

**FOR
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To: Members of the Executive Board

From: The Secretary

Subject: **Papua New Guinea—Selected Issues and Statistical Appendix**

This paper provides background information to the staff report on the 2007 Article IV consultation discussions with Papua New Guinea (SM/08/26, 1/22/08), which is tentatively scheduled for discussion on **Friday, February 15, 2008**. At the time of circulation of this paper to the Board, the Secretary's Department has not received a communication from the authorities of Papua New Guinea indicating whether or not they consent to the Fund's publication of this paper; such communication may be received after the authorities have had an opportunity to read the paper.

Questions may be referred to Ms. Creane (ext. 37294) and Mr. Hussain (ext. 37334) in APD.

Unless the Documents Section (ext. 36760) is otherwise notified, the document will be transmitted, in accordance with the procedures approved by the Executive Board and with the appropriate deletions, to the WTO Secretariat on Monday, February 11, 2008; and to the Asian Development Bank, the European Commission, the European Investment Bank, the Food and Agriculture Organization, and the United Nations Development Programme, following its consideration by the Executive Board.

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PAPUA NEW GUINEA

Selected Issues and Statistical Appendix

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Approved by the Asia and Pacific Department

January 31, 2008

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I. SOURCES OF INFLATION IN PAPUA NEW GUINEA¹

A. Introduction

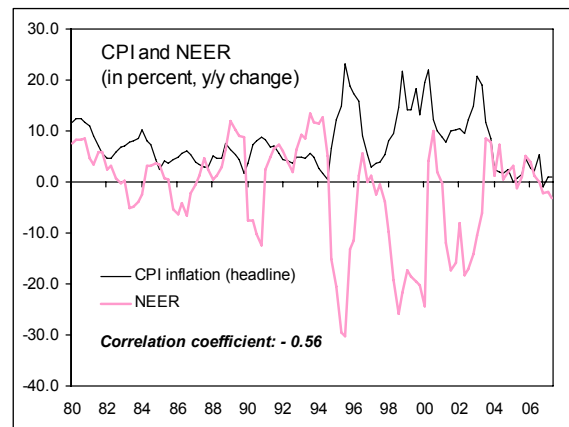
1. **Since 2004, Papua New Guinea's inflation has been low, compared to its historical level and its peer countries' inflation, in spite of rapid broad money growth and increased government expenditure.** This chapter examines the possible explanations for this puzzle by analyzing the sources of inflation in Papua New Guinea. The results from the empirical analysis indicate that kina exchange rate movements are the most important determinant of inflation in Papua New Guinea, and correspondingly, appreciation of the kina has contributed to the low inflation. Changes in broad money growth, government expenditure, and oil prices also have had an impact on inflation. In particular, the findings suggest that recent rapid broad money growth, increased government expenditure, and higher oil prices could increase inflationary pressure in the near future. Cross-country analysis suggests that similar relationships between inflation and the above economic variables hold in Papua New Guinea's peer countries as well. This analysis accordingly indicates that low inflation in Papua New Guinea compared to its peer countries was mainly caused by kina appreciation, in addition to relatively low, though increasing, government expenditure growth.

2. **The structure of the remainder of this chapter is as follows:** Section B reviews recent developments in inflation in Papua New Guinea and the economic environments surrounding it; Section C presents an empirical analysis of the relationship between inflation and different macroeconomic variables; Section D considers cross-country inflation analyses; and Section E presents the conclusions.

B. Inflation and the Economic Environment

3. **Papua New Guinea's inflation declined sharply in 2003 and has remained in low single digits since 2004.²**

4. **Inflation historically has had a strong negative correlation with foreign exchange rate movements.** The country experienced high inflation in line with depreciation of the kina exchange rate in 1995–96 (following the change in the foreign exchange regime from a pegged

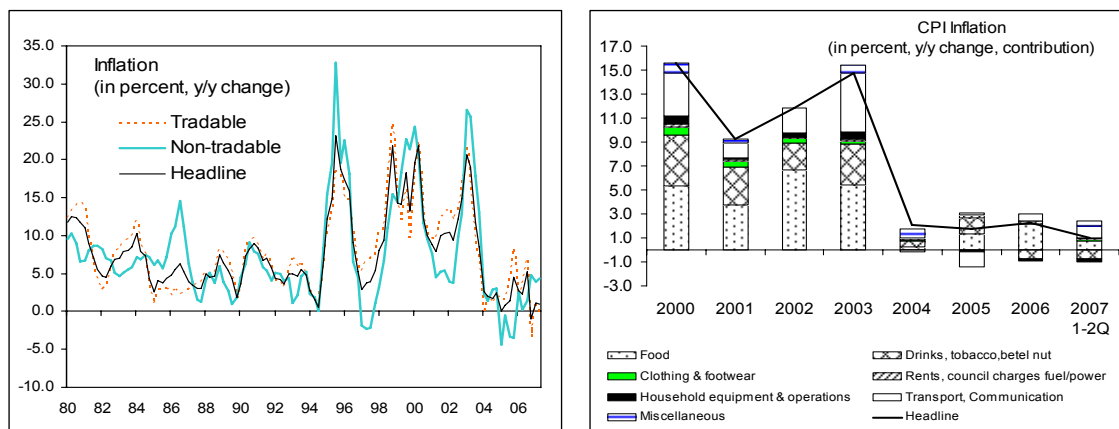


¹ Prepared by Aiko Mineshima. This chapter is based on a presentation delivered at the Bank of Papua New Guinea in Port Moresby in November 2007 and benefits from comments received at that time.

² The quality of CPI data for Papua New Guinea is poor: for example, the weights are outdated (based on a 1975–76 Household Income and Expenditure Survey), and prices on dwelling rentals, which compose about 3.9 percent of the headline CPI basket, have not been collected since 1991 and are therefore held constant.

regime to an independent float), 1998–2000, and 2001–03. Since 2004, with the roughly unchanged or somewhat appreciated kina exchange rate, inflation has been low.

5. **Movements in headline inflation are mainly explained by tradable goods**, which account for 77 percent of the CPI basket.³ Therefore, despite relatively large price increases in nontradable goods from 2006, headline inflation has been subdued.⁴ Given that most tradable goods are imported, changes in the exchange rate and prices abroad have an impact on PNG's domestic goods prices. Further disaggregation of headline CPI indicates that for tradable goods, food has been a key source of underlying inflationary pressure. Prices of “transport/communication” and “rent, council charges, and fuel/power” have increased since 2006, mainly pushed by high oil prices, but overall these were offset by lower prices of “drinks, tobacco, and betel nut” and “household equipment/operations,” resulting in lower headline inflation.



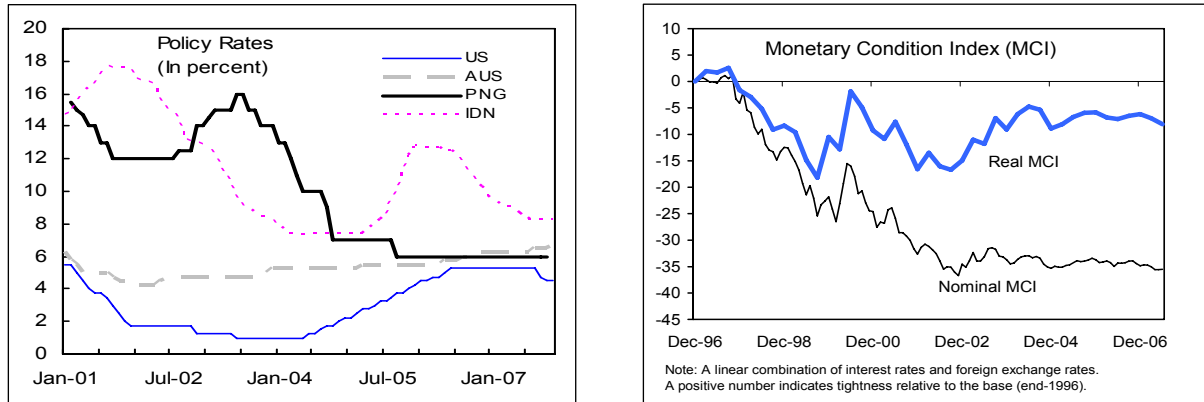
6. **Papua New Guinea's monetary conditions have remained roughly unchanged since mid-2004.** The policy rate of the Bank of Papua New Guinea (BPNG), the Kina Facility Rate (KFR), decreased from mid-2003 to September 2005 following a year of tightening in 2002. Since September 2005, the KFR has been unchanged at 6 percent, a historically low level, while several of Papua New Guinea's partner countries began raising policy rates in 2002–04. The staff's nominal monetary condition index (MCI) suggests that monetary conditions in Papua New Guinea have been roughly unchanged at the most relaxed level in the last 10 years from 2003 through 2006.⁵ However, in real terms, monetary conditions tightened

³ Tradable goods include: food; drinks, tobacco, and betel nut; clothing and footwear; household equipment; and motor vehicles.

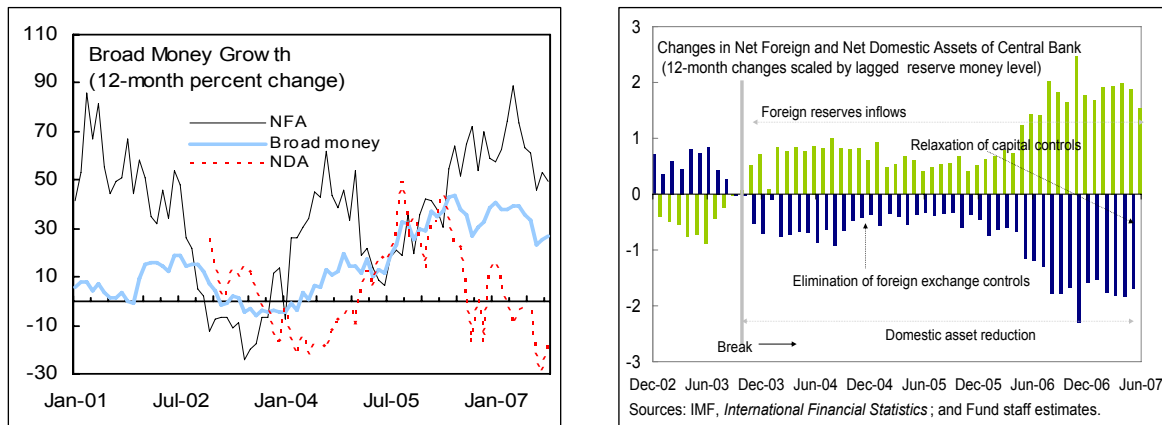
⁴ Nontradable goods include: rents, council charges, and fuel/power; transport and communication; and miscellaneous.

⁵ The monetary condition index (MCI) is a weighted average of changes in the effective exchange rate and interest rates relative to a base period (in this case, end-1996). Reflecting the relative influence on monetary conditions, the weights for Papua New Guinea are 75 percent for the NEER and 25 percent for the interest rate. As Papua New Guinea is a small, open economy with a shallow financial market, the impact of exchange rate movements on monetary conditions is more significant than in more developed economies.

in 2003 in line with the REER appreciation, resulting from the spike in inflation, and has roughly unchanged since then.



7. **Monetary aggregate growth began accelerating in 2004, as high prices for Papua New Guinea's key commodity exports increased net foreign asset inflows.** The BPNG intervened in the foreign exchange market to smooth exchange rate movements and avoid excessive appreciation of the kina against the U.S. dollar. It sterilized excess liquidity mainly by issuing central bank bills to maintain reserve money within its target growth rate. Net domestic asset growth began accelerating in 2005, driven by the recovery in private credit, which was in turn fueled by sound economic conditions, low interest rates, and improved financial intermediation. However, since 2006, net domestic asset growth has been near, as continued private credit growth has been offset by rising government deposits at the BPNG.



C. Empirical Analysis

8. **A Vector Error Correction Model (VECM) is used to examine the statistical relationships between CPI inflation and the exchange rate (NEER), broad money, government expenditure, inflation in Papua New Guinea's major trading partners, and**

oil prices.⁶ This study uses simple econometric models that include exchange rate (NEER) and either broad money or government expenditure as endogenous explanatory variables. Model A includes broad money, while Model B includes government expenditure. Results from the exercises are as follows:

- *CPI and NEER are negatively correlated.* A 1 percent appreciation in the kina is associated with a 0.87 percent decrease in CPI for Model A and 0.59 percent for Model B.⁷
- *CPI is positively correlated with broad money and central government expenditure.* A 1 percent increase in broad money is associated with a 0.23 percent increase in CPI while a 1 percent increase in central government expenditures is associated with 0.42 percent increase in inflation.^{8 9}
- *Inflation is positively correlated with a lagged oil prices.* A 1 percent increase in oil price change in a period before is associated with 0.05 percent increase in an inflation change for Model A and 0.06 percent increase for Model B.
- *Inflation is positively correlated with the world inflation.* Model A suggests a 1 percent increase in inflation in Papua New Guinea's major trading partners is associated with 1.37 percent increase in an inflation change. However, this variable is not statistically significant for Model B.
- Error correction terms suggest that deviations from the equilibrium level are adjusted by 24 percent per quarter for Model A and 29 percent for Model B, meaning it takes about 12 months to adjust full deviations for Model A and 9 months for Model B.

⁶ Productivity (GDP gap or real GDP per capita) could be an explanatory variable of inflation. However, both the GDP gap and real GDP per capita do not work well for Papua New Guinea; the sign for the GDP gap is opposite to the our expectation, while NEER becomes statistically insignificant when real GDP per capita is included in the model. These results could be related to the poor quality of national accounts data. Nonetheless, given indications that productivity has not improved in recent years, inflationary pressure could be further increased if other conditions are unchanged.

⁷ Thomas and al. (2006) estimated the exchange rate pass-through to underlying inflation by using OLS. The result shows the pass-through effect is approximately 50–60 percent.

⁸ Including both broad money and government expenditures in a model causes multicollinearity problem (the correlation coefficient of broad money growth and government expenditures is about 0.9). Other studies have shown that dropping one of correlated variables is the best way to solve this problem; Pearce and Reiter (1985) discusses the well-known two-stage strategy.

⁹ Private credit, related to broad money, could be an explanatory variable of inflation. However, the econometric model becomes divergent? if private credit is used instead of broad money.

Results of VECM

		Model A	Model B
Error Correction Term		-0.24 *** (-0.10)	-0.29 *** (-0.09)
Endogenous Variables	NEER	-0.87 *** (-0.06)	-0.59 *** (-0.09)
	Broad Money	0.23 *** (0.07)	...
	Government Expenditure	...	0.40 *** (0.08)
	
Exogenous Variables	Oil Price (t)	-0.01 (-0.02)	-0.02 (-0.02)
	Oil Price (t-1)	0.05 ** (0.02)	0.06 ** (0.02)
	Oil Price (t-2)	-0.03 (-0.03)	0.00 (-0.02)
	Oil Price (t-3)	-0.01 (-0.03)	-0.03 (-0.02)
	Inflation in PNG's Trading Partners	1.37 ** (0.57)	0.83 (0.56)
<i>R-squared</i>		0.78	0.76
<i>Adjusted R-squared</i>		0.62	0.63

1/ Quarterly data for 1995 1Q–2006 4Q are used for estimations.

2/ Coefficients with ***, **, and * are statistically significant at 1, 5, and 10 percent criteria respectively.

3/ Figures in parentheses are standard errors.

9. As the econometric analyses show, the nominal exchange rate (NEER) is the most important determinant of CPI in Papua New Guinea, followed by government expenditure and broad money. The correlation coefficients of CPI components and economic variables suggest that broad money is highly correlated with nontradable goods such as rent, council charges, and fuel/power and miscellaneous, while NEER has a high correlation with tradable goods such as food; drinks, tobacco, and betel nut; clothing and footwear; and household equipment and operations.¹⁰ Meanwhile, government expenditure is highly correlated with CPI components across the board.

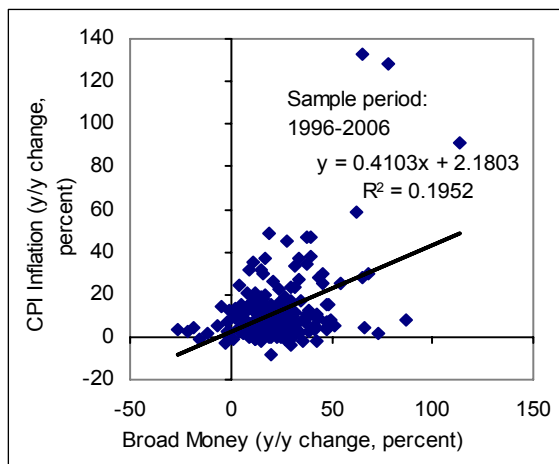
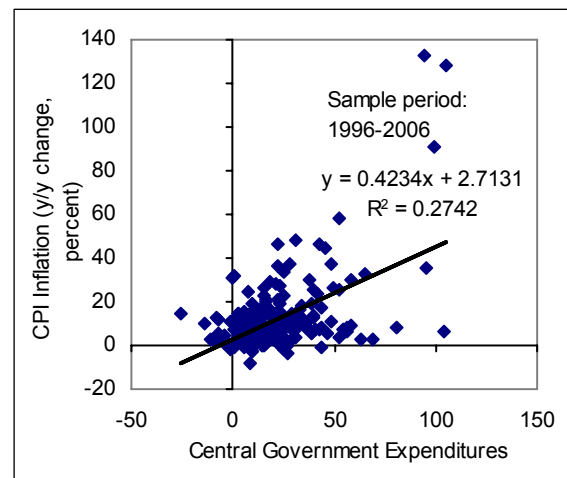
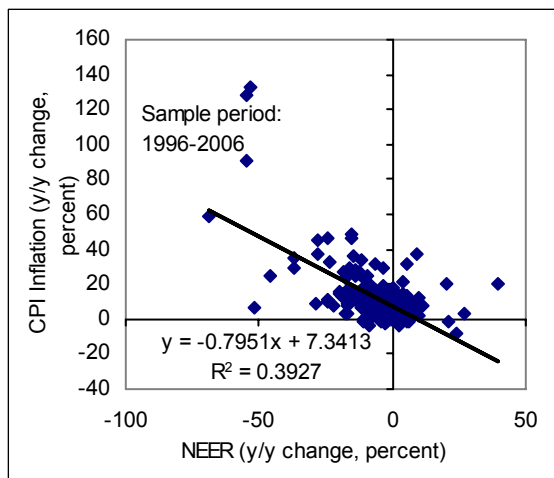
Correlation Coefficients of CPI components and Economic Variables							
	Food	Drinks, tobacco, and betel nut	Clothing and footwear	Rents, council charges, and fuel/power	Household equipment operations	Transport and Communication	Miscellaneous
NEER	-0.97	-0.96	-0.98	-0.84	-0.98	-0.96	-0.88
Broad Money	0.89	0.87	0.87	0.93	0.81	0.86	0.91
Government Expenditures	0.98	0.97	0.97	0.94	0.95	0.95	0.96

1/ Correlation coefficients larger than 0.90 in an absolute value are highlighted.
2/ Sample period is for 1996 4Q–2006 4Q.

