Time (days)	440.0	316.0	69.0
Cost (percent of debt)	110.3	57.0	9.0
Closing a Business			
Time (years)	2.8	3.6	0.8
Cost (per cent of estate)	38.0	29.8	1.0
Recover rate (cents on the dollar)	34.2	30.4	91.4
Source: World Bank - Doing Business Explore Economics.			
Website: http://www.doingbusiness.org/exploreconomies/businessclimatesnapshot .			

Human Capital

5. **Access to and quality of education are major factors that impede productivity growth.** Gross enrollment in Papua New Guinea at the primary school level is 69 percent, and at secondary schools is 11 percent (Table 3)—about the same levels as at independence. Retention rates are low and dropouts are widespread, with fewer than 60 percent of children completing grade 6. Access to education, particularly at higher levels, is constrained by long travel distances to school and a shortage of teachers in remote areas, and by the significant cost of education, especially at the secondary and tertiary level. The authorities' MTDS targets an increase in the quantity and quality of basic health care, education, and other high-priority services, with a view to improving long-term growth and social indicators appreciably over the longer term.

Table II.3. Papua New Guinea: School Enrollment Rates (Percent)										
	1970	1975	1980	1985	1990	1998	1999	2000	2001	2002
Gross primary school enrollment	51.6	56.4	58.9	65.9	66.2	74.8	77.7	78.2	73.4	68.9
Male	63.2	67.9	66.1	71.3	71.1	77.4	80.5	82.0	77.2	76.2
Female	39.1	44.0	50.9	60.1	60.9	71.8	74.6	74.1	69.3	61.0
Net primary school enrollment	...	...	...	...	66.0	74.8	77.7	78.2	73.0	68.5
Male	...	...	...	...	70.9	77.4	80.5	82.0	76.8	75.8
Female	...	...	...	...	60.8	71.8	74.6	74.1	68.9	60.7

Source: World Development Indicators Database, World Bank.

Physical Infrastructure

6. **An adequate supply of infrastructure services is an essential ingredient for productivity and growth.**⁴ Poor economic infrastructure contributes to high production costs for businesses, which reduce TFP and the capacity to compete with countries in the Asia-Pacific region. Because of its mountainous and rugged terrain, Papua New Guinea suffers from a fragmented system of transportation, and large parts of the country are virtually isolated. It is estimated that 4 percent of roads and airport runways are paved (Table 4). The capital, Port Moresby, is accessible from the rest of the country only by sea or air, making it costly to distribute products and reach markets. In the center of the country, only the Highlands Highway links the port of Lae to major population centers in the Highlands. Papua New Guinea also lies off the major sea routes and generates little cargo itself, and as a result sea-freight costs to and from PNG are high and service to and from the rest of the world is infrequent.

7. **An unreliable and costly supply of utilities is also a major impediment to TFP growth.** Frequent power interruptions have sharply increased production costs through production stoppages and missed delivery dates. A large number of firms operate their own power generators. The telecommunications network is limited in rural areas and service quality is unreliable. As a result, costs are high, especially for international calls, and only about 2 percent of the population has access to residential service. This compares unfavorably with other countries in the region. Wireless services, including a digital GSM network, are restricted to the major centers of Port Moresby and Lae, limiting productivity gains from these technologies.

⁴ Aschauer (1989) finds that the stock of public infrastructure capital is a significant determinant of aggregate TFP. More recent empirical literature, mostly in a cross-country panel data context, has confirmed the significant output contribution of infrastructure. See for example Roller and Waverman (2001).

Table II.4. Papua New Guinea: Transport and Communications Indicators					
	Roads/person (metres per capita)	Road Density (km/km ²)	Percent of Road paved	Telephone Mainlines /1000 people	Rail Density (km/000km ²)
Papua New Guinea	3.8	0.04	4.0	12.6	0.0
Cambodia	1.0	0.07	69.0	2.4	3.4
Indonesia	1.7	0.19	46.0	32.3	2.9
Malaysia	2.8	0.20	76.0	199.2	4.9
Mongolia	20.5	0.03	4.0	49.5	1.2
Myanmar	0.6	0.04	12.0	5.7	...
Philippines	2.6	0.68	21.0	40.0	1.7
Thailand	0.9	0.11	99.0	92.3	9.7
Vietnam	1.2	0.29	25.0	31.9	
Micronesia	2.0	...	18.0	84.1	0.0
Samoa	4.6	0.28	42.0	48.2	0.0
Solomon Islands	3.2	0.05	3.0	18.3	0.0
Tonga	6.7	0.94	27.0	98.4	0.0
Vanuatu	5.2	0.09	24.0	34.6	0.0

Source: Stephen Jones, OAP, Contribution of Infrastructure To Growth of Poverty Reduction, Bali, June 28, 2004

C. Empirical Estimation⁵

8. **Many factors may affect TFP growth directly and indirectly.** In this study, however, only those factors for which data are available are included in the empirical analysis. These include macroeconomic stability proxied by the inflation variable, technology transfer, and governance (proxied by foreign direct investment), and enrollment rates to capture improvements in human capital.⁶ The methodology employed in this paper uses unit root and Johansen's cointegration tests followed by a vector error correction model and variance decomposition to examine the dynamic relationships among variables. The first step requires that the unit root test be conducted in order to determine whether the series are non-stationary in levels and stationary in first differences, that is, integrated of order one. The second step is to use the cointegration test in order to determine whether those six non-stationary series have common long-run relationships. There are many possible tests for cointegration, the most general of them is the multivariate test based on the autoregressive representation discussed in Johansen (1988, 1991, 1995) and Johansen and Juselius (1990). The Johansen maximum likelihood method provides two different likelihood ratio tests, the trace test and the maximum eigenvalue test, in order to determine the number of

⁵ The dataset incorporates splicing of new and old data sources, and thus are an approximation, which the author believes provides a foundation for drawing general analytical conclusions. The policy implications, however, would need further empirical investigation given better data.

⁶ The foreign investment proxy may appear unorthodox, however Kinoshita and Campos (2001) and several researchers have found that bureaucratic efficiency—institutions—is a key factor in explaining foreign investors' decisions. They find that corruption in a host country substantially deters inward FDI. See for example Kinoshita and Davidson (2004) and Wei (2000).

cointegrating vectors. The finding of the presence of cointegration paves the way for using the vector error correction model.

9. **Table 5 shows the results of the unit root tests for the TFP, technology transfer and governance, and macroeconomic variables.** The levels of the series are nonstationary; however, differencing the data established that the variables are integrated of order one or are I (1) processes. Given that the variables in the model are I (1) and endogenous, we would expect that the TFP variable will be cointegrated with the other variables. The long-term relationship corresponds to the cointegrating relationship(s), while the short-term dynamics—i.e. the vector error correction model—return the variables to equilibrium after a shock. The maximum likelihood technique of Johansen and Juselius (1990) is used to determine the rank (r) and identify a long-run TFP relationship among the cointegrating vectors. The number of lags used in the VAR is based on the evidence provided by both likelihood ratio tests. The null hypothesis of no cointegration was rejected using both the λ -max (maximum Eigenvalue statistics) and trace tests, in favor of one cointegrating relationship. Both tests indicate one cointegrating vector at the 5 percent level. We then consider a dynamic vector error-correction model to capture the short-run dynamics of variables in the system. The results are presented in Table 6.

Table II.5. Papua New Guinea: Unit Root Statistics				
	Levels		First differences	
	ADF	P-value	ADF	P-value
CPI	-2.163	1.000	-3.660	0.011
Education	-2.902	0.057	-5.209	0.000
FDI	-2.682	0.089	-5.978	0.000
TFP	-2.290	0.182	-4.146	0.003

Note: Each ADF tests uses a constant and no trend. The lag length has been chosen based on the Schwartz information criterion. P-values are from Mackinnon (1996).

Table II.6. Papua New Guinea: Johansen (Trace) Cointegration Test				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 percent Critical Value	P-value
None *	0.731	62.678	47.856	0.001
At most 1	0.526	27.212	29.797	0.096
At most 2	0.196	7.031	15.494	0.574
At most 3	0.041	1.133	3.841	0.287

Note: The cointegrating test uses an intercept but no trend in the cointegration equation. The minimum value of the Schwartz criterion suggests the optimal lag is equal to zero for the Johanson cointegration test. Trace test indicates 1 cointegrating equation at the 0.05 level.

* denotes rejection of the hypothesis at the 5 percent levels.

Variance Decomposition

10. **The variance decomposition breaks down the variance of the forecast error for each variable into components that can be attributed to each of the endogenous variables.** It provides a measure of the percentage of a variable’s forecast error variance that occurs because of a shock from a variable in the system. To calculate both the Variance Decomposition (VDC) and Impulse Response Functions (IRF), the ordering of the variables is important. This is because the orthogonalizing process requires a particular causal ordering of variables, as different ordering will yield different results. To overcome this problem, the common practice is to place the policy variables at the beginning of the list, and the target variable at the end of the list. The results of the VDCs are shown in Table 7—for responses over a 15-year period to a one-standard deviation shock in each variable.

11. **The variance decomposition results indicate that about 50 percent of the variation in TFP is explained by its own innovations in the first year, while the influence to its own shock diminishes to under 46 percent after 15 periods.** Education, inflation, and foreign direct investment explains 20, 2.5, and 32 percent of the TFP variation, respectively, after 15 years. The variation in the governance—proxied by foreign direct investment (FDI)—and human capital variables have increasing influence on TFP. However, surprisingly, changes in the variability of economic conditions (proxied by the inflation variable) seem to have a decreasing impact on TFP. This may reflect the high volatility of inflation during this period, which would suggest that additional tests using other proxies for macroeconomic conditions could be pursued in future studies.

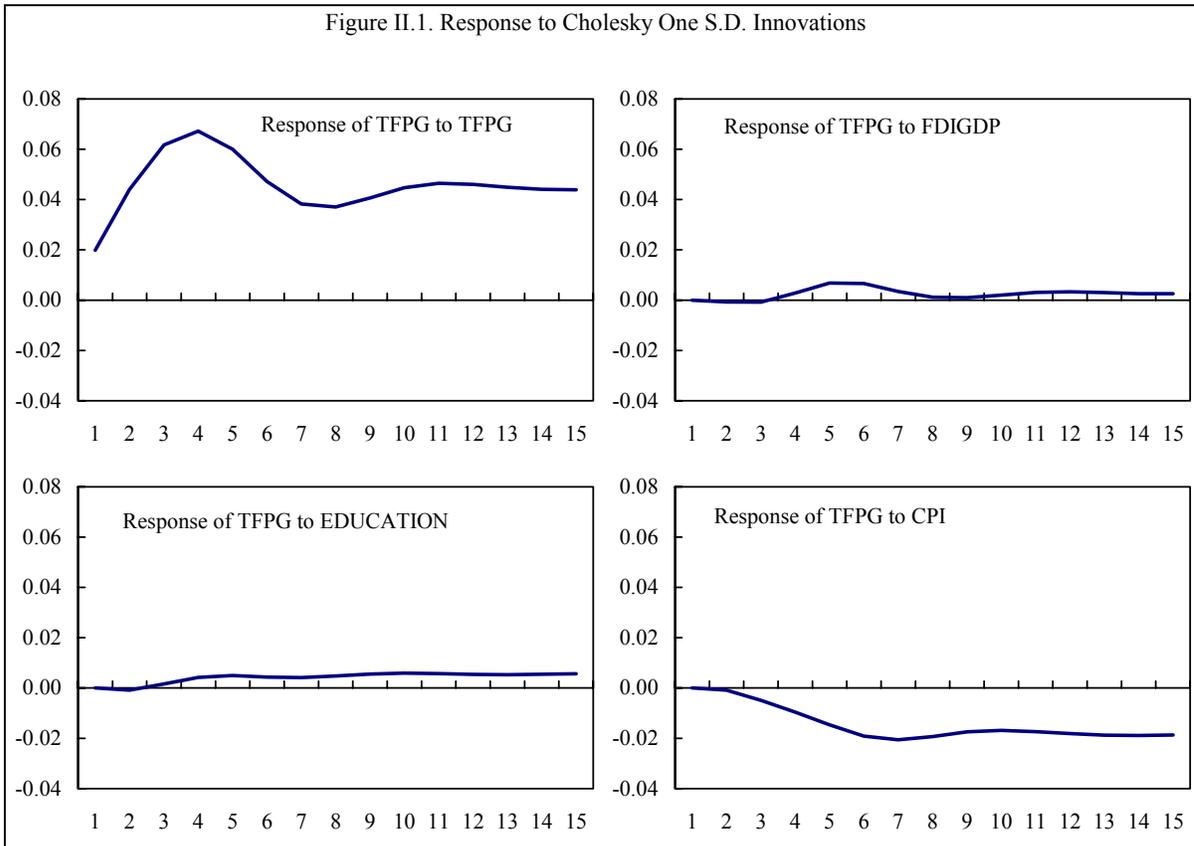
Table II.7. Papua New Guinea: Variance Decomposition of TFP