¹⁰ “Miscellaneous” includes medical and health care, entertainment, cultural goods and services, and other goods.

D. Cross-Country Analysis

10. Cross-country analysis for twenty countries including Papua New Guinea and its peers suggests that the relationships between inflation and NEER movements, broad money growth, and central government expenditure growth that are observed in Papua New Guinea hold across the board.¹¹ The coefficient of inflation and NEER for twenty countries including Papua New Guinea is -0.80, indicating a 1 percent appreciation in NEER is associated with 0.80 percent decrease in inflation. Meanwhile, the coefficient of inflation and central government expenditure is 0.42, indicating a 1 percent increase in central government expenditure is associated with 0.42 percent increase in inflation. Similarly, the coefficient of inflation and broad money growth is 0.41, indicating a 1 percent increase in broad money growth is associated with 0.41 percent increase in inflation.



1/ Correlation Coefficients are calculated by the cross-country data on PNG and its peer countries. The sample period is 1996-2006.
2/ Government expenditures for Mongolia is for "general government."

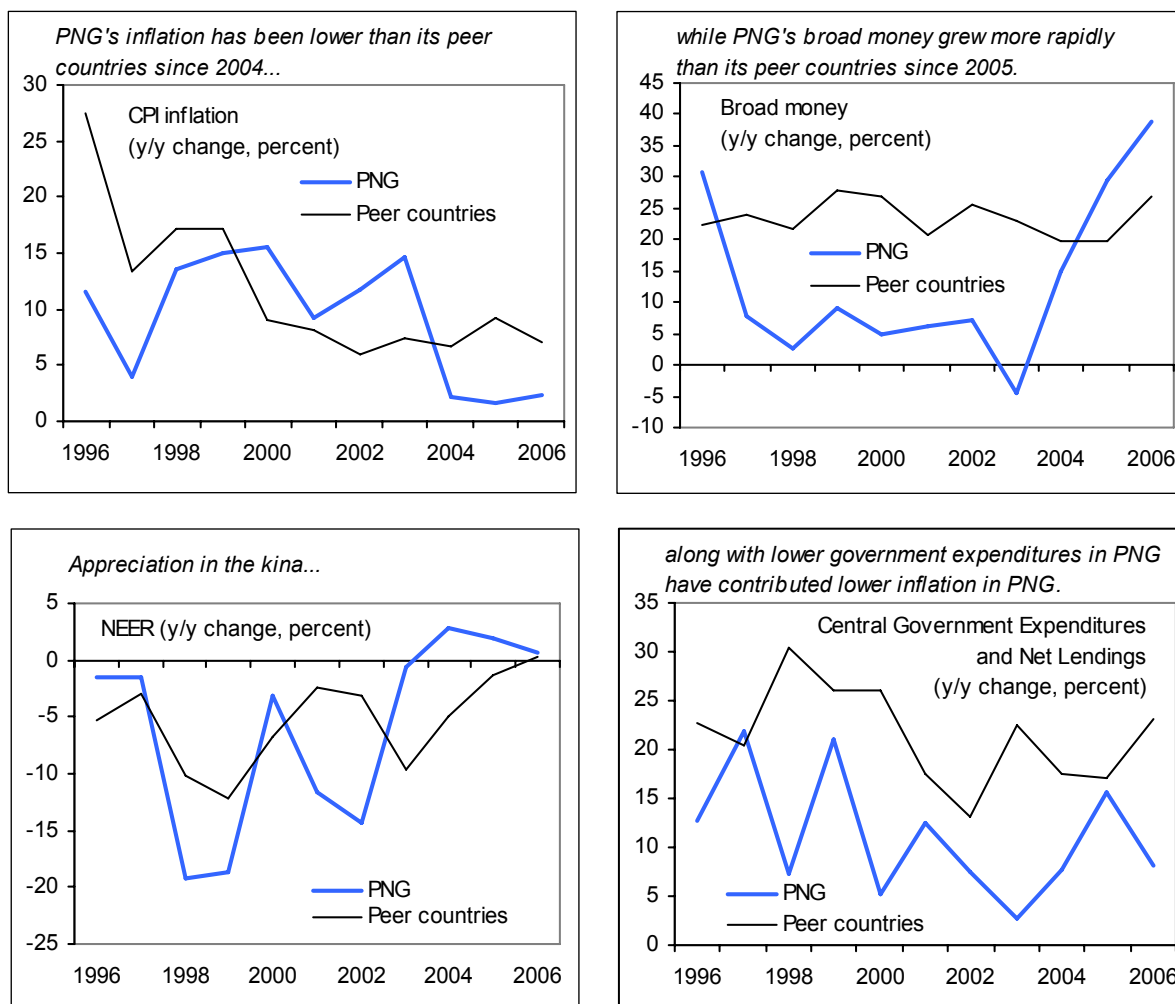
List of PNG's Peer Countries

Country	Exchange Arrangement
Algeria	Managed Float
Azerbaijan	Crawling Peg
Burundi	Managed Float
Côte d'Ivoire	WAEMU
Ghana	Managed Float
Indonesia	Managed Float
Kyrgyz Republic	Managed Float
Lao PDR	Managed Float
Malawi	Managed Float
Mali	WAEMU
Mongolia	Conventional Pegged
Mozambique	Managed Float
Niger	WAEMU
Nigeria	Conventional Pegged
Sierra Leone	Crawling Peg
Sudan	Managed Float
Tanzania	Managed Float
Uganda	Managed Float
Vietnam	Conventional Pegged
Conventional Pegged	3
Crawling Peg	2
Managed Float	11
Independently Float	0
WAEMU	3

1/ Peer countries are selected based on the size of impact of changes in commodity exports on current account balances, foreign exchange regimes, and income levels.

¹¹ Peer countries are selected based on the size of impact of changes in commodity exports on current account balances, foreign exchange regimes, and income levels.

11. **Papua New Guinea's inflation has been low compared to its peer countries, while broad money has grown more rapidly than its peer countries since 2005.** Lower inflation in Papua New Guinea has reflected higher appreciation of the exchange rate and lower increases in government expenditure compared to peer countries.¹²



E. Conclusions and Policy Implications

12. **The analyses in this chapter suggest that changes in the exchange rate are the most important determinant of inflation in Papua New Guinea, followed by government expenditure, broad money, and international oil prices.** In addition, the BPNG's proactive stance to absorb excess liquidity through open market operations as well as the low volatility in the kina might have contributed to the low inflation. However, looking ahead, the recent rapid

¹² Looking at levels rather than growth rates, government expenditure and broad money as a share of nominal GDP have been higher for PNG than for its peer countries: the average of government expenditure as a share of nominal GDP for 1996-2006 is 31 percent for PNG and 23 percent for its peers, while the average of broad money as a share of nominal GDP for 1996-2006 is 34 percent for PNG and 21 percent for its peers.

broad money growth, increased government expenditure, and increased international oil prices could increase inflationary pressures. The results from the empirical analysis indicate that the current equilibrium inflation rate ranges from 5–8 percent. Given the increased inflationary pressures, the BPNG should be prepared to tighten monetary conditions as necessary to counter such pressures. At the same time, given current conditions, it remains appropriate for the BPNG to continue the current exchange rate policy of leaning against the wind to prevent too rapid exchange rate appreciation against the U.S. dollar, and sterilizing the resulting reserve accumulation to help contain inflation, while also balancing concerns regarding the inflationary impact of nominal depreciation on a trade-weighted basis.

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ANNEX: TECHNICAL APPENDIX

A Vector Error Correction Model (VECM), which can capture both long-run and short-run relationships for an empirical analysis, is used in the paper. The data set for the estimation is on a quarterly basis, of which CPI data are seasonally adjusted by the Census X-12 while quarterly government expenditure data are calculated by interpolating the annual data in a quadratic-match average way. Independent variables are foreign exchange rate (NEER), broad money, central government expenditure, oil prices, and inflation in Papua New Guinea's major trading partners (import value weighted average of CPI in Australia, Japan, New Zealand, the United States, and developing countries). Oil prices and inflation in Papua New Guinea's major trading partners are assumed to be exogenous variables given Papua New Guinea is a small and open economy (price taker).

Model A

Long run (EC): $\log(CPI) = \alpha \log(NEER) + \beta \log(BroadMoney) + Constant$

VECM: $\Delta \log(CPI_t) = -\gamma EC_{t-1} + \sum \eta \Delta \log(CPI_{t-1/t-4}) + \sum \lambda \Delta \log(BroadMoney_{t-1/t-4})$
 $+ \sum \pi \Delta \log(Oilprices_{t/t-3}) + \psi \Delta \log(WorldCPI_t) + Constant$

Model B

Long run (EC): $\log(CPI) = \alpha \log(NEER) + \chi \log(GovernmentExpenditures) + Constant$

VECM: $\Delta \log(CPI_t) = -\gamma EC_{t-1} + \sum \eta \Delta \log(CPI_{t-1/t-3}) + \sum \nu \Delta \log(GovernmentExpenditures_{t-1/t-3})$
 $+ \sum \pi \Delta \log(Oilprices_{t/t-3}) + \psi \Delta \log(WorldCPI_t) + Constant$

As unit root tests, Augmented Dickey-Fuller (ADF) and Phillips-Peron (PP) tests are applied. Existence of I(1) process for all variables except for NEER were supported by both tests while I(1) process for NEER is supported only by PP tests. Existence of at least one cointegration among the variables for both model A and B was suggested by the cointegration tests. Expected signs for correlation coefficients are as follows:

Long-run Relationship (endogenous variables)

- Exchange rate: appreciation (depreciation) of the kina NEER expects to lower the inflation ($\alpha < 0$).
- Broad money: increase in broad money expects to increase inflation ($\beta > 0$).
- Government expenditure: increase in government expenditures expects to increase inflation ($\chi > 0$).

VECM (short-run relationship/exogenous variables)

- Oil prices: increase in oil prices (with time lags) expect to increase inflation ($\pi > 0$).
- Foreign inflation: increased inflation abroad expects to increase PNG's inflation ($\psi < 0$).

II. PAPUA NEW GUINEA: THE MONETARY TRANSMISSION MECHANISM¹

A. Introduction

1. **The Bank of Papua New Guinea (BPNG) has made progress towards attainment of an independent framework for the conduct of its monetary policy.** From a system of controlled monetary management prior to 1994, following the move to a floating exchange rate that year, it has gradually moved to a market-based system of monetary management with price stability as its objective.
2. **The main stimulus for this change was the significant reform of the banking and financial sector undertaken as part of a stabilization program begun earlier this decade.** In 2000, the Central Bank Act was passed granting the central bank the needed independence for the conduct of its monetary policy. Other key reforms implemented since then include passage of the Financial Institutions Act and the Insurance Act, and reform of the pension system. Together, these reforms have precipitated a rapid increase in the size of the overall financial sector since 2000 (see Chapter 4).
3. **Against this background of change in the institutional structure and size of the financial sector, an informed assessment of how and by what magnitude policy changes affect the economy would assist the successful design and implementation of monetary policy.** This paper therefore analyzes the workings and effectiveness of the monetary transmission mechanism in Papua New Guinea. The remainder of the paper is organized as follows: Section B describes the current institutional structure in Papua New Guinea. Section C looks at interest-rate pass through, while Section D considers the evidence from vector autoregression analysis on the relationship between monetary policy variables and output and prices. Finally, Section E sets out the paper's conclusions and policy implications.

B. Background: Institutional and Operational Framework

4. **As part of a broader agenda of financial sector reform, a new Central Bank Act was enacted in June 2000.**
 - This Act set price stability as the primary macroeconomic goal of the BPNG and granted considerable policy independence its pursuit. A Monetary Policy Committee was subsequently formed with responsibility for formulating appropriate policies that would help attain a stable inflationary environment and macroeconomic stability.

¹ Prepared by Ebrima Faal and Agnes Isnawangsih. This chapter is based on a presentation delivered at the BPNG in Port Moresby in November 2007 and benefits from comments received at that time.

- The central bank was then free to use whatever instruments it possesses to achieve price stability. To this end, the BPNG is required to publish semi-annual monetary policy statements, setting out its outlook for the economy and the intended policy response over the coming six months.
- The new Act also sought to reduce the effect of fiscal operations on monetary management by limiting the amount that the government can borrow from the central bank.²
- Papua New Guinea has also since adopted the principles of universal banking, promoted competition in the financial system through the nondiscriminatory treatment of foreign investment, privatized a public bank, introduced prudential regulations consistent with the Basle standards, and improved bank supervision significantly. In addition, a stock market and mutual funds started operations.

5. **In determining its monetary policy stance, the BPNG reviews a broad range of factors influencing the evolution of inflation.** These include developments in the global economy, the balance of payments, fiscal operations of the government, domestic activity and the exchange rate. Although the BPNG has price stability as its ultimate objective, it does not have an explicit inflation-targeting framework.³

- **The market component of Papua New Guinea's economy is relatively open, with nearly one-half of GDP exported and a larger proportion of consumption imported.** Appropriately, Papua New Guinea has a managed floating exchange rate regime that can help to buffer the domestic economy from external shocks. However, this also implies that the exchange rate does play a significant role in the transmission of monetary policy. While not targeting a particular level of the kina, the BPNG does seek to reduce short-term and seasonal volatility of the exchange rate through foreign exchange market intervention.
- **The BPNG uses a reserve money framework to conduct monetary policy operations.** Through market instruments it seeks to control the growth of reserve money, which in turn, through the money multiplier, is expected to determine the evolution of broader monetary aggregates in a manner that would achieve the price objective.

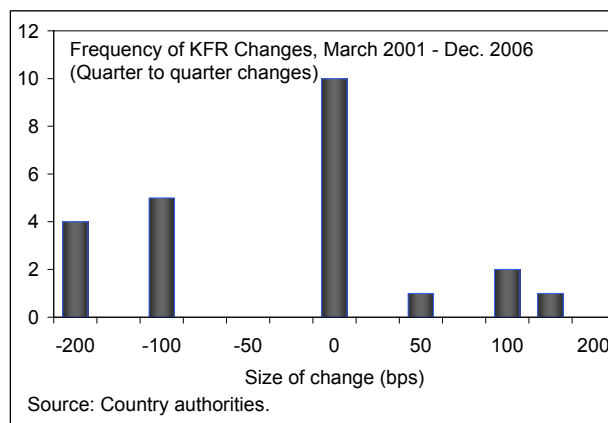
² Bank of Papua New Guinea can provide a temporary advance to the government (limited originally to K100 million, and since adjusted for inflation) for a period of no longer than six months. However, the central bank can also hold government securities for monetary policy purposes, which are not subject to the borrowing limit.

³ In part, this reflects the fact that there are insufficient timely data available, particularly on economic activity, for accurate inflation forecasts that would form the basis for a quantitative inflation target.

- **On a day-to-day basis, the BPNG gauges the tightness of its policy by the system-wide level of Exchange Settlement Account (ESA) balances.**⁴ These are accounts held at the BPNG by each commercial bank.

6. **In implementing monetary policy, the Kina Facility Rate (KFR) plays a key role.** Since February 2001, the BPNG has used the KFR as an indicator of the stance of monetary policy. Operationally, the KFR determines the rates on the central bank's Kina Facility and Repurchase Agreement Facility (the latter by a margin relative to the KFR determined at the BPNG's discretion). However, the KFR has a broader role as the official benchmark rate used to signal changes in the policy stance. Decisions to vary or keep unchanged this rate are explained publicly relative to the outlook for achieving the BPNG's inflation objective.

- In practice, changes in the KFR have been infrequent. It has remained unchanged at 6 percent since September 2005. In addition, average KFR changes measured over one month, at between 50 and -100 basis points, are small relative to comparator policy rate changes in transition countries.



- Other instruments actively used to manage liquidity and influence interest rates are open market operations, most recently using central bank bills and repurchase operations, which allow it to conduct open market operations at a higher frequency than the weekly treasury bill auction cycle. The Repurchase Agreement Facility (RAF) operates as an overnight unsecured borrowing and lending arrangement; as noted above, its interest rate is based on the prevailing KFR.
- The Kina Facility Rate and the RAF rate together anchor the short end of the yield curve. However, treasury bill rates have moved below the deposit rate for the Kina Facility in recent years, possibly reflecting market expectations for further reductions in the KFR. Given the size and persistence of the deviation, it may also reflect the KFR's loss of credibility as a signal of the BPNG's policy intentions (Figure 3).