Period	Standard error	TFPG	FDIGDP	Education	Inflation
1	0.0198	49.2	21.4	16.5	12.9
2	0.0483	48.9	23.4	15.2	12.6
3	0.0785	47.7	25.2	16.9	10.1
4	0.1039	48.4	25.4	18.5	7.7
5	0.1212	49.5	25.5	19.1	5.9
6	0.1317	49.6	26.3	19.1	5.0
7	0.1388	48.8	27.5	19.0	4.7
8	0.1450	47.9	28.8	19.0	4.3
9	0.1517	47.1	29.7	19.2	4.0
10	0.1591	46.6	30.2	19.5	3.6
11	0.1668	46.4	30.6	19.8	3.3
12	0.1741	46.2	30.9	19.9	3.0
13	0.1809	46.0	31.3	19.9	2.8
14	0.1872	45.8	31.6	20.0	2.6
15	0.1933	45.5	32.0	20.1	2.5

Note: Cholesky Ordering: FDI, Education, Inflation, TFP.

Impulse Functions

12. **The impulse response function can be thought of simply as a type of dynamic multiplier that shows the response of each variable in the system to a shock in one of the variables** (Figure 1). By introducing a one-period standard deviation shock to one of the endogenous variables, the observable responses of the system to the shock can be determined by using the IRF. The size and characteristics of the effects (either a positive or a negative reaction) can be identified from the IRF. Since the targeted variable in this paper is TFP, the IRFs examine the effect of a change in the education, inflation, and FDI variables on the former. Both the results of the VDC and IRF analyses suggest an interesting policy implication that improving institutional governance such as bureaucratic quality may be a strong signal of favorable investment environment for many foreign investors. In this regard, economic and political stability are necessary conditions for Papua New Guinea to attract foreign investment and boost TFP growth. In this test, the response of TFPG to inflation is more in line with intuitive expectations.



D. Conclusions

13. **This chapter uses time series techniques to analyze some possible determinants of productivity growth in Papua New Guinea.** Studies show that sound macroeconomic fundamentals, price stability, and opening up of the economy to foreign trade and investments are critical factors affecting TFP growth. The results of the empirical estimation conducted for PNG are consistent with these findings. In particular, the results suggest that factors that can positively influence real GDP and productivity growth in PNG include, among others, a stable macroeconomic environment and policies, higher levels of investment and technology transfer, and better public policies to reduce corruption and improve the quality of public institutions.

Appendix Table 1. Papua New Guinea: Growth Accounting				
(Factor Contribution to GDP Growth)				
	GDP Y	Capital K	Labor force L	Total factor Productivity TFP
	(in percentage points)			
1961	6.0	-0.1	1.1	5.0
1962	6.2	0.0	1.1	5.0
1963	4.0	0.5	1.2	2.3
1964	8.2	1.1	1.2	5.9
1965	9.8	1.8	1.2	6.7
1966	5.7	1.9	1.2	2.5
1967	4.0	2.0	1.3	0.7
1968	4.3	2.0	1.3	1.0
1969	7.9	3.3	1.2	3.4
1970	10.3	5.3	1.3	3.7
1971	6.1	4.7	1.3	0.1
1972	5.5	2.2	1.3	2.0
1973	6.3	0.7	1.3	4.3
1974	2.6	0.7	1.3	0.6
1975	-0.9	0.5	1.3	-2.7
1976	-3.4	0.3	1.3	-5.0
1977	0.8	0.4	1.3	-0.9
1978	8.2	0.6	1.3	6.3
1979	1.8	0.8	1.3	-0.4
1980	-2.3	1.1	1.4	-4.8
1981	-0.3	1.1	1.7	-3.0
1982	0.4	1.4	1.7	-2.8
1983	3.2	1.4	1.7	0.1
1984	-0.4	0.7	1.7	-2.8
1985	3.9	0.1	1.7	2.1
1986	4.6	0.4	1.7	2.5
1987	2.7	0.4	1.7	0.7
1988	2.9	0.9	1.6	0.4
1989	-1.4	0.9	1.6	-3.9
1990	-3.1	0.6	1.5	-5.2
1991	9.1	1.0	1.7	6.4
1992	13.0	0.7	1.7	10.5
1993	16.7	0.5	1.7	14.5
1994	5.8	0.6	1.8	3.4
1995	-3.4	0.6	1.8	-5.7
1996	7.4	0.4	1.8	5.3
1997	-5.0	0.0	1.8	-6.8
1998	-2.8	0.1	1.7	-4.6
1999	7.3	0.1	1.7	5.5
2000	-1.2	0.1	1.7	-3.0
2001	-3.4	0.1	1.7	-5.3
2002	-0.5	0.1	1.7	-2.3
2003	2.9	0.1	1.7	1.1
2004	3.0	0.0	1.7	1.2

Sources: National Statistical Office, IFS, and Author's estimates.

Appendix Table 2. Papua New Guinea: Growth Accounting				
(Log Levels)				
	Trend TFP	Foreign Direct Investment	Education	Consumer Price Index
1975	4.621	4.940	8.100	7.950
1976	4.613	5.070	8.079	8.030
1977	4.623	5.450	8.081	8.070
1978	4.644	5.480	8.082	8.130
1979	4.650	5.660	8.084	8.190
1980	4.623	5.880	8.080	8.300
1981	4.590	5.850	8.100	8.380
1982	4.570	5.910	8.090	8.430
1983	4.550	6.300	8.020	8.510
1984	4.550	6.140	8.090	8.580
1985	4.560	5.850	8.130	8.610
1986	4.583	5.930	8.190	8.670
1987	4.597	5.910	8.100	8.700
1988	4.590	6.240	8.040	8.750
1989	4.563	6.440	8.130	8.800
1990	4.556	6.180	8.170	8.860
1991	4.596	5.790	8.170	8.930
1992	4.700	5.510	8.130	8.970
1993	4.797	4.830	8.150	9.020
1994	4.837	4.770	8.040	9.050
1995	4.849	5.900	8.080	9.210
1996	4.828	5.450	8.190	9.320
1997	4.810	4.730	8.240	9.360
1998	4.793	5.720	8.160	9.490
1999	4.794	5.780	8.130	9.630
2000	4.790	5.650	8.100	9.770
2001	4.757	5.390	8.080	9.860
2002	4.733	5.198	8.010	9.970
2003	4.730	5.194	8.020	10.080
2004	4.732	5.198	8.040	10.130

Sources: National Statistical Office, IFS, and Author's estimates.

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III. FISCAL POLICY IN A RESOURCE-RICH COUNTRY¹

A. Introduction

1. **Countries rich in mineral resources face short- and long-term challenges in formulating fiscal policy arising from the fact that mineral revenue is volatile in the short-term and exhaustible in the long term.** As a result, fiscal authorities in these countries need to define policies to: (a) avoid the significant macroeconomic and fiscal costs associated with short-term variations in the fiscal stance; and (b) determine the optimal use of mineral revenue over time that maximizes welfare while guaranteeing the long-term sustainability of fiscal policy.
2. **To address these challenges, fiscal authorities should assess their fiscal stance focusing on non-mineral balances.** In the short term, they should avoid unintended fluctuations in the overall non-mineral balance. In the long term, they should identify the level of non-mineral primary balance that maximizes welfare and guarantees fiscal sustainability over time.
3. **This note briefly reviews the main challenges that resource-rich countries face in formulating fiscal policy,** considers policy options available to address these challenges, and investigates appropriate indicators to assess the fiscal stance. Against this framework, it then examines fiscal policy performance in Papua New Guinea in recent years.²

B. Fiscal Policy in Resource-Rich Countries: Challenges, Policy Options, and Indicators

What challenges do resource-rich countries face in formulating fiscal policy?

4. Countries rich in mineral resources face challenges in formulating fiscal policy that arise from the fact that mineral revenue is extremely volatile in the short-term and exhaustible over time.

The challenge with the short-term volatility of mineral revenue

5. **Short-term volatility in mineral revenue may lead to volatility in public expenditure and in the non-mineral fiscal balance,** eventually causing substantial macroeconomic and fiscal costs.³

¹ Prepared by Geremia Palomba.

² For discussion of different aspects of fiscal policy formulation in resource-rich countries, see Davis et al. (2003).

³ The *non-mineral balance* is defined as the government's overall fiscal balance net of mineral-related revenue and expenditure. Based on this definition, volatility in mineral revenue, with corresponding changes in public expenditure, would affect the non-mineral balance, but would have no effect on the overall fiscal balance.

6. Large and unpredictable changes in expenditure, and in the non-mineral deficit, can entail different types of *macroeconomic costs*.

- A rising non-mineral deficit financed with mineral revenue may create pressures toward a real appreciation of the domestic currency if not appropriately sterilized (Dutch disease). This would have negative effects on the competitiveness of the non-mineral sector of the economy, potentially reducing private investment and damaging economic growth.
- A rising non-mineral deficit could also put pressure on domestic demand with undesired consequence on inflation, and the external non-mineral current account, setting the stage for macroeconomic imbalances.

Similar considerations apply in the case of a rapidly expanding mineral sector. In this case, there could be an overshooting of the real exchange rate because of large investment projects (and significant foreign exchange inflows) and broader wealth effects.

7. Short-term fluctuations in government expenditure financed with mineral revenue windfalls also entail *fiscal costs*.

- The sudden creation of spending programs, following a surge in mineral revenue, can exceed the government's planning, implementation, and management capacity, making difficult to prevent wasteful spending.
- Expansions in spending programs during good times may lock in place a powerful hysteresis effect, making it difficult to streamline expenditure in bad times, and setting the stage for serious macroeconomic imbalances. At the same time, sharp expenditure reductions in the face of lowering mineral revenue may lead to social instability, discouraging private investment and reducing growth prospects.
- In the case where public expenditure has increased rapidly for some time, the marginal value of additional expenditure is likely to be in question and this may lead to suboptimal and inefficiently high levels of expenditure.

Indeed, depending on the macro and political economy situation, a country may well benefit instead from using revenue to lower public debt or keeping mineral revenue in the form of financial assets.