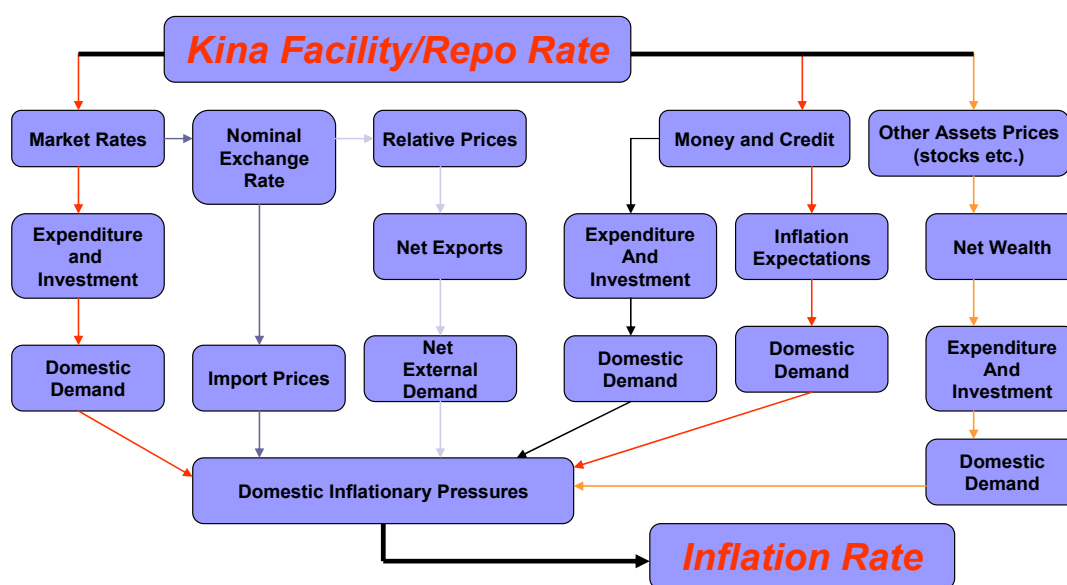
7. **The BPNG can also influence liquidity conditions on a daily basis through its interventions in the foreign exchange market.** The low interest rates associated with current

⁴ All interbank transfers are settled through these accounts, which represent "same-day" funds. The balances in these accounts do not include deposits used to satisfy reserve requirements, and therefore ESA levels represent the excess reserves of the banking system. The level of ESA balances is affected by many factors beyond the control of Bank of Papua New Guinea, including government expenditure and tax collections, foreign exchange transactions, and changes in the check float.

monetary conditions of high liquidity could lead to short-term capital outflows. If this occurred, and the BPNG sold foreign exchange to ease the resulting pressure on the exchange rate, it simultaneously would withdraw liquidity. However, the recent experience has been that the BPNG has generally been able to manage liquidity using its domestic instruments, and so has been able to maintain an adequate level of reserves.

8. **In practice, the main instrument for monetary policy has been the repurchase facility (or repo) rate.** As indicated in the monetary policy transmission mechanism depicted in Figure 2, the repo rate has direct effects on other variables in the economy, such as other interest rates, the exchange rate, money and credit, other asset prices and decisions on spending and investment. Thus, changes in the repo rate affect the demand for and supply of goods and services. Relative demand pressure and the supply capacity of the economy then becomes a key factor influencing domestic inflationary pressures. In addition, imported inflation, influenced by exchange-rate movements, plays an important role in contributing to price movements.⁵

Figure 2. Papua New Guinea: The Transmission Mechanism for Monetary Policy



C. Stylized Facts: Interest Rate Pass-Through

9. **To achieve the objectives of monetary policy, the key transmission channel is the pass-through from the repo rate to other interest rates.** Trends in nominal and real interest rates suggests that the repo and other interest rates have moved in the same direction since 2001 (Figure 3). Since 2003, repo rates have been declining, as have other rates. Simple OLS regressions of the contemporaneous and lagged KFR on the repo rate and of the repo rate

⁵ Papua New Guinea moved to a floating exchange rate system in September 1994.

on market rates are used to investigate interest rate pass-through. The results show that changes in the KFR translate quickly into changes in the repo rate (Table 1), as would be expected. However, changes in policy rates do not appear to translate as quickly or fully to market-determined interest rates. For each one percentage point increase in the repo rate, the Treasury bill rate changes by 75 basis points. Cross correlations of interest rates with credit, output and prices display mixed results (Table 2). While the repo rate appears to be positively correlated with inflation, it seems to have little relationship to output and credit.

Table 1. Interest Rate Pass-through
(Regression results, 2001M1 - 2006M12)

	Changes in Repo rate		Dependent Variable Changes in Tbill rate		Changes in Lending rate	
	Coefficient	T-statistics	Coefficient	T-statistics	Coefficient	T-statistics
Constant	-0.02	-0.50	...	...	...	...
Changes in Kina Facility rate	0.89	14.83	...	...	...	...
Adjusted R-squared	0.76	...	...	...	...	...
Constant	...	...	-0.07	-0.73	-0.10	-2.23
Changes in Repo rate	...	...	0.75	4.25	0.01	0.16
Adjusted R-squared	...	...	0.21	...	0.00	...

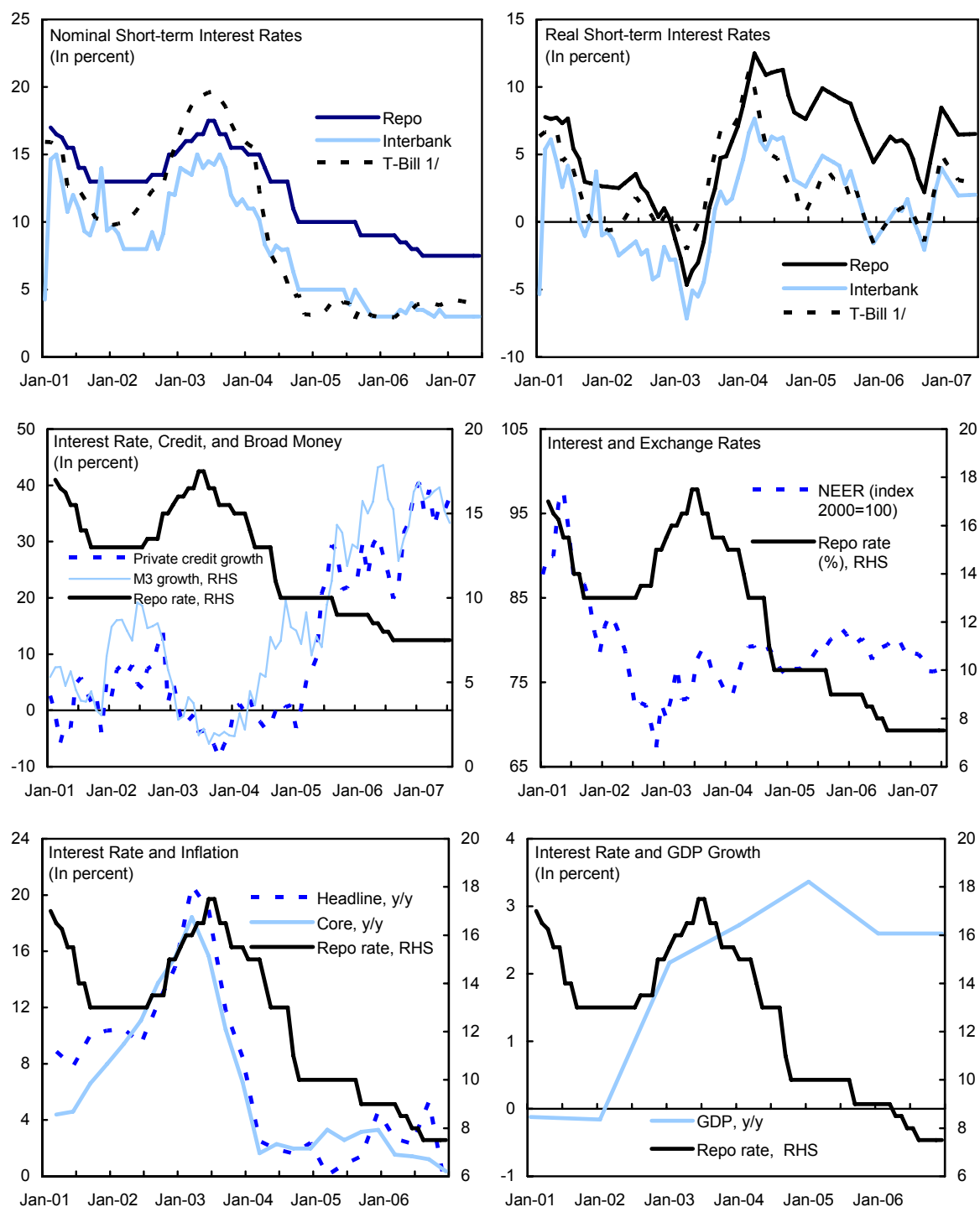
Source: Fund staff calculations.

Table 2. Cross-Correlations of Changes in the Repo rate and Select Variables, 2001M2-2006M12

Time	Headline inflation		Core inflation		Credit		Real GDP Growth	
	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead
0	0.24	0.24	0.26	0.26	-0.11	-0.11	0.03	0.03
1	0.32	0.08	0.37	0.24	0.00	0.11	-0.01	0.03
3	0.33	0.09	0.43	0.20	-0.03	-0.20	-0.04	0.05
6	0.10	0.08	0.30	0.03	0.06	0.07	-0.15	0.23
9	0.10	0.05	0.24	-0.11	-0.03	-0.15	-0.18	0.01
12	0.10	-0.10	0.13	-0.13	-0.09	0.02	-0.29	0.04
18	-0.11	-0.24	-0.16	-0.31	0.10	-0.06	-0.15	0.07
24	-0.07	-0.02	-0.18	-0.04	0.13	0.01	0.09	0.05

Source: Fund staff calculations.

Figure 3. Papua New Guinea: Key Financial Variables



Sources: IMF, *International Financial Statistics* and *Information Notice System*; Country authorities; and Fund staff calculations.

1/ From Sept 2005 onward using Central Bank Bills.

D. Evidence From Vector Autoregression Analysis

10. **This section examines the relationships between monetary policy variables and output and prices using a Vector Autoregression Analysis (VAR).** The VAR has several advantages:

- VARs have been used extensively in the study of monetary policy transmission processes as they represent dynamic systems of equations in which the current level of each variable in the system depends on past movements in that variable and all other variables in the system. A key advantage of the methodology is that it imposes minimal restrictions on how monetary shocks affect the economy.
- Moreover, the methodology recognizes explicitly the simultaneity between monetary policy and macroeconomic developments; that is, the dependence of monetary policy on other economic variables, as well as the dependence of economic variables on monetary policy.
- Once estimated, VARs can be used to simulate the response over time of any variable in the set to either an own disturbance or a disturbance to any other variable in the system and to produce a variance decomposition of the variable.

The mathematical representation of a VAR is:

$$y_t = \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \dots + \alpha_p y_{t-p} + \varepsilon_t \quad (1)$$

Where y_t is a k vector of endogenous variables, $\alpha_1, \dots, \alpha_p$ are matrices of coefficients to be estimated, and ε_t is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables. Given that only lagged values of the endogenous variables show on the right-hand side of the equations, simultaneity is not a problem, and OLS yields consistent estimates.

11. **The VAR is identified using recursive Cholesky decomposition.** As the reduced-form errors are typically correlated, the Cholesky decomposition isolates the underlying structural errors by recursive orthogonalization, with the innovation in the first equation untransformed, the innovation in the second equation taken as orthogonal to the first, and so on.

*Data and choice of variables*⁶

12. **The analysis focuses on the period since the passage of key financial sector reforms, including the Central Bank Act, and considers the effects of three policy instruments, namely interest rates, exchange rate, and money supply.** We use the repo rate, which is (in connection with the KFR), the key short-term interest rate used by the BPNG to signal its monetary policy stance. The second policy-related variable is the nominal exchange rate (x). We focus on the nominal effective exchange rate (NEER) to examine the effects of exchange rate changes on output and prices.⁷ Output is measured as real GDP (y) and the consumer price index (p) is taken as the measure of the general price level. All data are expressed in natural logs and are seasonally adjusted using ARIMA X12, with the exception of the repo rate, which is in levels and not seasonally adjusted.

13. **The Augmented Dickey-Fuller (ADF) test suggests that the null hypothesis that the variables are I(1) cannot be rejected.** Given that the monetary transmission mechanism is a short-run phenomenon, an analysis of the economy's long run behavior is not carried out in this paper. This allows us to conduct the analysis in levels, thereby allowing for implicit cointegrating relationships in the data.⁸ The lag length of the VAR estimation was selected using the Akaike (AIC) and Schwartz (SC) Information Criteria, and the residuals were tested for autocorrelation. Both tests suggest a lag of the first order, and the Lagrange Multiplier Test suggests that the residuals are not serially correlated.

The Basic Model

14. **In the baseline model, the vector of endogenous variables consists of real GDP (y_t), the consumer price index (p_t), repo rate ($repo_t$), and the nominal exchange rate ($neer_t$):**

$$Y = [y_t, p_t, repo_t, neer_t] \quad (2)$$

The ordering of the variables was based on the speed with which the variables respond to shocks. Real output is assumed to be the least responsive, as would be expected for a small, open, developing economy, like Papua New Guinea's, with many structural rigidities. A fundamental assumption is that in the short run, shocks to the policy variables have no

⁶ Monthly data for 2001–06 are used for the econometric analyses. The annual GDP series is converted into a monthly series using quadratic match sum feature in Eviews and the quarterly CPI series is converted using the linear match last feature.

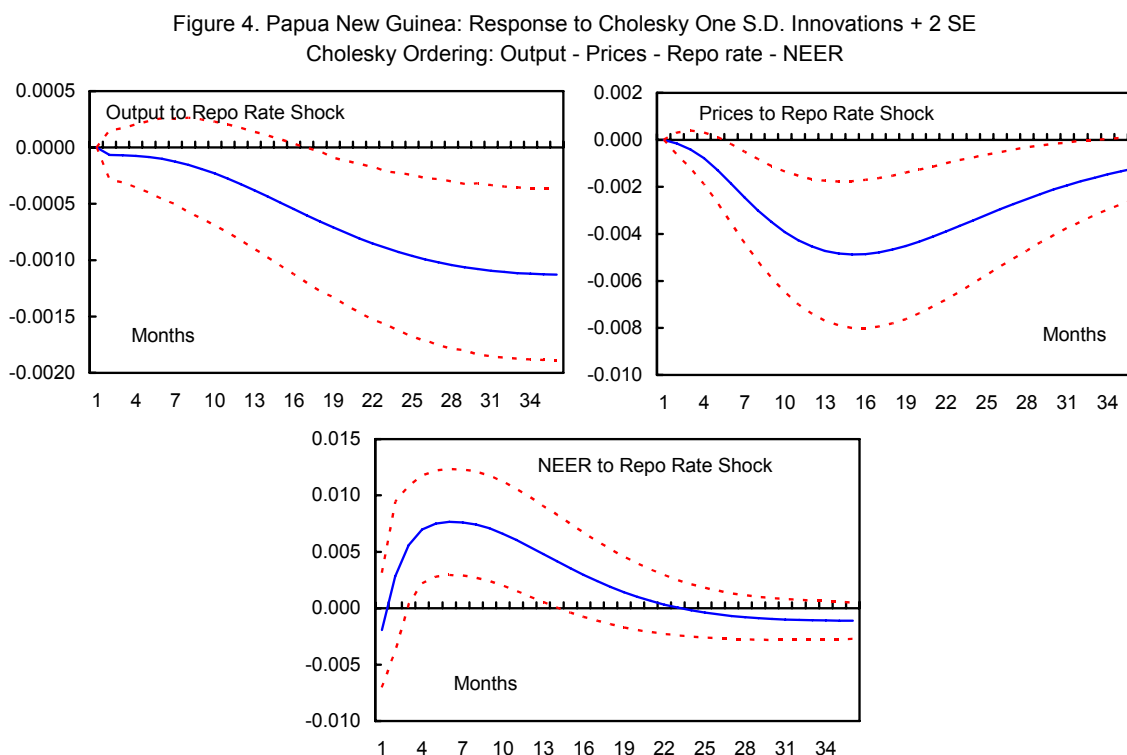
⁷ Using the NEER as opposed to a real effective exchange rate makes it easier to distinguish the exchange rate channel from other channels.

⁸ Most of the empirical literature on VARs has tended to estimate VARs that are unrestricted in levels (Favero, 2001). Sims, Stock, and Watson (1990) show that if enough of the variables are cointegrated, an analysis in levels is still correct because the ordinary least squares (OLS) estimator of the reduced-form VAR efficiently estimates the cointegrating relationship.

contemporaneous impact on output and prices due to the real sector's sluggish reaction to monetary and exchange rate shocks. The nominal interest rate responds contemporaneously to shocks to output and prices, but not to changes in financial variables. Finally, the nominal exchange rate responds contemporaneously to all types of shocks.⁹

Impulse responses and variance decomposition

15. To observe the influence of monetary policy on output and prices, we look at the impulse response functions (Figure 4). The results are summarized as follows:



- An unexpected, temporary rise in the repo rate tends to be followed by a sluggish, but persistent decline in output. Variance decomposition indicates that, after 2 years, monetary policy accounts for 42 percent of the fluctuation in output, with own shocks accounting for broadly the amount of the variance.
- An unexpected, temporary rise in the repo rate is followed by a decline in prices, that is significant between 5 to 17 months, peaking after around 15 months following the shock.

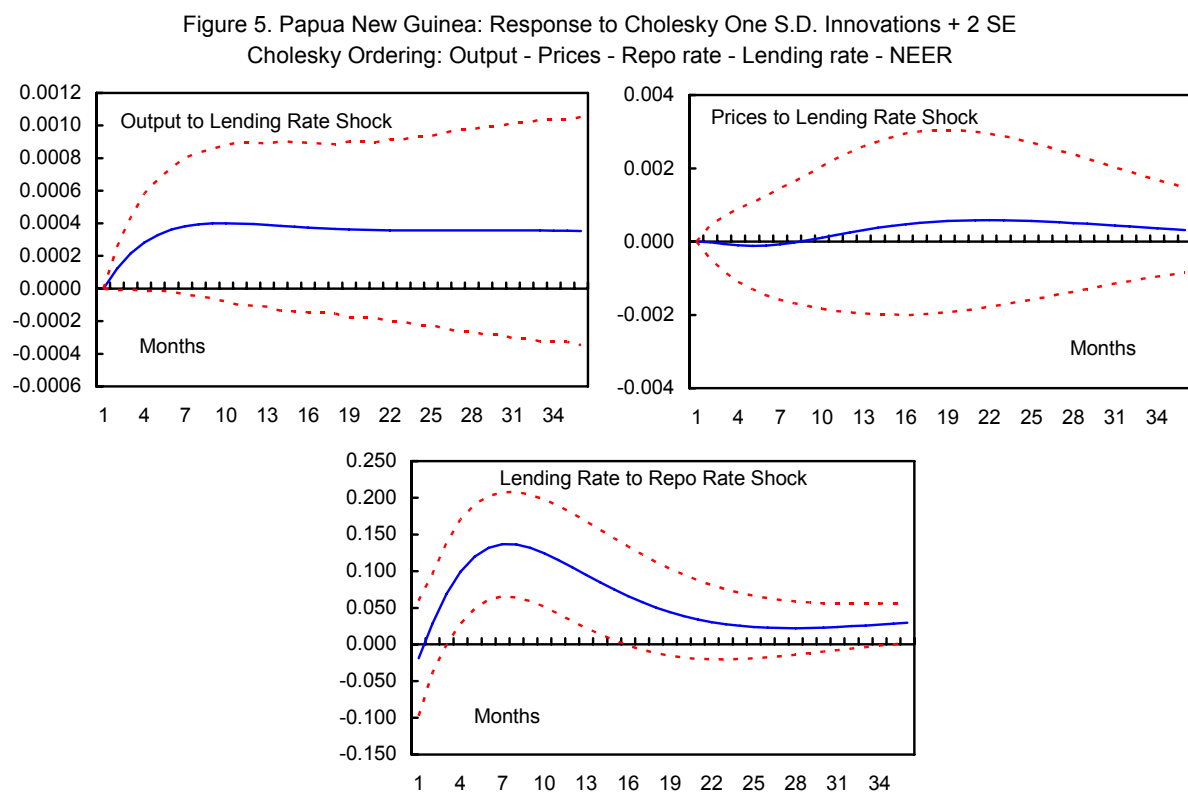
⁹ Alternative orderings of the variables in the VAR produced broadly similar qualitative findings as in the baseline model.

- Likewise, the nominal exchange rate responds strongly to an exogenous increase in the repo rate. An unexpected and temporary rise in the repo rate tends to be followed by an immediate nominal appreciation, with the impact culminating 9–12 months after the shock.

i. Interest Rate Channel

16. **To examine the interest rate channel more closely, we added to the basic model (Equation 2) the lending rate for new loans.** The variables in this expanded VAR have the following ordering: real output, prices, repo rate, lending rate on new loans, and NEER. Figure 5 presents impulse responses stemming from innovations in monetary policy (increase in the repo rate) and bank lending rates. The lending rate responds immediately and significantly to an unexpected change in the repo rate. Output and prices, however, do not respond significantly to lending rate shocks. The results highlight the transmission of changes in the key policy interest rate to other interest rates in the economy.

17. **Importantly, the results also highlight the weakness of the interest rate channel in Papua New Guinea, as changes in bank lending rates do not seem to affect economic activity and prices.** Variance decomposition suggests that, after two years, interest on new lending account for 11 percent of the fluctuation in output, and just 2 percent of the fluctuation in prices.



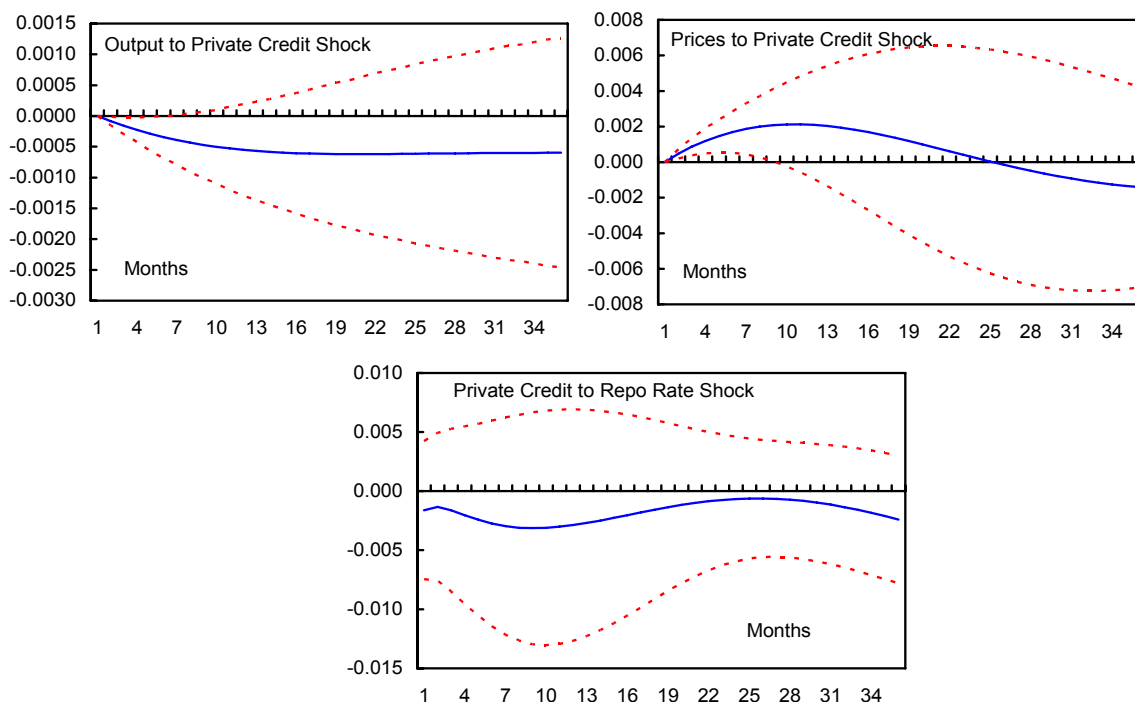
ii. Bank Lending Channels

Bank credit

18. To examine the importance of credit in the monetary transmission mechanism, we included the natural log of seasonally adjusted domestic credit in the VAR. The variables in this expanded VAR have the following ordering: real output, prices, bank credit, and the repo rate. Bank credit appears to be important for the monetary transmission mechanism and a significant source of independent shocks to prices. A shock to bank loans results in an almost immediate increase in prices that is significant for about a year (Figure 6). Variance decomposition suggests that, after one year, credit accounts for 15 percent of the fluctuation in prices (Annex, Table 1).

19. Shocks to bank credit do not appear to elicit an output response that conforms to what one would expect from the theory—i.e., a positive shock to credit results in a negative output response. This result may be explained by the still relatively modest share that credit to the economy has in total bank assets. Commercial banks with limited credit assessment capacity, in an environment where property rights are not adequately defined, and where corporate governance is weak, have tended to invest their funds in government securities rather than in credit portfolios.

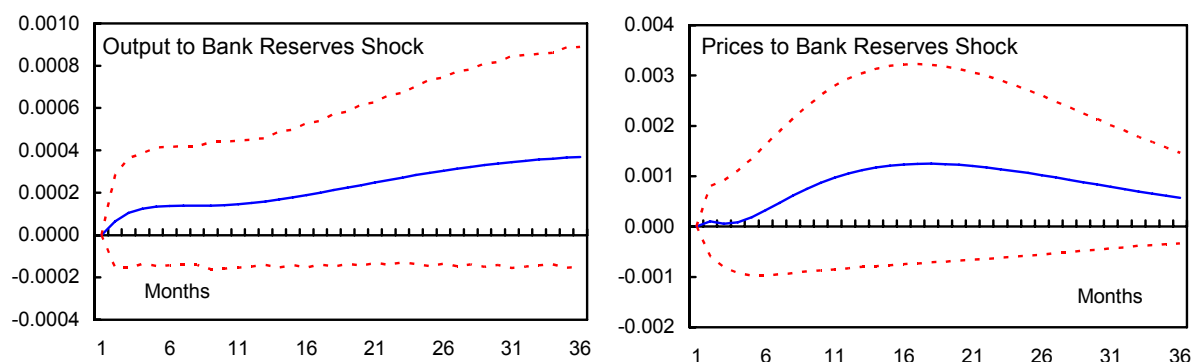
Figure 6. Papua New Guinea: Response to Cholesky One S.D. Innovations + 2 SE
Cholesky Ordering: Output - Prices - Repo rate - Credit - NEER



Bank reserves

20. To examine the issue of whether changes in the bank reserves have implications for output and prices in Papua New Guinea, we add bank reserves to Equation 2. As can be seen from Figure 7, the impulse response of output and prices to a change in bank reserves is not significant. Variance decomposition suggests that, after two years, a shock to reserve money account for only 2½ percent of the fluctuation in output, and only 2 percent of the fluctuation in prices. These results can be explained by structural rigidities in the banking system, including commercial banks' preference to invest in government paper rather than lending operations. The results are consistent with Saxegaard (2006), which uses a threshold vector autoregression model for a number of Sub-Saharan African countries and finds that excess liquidity in the region weakens the monetary transmission mechanism, and thus the ability of monetary authorities to influence demand conditions in the economy.

Figure 7. Papua New Guinea: Response to Cholesky One S.D. Innovations + 2 SE
Cholesky Ordering: Output - Prices - Bank reserves - Repo rate - NEER

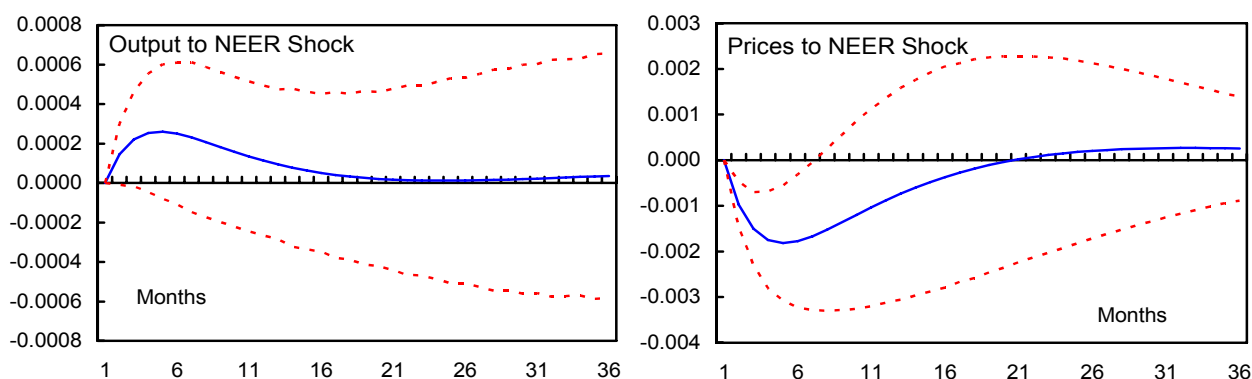


Source: Fund staff calculations.

iii. Exchange Rate Channel

21. **Evidence on the exchange rate channel suggests that prices respond strongly to the exchange rate.** An appreciation of the NEER results in an almost immediate (within 2 months) decline in prices, which is significant for 10 months after the initial shock. The rapid pass-through of exchange rate changes to prices is consistent with findings from other countries. The results suggest that the exchange rate plays a significant role for monetary transmission in Papua New Guinea.

Figure 8. Papua New Guinea: Response to Cholesky One S.D. Innovations + 2 SE
Cholesky Ordering: Output - Prices - NEER - Repo rate



Source: Fund staff calculations.

E. Conclusions And Policy Implications

22. **To gain insights into the workings of the Papua New Guinea economy, we investigated various channels of the monetary transmission mechanism.** While the results should be interpreted with some caution given the level of noise in the data, evidence presented in this paper suggests that monetary policy has been successful in influencing prices and market interest rates. It has been, however, less successful in influencing domestic output.

- **Policy instrument (repo):** We find evidence to support the view that changes in the BPNG's key policy instrument (the repo rate) have a significant and rapid impact on prices. Changes in the repo rate also affect output sluggishly, and with a significant lag. An unexpected and temporary rise in the repo rate also tends to be followed by nominal exchange rate appreciation.
- **Bank lending rate:** The lending rate responds immediately and significantly to an unexpected change in the repo rate. Output and prices, however, do not respond significantly to lending rate shocks.
- **Bank credit:** We find no statistical link in our data between monetary policy and bank credit, nor between bank credit and economic activity. Bank credit appears, however, to be an important source of independent shocks to prices.
- **Bank reserves:** Our results also show that monetary policy does not seem to have an effect on bank reserves. In addition, the response of output and prices to a change in bank reserves is not significant. These result could be explained by structural rigidities in the banking system, including commercial banks' preference to invest in government paper, despite a significant amount of excess liquidity.

- **Exchange rate:** The nominal exchange rate responds immediately and significantly to an unexpected change in the repo rate rates, possibly reflecting capital mobility associated with interest rate differentials vis-à-vis other countries. The appreciation of the currency following monetary tightening in turn makes imports cheaper, thereby decreasing the overall price level and the rate of inflation.

23. **While the BPNG has developed and improved its set of monetary instruments over the years, the instruments could be more effective, to allow the various channels of monetary transmission to operate most effectively.** The authorities could consider an in-depth assessment of the financial system to take stock, identify, and address remaining weaknesses in the sector. These include improving governance of the central bank and financial institutions, strengthening the regulatory framework, as well as enhancing the legal framework, with a view to improving the monetary transmission mechanism to the real sector. In addition, strengthening the quality, frequency and timeliness of price statistics and indicators of economic activity would contribute to an improved understanding of the monetary transmission mechanism.

Annex I. Model Variance Decomposition: Data Evidence

Table 1. Variance Decomposition of the Basic Model 1/

Period	Variance decomposition of output					Variance decomposition of prices				
	Std. error	Output	Prices	Repo	NEER	Std. error	Output	Prices	Repo	NEER
1	0.001	100.000	0.000	0.000	0.000	0.002	8.476	91.524	0.000	0.000
2	0.001	94.706	0.680	0.282	4.333	0.004	19.110	80.121	0.197	0.572
3	0.002	92.105	0.889	0.388	6.618	0.005	23.021	72.429	0.694	3.856
4	0.002	91.082	1.065	0.459	7.395	0.007	23.307	65.579	1.779	9.335
5	0.002	90.749	1.335	0.538	7.379	0.008	21.937	59.926	3.662	14.475
6	0.002	90.555	1.759	0.654	7.032	0.010	20.131	55.560	6.356	17.953
7	0.002	90.292	2.343	0.827	6.539	0.011	18.349	52.146	9.726	19.779
8	0.003	89.882	3.064	1.073	5.981	0.012	16.702	49.325	13.578	20.394
9	0.003	89.282	3.897	1.412	5.409	0.014	15.206	46.866	17.709	20.219
10	0.003	88.462	4.818	1.863	4.857	0.015	13.856	44.649	21.939	19.556
11	0.003	87.405	5.800	2.445	4.350	0.016	12.651	42.619	26.117	18.614
12	0.003	86.112	6.820	3.168	3.899	0.017	11.586	40.751	30.125	17.538
18	0.004	74.820	12.519	10.397	2.264	0.022	7.625	32.552	47.801	12.023
24	0.006	62.403	16.009	20.038	1.550	0.024	6.200	28.561	55.433	9.806
30	0.007	52.650	17.607	28.614	1.129	0.025	5.748	27.001	58.041	9.210

Source: Fund staff calculations.

1/ Cholesky Ordering: Output - Prices - Repo - NEER.

Table 2. Variance Decomposition of Extended Model - Lending Rate 1/

Period	Variance decomposition of output						Variance decomposition of prices					
	Std. error	Output	Prices	Repo	Lending rate	NEER	Std. error	Output	Prices	Repo	Lending rate	NEER
1	0.001	100.000	0.000	0.000	0.000	0.000	0.003	7.880	92.120	0.000	0.000	0.000
2	0.001	97.580	0.277	0.687	1.006	0.451	0.004	8.630	83.921	0.448	0.001	6.999
3	0.002	93.853	0.786	1.639	2.640	1.083	0.005	8.126	74.391	2.326	0.018	15.139
4	0.002	90.020	1.418	2.523	4.393	1.646	0.006	7.092	65.755	5.964	0.044	21.146
5	0.002	86.571	2.113	3.246	6.018	2.052	0.007	5.939	58.281	11.102	0.062	24.615
6	0.002	83.626	2.840	3.820	7.420	2.293	0.008	4.866	51.855	17.192	0.067	26.020
7	0.002	81.151	3.585	4.289	8.582	2.392	0.009	3.953	46.348	23.651	0.059	25.989
8	0.003	79.056	4.342	4.700	9.519	2.383	0.010	3.218	41.649	30.009	0.048	25.076
9	0.003	77.245	5.107	5.093	10.256	2.298	0.011	2.648	37.661	35.957	0.041	23.693
10	0.003	75.629	5.877	5.502	10.825	2.167	0.012	2.216	34.290	41.335	0.043	22.116
11	0.003	74.133	6.650	5.953	11.251	2.012	0.013	1.894	31.447	46.086	0.057	20.516
12	0.003	72.696	7.423	6.470	11.560	1.851	0.014	1.658	29.050	50.220	0.083	18.988
18	0.004	63.422	11.749	11.752	11.850	1.227	0.019	1.159	20.686	65.172	0.394	12.589
24	0.005	52.271	14.762	20.814	10.916	1.237	0.022	1.165	17.395	70.946	0.723	9.771
30	0.006	41.741	16.174	30.898	9.794	1.393	0.023	1.244	16.015	73.206	0.933	8.603

Source: Fund staff calculations.

1/ Cholesky Ordering: Output - Prices - Repo - Lending rate - NEER

Table 3. Variance Decomposition of Extended Model - Bank Credit 1/

Period	Variance decomposition of output						Variance decomposition of prices					
	Std. error	Output	Prices	Repo	Credit	NEER	Std. error	Output	Prices	Repo	Credit	NEER
1	0.001	100.000	0.000	0.000	0.000	0.000	0.003	10.864	89.136	0.000	0.000	0.000
2	0.001	99.186	0.179	0.032	0.479	0.124	0.004	11.371	82.927	1.270	1.628	2.804
3	0.001	97.691	0.515	0.077	1.470	0.248	0.005	10.390	74.461	4.890	4.483	5.775
4	0.002	95.729	0.969	0.131	2.837	0.334	0.006	8.838	65.479	10.261	7.590	7.831
5	0.002	93.436	1.520	0.201	4.458	0.385	0.007	7.256	57.044	16.365	10.355	8.980
6	0.002	90.909	2.154	0.297	6.232	0.408	0.008	5.878	49.661	22.424	12.550	9.487
7	0.002	88.227	2.860	0.429	8.075	0.410	0.009	4.760	43.448	28.029	14.163	9.600
8	0.003	85.449	3.627	0.607	9.920	0.398	0.010	3.884	38.321	33.036	15.271	9.489
9	0.003	82.621	4.444	0.843	11.716	0.376	0.011	3.207	34.122	37.440	15.970	9.261
10	0.003	79.775	5.302	1.146	13.427	0.349	0.012	2.686	30.685	41.297	16.352	8.979
11	0.003	76.936	6.190	1.528	15.026	0.320	0.013	2.285	27.866	44.680	16.490	8.678
12	0.003	74.118	7.099	1.997	16.495	0.291	0.014	1.975	25.543	47.662	16.443	8.377
18	0.004	58.110	12.485	6.887	22.317	0.201	0.019	1.116	17.799	59.958	14.243	6.884
24	0.005	44.334	16.671	14.871	23.819	0.306	0.022	0.901	14.997	66.544	11.607	5.952
30	0.006	33.524	19.040	23.827	23.101	0.507	0.023	0.846	13.944	69.300	10.513	5.396

Source: Fund staff calculations.