The challenge with long-term exhaustibility of mineral revenue

8. Over the long-term, mineral revenue is exhausted, and this poses the problem of how much revenue to consume at each point in time. The risk is that consuming too much at the present results in suboptimal choices from a welfare point of view and either the need for substantial fiscal adjustment or potentially explosive debt dynamics in the post-mineral period.

9. In conclusion, governments in countries rich in mineral resources face a double challenge. They need to define a fiscal policy to: (a) absorb the macroeconomic and fiscal

costs deriving from the short-term volatility of mineral revenue; and (b) determine how to use mineral revenue over time to maximize social welfare while guaranteeing long-term fiscal sustainability.

What are the policy options available to address these challenges?

10. **Different policy options are available to address the short- and the long-term challenges** posed by the dependence on mineral revenue.

11. **In the short term, there are strong arguments for smoothing the public expenditure path and reducing fluctuations in the non-mineral fiscal balance.** This policy would reduce the macroeconomic and fiscal costs associated with mineral revenue volatility. In this respect, a key policy objective should be to pursue fiscal strategies aimed at breaking the pro-cyclical response of expenditure to volatile mineral revenue. This can be achieved by eliminating expansionary fiscal policy biases during mineral booms and targeting prudent non-mineral fiscal balances. By reducing fluctuations in public expenditure and in the non-mineral fiscal balance, the government would contribute to a more stable evolution of aggregate demand, while maintaining the quality and efficiency of its spending programs. A smoothing policy would also satisfy a precautionary motive underlying fiscal policy in resource-rich countries. Specifically, caution in expenditure planning would reduce the country's exposure to unexpected adverse mineral and financing shocks.

12. **In the case of a rapidly expanding mineral sector, there could be a strong justification for a countercyclical non-mineral fiscal policy.** Sudden mineral booms may lead to surges in domestic demand with pressure on the currency and inflation. In these cases, a clearly countercyclical non-mineral fiscal policy would play an important stabilization function.

13. **In the long term, fiscal policy should aim at smoothing consumption over time to maximize intertemporal welfare and guarantee long-term fiscal sustainability by targeting the primary non-mineral balance.** Revenue coming from mineral resources should first be partly saved (e.g., by repaying public debt or acquiring financial wealth) and then used after the depletion of mineral resources. In this respect, fiscal policy should be targeted at accumulating substantial net assets during the period of mineral production to sustain the non-mineral deficit in the post mineral period. Formally, this outcome can be achieved by targeting an appropriate level of primary non-mineral balance.⁴

⁴ For discussion on how to determine the level of non-mineral primary balance that maximizes social welfare and guarantees long-term fiscal sustainability see, for example, Davis et al. (2003), Chapter 3.

Indicators to assess the fiscal stance in resource-rich countries

14. **In assessing the fiscal performance in resource-rich countries, non-mineral fiscal balances play a critical role** to integrate the standard analysis based on overall fiscal balances.⁵

15. **The non-mineral balance is a good indicator of the government demand on the economy.** An increase in government expenditures financed by higher mineral revenue would be reflected in a larger non-mineral fiscal balance, but would not be picked up by the overall balance, as this would be fully financed. The non-mineral balance also provides a clearer picture of the government's fiscal policy stance and its adjustment efforts. Indeed, differently from the overall balance, the non-mineral balance is an aggregate largely under the control of fiscal authorities. In this respect, it reflects better the government's actual adjustment efforts. Many mineral-rich countries use the non-mineral balance as a leading indicator of the fiscal stance. For example, in Norway, budget documents and fiscal policy discussions prominently focus on the concept of non-oil balance. This focus has the additional advantage of making the use of mineral revenue more transparent.

16. **In mineral-rich countries, the overall fiscal balance is still an important measure of the budget financial requirements and vulnerability.** The overall balance underpins the gross financing needs of the government's fiscal operations, and helps to identify possible financing problems and vulnerabilities.

C. How is Papua New Guinea Managing Fiscal Policy and Mineral Revenue?

17. **Over the last four years, the fiscal policy stance in Papua New Guinea has improved substantially.** As a result of the government's effort of reducing fiscal deficits, non-mineral fiscal balances have improved significantly and have been very little correlated to the volatile pattern of mineral revenue. This has reduced the risk of having a pro-cyclical fiscal policy associated with mineral revenue performance, certainly contributing to recent macroeconomic stability.

The fiscal stance in Papua New Guinea

18. **Since 2002, both the non-mineral overall and the primary balances have improved** (Table 1). This is a remarkable result as it occurred against a background of relatively volatile mineral revenue that reached a minimum of about 15 percent of total revenue in 2002 and a maximum of about 29 percent of total revenue in 2005.⁶

⁵ For discussion of different indicators of fiscal stance see, for example, Blejer and Cheasty (1993).

⁶ Table 1 reports non-mineral balances in terms of non-mineral GDP. However, because of the uncertainty about the relative sizes of the mineral and non-mineral sectors, the table also reports the non-mineral balances as a share of total GDP.

	2000	2001	2002	2003	2004	2005
Share of mineral revenue over total revenue	21.8	24.2	14.8	19.6	22.9	26.7
Overall fiscal balance	-1.3	-3.9	-5.3	-1.6	1.1	2.7
Primary fiscal balance	3.0	0.1	-1.5	3.7	3.8	4.8
Non-mineral overall balance	-6.6	-9.6	-8.5	-6.0	-4.7	-4.4
Non-mineral primary balance	-2.5	-5.6	-4.7	-0.7	-2.0	-2.4
Nonmineral overall balance (% of nonmineral GDP)	-8.8	-12.1	-8.9	-7.0	-5.3	-5.9
Nonmineral primary balance (% of nonmineral GDP)	-3.3	-7.3	-5.8	-0.8	-2.5	-3.2
Memo items						
Mineral revenue (Percent of total GDP)	5.5	5.7	3.2	4.4	5.8	7.2
Non-mineral revenue (Percent of GDP)	19.8	18.0	18.6	18.1	19.4	17.6

Source: Authorities data and Staff estimates

19. **The fiscal stance has not been influenced by the volatility of mineral revenue.** The non-mineral overall and primary balances have been little correlated to mineral revenue, over the last few years (Table 2). This result was achieved in the context of the government's medium-term fiscal framework and debt reduction strategy that helped to isolate expenditure patterns from mineral revenue's upward volatility. The mirror image of this achievement is that the overall fiscal balance is significantly correlated to mineral revenue, as the latter was used to improve the overall fiscal balance.

	2000-2004
Mineral revenue	1.0
Overall fiscal balance (% of total GDP)	0.23
Primary fiscal balance (% of total GDP)	0.08
Nonmineral overall balance (% of nonmineral GDP)	-0.04
Nonmineral primary balance (% of nonmineral GDP)	0.03

Source: Authorities data and Staff estimates

How have unexpected mineral revenue windfalls been used?

20. **An interesting issue is to examine how the fiscal authorities have reacted in the past to unexpected mineral revenue windfalls.** To do this, we need to define the concept of unexpected mineral revenue windfalls. Since commodity prices are believed to follow a random walk, the best predictor of mineral revenue in one year is the amount of mineral revenue collected the previous year. Therefore, we can use year-to-year changes in mineral revenue as a proxy for unexpected mineral revenue or windfalls. Once mineral revenue windfalls materialize, the government has three basic options. It may: (a) adjust the non-mineral revenue; (b) modify expenditure plans; and/or (c) allow changes in the overall fiscal balance. What course of action did the fiscal authorities in Papua New Guinea adopt in the face of changes in mineral revenue in past years?

21. **Over the last few years, the fiscal authorities have not adopted a systematic approach as to how use mineral revenue windfalls.** Revenue windfalls have indeed neither been systematically spent nor saved. For example, the increases in mineral revenue in 2003 and 2004 led to different policy reactions (Table 3). In 2003, the mineral revenue increase allowed a reduction in non-mineral revenue, and was associated with sharp reductions in expenditure, thus resulting in significant fiscal savings. In 2004, the policy response was different. The increase in mineral revenue was accompanied by an improvement in non-mineral revenue and very little adjustment on the expenditure side, leading to significant fiscal savings. If we look at the response to reductions in mineral revenue, the policy response is yet different. For example, in 2002 lower mineral revenue had little effect on non-mineral revenue and led to a reduction in expenditure and a worse overall fiscal balance. Underlying these differences is that starting in 2003, the authorities embarked on a significant fiscal adjustment plan that focused on reducing expenditure independently of revenue performance. This has broken the correlation between mineral revenue performance and expenditure.

Table III.3. Papua New Guinea: Fiscal Response to Mineral revenue Shocks Non-Mineral Balance (Central Government) (In percent of GDP)					
	2001	2002	2003	2004	2005
Mineral revenue shock 1/	0.2	-2.5	1.2	1.4	1.4
Non-mineral revenue reaction 2/	1.3	-0.1	0.7	-1.3	1.8
Expenditure reaction	1.6	-1.1	-3.2	-0.1	-1.9
Savings 3/	-2.6	-1.4	3.7	2.7	1.6

Source: Authorities data and Staff estimates.
 1/ A mineral revenue shock is defined as a variation in mineral related revenue from one year to the next.
 2/ Non-mineral revenue reaction is defined as a decrease in non-mineral revenue (a positive number indicates a decrease in non-mineral revenue).
 3/ Savings are defined as changes in the overall fiscal balance.

D. What Do We Conclude?

22. **To date, Papua New Guinea is on the right track in dealing with the challenges that mineral-rich countries face in formulating fiscal policy.** These challenges arise from the fact that mineral revenue is volatile in the short-term and exhaustible in the long term. As a result, fiscal authorities in these countries need to define a policy to: (a) avoid the significant macroeconomic and fiscal costs associated to short-term variations in the fiscal stance; and (b) determine the optimal use of mineral revenue over time that maximizes social welfare and guarantees the long-term sustainability of fiscal policy. To address these challenges, fiscal authorities should assess their fiscal stance focusing on non-mineral balances. In the short term, they should avoid unintended fluctuations in the overall non-mineral balance. In the long term, they should identify the level of non-mineral primary balance that maximizes welfare while guaranteeing fiscal sustainability over time. In Papua New Guinea's case, by adopting a fiscal adjustment plan that reduces expenditure independently of revenue performance, the strategy effectively addresses the short-term challenge. For the longer term, a parallel debt policy of progressively reducing debt-to-GDP ratios over time has so far met the long-term challenge although significant increase in future mineral revenue may warrant some attention to the long-term dynamics of non-mineral balances.

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Table 1. Papua New Guinea: GDP by Sector at Current Market Prices, 2000-04

	2000	2001	2002	<u>2003</u> Est.	<u>2004</u> Est.
(In millions of kina)					
Nominal GDP	9,736	10,396	11,657	12,858	13,790
Mineral	2,464	2,401	2,150	2,533	2,873
Non-mineral	7,272	7,995	9,507	10,326	10,916
<i>Of which</i> : Non-agricultural	3,965	4,418	5,079	5,297	5,544
Agriculture, forestry and fishing	3,307	3,578	4,428	5,029	5,372
Mining, quarrying, and petroleum	2,464	2,401	2,150	2,533	2,873
Manufacturing	698	731	729	766	803
Electricity, gas and water	140	167	195	217	227
Construction	528	702	996	1,069	1,125
Wholesale and retail trade	321	558	746	802	839
Transport, storage and communication	258	258	268	284	298
Financing, insurance, real estate and business servi	396	407	407	423	442
Less: Imputed bank service charge	163	179	185	188	196
Community, social and personal services	1,297	1,241	1,352	1,354	1,402
Import duties	494	535	575	572	606
Less: Subsidies	3	3	3	3	3
(In percent of GDP)					
Memoranda items:					
Nominal GDP	100.0	100.0	100.0	100.0	100.0
Mineral	25.3	23.1	18.4	19.7	20.8
Non-mineral	74.7	76.9	81.6	80.3	79.2
<i>Of which</i> : Non-agricultural	40.7	42.5	43.6	41.2	40.2
Agriculture, forestry and fishing	34.0	34.4	38.0	39.1	39.0
Mining, quarrying, and petroleum	25.3	23.1	18.4	19.7	20.8
Manufacturing	7.2	7.0	6.3	6.0	5.8
Electricity, gas and water	1.4	1.6	1.7	1.7	1.6
Construction	5.4	6.8	8.5	8.3	8.2
Wholesale and retail trade	3.3	5.4	6.4	6.2	6.1
Transport, storage and communication	2.7	2.5	2.3	2.2	2.2
Financing, insurance, real estate and business ser	4.1	3.9	3.5	3.3	3.2
Less: Imputed bank service charge	1.7	1.7	1.6	1.5	1.4
Community, social and personal services	13.3	11.9	11.6	10.5	10.2
Import duties	5.1	5.1	4.9	4.5	4.4
Less: Subsidies	0.0	0.0	0.0	0.0	0.0

Sources: Data through 2002 provided by the National Statistical Office; data for 2003-04 from the Treasury Department.

Table 2. Papua New Guinea: GDP by Type of Expenditure at Current Market Prices, 2000-2004

	2000	2001	2002	<u>2003</u> Est.	<u>2004</u> Est.
	(In millions of kina)				
Gross domestic product	9,736	10,396	11,657	12,858	13,790
Market component	7,996	8,191	8,770	9,581	10,287
Nonmarket component	1,740	2,206	2,887	3,277	3,502
Consumption	5,956	6,650	8,847	8,587	9,650
Private	4,343	4,962	7,060	6,783	7,787
Government	1,613	1,688	1,788	1,804	1,862
Gross investment	2,131	2,386	2,470	2,714	2,903
Gross fixed capital formation	1,988	2,200	2,264	2,496	2,676
Change in inventories	144	186	206	219	228
Domestic demand	8,087	9,037	11,317	11,302	12,553
Foreign balance (net)	1,649	1,360	339	1,557	1,237
Exports of goods and services	6,443	6,792	7,100	8,559	8,982
Imports of goods and services	4,794	5,432	6,761	7,003	7,746
	(In percent of GDP)				
Memoranda items:					
Gross domestic product	100.0	100.0	100.0	100.0	100.0
Market component	82.1	78.8	75.2	74.5	74.6
Nonmarket component	17.9	21.2	24.8	25.5	25.4
Domestic demand	83.1	86.9	97.1	87.9	91.0
Consumption	61.2	64.0	75.9	66.8	70.0
Private	44.6	47.7	60.6	52.8	56.5
Government	16.6	16.2	15.3	14.0	13.5
Gross investment	21.9	23.0	21.2	21.1	21.1
Foreign balance (net)	16.9	13.1	2.9	12.1	9.0

Sources: Data through 2002 provided by the National Statistical Office; data for 2003-04 from the Treasury Department.

Table 3. Papua New Guinea: GDP by Type of Expenditure at Constant 1983 Prices, 2000-04

	2000	2001	2002	<u>2003</u> Est.	<u>2004</u> Est.
(In millions of 1983 kina)					
Gross domestic product	7,741	7,728	7,954	8,185	8,428
Market component	6,256	6,233	6,423	6,614	6,816
Nonmarket component	1,485	1,495	1,531	1,571	1,612
Consumption	4,397	5,289	4,529	5,564	6,354
Private	2,846	3,737	3,025	4,095	4,908
Government	1,552	1,552	1,505	1,469	1,446
Gross investment	2,047	2,001	2,059	2,819	3,403
Gross fixed capital formation	1,887	1,834	1,892	2,652	3,236
Change in inventories	160	167	167	167	167
Domestic demand	6,444	7,290	6,589	8,383	9,756
Foreign balance (net)	1,296	439	1,366	-199	-1,328
Exports of goods and services	5,775	5,703	6,543	6,115	6,331
Imports of goods and services	4,479	5,264	5,178	6,314	7,659
(Annual percentage change)					
Memoranda items:					
Gross domestic product	-0.1	-0.2	2.9	2.9	3.0
Market component	0.4	-0.4	3.0	3.0	3.1
Nonmarket component	-2.3	0.7	2.4	2.6	2.6
Domestic demand	-3.5	14.4	-10.6	30.0	18.0
Consumption	-7.3	20.3	-14.4	22.9	14.2
Private	-13.6	31.3	-19.1	35.4	19.8
Government	7.1	0.0	-3.1	-2.4	-1.6
Gross investment	7.0	-2.3	2.9	36.9	20.7
Foreign balance (net)	18.6	-66.2	211.3	-114.5	568.8

Sources: Data through 2002 provided by the National Statistical Office; data for 2003-04 from the Treasury Department.

Table 4. Papua New Guinea: Production of Major Commodities, 2000–04

	2000	2001	2002	2003	2004
Production volumes					
Crude Oil (millions of barrels)	23.6	21.4	15.4	15.0	12.6
Copper (thousands of tonnes)	126.8	212.6	170.1	230.6	173.9
Gold (tonnes)	72.8	69.1	59.1	68.4	67.3
Silver (tonnes)	61.2	58.6	54.1	61.3	49.5
Cocoa (thousands of tonnes)	38.0	36.3	34.9	40.3	41.5
Coffee (thousands of tonnes)	66.6	51.6	63.1	68.8	63.0
Tea (thousands of tonnes)	8.5	8.8	5.2	6.6	8.1
Copra (thousands of tonnes)	67.2	21.8	15.8	8.4	19.2
Copra oil (thousands of tonnes)	48.0	27.1	28.2	47.7	45.1
Palm oil (thousands of tonnes)	336.3	327.6	323.9	326.9	339.0
Rubber (thousands of tonnes)	3.7	3.6	3.8	4.2	3.8
Logs (millions of cubic meters)	1.4	1.2	1.8	2.0	2.0
(In millions of kina)					
Production values					
Crude Oil	1,922	1,889	1,431	1,632	1652.2
Copper	595	1,074	1,019	1,415	1544.2
Gold	1,951	2,115	2,295	2,811	2779.5
Silver	32	37	39	36	31.5
Cocoa	85	110	226	258	218
Coffee	295	189	277	299	283.8
Tea	20	22	18	19	22.9
Copra	60	16	11	7	17
Copra oil	66	27	33	67	81
Palm oil	307	291	390	421	438.7
Rubber	6	7	9	12	13.8
Logs	283	234	366	370	355.7

Sources: Data provided by the Papua New Guinea authorities, and Fund staff estimates.

Table 5. Papua New Guinea: Employment by Sector, 2002–September 2005

	2002	2003	2004	2005 Sept.
(March 2002 =100, annual average) 1/				
Total	102.2	109.9	111.1	112.7
Retail	98.2	99.6	100.7	91.2
Wholesale	102.8	113.4	117.0	135.3
Manufacturing	102.2	107.5	112.2	130.4
Building and construction	90.5	98.7	96.7	107.4
Transportation	106.3	105.8	107.9	105.1
Agriculture, forestry, and fisheries	104.1	119.0	117.5	115.5
Financial and business services	102.9	108.4	111.1	106.1
Mining 1/	98.8	97.6	102.3	103.0
(Annual percentage change)				
Total	1.6	7.5	1.1	2.5
Retail	-2.4	1.4	1.1	-1.3
Wholesale	0.1	10.3	3.2	10.7
Manufacturing	2.7	5.2	4.4	16.1
Building and construction	-2.6	9.1	-2.0	4.4
Transportation	6.9	-0.5	2.0	-2.1
Agriculture, forestry, and fisheries	1.9	14.3	-1.3	0.9
Financial and business services	2.4	5.3	2.5	1.2
Mining 1/	2.0	-1.2	4.8	6.6

Source: Bank of Papua New Guinea, *Quarterly Economic Bulletin*.

1/ Not included in overall index; excludes subcontractors.

Table 6. Papua New Guinea: Consumer Price Index by Expenditure Group, 2000–September 2005

	All Groups Total	Food	Drinks, Tobacco, and Betelnut	Clothing and Footwear	Rents, Fuel, and Power	Household Equipment and Operations	Transportation and Communication	Miscellaneous	Bank of Papua New Guinea's Underlying Inflation 1/
(Percentage change from corresponding quarter of previous year)									
2000									
March	19.6	19.9	13.3	18.2	8.2	24.0	28.5	21.2	15.0
June	21.9	19.6	28.2	17.8	8.3	23.2	22.3	20.2	14.4
September	12.2	8.8	18.6	14.3	5.6	8.0	13.0	13.6	7.9
December	10.0	7.7	13.9	13.0	7.3	2.2	11.3	11.5	5.5
2001									
March	8.9	5.9	15.5	11.2	2.5	3.7	10.2	4.4	4.4
June	7.8	7.9	11.7	12.5	6.8	-0.7	4.7	6.7	4.6
September	10.0	11.8	13.3	12.0	7.7	2.0	4.6	9.1	6.6
December	10.4	12.5	13.5	11.1	7.7	2.6	4.6	9.5	8.0
2002									
March	10.5	15.9	10.7	10.9	7.1	0.2	5.8	-2.0	9.4
June	9.4	17.3	4.5	9.6	1.4	4.7	5.5	-2.0	11.1
September	12.3	17.1	8.2	8.6	1.4	9.6	13.7	0.3	13.7
December	14.8	17.8	13.9	6.5	2.7	12.7	17.8	1.2	15.5
2003									
March	20.7	23.7	22.2	5.1	7.1	19.3	33.4	17.6	18.4
June	19.0	14.9	20.0	4.6	7.9	16.3	32.9	16.2	15.7
September	11.8	8.9	10.2	4.9	7.9	12.6	21.6	13.0	10.4
December	8.4	6.9	5.9	4.1	1.4	9.0	15.9	12.0	6.7
2004									
March	2.5	-1.4	1.1	3.9	1.3	0.2	-0.1	16.5	1.6
June	1.9	2.8	0.7	4.1	3.3	0.9	-1.9	16.4	2.3
September	1.6	1.7	-0.1	1.5	8.2	-0.8	0.0	16.5	2.0
December	2.4	-0.6	6.7	0.7	15.7	-1.7	-0.3	15.4	2.0
2005									
March	0.1	1.4	2.5	-1.4	8.8	-3.5	-8.3	4.4	3.3
June	0.8	1.4	2.4	-2.1	16.6	0.9	-3.9	2.3	2.6
September	1.4	3.4	5.4	-2.6	6.7	-2.3	-6.2	2.0	3.2
Memorandum item:									
Weights in total basket (percent) 2/	100.0	40.9	20.0	6.2	7.2	5.3	13.0	7.5	63.6

Sources: *Consumer Price Index*, National Statistical Office; and Bank of Papua New Guinea's *Quarterly Economic Bulletin*.

1/ Excluding food and goods and services subject to administered prices.

2/ Weights are based on the 1977 expenditure survey.