1/ Cholesky Ordering: Output - Prices - Repo - Credit - NEER

Table 4. Variance Decomposition of Extended Model - Bank Reserves 1/

Period	Variance decomposition of output						Variance decomposition of prices					
	Std. error	Output	Prices	Reserves	Repo	NEER	Std. error	Output	Prices	Reserves	Repo	NEER
1	0.001	100.000	0.000	0.000	0.000	0.000	0.003	7.321	92.679	0.000	0.000	0.000
2	0.001	98.174	0.222	0.273	0.149	1.182	0.004	8.046	84.375	0.074	0.379	7.126
3	0.002	95.833	0.615	0.658	0.294	2.601	0.005	7.568	74.530	0.058	2.336	15.508
4	0.002	93.802	1.102	0.999	0.395	3.702	0.006	6.608	65.583	0.063	6.143	21.603
5	0.002	92.231	1.650	1.260	0.469	4.389	0.007	5.551	57.938	0.123	11.377	25.011
6	0.002	91.044	2.244	1.451	0.538	4.723	0.008	4.571	51.471	0.267	17.394	26.297
7	0.002	90.116	2.876	1.591	0.621	4.796	0.009	3.737	46.003	0.496	23.602	26.162
8	0.002	89.327	3.542	1.698	0.737	4.696	0.010	3.063	41.381	0.794	29.574	25.187
9	0.003	88.581	4.240	1.786	0.905	4.488	0.011	2.536	37.479	1.137	35.061	23.788
10	0.003	87.802	4.963	1.865	1.146	4.223	0.012	2.133	34.185	1.500	39.953	22.229
11	0.003	86.934	5.706	1.943	1.482	3.935	0.013	1.830	31.403	1.865	44.233	20.669
12	0.003	85.936	6.463	2.023	1.932	3.646	0.014	1.606	29.049	2.220	47.933	19.192
18	0.004	76.457	10.793	2.682	7.700	2.368	0.018	1.118	20.655	3.884	61.325	13.018
24	0.005	63.059	13.719	3.601	17.775	1.847	0.021	1.121	17.155	4.809	66.702	10.213
30	0.006	50.505	14.997	4.516	28.356	1.628	0.022	1.189	15.604	5.285	68.926	8.996

Source: Fund staff calculations.

1/ Cholesky Ordering: Output - Prices - Reserves - Repo - NEER.

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III. EXPORT PERFORMANCE AND COMPETITIVENESS IN PAPUA NEW GUINEA¹

A. Introduction

1. **Export performance is a key factor driving both economic growth and stability in a small open economy like Papua New Guinea.** Accordingly, this paper reviews a broad set of indicators of export competitiveness, including estimation of the equilibrium real effective exchange rate (REER) using different methodologies. The REER appears to be broadly in equilibrium at present. However, other indicators suggest Papua New Guinea faces structural competitiveness problems, including a weak business environment, poor physical and knowledge infrastructure, land tenure issues, crime, and weak governance, which hamper overall export competitiveness. Looking forward, Papua New Guinea would benefit from accelerating the structural reforms necessary to improve the investment environment for the nonmineral economy.

2. The remainder of this chapter is structured as follows: Section B reviews Papua New Guinea's export performance over the last decade. Section C considers different measurements of price competitiveness and Section D estimates the equilibrium real effective exchange rate. Section E assesses structural competitiveness in Papua New Guinea. Finally, the conclusions are presented in Section F.

B. Export Performance

3. **Since 1995, Papua New Guinea's export performance has been lackluster, notwithstanding large mineral discoveries during the 1980s and early 1990s.** Mineral

export volumes have generally been on a declining trend reflecting depletion of proven reserves (especially for petroleum) and until recently a lack of new investment in exploration activities. Nonmineral export volumes have increased somewhat, mainly because of increased palm oil acreages, logging, and production of copra oil. Despite this increase, nonmineral export values have declined significantly because of lower average prices during the review period. Analysis of the causes of this poor export performance is particularly important because growth in Papua New Guinea is closely linked to exports. Indeed, real GDP growth has been generally modest, averaging about 1 percent annually for the period 1995–2006. Some salient developments are summarized below.

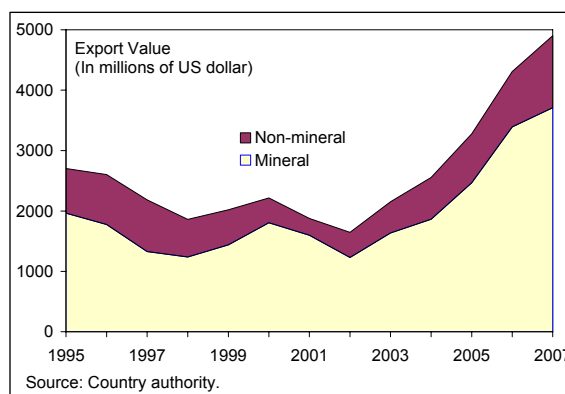
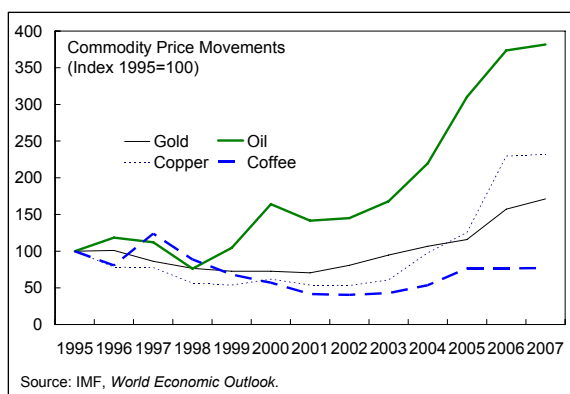
Papua New Guinea: Export Values, 1995 - 2006 (Annual growth)			
	Total	Mineral	Non-mineral
Mean	5.3	7.3	3.3
Median	3.3	9.7	7.7
Maximum	31.5	37.5	49.2
Minimum	-16.1	-25.3	-31.8
Std. deviation	18.6	22.3	26.2
Observations	12	12	12
Sources: Country authority; and Fund staff calculations.			

¹ Prepared by Ebrima Faal, Qaizar Hussain, Agnes Isnawangsih, and Aiko Mineshima. This chapter is based on a presentation delivered at the Bank of Papua New Guinea in Port Moresby in November 2007 and benefits from comments received at that time.

- Export values grew at an average rate of about 5.3 percent for the period 1995–2006. Mineral exports performed somewhat better (growth rate of about 7.3 percent) than nonmineral exports (growth rate of about 3.3 percent).
 - The average export growth rates masked very high year-to-year fluctuations in virtually all the products, with an overall coefficient of variation of 18. At least 95 percent of Papua New Guinea's exports are commodities, with raw minerals accounting for about 80 percent of total exports.
 - Both price and volume trends affected the observed trend in values. For the period 1995–2006, average export volumes grew by only about -0.8 percent per annum. Mineral export volumes grew by -1 percent, while nonmineral exports volumes grew by 1 percent. Strong export volume growth was observed mainly in palm oil, and to some extent, in tea, copper and cocoa.
 - Mineral exports were negatively affected by declining oil reserves, the closure in 1989 of the large Bougainville copper mine, and the virtual cessation of mining exploration activities and sharp decline in oil sector exploration until the recent up tick in global mining and oil prices. Petroleum export volumes declined by 7.7 percent on average during 1995–2006. This was partially offset by increased production at the Ok Ted copper mine.
 - Overall average export prices increased by about 7.2 percent per annum in U.S. dollar terms during 1995–2006. Mineral price trends were generally favorable over the period under study. Average mineral prices increased by 11 percent, while nonmineral prices increased by about 1.5 percent. Prior to 2002, poor price trends were observed virtually across the board with the exception of oil.
4. Papua New Guinea's export growth can be decomposed into three broad factors: global demand, product and markets, and competitiveness.

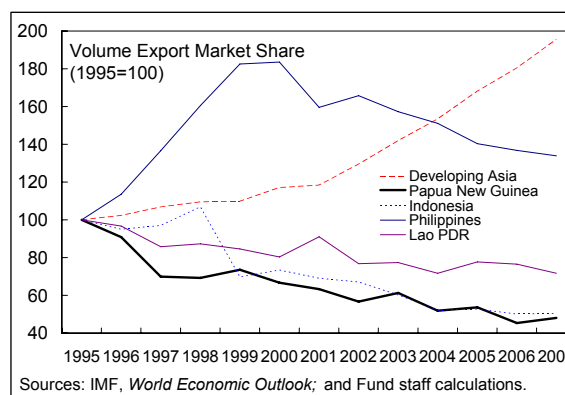
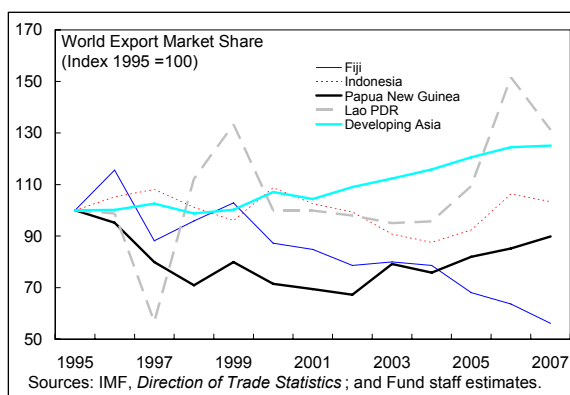
Global Demand

- Part of export growth can be attributed to rising international demand; i.e., the stronger global import demand is for a particular product, the stronger would export value growth for that product be. This has been the main influence on export value growth in Papua New Guinea. Rising mineral prices have increased the share of mineral exports in total exports from 70 percent during 1991–99 to 77 percent in 2000–06 despite declining export volumes.



Product and Market

5. **While Papua New Guinea's share of the world exports market has been improving in value terms since 2002 with the rise in commodity prices, it has been declining in volume terms over the past decade.** Over a longer-term, an increase in market share could be expected if Papua New Guinea's exports mainly comprised products for which world demand is growing more rapidly than the global average. However, against the background of a commodity demand boom, while world trade volumes increased by around 7.1 percent per annum over the period 1995–2006, over the same period, Papua New Guinea's export volume growth averaged around -0.8 percent per annum. As a result, the share of country's goods in world exports has made significant losses since the mid-1995 in volume terms. Although nonmineral export volume has increased recently, the increase has been less than the world's increase.

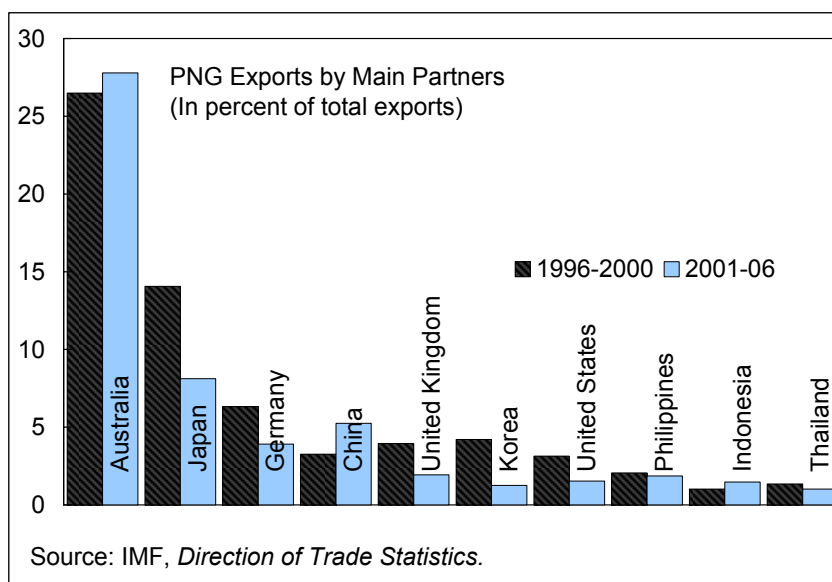


- **The range of Papua New Guinea's exports is limited and has been relatively unchanged over the years.** Exports consist mainly of commodities, including minerals and fuel, wood products, and agricultural products. Other areas, such as manufactured products, contribute little.

Papua New Guinea: Exports Composition and Growth (In percent, annual average)						
	1991–99			2000–06		
	Share to total	Growth rate	Contribution to growth	Share to total	Growth rate	Contribution to growth
Total	100.0	20.0	100.0	100.0	14.7	100.0
Agricultural products	29.5	21.9	1.9	22.3	7.9	24.4
Fuels and mining products	70.1	20.7	99.1	77.0	17.6	72.9
Manufactures	0.5	1.4	-1.0	0.8	50.0	2.6

Sources: Bank of Papua New Guinea and Fund staff calculations.

- **Export performance can also be affected by changes in the demand for exports across regions** such that an increase in global market share would be expected if a country's exports were destined for markets that grow more rapidly than the global average. However, Australia remains Papua New Guinea's main trading partner—reflecting historical ties, rather than the fast growing emerging economies to the north.

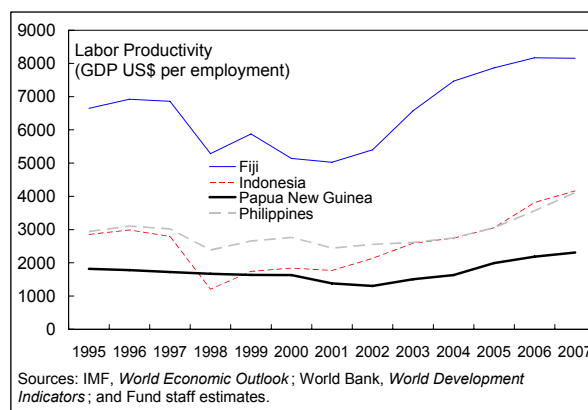


C. Assessing Competitiveness: Wage and Cost Indicators

Labor costs

6. **Wage costs are an important component in the total costs of producing exports; unfortunately, poor data availability bar a thorough analysis on these grounds in Papua new Guinea.** Unit labor costs in the traded sector relative to the main trading partners,

expressed in a common currency, are generally accepted as a useful proxy for cost competitiveness. However, the latest data collected for Papua New Guinea dates from the mid-1990s. A study by Duncan and Lawson (1997) found that Papua New Guinea's unit labor costs were high compared to competitor countries, such as Malaysia, Indonesia, and the Philippines. For the period 1970–1994, unit labor costs for Malaysia and the Philippines averaged



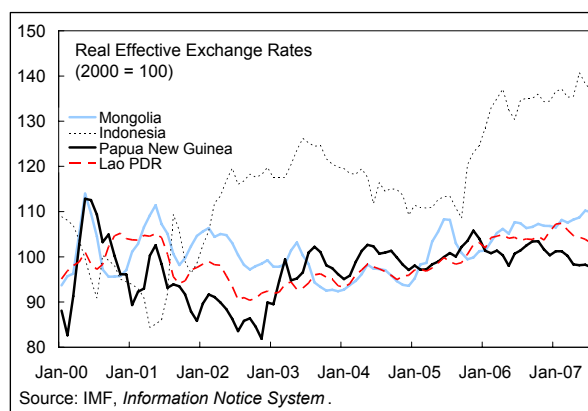
40 percent of those of the United States, and those of the Indonesia averaged 0 percent,² while Papua New Guinea averaged 80–100 percent. Duncan and Lawson show that the main reason for the high unit labor costs in Papua New Guinea was poor productivity performance. Available data since the Duncan and Lawson study was completed suggest there has likely been no improvement in productivity, since the mid-1990s.³

² R. Duncan and T. Lawson. 1997. *Cost Structures in Papua New Guinea*. Port Moresby: Institute of National Affairs, Discussion Paper No. 69:45.

³ Faal (2006) estimates that total factor productivity growth during 1980–2006 was zero.

Real Effective Exchange Rates

7. **Real effective exchange rate (REER) indicators suggest that price competitiveness has remained roughly unchanged over the past decade.** The REER has remained largely stable since the August 1994 devaluation (depreciation by about 0.37 percent for the period January 1995–July 2007), as appreciation on a nominal effective exchange rate basis was offset by relatively lower domestic inflation.



8. **Pair wise correlation analysis shows no evidence of an inter-relationship between the REER and export performance in Papua New Guinea.** Granger causality tests seem to indicate no causality between exports and the REER.⁴ Nonetheless, it would be premature to conclude that changes in the REER would not affect export performance.

- First, it is likely that the limited impact of the exchange rate on export performance reflects the duality between the mineral sector and the nonmineral sector. The mining industry has largely operated at world prices as an enclave with few linkages to the rest of the economy.
- Second, the results are consistent with the view that export growth has generally been a result of discovery of new minerals and, to some extent, the extension of cultivated areas (e.g., palm oil and copra), rather than the emergence of nontraditional exports. Thus, export volumes would have been little affected by foreign currency-denominated prices (see Mlachila 2002).

9. **Other research has found that a real depreciation in Papua New Guinea has a positive impact on the nonmineral sector, for example, by opening up new markets.**⁵

D. Assessing Competitiveness: REER Estimates

10. **This section seeks answers to the question of whether the REER is in line with macroeconomic fundamentals.** As estimates of equilibrium real effective exchange rates (EREERs) tend to be quite sensitive to the methodology used, especially in countries like

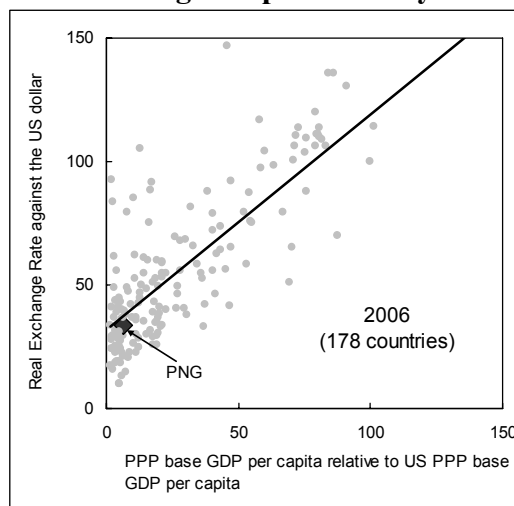
⁴ The hypothesis that changes in export values do not Granger-cause changes in the REER is rejected at the 5 percent significance levels. P-values of 0.233 and 0.665 suggests that we cannot reject the hypothesis.

⁵ In a detailed study of the tree-crop sector in Papua New Guinea, Kannapiram (2000) argued that kina depreciation achieved the twin objectives of improving competitiveness and increasing profit margins, especially for coffee and oil palm production and exports.

Papua New Guinea with severe data limitations, this study uses three different approaches: the purchasing power parity approach (PPP), the macroeconomic balance approach, and the behavioral equilibrium exchange rate (BEER) approach.

Purchasing Power Parity Approach

11. **Assessing real exchange rate misalignment under the Purchasing Power Parity (PPP) approach involves a comparison of prices of a basket of goods produced by the home country with those of a comparable basket abroad and calculating the exchange rate that would equate them.** Assuming the Balassa-Samuelson hypothesis holds, a country's prices should become relatively higher as the country becomes relatively richer. The real exchange rate calculated on a PPP basis—measured as the ratio of the domestic price level to international prices—is currently below what would be predicted given Papua New Guinea's relative income. However, the deviation is small compared to other countries.



Macroeconomic Balance Approach

12. **Macroeconomic Balance approach estimates the REER that simultaneously achieves internal and external balance.** To this end, the fundamental equilibrium exchange rate (FEER) is defined as the exchange rate that will equate the current account to the structural savings/investment balance in the medium term. The estimation process comprises the following three steps:

- estimating an equilibrium relationship between current account balances and a set of fundamentals;
- computing an equilibrium current account (current account norm) from these relationships as a function of the levels of fundamentals projected to prevail in the medium term; and
- calculating the REER adjustment that would close the gap between the estimated current account norm and the underlying current account balance (the current account projection for 2012).

13. The fundamental variables used for the model are the following:

demographic variables affecting the saving rate (old dependency ratio and population growth rate), initial net foreign assets (share of nominal GDP), fiscal balance (share of nominal GDP), relative income (PPP-based per-capita income relative to Australian data), relative real interest rate (relative to Australian data), and mineral exports (share of nominal GDP).

Macroeconomic Balance Approach: Current Account Regression

	Coefficient
Old-age Dependency	-4.52 *
Population Growth	-25.05 *
Initial NFA	-0.58 *
Fiscal Balance	-0.38
Relative Income	3.17 **
Relative Real Interest Rate	-0.25
Mineral Exports	0.46 **
Constant	44.23
Adjusted R-squared	0.85

Note: A *, ** indicates significance at the 10, 5 percent level.

14. Given the estimated import/exports elasticities to exchange rate movements, the REER would need to depreciate by 0.4 percent to close the gap between the underlying current account balance (-2.5 percent) and the current account norm (3.1 percent).^{6 7}

Behavioral Equilibrium Exchange Rate Approach

15. This approach estimates the EREER by identifying structural determinants using a behavioral exchange rate model. Clark and McDonald (1998, 2000) popularized the behavioral equilibrium exchange rate (BEER) approach as a modeling strategy designed to seek a long run relationship between observed real exchange rates and a set of fundamental determinants derived from a theoretical real exchange rate model. An attractive feature of the model is that the real exchange rate is required to be in equilibrium only in terms of its value given by the appropriate set of explanatory variables over a specific sample period. This allows representation of the equilibrium real exchange rate in terms of the dynamic structure that generates the data on the real exchange rate and its fundamental determinants, even though the variables themselves are derived from a long run structural model.⁸

⁶ The results should be treated with some caution given the limited data set and degrees of freedom.

⁷ Annual data for 1992–2006 are used for the econometric analyses and are shown in Table 1. Elasticity of exports/imports/current accounts with respect to the REER are assumed to be:

- Exports: -0.46 (one percent appreciation in REER decreases exports in share of GDP by 0.46).
- Imports: -0.62 (one percent appreciation in REER decreases imports in share of GDP by 0.62).
- Current accounts: $-0.46 * (\text{exports in share of GDP}) - (-0.62) * (\text{imports in share of GDP})$.

⁸ Hinkle & Montiel, 1999.

16. **The paper uses a vector error correction model to estimate the BEER.** The following model is estimated using Johansen's co-integration and error correction techniques.⁹

$$LREER = \beta_0 + \beta_1 LTOT + \beta_2 RID + \beta_3 LYPC + \beta_4 OPEN + \beta_5 N FAGDP + \beta_6 FIS + \beta_7 DSR + \mu$$

where the notation used is defined in Box 1. The figure below shows the behavior of the key fundamental variables since 1994. The analysis shows that commodity price movements, productivity, real interest rates differentials vis-à-vis trading-partner countries, the size of the fiscal balance, net foreign assets position, and the debt service ratio explain much of the long-run behavior of the real effective exchange rate.

The results of the estimation are summarized in the table below and show that:

- An increase in the terms of trade of 1 percent is associated with a depreciation of 0.16 percent in the real effective exchange rate.
- An increase in real interest rate differential of one percentage point is associated with an appreciation of 0.01 percent in the real effective exchange rate.
- An increase in real GDP per capita relative to trading partners of 1 percent is associated with an appreciation of 0.10 percent in the real effective exchange rate.
- An improvement in the fiscal balance of 1 percentage point of GDP is associated with an appreciation of the real effective exchange rate of around 1.4 percent.
- An improvement in the debt service ratio of 1 percentage point is associated with an appreciation of the real effective exchange rate of around 0.4 percent.

⁹ An important advantage over single-equation methods (such as the Engle-Granger method) is that this approach accounts for simultaneity and autocorrelation of the endogenous variables. The VECM also permits the inclusion of additional exogenous variables that may help explain the short-run behavior of the real exchange rate.

Selected Results of the Vector Error Correction Estimates
Sample period: 1995Q2–2006Q4 1/

		(1)	(2)
<i>Estimates of the cointegrating relationship with the real exchange rate</i>			
Log of real exchange rate	LREER (-1)	1.000	1.000
Log of terms of trade	LTOT(-1)	0.169 [5.241]	0.160 [3.133]
Real interest differential with partners	RID (-1)	-0.007 [-4.443]	-0.008 [-3.532]
Real income per capital relative to partners	LYPC (-1)	-0.219 [-5.578]	-0.101 [-2.071]
Measure of Openness	OPEN (-1)	-0.441 [-5.109]	... ...
Log of net foreign assets to GDP	LNFA GDP (-1)	-0.033 [-3.110]	... ...
Fiscal deficit to GDP	FIS (-1)	-1.115 [-6.292]	-1.434 [-5.520]
Debt service ratio	DSR (-1)	0.943 [8.141]	-0.356 [-2.312]
C		-5.155	-5.089
<i>Estimates of the Short-term impact on the real exchange rate D(LREERS)</i>			
D(RID)		-0.004 [-1.957]	... ...
D(DSR(-1))		-0.524 [-2.217]	-0.610 [-2.841]
<i>Estimates of the speed of adjustment of the real exchange rate:</i>			
CointEq1		-0.585 [-3.487]	-0.356 [-2.312]
Half-life of the deviation from equilibrium exchange rate 2/			
in quarters		0.85	1.41
in years		0.21	0.35

1/ t-statistics in square brackets.

2/ The implied half-life of the shock to real exchange rate is calculated as follows: the time (T) required to dissipate x percent (in this case, 50 percent) of a shock is determined according to $T=(1-x)/\Theta$, where Θ is the coefficient of the error-correction term and T is the required number of periods (quarters).

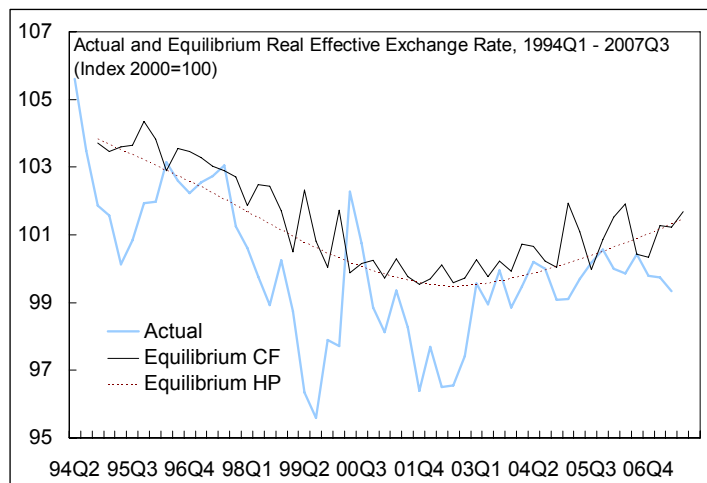
Box 1. Macroeconomic Determinants of the Exchange Rate

- **Terms of trade (LTOT):** The impact of the terms of trade on the real exchange rate is theoretically ambiguous.¹ Changes in terms of trade entail changes in domestic prices of importables, and as a result, generate inter-temporal and intra-temporal substitution effects as well as income effects. This makes the net effect on the equilibrium real exchange rate (ERER) ambiguous (Edwards 1989, 1994).
- **The real interest rate (RID):** An increase in a country's real interest rate relative to its trading partners tends to appreciate the ERER. For an economy that is highly open to international capital markets, a higher domestic real interest rate relative to that of its trading partners creates opportunities for capital inflows.
- **Productivity growth differential (LYPD):** An increase in productivity relative to other countries leads to an improvement in the current account, thereby appreciating the real exchange rate. Given lack of data availability in Papua New Guinea, we employ real GDP per capita with respect to trading partner countries as a proxy for the Balassa-Samuelson effect.
- **Trade policy (Open).** Permanently higher levels of trade taxes (i.e., reducing the openness of the economy) lead to ERER appreciation. Consumption becomes more expensive with the increase in the relative price of importables, while also creating excess demand of both exportables and nontraded goods. The excess demand in the nontradable goods sector permits an appreciation of the ERER.
- **Net capital inflows (LNFAGDP).** Net capital inflows (as a percentage of GDP) are used as a proxy for capital controls. In models of ERER determination, a permanent increase in net capital inflows (interpreted as a reduction in the tax on foreign borrowing) leads to an appreciation of the ERER.
- **Fiscal policy (FIS):** Fiscal policy has an ambiguous effect on the equilibrium real exchange rate: the direction of its quantitative influence depends on the sectoral composition of the change in government expenditure.
- **The debt service ratio (DSR).** If the debt service ratio falls permanently, this will improve the sustainability of the current account and thus lead to an appreciation of the ERER. If a country is a net debtor, an increase in the debt burden will deteriorate its current account. The real exchange rate will depreciate and make correction of current account imbalances possible. If a country is a net creditor, higher interest income from loans will lead to a current account surplus and the real exchange rate will appreciate.

1/ See MacDonald and Ricci (2003).

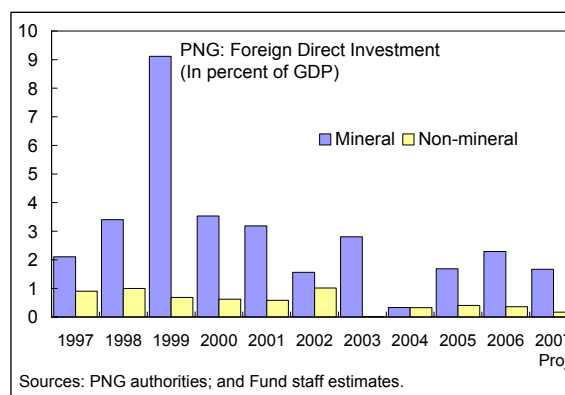
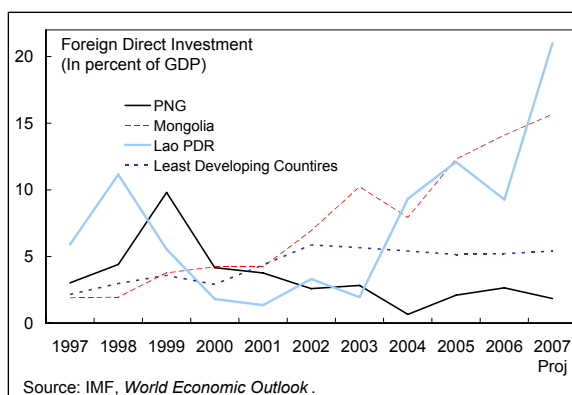
17. **The level of the exchange rate appears to be in line with fundamentals.** The equilibrium real exchange rate (ERER) was obtained by imposing the coefficients of the long-run equation on the permanent values of the fundamentals using Hodrick-Prescott (HP) and Christiano-Fitzgerald (CF) filters.

- Relative to its equilibrium values (HP and CF), the actual exchange rate was mostly undervalued by a small margin during 1994–2007. There were three periods of significant undervaluation during 1995, 1998–2000, and 2001–02, and three brief periods of small to moderate overvaluation in 1997, 2000, and 2005.
- The first resulted from the use of a nominal exchange rate anchor that was not supported by a consistent fiscal policy in the period prior to 1994. It also reflected broad inconsistencies in the conduct of macroeconomic policies and in the fundamental variables.
- By end-2006, the actual RER was somewhat more depreciated than the estimated equilibrium exchange rate. The increase in the ERER is due to various factors. The increase in the terms of trade contributed to kina depreciation as income effects dominated substitution effects. However, the improvement in the fiscal balance, increase in net foreign assets, and small increase in the real interest rate differential partly offset these terms of trade effects.



E. Assessing Competitiveness: Structural Indicators

18. **While it appears that price competitiveness is nonbroadly appropriate in Papua New Guinea, structural factors are also important determinants of competitiveness.** The structural factors include the business environment (including entrepreneurship, tax regime, regulations, access to finance, and governance), physical and knowledge infrastructure, law and order, land policy, and trade policy. These elements are important determinants of current and future productivity, which is one of the factors that influence competitiveness. One indication of Papua New Guinea's relative structural competitiveness is the comparatively low level of foreign direct investment relative to other resource rich countries in Asia and low income countries globally. Foreign direct investment is particularly low outside of the mineral sector.



19. **Survey-based indicators of the business environment suggest structural impediments to external competitiveness exist.** Although Papua New Guinea's ranking in the World Bank's ease-of-doing-business database compares relatively favorably with other countries in the region, key areas rank poorly. These include enforcing contracts, dealing with licenses, getting credit, and trading across borders. Another disincentive to investment is and high political risks due to corruption, bureaucracy quality, and ethnic tensions. The World Bank's CPIA index and Transparency International both rank Papua New Guinea poorly on these issues.¹⁰ In addition, the evolution of rankings indicates that the structural reforms undertaken to date have yet to improve competitiveness in a meaningful way.

¹⁰ International comparisons of structural indicators are often based on survey evidence and, therefore, need to be interpreted with caution.

Selected Countries: Doing Business 2006–07 1/

	Fiji	Mongolia	Papua New Guinea	Philippines	Indonesia	Lao PDR
Doing business	36	52	84	133	123	164
Starting a business	69	62	76	144	168	49
Dealing with licenses	28	43	118	77	99	111
Employing workers	16	64	31	122	153	82
Registering property	77	18	64	86	121	149
Getting credit	48	68	115	97	68	170
Protecting investors	33	19	33	141	51	176
Paying taxes	52	90	79	126	110	114
Trading across borders	111	168	82	57	41	158
Enforcing contracts	62	27	162	113	141	111
Closing a business	114	115	97	147	136	178

1/ Economies are ranked on their ease of doing business, from 1–178, with first place being the best.

Source: World Bank, *Doing Business*, 2008.

Corruption Perception Index, 2006

	Rank 1/	CPI Score 2/	Confidence range 3/	Surveys used 4/
Sri Lanka	84	3.1	2.7 - 3.5	6
Laos	111	2.6	2.0 - 3.1	4
Philippines	121	2.5	2.3 - 2.8	9
Indonesia	130	2.4	2.2 - 2.6	10
Papua New Guinea	130	2.4	2.3 - 2.6	4

Source: Transparency International, 2006.

1/ From 1 to 163 with first place being the best.

2/ Relates to perceptions of the degree of corruption as seen by business people and country analysts, and ranges between 10 (highly clean) and 0 (highly corrupt).

3/ Nominally, with 5 percent probability the score is above this range and with another 5 percent it is below. However, particularly when only few sources are available, an unbiased estimate of the mean coverage probability is lower than the nominal value of 90%.

4/ Twelve surveys and expert assessments were used and at least three were required for a country to be included in the CPI.

Governance Indicators: APD Resource-rich Low-income Countries 1/

	Lao P.D.R	Mongolia	Papua New Guinea	Timor-Leste	Vietnam	Asia average 2/
Country Policy and Institutional Assessment (CPIA)	3.5	2.5	1.5	n.a.	3.5	n.a.
Government effectiveness	-1.1	-0.4	-1.0	-1.0	-0.3	0.6
Rule of law	-1.1	-0.3	-0.9	-0.5	-0.4	0.3
Political stability	-0.3	0.9	-0.8	-0.7	0.3	-0.2

Sources: World Bank, Kaufmann, Kravay and Mastruzzi (2005).

1/ The World Bank Country Policy and Institutional Assessment rates eligible countries against 16 criteria grouped in four clusters: (a) economic management; (b) structural policies; (c) policies for social inclusion and equity; and (d) public sector management and institutions. Scores range from 1–6, with higher scores reflecting better performance. Other indicators range between ± 2.5 , with higher positive outcomes reflecting better outcomes. See www.worldbank.org.

2/ Coverage varies depending on data availability.

20. **Papua New Guinea suffers from infrastructure bottlenecks, even when compared to other low income countries.** Due to its mountainous terrain, most of the country is impassable, as evidenced by its low proportion of paved roads (less than 5 percent). Access to telecommunications is limited and unit costs are high. At the same time, Papua New Guinea also has low social indicators, indicating a weak knowledge infrastructure. Given the very high annual population growth rate, the country faces considerable challenges in education, especially to increase its school enrolment and retention ratios. In the health sector, a key challenge is to increase access to primary health care facilities, and to reduce the prevalence of communicable diseases.