Table 7a. Papua New Guinea: Central Government Budget 2001–05

(In millions of kina)

	2001	2002	2003	2004	2005 Rev. budget
Revenue	3,087	3,237	3,657	4,317	5,004
Tax	2,295	2,370	2,678	3,220	3,493
Mineral taxes	555	365	498	736	975
Nonmineral taxes	1,740	2,005	2,180	2,484	2,518
Nontax	172	170	232	248	228
<i>Of which:</i> mineral nontax revenue	42	10	74	60	85
Grants	620	697	747	850	1,283
Budget Grants	71	21	0	0	0
Project Grants	550	676	747	850	1,283
Expenditure	3,457	3,713	3,811	4,104	5,101
Recurrent	2,414	2,547	2,677	2,831	2,933
Noninterest recurrent expenditures	1,996	2,110	1,987	2,461	2,585
National departments	1,242	1,357	1,189	1,576	1,746
Salaries and wages	540	574	618	681	699
Arrears payments	91	12	14	37	86
Education funding	0	135	19	40	41
Goods and services	386	568	528	752	854
Structural adjustment payments	40	68	10	67	66
Other	186	0	0	0	0
Provinces	589	588	594	678	641
Salaries and wages	420	485	504	589	551
Goods and services	98	49	61	65	55
Conditional grants	71	54	29	24	35
Other	0	0	0	0	0
Statutory authorities	165	165	203	207	198
Interest	418	437	690	370	348
Domestic	253	248	528	239	237
Foreign	165	189	161	131	111
Development budget and net lending	1,043	1,166	1,134	1,273	2,168
Development budget	1,047	1,171	1,144	1,283	1,772
Project grants	550	676	747	850	1,283
Concessional Loans	142	120	134	74	133
Nonconcessional loans	0	138	56	25	11
Domestic Funds	355	237	207	334	345
Net lending	-4	-5	-10	-10	396
Overall balance (from above the line)	-370	-476	-154	213	-96
Errors, omissions, and discrepancy	-34	-137	-51	-64	0
Overall balance (from below the line)	-404	-612	-206	150	-97
Financing	404	612	206	-150	97
Foreign financing (net)	312	-101	-266	-222	-156
Domestic financing (net)	-35	665	432	-83	252
Float	127	-153	-1	130	0
Asset sales	0	201	40	25	0
Memorandum items:					
Nominal GDP (in millions of kina)	10,396	11,657	12,858	13,790	15,143

Sources: Data provided by the Papua New Guinea authorities; and Fund staff estimates.

Table 7b. Papua New Guinea: Central Government Budget 2001–05

(In percent of GDP)

	2001	2002	2003	2004	2005
					Rev. budget
Revenue	29.7	27.8	28.4	31.3	33.0
Tax	22.1	20.3	20.8	23.3	23.1
Nonmineral taxes	5.3	3.1	3.9	5.3	6.4
Mineral taxes	16.7	17.2	17.0	18.0	16.6
Nontax	1.6	1.5	1.8	1.8	1.5
<i>Of which:</i> Mineral nontax revenue	0.4	0.1	0.6	0.4	0.6
Grants	6.0	6.0	5.8	6.2	8.5
Budget Grants	0.7	0.2	0.0	0.0	0.0
Project Grants	5.3	5.8	5.8	6.2	8.5
Expenditure	33.2	31.8	29.6	29.8	33.7
Recurrent	23.2	21.8	20.8	20.5	19.4
Noninterest recurrent expenditures	19.2	18.1	15.5	17.8	17.1
National departments	11.9	11.6	9.3	11.4	11.5
Salaries and wages	5.2	4.9	4.8	4.9	4.6
Arrears payments	0.9	0.1	0.1	0.3	0.6
Education funding	0.0	1.2	0.2	0.3	0.3
Goods and services	3.7	4.9	4.1	5.5	5.6
Structural adjustment payments	0.4	0.6	0.1	0.5	0.4
Other	1.8	0.0	...	...	...
Provinces	5.7	5.0	4.6	4.9	4.2
Salaries and wages	4.0	4.2	3.9	4.3	3.6
Goods and services	0.9	0.4	0.5	0.5	0.4
Conditional Grants	0.7	0.5	0.2	0.2	0.2
Statutory authorities	1.6	1.4	1.6	1.5	1.3
Interest	4.0	3.7	5.4	2.7	2.3
Domestic	2.4	2.1	4.1	1.7	1.6
Foreign	1.6	1.6	1.3	1.0	0.7
Development budget and net lending	10.0	10.0	8.8	9.2	14.3
Development budget	10.1	10.0	8.9	9.3	11.7
Project grants	5.3	5.8	5.8	6.2	8.5
Project concessional Loans	1.4	1.0	1.0	0.5	0.9
Nonconcessional loans	0.0	1.2	0.4	0.2	0.1
Domestic Funds	3.4	2.0	1.6	2.4	2.3
Net Lending	0.0	0.0	-0.1	-0.1	2.6
Overall balance (from above the line)	-3.6	-4.1	-1.2	1.5	-0.6
Errors, omissions, and discrepancy	-0.3	-1.2	-0.4	-0.5	0.0
Overall balance (from below the line)	-3.9	-5.3	-1.6	1.1	-0.6
Financing	3.9	5.3	1.6	-1.1	0.6
Foreign financing (net)	3.0	-0.9	-2.1	-1.6	-1.0
Domestic financing	-0.3	5.7	3.4	-0.6	1.7
Float	1.2	-1.3	0.0	0.9	...
Asset sales	0.0	1.7	0.3	0.2	...
Memorandum item:					
Nominal GDP (in millions of kina)	10,396	11,657	12,858	13,790	15,143

Sources: Data provided by the Papua New Guinea authorities; and Fund staff estimates.

Table 8. Papua New Guinea: Central Government Revenue and Grants 2001–05

(In millions of kina)

	2001	2002	2003	2004	2005 Rev. budget
Total revenue and grants	3,087	3,237	3,657	4,317	5,004
Total revenue	2,467	2,540	2,910	3,468	3,736
Tax revenue	2,295	2,370	2,678	3,220	3,493
Taxes on income and profit	1,509	1,491	1,786	2,223	2,530
Personal tax	599	694	758	827	875
Company tax	252	311	335	437	442
Dividend withholding tax	58	62	117	123	140
Mineral and petroleum taxes	435	259	396	634	891
Other direct	52	69	55	79	70
Interest withholding tax	51	22	41	33	19
Gaming tax	62	74	83	91	94
Indirect taxes	786	879	892	997	963
Excise tax	187	179	175	203	249
VAT plus mining levy	319	396	414	417	420
VAT (70 percent national share only)	198	290	312	316	336
Mining levy	120	106	102	101	84
Other indirect	2	1	1	1	1
Taxes on international trade	280	303	302	376	293
Import duties	73	80	74	151	94
Export duties (logs)	98	107	112	102	114
Import excises	108	117	110	123	86
Import levy	0	0	7	0	0
Nontax revenue	172	170	232	248	243
Property income	98	74	160	165	166
Dividends	56	64	86	105	66
Mining and petroleum	42	10	74	60	100
Interest and fees	1	1	4	3	5
Other	73	72	68	80	73
Asset sales costs	0	22	0	0	0
Foreign grants	620	697	747	850	1,283
Budgetary support	71	21	0	0	0
Australia	71	21	0	0	0
Other	0	0	0	0	0
Project grants	550	676	747	850	1,283

Sources: Data provided by the Papua New Guinea authorities; and Fund staff estimates.

Table 9. Papua New Guinea: Central Government Fiscal Financing 2001–05

(In millions of kina)

	2001	2002	2003	2004	2005 Rev. budget
Total Financing	404	612	206	-150	97
Foreign financing (net)	312	-101	-266	-222	-156
New borrowing	627	258	190	181	144
Project loans	172	258	190	99	144
Concessional financing	456	0	0	82	0
Amortization	315	358	456	403	300
Domestic financing (net)	-35	665	432	-83	252
Bank of Papua New Guinea					
Net credit to central government	-269	233	-83	-20	...
Securities	-26	-31	-48	35	...
Treasury bills	0	-12	-29	35	...
Inscribed stock	-26	-19	-19	-1	...
Temporary advance	0	75	-36	-39	...
Deposits	-243	189	1	-16	...
Commercial Banks					
Net credit to central government	23	327	-51	102	...
Securities	83	304	-92	137	...
Treasury bills	-2	369	-72	-299	...
Inscribed stock	85	-65	-20	436	...
Loans	-5	-4	-1	-1	...
Deposits	-55	27	42	-34	...
Nonbanks					
Net credit to central government	210	105	566	-164	...
Securities	288	71	571	-164	...
Treasury bills	187	70	641	-473	...
Inscribed stock	101	1	-71	308	...
Loans	-77	34	-5	0	...
Float	127	-153	-1	130	0
Asset sales	0	201	40	25	0

Sources: Data provided by the Papua New Guinea authorities; and Fund staff estimates.

Table 10. Papua New Guinea: Central Government Domestic Debt, 2001-September 2005

(In millions of kina; end of period)

	2001	2002	2003	2004	2005		
					Mar.	Jun.	Sept.
Central government domestic debt: by creditor							
Bank of Papua New Guinea							
Net credit to central government	472	705	622	601	608	529	638
Securities	746	715	667	702	702	705	706
Treasury bills 1/	633	621	592	627	627	627	628
Inscribed stock 2/	113	94	76	75	75	78	78
Temporary advance	0	75	39	0	0	0	15
Less: Deposits	275	86	84	101	94	176	83
Commercial Banks							
Net credit to central government	225	552	501	603	573	574	560
Securities	528	832	740	876	861	890	859
Treasury bills 1/	443	812	740	441	425	440	246
Inscribed stock 2/	85	20	0	436	436	451	613
Loans	7	3	2	1	1	2	1
Less: Deposits	310	283	240	275	288	318	300
Nonbanks							
Net credit to central government	843	948	1,514	1,350	1,433	1,447	1,382
Securities	819	891	1,461	1,297	1,380	1,394	1,329
Treasury bills 2/	651	721	1,362	890	973	891	803
Inscribed stock 2/	168	170	99	407	407	503	527
Loans	24	58	53	53	53	53	53
Central government net domestic debt: total	1,540	2,205	2,637	2,554	2,614	2,550	2,580
Total gross domestic debt	2,124	2,573	2,962	2,930	2,996	3,045	2,963
Securities	2,093	2,438	2,868	2,875	2,942	2,990	2,894
Total treasury bills	1,727	2,154	2,694	1,958	2,025	1,958	1,676
Loans	31	135	94	54	54	55	69
Less: Central government deposits	584	368	325	376	382	495	383

Sources: Data provided by the Bank of Papua New Guinea; and Department of Treasury.

1/ Discount value.

2/ Face value.