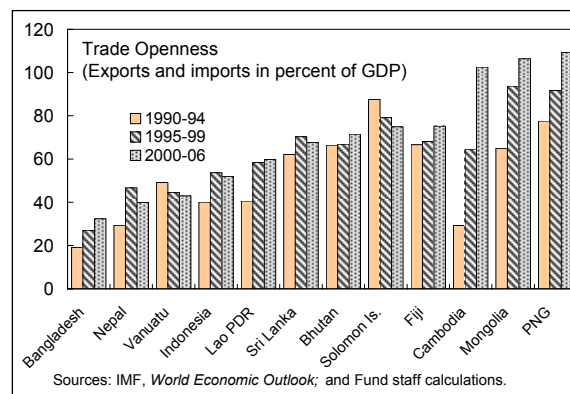
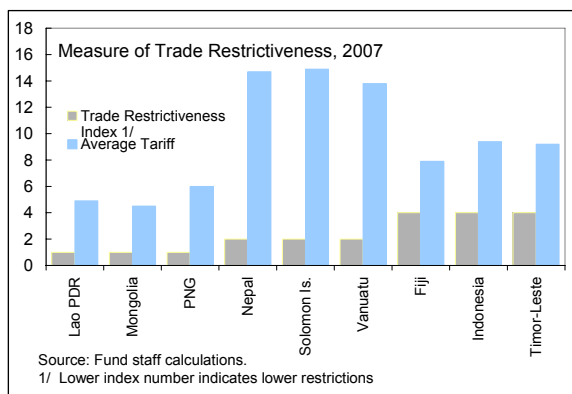
Indicators of human and physical capital: APD Resource-rich Low-income Countries						
	Lao P.D.R	Mongolia	Papua New Guinea	Timor-Leste	Vietnam	Asia average
Public infrastructure quality (most recent year)						
Paved roads (percent of total roads)	14.1	3.5	3.5	Poor	25.1	58.0
Water quality (percent of population with access)	30.0	59.0	44.0	36.0	61.0	58.3
Human capital quality Index						
Adult literacy rate (percent of ages 15 and over)	68.7	97.8	57.3	58.6	90.3	87.9
Life expectancy at birth (years)	55.1	64.5	55.7	56.0	70.8	72.1

Source: World Bank, World Development Indicators.

21. **Papua New Guinea's law and order problems and related security costs also have an adverse impact on the business environment.** In addition to direct costs of security, estimated at 3 percent of total business cost on average, there are indirect costs. Security concerns constrain the geographical area in which a company can operate. Overall labor costs are increased to compensate employees for the added personal insecurity, especially for imported labor. Security concerns also generally lead to reduced intensity of capital equipment usage as during certain hours, for example, at night. Finally, security issues occupy management's time, thereby reducing overall productivity.

22. **The lack of transferable land titles is considered another structural impediment, with about 97 percent of the land communally owned.** Arguments for land reform include: the traditional tenure system reduces the incentive for landholders to invest in their land since the cost of improvement is privately borne by the landholder while the benefits are socialized; the inability to use land as collateral makes it difficult for landholders to borrow money to finance new investments; and the lack of well-defined property rights over land can divert resources into activities focused on rent-seeking rather than wealth creation. Efforts to modernize land tenure by establishing a national land registry system have met with little success to date due to popular opposition, although there have been some successful individual ventures. For example, in some oil palm estates clearly demonstrable benefits (e.g., royalties, jobs, social services) have encouraged some tribes to lease their land, contributing to a considerable increase in the exports of palm oil.

23. **Given its high level of trade openness, Papua New Guinea appropriately maintains one of the least restrictive trade regimes in the region.** It fares well relative to comparator countries in terms of both the trade restrictiveness index as well as average import tariffs, which are little over 5 percent, following a recently completed tariff reform.¹¹ The government is currently conducting an overall review of its trade policy.



F. Conclusions and Policy Implications

24. **While Papua New Guinea has enjoyed strengthened export performance in recent years, the improvement mainly reflects the significant rise in world commodity prices as exports remain concentrated in the mining and petroleum sectors.** In volume terms, Papua New Guinea has seen a declining share in total global trade. Staff estimates indicate that the exchange rate is broadly in line with macroeconomic fundamentals at present. In contrast, comparisons of unit labor costs across countries suggest a cost competitiveness problem, though data availability limits a more thorough analysis and makes comparisons difficult. Available data also indicate a structural competitiveness problem.

25. **Given volatility and scarcity of resources in the mineral sector, sustained improvement requires enhanced productivity growth and resource reallocation to the nonmineral sector.** Foreign direct investment and domestic private investment are key to achieving the necessary economic transformation, but boosting investment will depend on the successful implementation of structural reforms aimed at improving the overall investment environment.

¹¹ There are four major ad valorem tariff rates (0, 15, 25, 40) and some additional specific tariff rates (such as 70 percent on sugar and 20 percent on mackerel).

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Technical Appendix

Johansen Vector Error Correction

In order to investigate the existence of a long-run, co-integrating, relationship between the real effective exchange rate and the variables discussed above, our study employs the Johansen (1995) maximum likelihood estimator, which corrects for autocorrelation and endogeneity parametrically using a vector error-correction mechanism (VECM) specification.¹²

The Johansen methodology can be described as follows. Define a vector:

$$X_t = [LREER, LTOT, RID, LYPC, OPEN, Kflow, FIS, DSR] \quad (3)$$

and assume that the vector has a VAR representation of the form:

$$x_t = \eta + \sum_{i=1}^p \Pi x_{t-i} + \varepsilon_t \quad (4)$$

where η is a $(n \times 1)$ vector of deterministic variables, p is the lag length, and ε is a $(n \times 1)$ vector of white noise disturbances, with mean zero and covariance matrix Ξ , and Π is a $(n \times n)$ matrix of coefficients. Express 3 may be reparameterized into the so-called vector error correction mechanism (VECM) as:

$$\Delta x_t = \eta + \sum_{i=1}^{p-1} \Phi \Delta x_{t-i} + \Pi x_{t-1} + \varepsilon_t \quad (5)$$

where Δ denotes the first difference operator, Φ is a $(n \times n)$ coefficient matrix $-\sum_{j=1+i}^p \Pi_j$, and

Π is a $(n \times n)$ matrix equal to $-\sum_{i=1}^p \Pi_i - I$ whose rank determines the number of co-integrating vectors. When specified in this VECM form, a vector autoregressive process has the advantage of providing information on both the long run relationships among the variables and their short run adjustment to such long run equilibrium relationships.

¹² There are alternative ways of addressing serial correlation and endogeneity in a co-integrating framework, such as Phillips and Hansen (1990).

- If Π is of full rank, n , or zero rank, $\Pi = 0$, no co-integration exists amongst the elements in long-run relationship (in these instances it would be appropriate to estimate the model in, respectively, levels or first differences).
- If, Π is of reduced rank, r (where $r < n$), then there exist $(n \times r)$ matrices α and β such that $\Pi = \alpha \beta'$, where β is the matrix whose columns are the linearly independent co-integrating vectors, and the α matrix is interpreted as the adjustment matrix, indicating the speed with which the system responds to last period's deviations from the co-integrating relationships.

Testing for co-integration therefore requires an estimate of the pie matrix $\Pi = \alpha \beta'$. In the Johansen's approach, this is achieved by estimating the pie matrix $\Pi = \alpha \beta'$ from the unrestricted VAR model, and then testing whether the restrictions imposed Π by the reduced rank of matrix can be rejected by the data.¹³ This is tested using two types of tests advocated by Johansen. The first is the trace statistic, which allows one to perform a log likelihood ratio (LR) test for the null hypothesis that there exist r co-integrating vectors against the alternative of co-integrating vectors (where is the number of endogenous variables in the VAR).

The second is the maximum eigenvalue ($\max - \lambda$) statistic. This is a log likelihood test that tests the null hypothesis that there is r co-integrating vectors against the alternative that there is co-integrating vectors. Asymptotic critical values for conducting these two tests have been provided by Johansen (1988), and also Osterwald-Lenum (1992).

An important advantage of the Johansen methodology in the current application is that the estimated coefficient—the p vector—can be used to prove a measure of the equilibrium real exchange rate and therefore a quantification of the gap between the prevailing real exchange rate and its equilibrium level. The methodology also derives estimates of the speed at which the real exchange rate converges to the equilibrium level.

¹³ (Eviews 5.0 Users Guide, p. 724.)

IV. Financial Sector Developments in Papua New Guinea¹

A. Introduction

1. **In recent years, Papua New Guinea's financial system has experienced rapid transformation helped by sustained economic recovery, low interest rates, and high commodity prices of key exports.** Following a period of severe economic and financial crisis in the late 1990s, the authorities began to introduce a significant reform of the financial system in 2000, including an increasingly prudent regulatory and supervisory regime, which has provided a viable environment for the financial sector to grow. This paper takes a snap shot look at the current status of the financial system, including its structure, the regulatory and supervisory framework, performance (using CAMEL approach), as well as the constraints and risks. In the last section, we conduct stress tests on the banking sector to assess its ability to absorb shocks. Finally, we discuss implication of our findings and areas of further reform.

B. Overview of the Financial Sector and Recent Developments

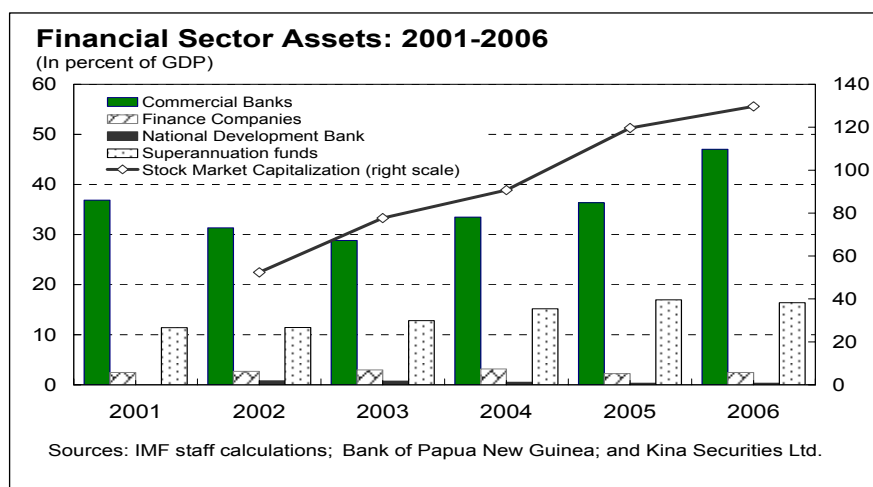
2. **Papua New Guinea's financial sector comprises four commercial banks, a number of finance companies, saving and loan institutions, superannuation funds, insurance companies, a government bond market and a stock exchange.**

3. **The banking system has four commercial banks** (Australia and New Zealand Bank, Bank South Pacific, Maybank, and Westpac Bank). The domestic bank (Bank South Pacific) is the largest bank accounting for over 50 percent of the banking system. Total assets of the banking system have grown from 36 percent of GDP in 2000 to 51 percent of GDP at end-June 2007. Bank concentration estimated by the Herfindahl index (defined as the sum of squares of the shares of banks) shows a figure of over 40 percent having risen from 25 percent in 2000 following consolidation of the banking system.² Papua New Guinea's banks occupy a large share of the financial system (70 percent). However, despite the banking sector's rapid growth in recent years, access to financial services remains poor, especially in rural areas. There is also a development bank (National Development Bank, formerly the Rural Development Bank) that lends with funds provided by the government.

¹ Prepared by Qaizar Hussain. This chapter is based on a presentation delivered at the Bank of Papua New Guinea in Port Moresby in November 2007 and benefits from comments received at that time.

² Bank South Pacific has about 40 branches in Papua New Guinea (along with a branch in Niue and newly acquired banks in Fiji and Solomon Islands). The Australian bank subsidiaries, Australia and New Zealand Bank and Westpac Bank, have 9 and 15 branches, respectively, and Maybank, a subsidiary of a Malaysian bank, operates 2 branches in Papua New Guinea (see Briggs, 2007). Along with the branches, the number of Automatic Teller Machines continues to grow rapidly.

4. **The nonbank sector has grown significantly.** The main institutions include ten licensed finance companies³ (including microfinance companies) and seven superannuation funds.⁴ The superannuation funds have enjoyed rapid growth following their restructuring in the early 2000s. At end-2006, total assets of these funds amounted to K2.8 billion (one fourth of total financial sector assets or 16 percent of GDP). The two largest funds, Nambawan Super (formerly Public Officers' Superannuation Fund (POSF)) at 56 percent and Nasfund at 31 percent share of the total, dominate the superannuation industry with 88,000 and 95,000 members, respectively. Prior to its reform in the early 2000s, POSF membership was restricted to government employees but is now opened to the private sector. There are also a number of small saving and loan institutions and insurance companies.

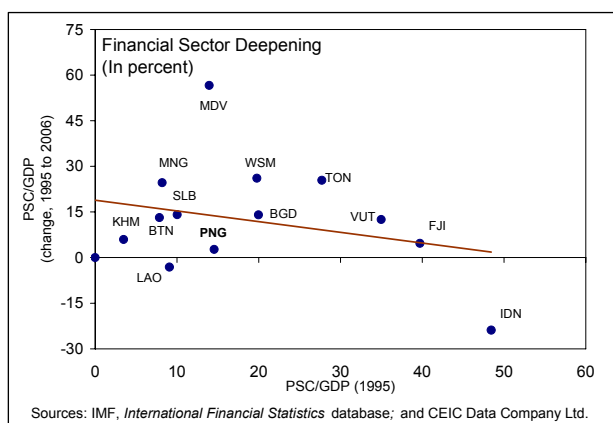


5. **The securities market comprises a large government primary bond market and a stock exchange.** The government bond market consists of short-term treasury bills and longer-term inscribed bonds (18 percent of GDP). Under the new government debt strategy, the short term instruments are being replaced by instruments with longer maturities in order to deepen the market. These securities are primarily held by commercial banks and other nonbanks. The Port Moresby Stock Exchange (POMSoX) is fairly thin having a share listing of only 14 companies⁵ which have relatively high shareholder concentration; however, market capitalization has jumped from 52 percent of GDP to almost 130 percent of GDP during 2002–06, and has continued to rise sharply in 2007 helped by a positive economic environment and high profits of mining companies. The corporate bond market is virtually nonexistent.

³ These financial institutions are restricted from issuing checkable deposits.

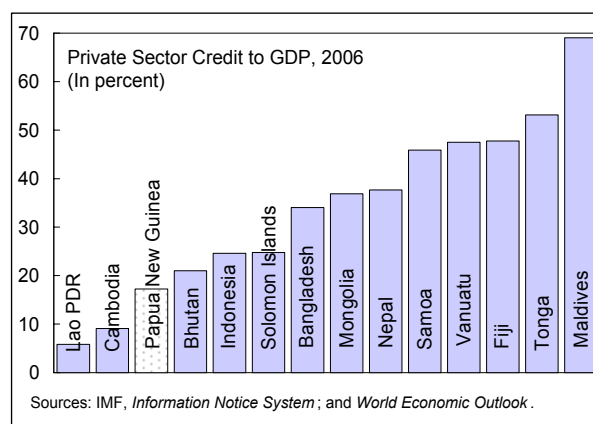
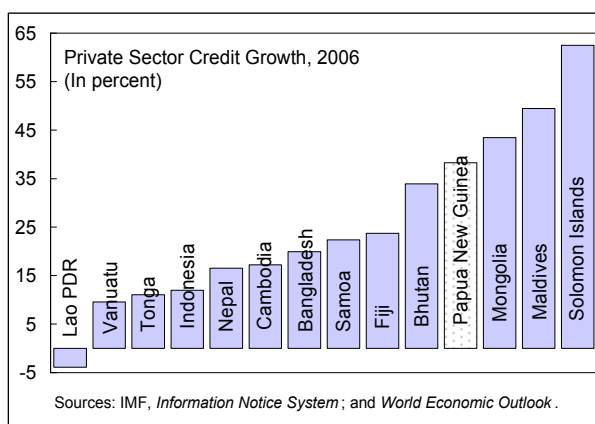
⁴ In a superannuation fund, members' entitlements are calculated by reference to the amounts standing in the members' individual accounts and not by reference to defined or guaranteed benefits. It provides for compulsory savings for retirement through mandatory and/or voluntary contributions by employees and employers.

⁵ Of the 14 companies, nine have home listings and five have dual listings. Companies comprise mainly mining and financial companies. In addition, there is one company having a debt listing.



6. **Despite rapid growth of the banking sector, financial sector depth is still low relative to comparator economies.** While private sector credit growth has been high recently in Papua New Guinea, the ratio of credit to GDP is still low. To further estimate financial deepening, we included a sample of comparator Asian economies to examine the relationship between the level of private sector credit to GDP and its change over the last decade. We find that the

degree of deepening in Papua New Guinea is low relative to comparators (ceteris paribus we would expect countries to fall along the negatively sloped line or countries with high level of private sector credit to GDP in 1995 to have slower private sector credit growth and vice versa).



C. Regulatory and Supervisory Framework

7. **Beginning in 2000, the authorities undertook a significant revamping of the regulatory framework.** The current framework now encompasses laws governing the central bank, commercial banks and finance institutions, saving and loans, superannuation funds, and life insurance companies that were new or reformed at that time. The most recent reform was in 2007 relating to the superannuation industry to improve and further strengthen the effectiveness of regulations and supervision.⁶ The financial sector's regulatory framework is transparent and is posted on Bank of Papua New Guinea (BPNG)'s website. Most institutions including the two largest superannuation funds disclose their financial results and are regularly audited as required by law. Papua New Guinea does not have an explicit deposit insurance

⁶ A key change was the requirement for compulsory superannuation coverage for companies to 15 from 20 employees while the change to also include noncitizens was delayed for a year.

system.⁷ New legislation has been passed by the parliament governing the newly-revived National Development Bank which aims to expand its activities into the microfinance sector with deposit-taking and lending to districts. However, the BPNG has not yet issued it a license for microfinance.

8. **The banks' supervisory framework is fully compliant with the 1988 Basel I Core Principles and efforts are being made to follow the Basel II recommendations.** The outstanding issues are primarily related to capacity building and the establishment of a comprehensive bank database. Commercial banks, finance institutions and superannuation funds are supervised once a year through on-site examinations. Off site supervision is conducted quarterly. Currently, there are plans to extend supervision to all insurance companies.

9. **Plans are underway to introduce a credit registration system for banks.** Currently, borrower credit information is shared only informally. The International Finance Corporation is assisting the BPNG in setting up a credit bureau, which the commercial banks welcome.