Table 11. Papua New Guinea: Monetary Survey, 2001–June 2005

(In millions of kina; end of period)

	2001	2002	2003	2004	2005	
					Mar.	Jun.
Net foreign assets	1,580	1,419	1,616	2,157	2,005	1,988
Bank of Papua New Guinea	1,249	908	1,317	1,862	1,691	1,723
Foreign assets	1,656	1,379	1,735	2,063	1,808	1,760
Less: Foreign liabilities	406	471	418	201	117	37
Commercial banks	331	511	299	296	314	265
Net domestic assets	1,507	1,798	1,494	1,430	1,565	1,676
Domestic credit	2,367	2,850	2,620	2,655	2,757	2,846
Net credit to central government 1/	697	1,257	1,123	1,204	1,198	1,152
Bank of Papua New Guinea 1/	472	705	622	601	638	677
Claims on central government 1/	746	790	706	702	721	760
Less: Central government deposits	275	86	84	101	83	83
Commercial banks 1/	225	552	501	603	560	475
Claims on central government 1/	535	835	742	878	860	829
Securities	528	832	740	876	859	828
Loans	7	3	2	1	1	0
Less: Central government deposits	310	283	240	275	300	354
Claims on other sectors	1,670	1,594	1,497	1,451	1,559	1,695
Claims on the private sector	1,543	1,445	1,383	1,352	1,436	1,582
Claims on official entities	115	128	101	74	106	99
Claims on nonmonetary financial instituti	12	20	13	25	17	14
Other items, net 1/	-860	-1,052	-1,126	-1,225	-1,192	-1,170
Broad money	3,087	3,217	3,109	3,587	3,570	3,664
Narrow money	1,321	1,535	1,708	2,215	2,252	2,312
Currency outside banks	272	366	399	420	384	430
Demand deposits	1,049	1,169	1,309	1,795	1,869	1,882
Quasi money	1,766	1,682	1,401	1,373	1,318	1,352
Memoranda items:						
Narrow money growth rate 2/	3.9	16.2	11.3	29.6	34.8	20.0
Broad money growth rate 2/	1.9	4.2	-3.3	15.4	18.7	11.9
Private sector credit growth rate 2/	-1.2	-6.3	-4.3	-2.2	4.4	16.8
Nominal nonmineral GDP/broad money	2.6	3.0	3.3	3.0	...	...

Sources: Data provided by the Papua New Guinea authorities; and Fund staff estimates.

1/ From January 2002 BPNG stopped netting the outstanding stock of its own short-term securities from from its gross holdings of government treasury bills, and now records its total holdings of treasury bills as assets and the outstanding stock of central bank securities as liabilities. This led to a shift in the composition of credit to the central government from the commercial banks to the BPNG in March 2002.

2/ Percent change from corresponding period of previous year.

Table 12. Papua New Guinea: Balance Sheet of the Central Bank, 2001-June 2005

(In millions of kina; end of period)

	2001	2002	2003	2004	2005	
					Mar.	Jun.
Net foreign assets	1,249	908	1,317	1,862	1,691	1,723
Foreign assets	1,656	1,379	1,735	2,063	1,808	1,760
Less: Foreign liabilities	406	471	418	201	117	37
<i>Of which: Non-IMF liabilities</i>	2	4	13	1	0	3
Net domestic assets 1/	-671	-264	-651	-988	-988	-1,029
Domestic credit 1/	-74	574	254	-262	-298	-408
Net credit to government 1/	472	705	622	601	638	677
Securities 1/	746	715	667	702	706	742
Treasury bills 1/	633	621	592	627	628	633
Inscribed stock	113	94	76	75	78	109
Advances	0	75	39	0	15	18
Less: Central government deposits	275	86	84	101	83	83
Credit to other sectors	56	56	55	29	29	28
Claims on the private sector	3	3	4	5	5	5
Claims on deposit money banks	52	52	50	24	24	23
Claims on nonmonetary financial institutions	0	0	0	0	0	0
Less: Central bank securities	586	157	422	891	965	1,114
Less: Kina facility deposits	15	30	0	0	0	0
Other items net 1/	-598	-837	-905	-726	-690	-621
Reserve money	578	644	666	874	702	694
Currency in circulation	385	472	512	531	479	544
Notes	349	433	471	489	437	500
Coins	37	39	41	42	43	44
Deposits of commercial banks	188	162	153	332	218	140
ESA deposits	34	8	66	231	114	33
CRR deposits	154	154	87	101	104	107
Other deposits	4	9	0	10	5	10
Memoranda items:						
Reserve money growth 2/	7.6	11.4	3.4	31.2	15.8	8.9
Use of fund credit (millions of U.S. dollars)	107.5	116.3	121.5	64.3	37.6	10.3
Gross international reserves (millions of U.S. dollars)	440.1	340.1	520.6	639.1	581.0	564.8
Exchange rate (U.S. dollar/kina)	0.27	0.25	0.30	0.32	0.32	0.32
Exchange rate (U.S. dollar/SDR)	1.26	1.36	1.49	1.55	1.51	1.46

Sources: Data provided by Papua New Guinea authorities; and Fund staff estimates.

1/ From January 2002 BPNG stopped netting the outstanding stock of its own short-term securities from its gross holdings of government treasury bills, and now records its total holdings of treasury bills as assets and the outstanding stock of central bank securities as liabilities.

This led to a shift in the composition of credit to the central government from the commercial banks to the BPNG in March 2002.

2/ Percent change from corresponding period of previous year.

Table 13. Papua New Guinea: Consolidated Balance Sheet of Commercial Banks, 2001-June 2005

(In millions of kina; end of period)

	2001	2002	2003	2004	2005	
					Mar.	Jun.
Net foreign assets	331	511	299	296	314	265
Foreign assets	422	615	356	364	381	338
Foreign liabilities	91	104	56	69	67	73
Reserves	188	162	153	332	218	140
CRR accounts	154	154	87	101	104	107
ESA accounts	34	8	66	231	114	33
	0	0	0	0	0	0
Currency	113	106	113	112	96	114
Domestic credit	2,421	2,298	2,416	2,914	3,053	3,252
Net credit to central government	811	709	923	1,494	1,525	1,589
Claims on central government	1,121	991	1,164	1,769	1,825	1,942
Securities	1,114	989	1,161	1,768	1,824	1,942
Treasury bills	443	812	740	441	246	152
Inscribed stock	85	20	0	436	613	676
Inscribed stock of maturity < 3 years	85	20	0	278	325	348
Inscribed stock of maturity > 3 years	0	0	0	157	288	328
Loans	7	3	2	1	1	0
Less: Central government deposits	310	283	240	275	300	354
Claims on other sectors	1,610	1,589	1,493	1,420	1,528	1,663
Claims on the private sector	1,483	1,441	1,379	1,347	1,431	1,577
Claims on official entities	115	128	101	48	80	72
Claims on NFPE's	114	126	95	44	77	70
Claims on provincial governments	1	2	6	4	3	3
Claims on nonmonetary financial institutions	12	20	13	25	16	14
Other items, net	-186	-175	-221	-462	-468	-513
Deposits	2,815	2,851	2,710	3,168	3,187	3,234
Demand	1,550	1,710	1,761	2,298	2,385	2,415
Term	1,265	1,141	949	870	802	819
Central bank credit	52	52	50	24	26	23
Discount facility	0	0	0	0	0	0
Repurchase agreements	0	0	0	0	0	0
Agricultural support schemes	52	52	52	26	26	29
Other	0	0	-2	-2	0	-6
Memoranda items:						
Deposits subject to reserve requirements	3,100	3,120	2,948	3,393	3,455	3,503
Implied cash reserve ratio (percent)	0	5	3	3	3	3
Kina facility borrowings (-deposits)	-15	-30	0	0	0	0
Liquid assets	638	932	900	1,036	766	622
Liquid asset ratio (percent)	0	30	31	31	22	18
Excess ESA balances	19	-22	66	231	114	33
Total commercial bank assets	3,926	3,954	3,893	4,355	4,428	4,539
Claims on central government/total assets (percent)	29	25	30	41	41	43

Sources: Data provided by Papua New Guinea authorities; and Fund staff estimates.

Table 14. Papua New Guinea: Commercial Bank Loans by Sector, 2001–September 2005

	2001			2002			2003			2004			2005		
	1674	1593	1413	1495	1421	1531	1662	1721	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	(In millions of kina; end of period)														
Total	1473	1413	1331	1223	1294	1410	1458	100.0	88.7	89.0	86.1	84.5	84.8	84.7	
Business	200	90	51	64	98	129	117	12.0	5.6	3.4	4.5	6.4	7.7	6.8	
Agriculture, forestry, and fishing	11	2	3	1	3	27	26	0.6	0.1	0.2	0.1	0.2	1.6	1.5	
Coffee	74	56	1	24	8	15	8	4.4	3.5	0.1	1.7	0.5	0.9	0.4	
Cocoa	27	0	0	1	1	1	0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	
Coconut products	38	0	0	0	28	28	25	2.3	0.0	0.0	0.0	1.9	1.7	1.5	
Palm oil	8	6	7	19	22	24	19	0.4	0.4	0.4	1.4	1.4	1.5	1.1	
Fisheries	20	15	21	8	12	13	18	1.2	0.9	1.4	0.5	0.8	0.8	1.0	
Forestry	23	10	20	12	25	21	20	1.4	0.7	1.3	0.8	1.6	1.3	1.2	
Other 1/	107	136	99	95	101	113	114	6.4	8.6	6.6	6.7	6.6	6.8	6.6	
Manufacturing	4	4	6	3	11	13	27	0.3	0.3	0.4	0.2	0.7	0.8	1.5	
Engineering and metal processing	71	74	71	45	44	49	47	4.2	4.7	4.8	3.2	2.9	3.0	2.7	
Food, drink, and tobacco processing	11	8	9	10	5	4	4	0.6	0.5	0.6	0.7	0.3	0.2	0.2	
Textile, leather, and wood products	1	5	1	0	6	4	5	0.0	0.3	0.1	0.0	0.4	0.3	0.3	
Chemicals, paints, and gases	20	44	12	36	35	42	32	1.2	2.8	0.8	2.5	2.3	2.5	1.8	
Other 2/	126	114	124	72	70	72	91	7.5	7.2	8.3	5.1	4.5	4.3	5.3	
Transport and communication	12	20	13	25	16	14	9	0.7	1.2	0.9	1.7	1.1	0.8	0.5	
Finance	375	325	373	384	336	422	446	22.4	20.4	25.0	27.0	22.0	25.4	25.9	
Commerce	232	236	265	214	214	264	290	13.9	14.8	17.7	15.1	14.0	15.9	16.8	
Retail trade	46	29	75	94	95	120	123	2.7	1.8	5.0	6.6	6.2	7.2	7.2	
Buyers, processors, and exporters	97	60	33	76	27	38	33	5.8	3.8	2.2	5.3	1.8	2.3	1.9	
Wholesale trade	61	42	66	66	81	94	91	3.6	2.7	4.4	4.7	5.3	5.7	5.3	
Building and construction	17	69	20	6	12	6	11	1.0	4.3	1.3	0.4	0.8	0.3	0.6	
Mining and quarrying	3	47	6	6	12	6	11	0.2	2.9	0.4	0.4	0.8	0.3	0.6	
Metals and other mining	14	22	14	0	0	0	0	0.9	1.4	0.9	0.0	0.0	0.0	0.0	
Petroleum and natural gas	576	617	587	511	581	561	580	34.4	38.7	39.2	36.0	37.9	33.7	33.7	
Other business 3/															
Government	8	5	8	5	4	3	1	0.5	0.3	0.6	0.3	0.3	0.2	0.1	
Central government 4/	7	3	2	1	1	1	0	0.4	0.2	0.1	0.1	0.1	0.0	0.0	
Provincial government	1	2	3	2	1	1	1	0.0	0.1	0.2	0.1	0.1	0.1	0.0	
Local government	0	0	3	2	2	2	1	0.0	0.0	0.2	0.1	0.1	0.1	0.0	
Persons	192	175	156	193	231	251	263	11.5	11.0	10.4	13.6	15.1	15.1	15.3	
Advances for housing	82	126	103	121	133	142	144	4.9	7.9	6.9	8.5	8.7	8.5	8.4	
Other personal loans	111	49	52	73	99	110	119	6.6	3.1	3.5	5.1	6.4	6.6	6.9	

Source: Bank of Papua New Guinea, *Quarterly Economic Bulletin*.

1/ Includes rubber, tea, and cattle.

2/ Includes printing and packaging.

3/ Includes hotels and restaurants, real estate, renting and business services, electricity, and gas and water supply.

4/ Excludes short-term government debt instruments and other deposits.

Table 15. Papua New Guinea: Reserve Requirements, March 1997–September 2005

(In percent)

Period	Cash Reserve Requirement	Minimum Liquid Assets Ratio	Total Requirement
March 1997–July 1998	0	20	20
August 1998–November 1998	0	20	20
December 1998–January 12, 1999	0	0	0
January 15, 1999–February 1999	10	0	10
March 1999–May 1999	5	15	15
June 1999–August 1999 1/	5	20	25
September 1999–December 2002	5	25	30
October 2003–September 2005	3	25	28

Source: Bank of Papua New Guinea.

1/ From June 1999, CRR deposits at the central bank were excluded from the definition of liquid assets.

Table 16. Papua New Guinea: Interest Rates, 2001-September 2005

	Kina Facility Rate	Kina Deposit Rate 1/	Treasury Bills				Weighted Average Deposit Rate	Weighted Average Lending Rate	Indicative Overdraft Rate	Commercial Banks			
			Weighted 28-day	Average 63-day	Auction 91-day	Yield 182-day				Passbook Accounts	Term Deposits (less than K50,000)		
											3-6 Months	6-12 Months	12-24 Months
2001 (December)	12.00	11.25	10.15	10.17	10.26	10.23	4.1	14.6	13.65	2.50-5.25	5.50-11.50	5.75-11.50	5.00-10.00
2002 (December)	14.00	13.25	15.48	15.10	14.00	13.50	5.6	13.7	8.75	1.50-3.25	4.00-6.00	4.00-7.75	4.75-6.00
2003													
January	14.50	13.75	16.66	16.47	16.52	16.80	4.7	13.7	8.75	1.50-3.25	4.00-8.00	4.00-7.75	4.75-7.25
February	15.00	14.25	17.76	17.67	17.27	17.11	4.9	13.7	8.75	1.50-3.25	3.50-8.00	4.00-8.00	4.75-8.00
March	15.00	14.25	18.62	18.62	18.66	18.19	4.9	13.4	8.75	1.50-3.25	3.50-8.00	4.00-11.00	4.75-8.00
April	15.00	--	19.10	19.26	19.43	19.83	5.0	13.8	10.25	2.00-3.25	3.50-7.25	4.00-11.00	4.75-8.00
May	15.00	--	19.39	19.57	19.94	20.03	5.0	13.0	10.25	2.00-3.25	4.00-8.00	4.00-11.00	4.75-9.00
June	16.00	--	19.59	19.75	20.11	20.23	4.6	13.1	10.25	2.00-3.25	4.00-8.00	4.25-11.00	4.25-9.00
July	16.00	--	19.69	19.84	20.31	20.45	4.8	13.3	10.25	2.00-3.25	4.00-7.50	4.25-11.00	4.75-9.00
August	15.00	--	19.13	19.56	19.98	20.09	4.6	13.0	10.25	2.00-3.25	4.00-7.50	4.25-11.00	4.00-9.00
September	15.00	--	18.52	19.08	19.47	19.54	4.2	13.3	10.25	1.00-3.25	4.00-8.25	4.25-11.00	4.50-9.00
October	14.00	--	17.33	17.65	17.58	17.65	3.8	13.0	10.25	1.00-3.25	3.50-8.25	4.25-7.50	4.00-9.00
November	14.00	--	16.46	16.97	16.83	17.40	3.0	13.4	10.50	1.00-3.25	4.00-8.25	4.25-7.50	4.00-9.00
December	14.00	--	16.13	16.36	16.30	16.91	3.0	13.5	10.50	1.00-3.25	4.00-8.25	4.25-8.75	4.00-9.00
2004													
January	13.00	--	15.76	15.73	16.00	16.74	2.7	13.9	10.50	0.50-3.25	4.00-7.50	4.25-8.75	4.75-9.00
February	13.00	--	15.52	15.52	15.77	16.48	2.4	13.5	10.50	0.50-3.25	4.25-7.50	4.25-8.75	4.75-9.00
March	12.00	--	12.38	13.59	13.90	14.16	2.2	13.6	10.50	0.50-3.25	4.00-7.50	4.25-8.00	4.75-9.00
April	11.00	--	9.91	10.38	10.18	10.40	1.8	13.5	10.75	0.50-3.25	4.00-5.00	4.25-8.75	4.75-9.00
May	10.00	--	7.67	7.86	8.34	8.85	1.8	13.2	10.75	0.50-2.20	2.75-7.00	2.75-8.75	4.00-9.00
June	10.00	--	6.90	6.76	7.02	8.26	1.5	13.3	10.75	0.50-2.20	2.75-7.00	2.75-8.75	4.00-9.00
July	10.00	--	6.55	6.35	6.37	7.73	1.5	13.7	10.75	0.50-2.20	2.75-6.25	2.75-8.75	4.00-9.00
August	10.00	--	5.48	5.00	5.00	5.00	1.6	13.4	10.75	0.50-2.20	2.75-7.00	2.80-8.00	4.00-9.00
September	9.00	--	4.44	4.06	4.74	5.43	1.5	13.3	10.75	0.50-2.20	2.00-7.00	2.75-8.00	4.00-9.00
October	7.00	--	4.64	4.47	4.85	5.49	1.4	13.1	10.75	1.75-2.00	2.00-8.00	2.25-4.85	4.00-9.00
November	7.00	--	3.16	2.95	2.98	3.13	1.3	12.4	10.75	1.75-2.00	1.50-8.00	1.50-4.85	2.50-9.00
December	7.00	--	3.14	3.44	3.70	4.57	1.1	12.1	8.00	1.75-2.00	0.65-8.00	0.65-4.85	1.00-9.00
2005													
January	7.00	--	3.20	3.14	4.11	4.56	0.9	12.0	8.00	1.75-2.00	0.65-4.85	0.65-4.85	1.00-8.00
February	7.00	--	3.14	3.32	4.13	4.73	0.9	12.2	8.00	1.50-2.25	0.65-4.85	0.65-4.85	1.00-9.00
March	7.00	--	3.54	--	4.09	4.37	0.9	11.9	8.00	1.50-2.26	0.65-4.85	0.65-4.85	1.00-9.00
April	7.00	--	4.11	--	4.24	4.66	0.9	11.6	8.00	1.25-2.00	0.65-4.00	0.65-4.85	0.65-9.00
May	7.00	--	3.75	--	4.28	4.50	0.9	11.6	8.00	1.25-2.00	0.65-4.00	0.65-4.00	0.65-9.00
June	7.00	--	4.06	--	3.95	4.47	1.0	11.8	8.00	1.00-2.00	0.65-4.00	0.65-4.00	0.65-9.00
July	7.00	--	3.97	--	4.24	4.53	0.9	11.4	8.00	1.00-2.00	0.65-4.00	0.65-4.00	1.00-1.25
August	7.00	--	2.84	--	2.77	3.05	0.9	11.4	8.00	1.00-2.00	0.65-4.00	0.65-5.25	1.00-2.50
September	6.00	--	--	--	0.84	1.14	0.8	11.1	8.00	1.00-2.00	0.35-4.00	0.50-2.82	0.75-2.50

Source: Bank of Papua New Guinea, *Quarterly Economic Bulletin*.

1/ Prior to February 2001, the kina deposit rate was determined by a weekly auction for deposits conducted by the central bank. Since then the Bank of Papua New Guinea has announced a Kina Facility rate, and the deposit rate was set 125 basis points below this rate until July 2000, when the margin was reduced to 75 basis points. The facility was abolished in April 2003.

Table 17. Papua New Guinea: Balance of Payments, 2001-04

(In millions of U.S. dollars)

	2001	2002	2003	2004
Current account balance	201	-31	159	88
Mineral	802	473	728	793
Nonmineral	-601	-503	-569	-705
Trade balance	556	344	718	760
Exports (f.o.b.)	1,878	1,646	2,153	2,554
Mineral	1,598	1,228	1,635	1,863
Nonmineral	280	417	518	690
Imports (c.i.f.)	-1,321	-1,301	-1,435	-1,794
Mineral	-394	-397	-325	-482
Nonmineral	-927	-904	-1,109	-1,312
Services balance	-497	-571	-795	-853
Mineral (net)	-401	-358	-582	-588
Nonmineral (net)	-96	-213	-213	-265
Unrequited transfers (net)	142	196	235	182
Official	184	174	199	142
Private	-42	22	36	40
Capital account balance	-252	-104	-23	35
Medium- and long-term loan disbursements	-218	-154	-151	-213
Official (net)	-60	-26	-100	-101
Private capital flows (net)	-158	-128	-51	-113
Foreign direct investment (net)	74	19	97	26
Change in net foreign assets of commercial banks	2	-33	-60	-1
Other (net)	-110	63	90	224
Exceptional financing	135	0	0	0
Overall balance	66	-100	184	184
Change in net international reserves (- increase)	-66	100	-184	-184
Gross official reserves	-136	100	-181	-118
IMF (net)	70	0	-6	-62
Purchases	72	0	0	0
Repurchases	-1	0	-6	-62
Other foreign liabilities	-1	0	3	-4
Memoranda items:				
Current account (in percent of GDP)	6.5	-1.0	4.4	2.1
Gross official reserves (end-year)				
In millions of U.S. dollars	440	340	521	639
In months of nonmineral imports	5.7	4.5	5.6	5.8
Public external debt-service-exports ratio (in percent) 1/	7.9	7.9	7.5	8.7
Public external debt-GDP ratio (in percent) 1/	48.7	51.5	44.1	34.5

Sources: Data provided by the Papua New Guinea authorities; and Fund staff estimates.

1/ Public external debt includes central government, central bank external debt, and statutory authorities.

Table 18. Papua New Guinea: Exports of Major Commodities, 2001-04

	2001	2002	2003	2004
Copper				
Value (in millions of U.S. dollars)	319.7	262.1	393.0	478.7
Volume (thousands of tons)	212.6	170.1	230.6	173.9
Unit value (U.S. dollars per ton)	1503.6	1541.0	1704.2	2753.0
(U.S. cents per pound)	68.2	69.9	77.3	124.9
Gold				
Value (in millions of U.S. dollars)	628.9	590.4	780.0	861.8
Volume (tons)	69.1	59.1	68.4	67.3
Unit value (U.S. dollars per ounce)	283.1	310.7	354.7	398.3
Petroleum				
Value (in millions of U.S. dollars)	560.0	368.9	452.5	512.6
Volume (thousands of barrels)	21294.0	15370.5	14983.4	12564.7
Unit value (U.S. dollars per barrel)	26.3	24.0	30.2	40.8
Silver				
Value (in millions of U.S. dollars)	9.4	7.7	9.3	10.1
Volume (tons)	67.7	46.1	64.2	46.7
Unit value (U.S. dollars per ounce)	4.3	5.2	4.5	6.7
Logs				
Value (in millions of U.S. dollars)	73.1	94.1	102.6	110.3
Volume (thousands of cubic meters)	1212.2	1834.0	2016.0	2012.0
Unit value (U.S. dollars per cubic meter)	60.3	51.3	50.9	54.8
Coffee				
Value (in millions of U.S. dollars)	56.1	71.2	82.8	88.0
Volume (thousands of tons)	51.6	63.1	68.8	63.0
Unit value (U.S. dollars per ton)	1087.2	1128.4	1203.5	1396.9
(U.S. cents per pound)	49.3	51.2	54.6	63.4
Cocoa				
Value (in millions of U.S. dollars)	32.6	58.2	71.5	67.6
Volume (thousands of tons)	36.3	34.9	40.3	41.5
Unit value (U.S. dollars per ton)	898.1	1667.6	1774.2	1629.0
Palm oil				
Value (in millions of U.S. dollars)	85.2	100.3	116.9	136.0
Volume (thousands of tons)	327.6	323.9	326.9	339.0
Unit value (U.S. dollars per ton)	260.1	309.7	357.6	401.3
Copra				
Value (in millions of U.S. dollars)	4.5	2.8	1.8	5.3
Volume (thousands of tons)	21.0	15.8	8.4	19.2
Unit value (U.S. dollars per ton)	214.3	177.2	214.3	277.8
Copra Oil				
Value (in millions of U.S. dollars)	8.1	8.6	18.7	25.1
Volume (thousands of tons)	27.1	28.2	47.7	45.1
Unit value (U.S. dollars per ton)	298.9	305.0	392.0	556.9
Tea				
Value (in millions of U.S. dollars)	5.5	4.7	5.4	7.1
Volume (thousands of tons)	7.9	5.2	6.6	8.1
Unit value (U.S. dollars per ton)	694.2	903.8	818.2	876.7
(U.S. cents per kilogram)	69.4	90.4	81.8	87.7
Rubber				
Value (in millions of U.S. dollars)	2.0	2.3	3.4	4.3
Volume (thousands of tons)	3.6	3.8	4.2	3.8
Unit value (U.S. dollars per ton)	555.6	605.3	809.5	1126.2
(U.S. cents per pound)	25.2	27.5	36.7	51.1
Other				
Value (in millions of U.S. dollars)	92.6	97.9	115.0	246.6
Total exports (in millions of U.S. dollars)	1877.7	1645.7	2153.0	2553.7
Minerals and petroleum	1597.9	1228.3	1634.8	1863.3
Nonmineral	279.8	417.4	518.2	690.4

Sources: Data provided by the Papua New Guinea authorities; and Fund staff estimates.

Table 19. Papua New Guinea: Direction of Trade, 2000–04

(In percent of total)

	2000	2001	2002	2003	2004
Exports (f.o.b.) by destination					
Australia	30.0	24.6	42.8	45.7	45.6
Japan	11.3	10.6	15.9	12.8	10.8
People's Republic of China 1/	6.5	4.2	4.4	6.7	4.9
Germany	4.1	4.0	3.5	6.6	7.1
Korea	3.8	3.0	5.1	5.4	6.1
United Kingdom	2.8	2.1	2.8	2.5	3.5
United States	1.3	1.5	4.6	2.7	2.2
New Zealand	0.7	1.3	1.5	0.5	0.4
Philippines	0.6	2.3	1.8	3.5	4.0
Singapore	0.7	0.8	3.7	2.1	2.2
Netherlands	0.5	0.6	1.8	1.1	1.5
Malaysia	0.4	0.3	0.0	0.4	0.9
Hong Kong, SAR	0.2	0.2	0.3	0.9	0.1
Other	37.1	44.4	11.8	9.1	10.7
Imports (c.i.f.) by origin					
Australia	49.7	51.2	59.1	54.8	57.3
Singapore	19.9	19.0	5.7	6.6	6.2
Japan	4.0	4.6	5.1	4.8	4.6
New Zealand	3.8	4.0	4.0	5.2	3.4
Malaysia	3.4	2.8	2.1	2.3	1.7
People's Republic of China 1/	2.2	1.9	1.8	4.6	3.3
United States	2.2	2.2	8.7	9.6	8.4
Germany	0.7	0.7	0.9	0.3	0.2
Hong Kong, SAR	1.2	0.9	0.8	0.9	0.8
Korea	1.0	0.9	0.8	0.5	0.5
United Kingdom	0.7	0.6	3.3	1.0	0.7
Netherlands	0.3	0.5	0.1	0.0	0.0
Philippines	0.2	0.2	0.3	0.3	0.2
Other	10.6	10.6	7.3	9.1	12.7

Sources: Data provided by the Papua New Guinea authorities; and Fund staff estimates.

1/ Excluding Hong Kong SAR and Macau.

Table 20. Papua New Guinea: Net Services and Transfers, 2001-04

(In millions of U.S. dollars)

	2001	2002	2003	2004
Services balance (net)	-497.3	-571.3	-794.8	-853.1
Factor services	-249.5	-225.9	-406.7	-368.2
Interest	-80.1	-79.2	-52.9	-41.9
Receipts	18.5	19.9	9.6	16.0
Mineral	11.6	9.6	1.7	10.2
Nonmineral	1.1	5.3	0.7	0.8
Official	5.8	5.0	7.2	5.0
Payments	-98.6	-99.1	-62.5	-57.9
Mineral	-30.5	-33.5	-12.8	-10.2
Nonmineral	-8.7	-15.0	-0.9	-4.0
Official	-59.4	-50.6	-48.8	-43.7
Concessional	-52.3	-45.7	-44.5	-40.0
Nonconcessional	-3.8	-1.3	-1.4	-0.8
IMF charges	-3.3	-3.6	-2.9	-2.9
Gap interest	0.0	0.0	0.0	0.0
Dividends	-151.6	-131.3	-353.8	-326.3
Receipts	1.5	7.3	6.2	2.1
Mineral	0.0	4.2	5.2	0.5
Nonmineral	1.5	3.1	1.0	1.6
Payments	-153.1	-138.6	-360.0	-328.4
Mineral	-116.1	-92.6	-259.1	-222.7
Nonmineral	-37.0	-46.0	-100.9	-105.7
Other factor service payments	-17.8	-15.4	0.0	0.0
Nonfactor services	-183.9	-296.6	-307.9	-420.0
Freight, insurance	28.1	7.3	22.4	29.8
Travel payments	-29.9	-32.1	-51.3	-51.7
Mineral	-1.3	-1.4	-1.6	-2.8
Nonmineral	-28.6	-30.7	-49.7	-48.9
Other	-182.1	-271.8	-279.0	-398.1
Receipts	257.8	154.7	208.0	175.3
Mineral	84.9	32.5	41.4	45.6
Nonmineral	172.9	122.2	166.6	129.7
Payments	-439.9	-426.5	-487.0	-573.4
Mineral	-285.9	-228.5	-276.3	-344.0
Nonmineral	-154.0	-198.0	-210.7	-229.4
Other	-63.9	-48.8	-80.2	-64.9
Unrequited transfers	142.1	196.4	235.1	181.7
Official	183.8	174.4	199.1	141.8
Receipts	183.8	174.4	199.1	141.8
Australia budgetary support	20.9	0.0	5.8	0.0
Project & Commodity aid	155.2	169.0	193.3	141.8
Other grants	7.7	5.4	0.0	0.0
Payments	0.0	0.0	0.0	0.0
Private	-41.7	22.0	36.0	39.9
Receipts	25.6	80.8	116.4	117.1
Payments	-67.3	-58.8	-80.4	-77.2

Sources: Data provided by the Papua New Guinea authorities; and Fund staff estimates.

Table 21. Papua New Guinea: External Debt Outstanding, 2000-04

	2000	2001	2002	2003	2004
(In millions of U.S. dollars)					
Total external debt	2,354	2,289	2,304	2,311	2,127
Public external debt 1/	1,514	1,530	1,570	1,617	1,489
Central government	1,394	1,390	1,430	1,473	1,411
Multilateral creditors	790	844	841	865	861
Of which: World Bank Group	345	380	363	348	334
Asian Development Bank	387	409	419	443	452
Bilateral creditors	571	516	541	553	496
Of which: Australia	85	99	99	87	40
Japan	423	371	391	412	406
Commercial creditors	33	29	48	55	54
Central bank	39	109	115	124	64
Of which: IMF liabilities	39	108	115	120	64
Commercial statutory authorities	80	31	25	20	15
Private external debt	840	758	733	694	637
Of which: mineral sector	546	470	454	415	349
(In percent of GDP)					
Memoranda items					
Total external debt	67	74	77	64	50
Total public external debt 1/	43	50	52	45	35
Central government external debt	40	45	48	41	33
Multilateral creditors	22	27	28	24	20
Bilateral creditors	16	17	18	15	12
Commercial creditors	1	1	2	2	1
Central bank	1	4	4	3	1
Commercial statutory authorities	2	1	1	1	0
Private external debt	24	25	24	19	15
Nominal GDP (in millions of U.S. dollars)	3,521	3,081	2,999	3,618	4,280

Sources: Data provided by the Papua New Guinea authorities; and Fund staff estimates.

1/ Including central government, central bank, and commercial statutory authorities.

Table 22. Papua New Guinea: Public External Debt Service, 2000-04

(In millions of U.S. dollars)

	2000	2001	2002	2003	2004
Total public sector	166.0	146.8	142.5	182.7	241.1
Principal	114.2	94.7	92.2	133.9	197.4
Interest	51.7	52.2	50.3	48.8	43.7
Central government	145.0	142.3	139.2	174.3	176.0
Principal	95.2	93.4	92.2	128.4	135.2
Interest	49.8	48.9	47.0	45.9	40.8
Multilateral creditors	85.9	79.6	73.8	74.2	73.1
Principal	54.3	50.2	48.6	50.7	51.9
Interest	31.6	29.4	25.2	23.5	21.2
World Bank Group	48.8	41.9	37.3	35.4	34.2
Principal	32.3	29.0	26.8	25.8	26.1
Interest	16.5	12.9	10.5	9.6	8.1
Asian Development Bank	31.4	31.0	31.1	31.8	34.0
Principal	17.6	17.7	18.2	19.2	22.3
Interest	13.8	13.3	12.9	12.6	11.7
Other	5.7	6.7	5.4	7.0	4.9
Principal	4.4	3.5	3.6	5.7	3.5
Interest	1.3	3.2	1.8	1.3	1.4
Bilateral creditors	46.5	49.0	55.4	86.0	94.0
Principal	31.1	31.4	34.9	65.0	75.2
Interest	15.4	17.6	20.5	21.0	18.8
Australia	0.2	5.6	19.9	48.2	52.6
Principal	0.2	0.1	12.4	40.3	47.1
Interest	0.0	5.5	7.5	7.9	5.5
China	0.2	0.7	0.6	0.6	0.6
Principal	0.0	0.4	0.4	0.4	0.4
Interest	0.2	0.3	0.2	0.2	0.2
Japan	44.7	39.2	29.9	31.5	31.3
Principal	30.0	28.4	18.7	20.1	19.6
Interest	14.7	10.8	11.2	11.4	11.7
Other	1.4	3.5	5.0	5.7	9.5
Principal	0.9	2.5	3.4	4.2	8.1
Interest	0.5	1.0	1.6	1.5	1.4
Commercial creditors	12.6	13.7	10.0	14.1	8.9
Principal	9.8	11.8	8.7	12.7	8.1
Interest	2.8	1.9	1.3	1.4	0.8
Banks	9.4	11.6	7.5	6.8	4.8
Principal	7.0	9.9	7.1	6.4	4.8
Interest	2.4	1.7	0.4	0.4	0.0
Other	3.2	2.1	2.5	7.3	4.1
Principal	2.8	1.9	1.6	6.3	3.3
Interest	0.4	0.2	0.9	1.0	0.8
Central bank	21.0	4.5	3.3	8.4	65.1
Principal	19.0	1.3	0.0	5.5	62.2
Interest	1.9	3.3	3.3	2.9	2.9
Memorandum item:					
Public debt-service ratio	6.8	7.9	7.9	7.5	8.7

Sources: Data provided by the Papua New Guinea authorities; and Fund staff estimates.