10. **The POMSoX rules and regulations closely follow the Australian stock exchange (ASX) model.** The stock market regulations are considered to be generally appropriate although oversight is being tightened. The 1997 parliamentary passage of the Securities Act and Company Act paved the way for establishing the legal framework governing the exchange, and in 1998 POMSoX was incorporated as a private company. While there is a concentration of large shareholders, small investors are permitted to purchase shares in listed companies.

11. **The liberalization of the capital account since 2005 has contributed to a conducive environment for financial sector growth.** A key innovation, since 2005, is the permission to allow nonresident companies (notably mining) to borrow from banks. Foreign exchange accounts by both residents and nonresidents are permitted. Short-term commercial credits with less than one month maturity are not actively regulated. Large financial institutions are taking increasing advantage of investment opportunities abroad, although improved domestic economic conditions could offset the anticipated outflows.

D. Performance of the Financial Sector

Capital Adequacy

12. **Backward looking indicators of capital adequacy are strong.** At end-June 2007, commercial banks' capital to risk weighted assets remained comfortable at 25 percent, against the prudential minimum requirement of 12 percent. This is significantly higher than the comparator Asian low income and small countries (LISC)⁸ where the average ratio was

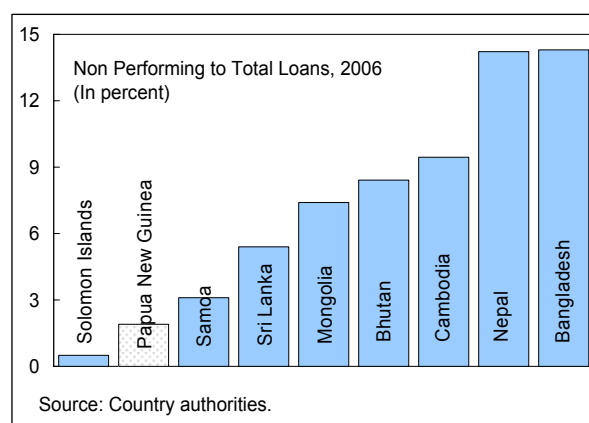
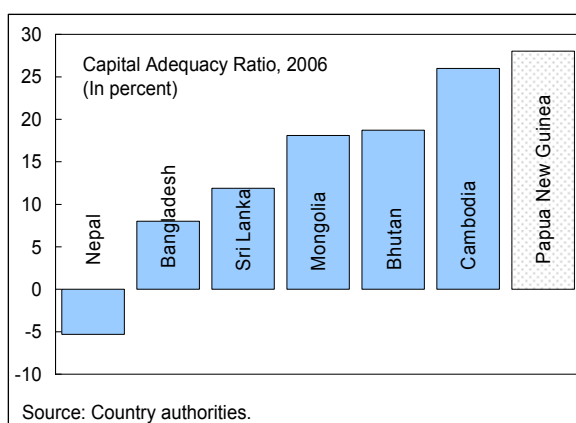
⁷ Like Papua New Guinea, Australia, New Zealand, and Singapore have implicit deposit insurance; by contrast, other neighbors such as Indonesia, Malaysia, and Thailand have explicit deposit insurance.

⁸ The sample includes Bangladesh, Bhutan, Brunei Darussalam, Cambodia, Fiji, Kiribati, Lao P.D.R., Maldives,

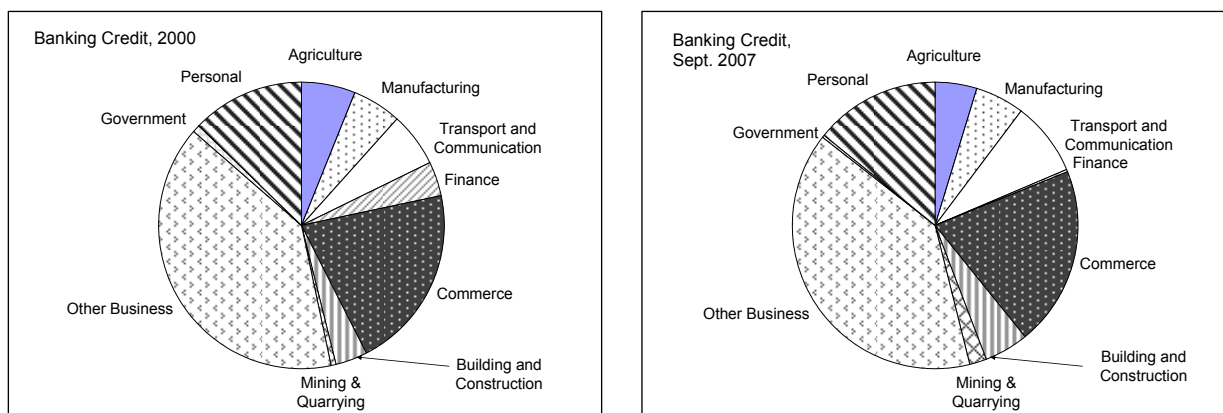
18.3 percent at end-2006, and also higher than selected countries shown in the figure below. At the same time, latest data for Tier 1 capital to risk weighted assets in the Papua New Guinea banking system also shows a comfortable level (16.8 percent in June 2007) against the prudential requirement of 8 percent.

Asset Quality

13. **Commercial banks' asset quality is reasonably sound.** Banks hold about a third of their portfolio in government securities, and have a preference for short-term instruments. In terms of lending quality, the ratio of nonperforming loans to total loans declined significantly from 16.9 percent to 1.8 percent from 2000 to 2007; comparatively, selected Asian countries had higher average ratios, including those that have also seen rapid rates of credit growth in recent years. At the same time, both Papua New Guinean banks and finance companies have maintained high provisioning ratios of loans losses relative to their NPLs.



14. **Personal and commerce sectors comprise an important share of bank credit, while building and construction, and transport and communication have grown.** Outstanding advances to mining and quarrying had also grown significantly over the past year (likely associated with the 2005 liberalization of lending to nonresident companies and increased mining activity) but fell substantially in September 2007.



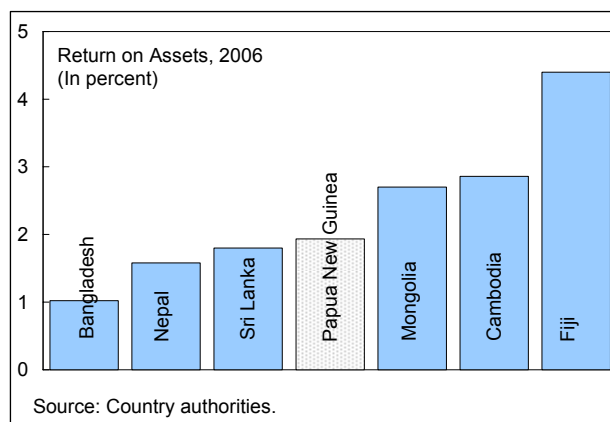
15. **While asset quality in terms of total assets is generally not yet of concern, certain underlying trends over the past year could be noted which may stretch supervisory capacity.** Banks' zero risk assets to total risk-weighted assets fell from 53 percent to 48 percent in June 2007 (y/y), while the share of 50 percent risk-weighted assets rose from 4 percent to 13 percent. Also, the stock of NPLs and past due loans have started to rise from negative growth in past years, although they are stable in relation to total loans. The NPLs of the National Development Bank have been reported to be around 100 percent on "old" and 20 percent on "new" loans.

16. **At the same time, the overall banking system's large borrower exposure is considered high.** In particular, the exposure of the 25 largest borrowers against banking system's total prudential capital base was about 100 percent in June 2007, although individual borrower exposures have not been high.

17. **The rapid expansion of the superannuation funds so far does not seem to have an adverse effect on asset quality.** While Nasfund and Nambawan Super have invested in the domestic equity and property markets, they have also expanded overseas investments to diversify their portfolio and now earn higher returns in both fixed income assets as well as equities (total international investments for the two funds accounted for 23.0 percent and 17.4 percent, respectively in 2006). Over the past few years, both funds have also enjoyed rapid asset growth.

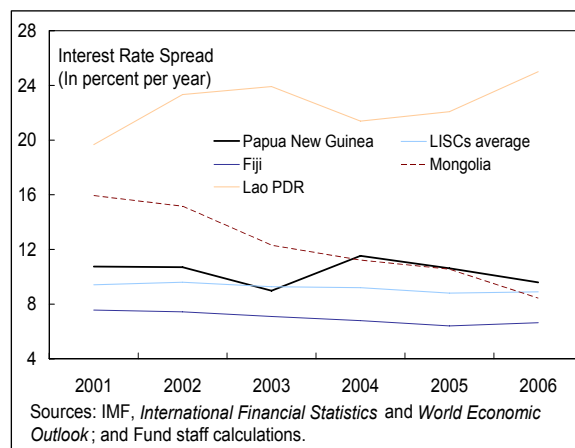
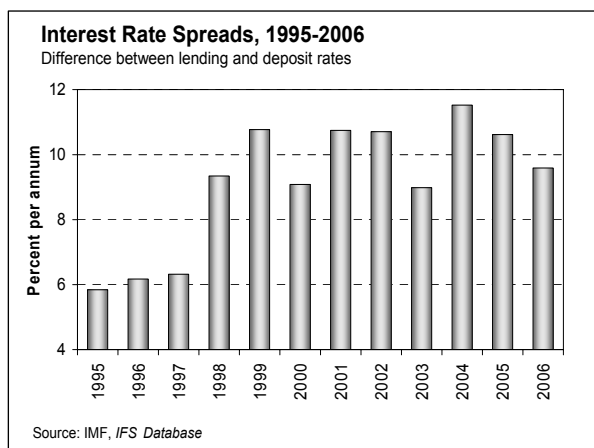
Management Quality and Conduct

18. **The return on assets, which measures the ability of management to utilize real and financial resources of a bank to generate returns, rose from 1.2 percent to 2.8 percent during 2000–07.** The figure below shows Papua New Guinea's return on assets relative to comparator Asian countries. Management accountability in key financial institutions is evidenced by the regular publication of financial reports and company information posted on their respective websites for the benefit of shareholders and customers.



Interest Rate Structure and Earnings Performance

19. **Interest rate spreads (lending minus deposit rates) have declined in recent years** (see figures below). Spreads were as high as 11 percent before easing to a still high 9.6 percent in 2006, likely reflecting macroeconomic uncertainty, high administrative costs of banks in rural areas, limited bank competition, and low incentive to attract deposits given banks' relative preference to hold government paper in light of limited investment opportunities. While Papua New Guinea's nominal lending rates in 2006 (10.6 percent) were lower than the LISC average (14.0 percent), real lending rates were comparable (7.0 percent). In comparison to U.S., Australia, and Indonesia, real lending rates are higher in Papua New Guinea, although they have declined over the years in part due to lower inflation.



20. **Both banks and superannuation funds have enjoyed high profitability in recent years.** As the return on assets rose, the return on equity also increased from 21.7 percent to 38.9 percent over the same period. By contrast, low income and small Asian countries on average show an equivalent return on assets (3.0 percent), but a lower return on equity

(29.5 percent) as of 2006. The largest superannuation funds, Nambawan Super and Nasfund, enjoyed high net after tax return (16 and 10 percent, respectively in 2006).

Liquidity

21. **Liquidity in the financial system is high, constituting large holdings of government paper.** Commercial banks' liquidity (average liquid assets to total deposits) rose from 54 percent in 2002 to around 75 percent in 2007—significantly higher than the average for low income and small Asian countries (27 percent).

Efficiency

22. **Banks have been generating strong profits and dividends resulting from a favorable economic environment and high commodity prices, but also due to their ability to control expenses.** The “efficiency ratio” measured by noninterest expenses to gross income is around 40 percent and average gross income per employee (K274,000) for the banking system is significantly greater than per employee costs (K41,000).

Papua New Guinea: Banking System Financial Soundness Indicators, 2006

(in percent)

Indicator	All banks
Regulatory capital to risk-weighted assets	24.8
Tier1 capital to risk-weighted assets	17.9
Nonperforming loans (NPLs) to total loans (both net of accrued interest on NPLs)	1.8
Nonperforming loans (net of provisions and accrued interest) to regulatory capital	1.7
Loan loss provisions to nonperforming loans (net of accrued interest)	73.6
Return (before tax) on assets	6.9
Return (before tax) on equity	60.1
Interest margin to gross income	45.8
Noninterest expenses to gross income	39.0
Foreign exchange gains/losses to gross income	39.5
Total operating expenses over average assets	4.4
Average interest rate paid on interest-bearing liabilities	-1.5
Average interest rate received on interest-earning assets	7.2
Gross income per employee (thousand domestic currency units)	273.9
Staff expenses per employee (thousand domestic currency units)	40.5
Share of foreign-currency deposits in total deposits	7.9
Ratio of net loans to total deposits	37.0
Liquidity ratio	75.9

Source: Estimates based on annual reports of banks and data provided by the central bank.

23. **The thin securities markets limit financial deepening.** Stock market capitalization (at over 100 percent of GDP) is amongst the highest as compared to the group of low income

and small Asian countries (15 percent of GDP), helped by dual listing of several companies on both the Papua New Guinea and foreign stock exchanges (mainly Australia). However, at the same time, comparatively, there are fewer companies and the annual market turnover is relatively low (0.5 percent of GDP vs. 1.6 percent of GDP for sample of LISC countries). At present, there are only two brokers and relatively high shareholder concentration. The thin stock exchange potentially could limit the ability of firms (especially in the nonmineral sector) to secure equity financing, hence further increasing their reliance on banks. As regards other markets, there is only a primary government securities market with financial institutions holding about 85 percent of these securities.

E. Constraints, Vulnerabilities, and Risks

24. **Papua New Guinea ranks relatively low in a global ranking of “getting credit” (115 out of 175 countries)**, according to the latest World Bank’s Doing Business survey. Focusing on the sub-categories, the “legal rights” index performs equally well relative to the region, while given an absence of a credit registry in Papua New Guinea, the “credit information index” (representing the access and quality of credit information available through public registries or private bureaus) receives a 0 rating out of a possible 6 (with a 2 rating for South Asia and East Asia/Pacific region). At the same time, Papua New Guinea also ranks relatively low in the categories of “enforcing contracts” (162) and “closing a business” (97).

Doing Business: Papua New Guinea and Comparators 1/

	Overall Ease	Protecting Investors	Enforcing Contracts	Closing a Business	Getting Credit
Papua New Guinea	84	33	162	97	115
East Asia and Pacific 2/	77	77	86	98	99
South Asia 2/	107	70	132	113	102

Source: World Bank, Doing Business Indicators, 2008.

1/ Economics are ranked on their ease of doing business, from 1–178, with first place being the best.

2/ Simple average of countries in the region.

**Doing Business—Getting Credit Sub-indices:
Papua New Guinea and Comparators**

	Legal Rights Index 1/	Credit Information Index 1/	Public Registry Coverage (% of adults)	Private Bureau Coverage (% of adults)
Papua New Guinea	5.0	0.0	0.0	0.0
East Asia and Pacific	4.5	1.9	5.5	10.8
South Asia	3.9	1.9	0.7	1.9

Source: World Bank, Doing Business Indicators, 2008.

1/ Higher score the better. Legal Rights Index has a score from 0–10 and Credit Information Index from 0–6.

25. **The scope for financial deepening is also constrained by weak corporate insolvency and debt recovery procedures** (see Appendix Table I, lines 1–20).⁹ These procedures include formal and informal rules for enforcement of debt contracts, bankruptcy liquidation, and the rehabilitation of distressed firms. We note that while the procedures for acquiring collateral are comparable to sample countries, the process of collateral enforcement is weaker. More generally, a high degree of communal land ownership (about 97 percent of all land) and less liquid asset markets could be constraining the ability of lending institutions to secure and especially enforce collateral requirements. Given weaknesses in formal debt recovery procedures, informal procedures could be preferred (e.g., lines 11–14). More positively, the judicial processes for debt recovery (lines 17–20) appear to be relatively more efficient in Papua New Guinea compared with most sample countries including Bangladesh and Indonesia.

⁹ We obtained an assessment of processes for debt recovery from a banking expert in Papua New Guinea during the 2007 Article IV mission. The table compares Papua New Guinea with several low and middle income countries in the region reported in previous studies (Hussain and Wihlborg, 1999 and Hussain, 2002). The country wide comparisons should be treated with caution since we used different time periods, and procedures would be expected to improve over time. Also, there is a risk that each individual country survey could employ a different “scale” for evaluation.

Box. What are Stress Tests?

Stress tests are analytical techniques for quantifying the vulnerability of banks' portfolio to exceptional but plausible changes in the macro environment.¹ Under the stress tests, the effect of shocks on banks' soundness is measured by their impact on banks' regulatory capital to risk-weighted assets.

Credit risk stress tests quantify the effect on banks' soundness of deterioration in the average asset quality of their portfolios. The deterioration of asset quality has both a repricing and a net income effect on banks' regulatory capital. The following credit risk tests were applied: (i) increase in nonperforming loans: The nonperforming loans approach involves reclassification of existing current loans to nonperforming, with corresponding increases in the level of specific provisions and a decrease in the level of general provisions; (ii) large exposures to borrowers: The stress test on banks' large exposures to borrowers is a specific parameterization of the credit risk stress test based on the nonperforming loans approach. It involves the reclassification of all loans to each bank's largest borrowers (assumed to be current prior to the stress test) to nonperforming, with corresponding increases in the level of specific provisions and a decrease in the level of general provisions; and (iii) increased provisioning approach on existing NPLs: The provisioning approach involves the reclassification of existing nonperforming loans into categories indicating a higher degree of impairment. A corresponding increase in the level of specific provisions would need to be set aside by banks to cover the upwardly revised expectations of losses. Finally, we also performed a test for migration of risk-weighted assets from low risk to high-risk weights.

Interest rate risk is estimated using the duration model, which measures the impact of interest rate changes only on the price of securities held by banks. Duration can be defined as the weighted average time to maturity, using the present value of cash flows as weights. In Papua New Guinea, banks hold government securities only sold in the primary market.

1/ The above information borrows heavily from "Stress Test Toolkit," Plamen Iossifov (IMF), 2007. Also see "Introduction to Applied Stress Testing," Martin Cihak (IMF Working Paper WP/07/59).

Stress Tests for Papua New Guinea Banking System

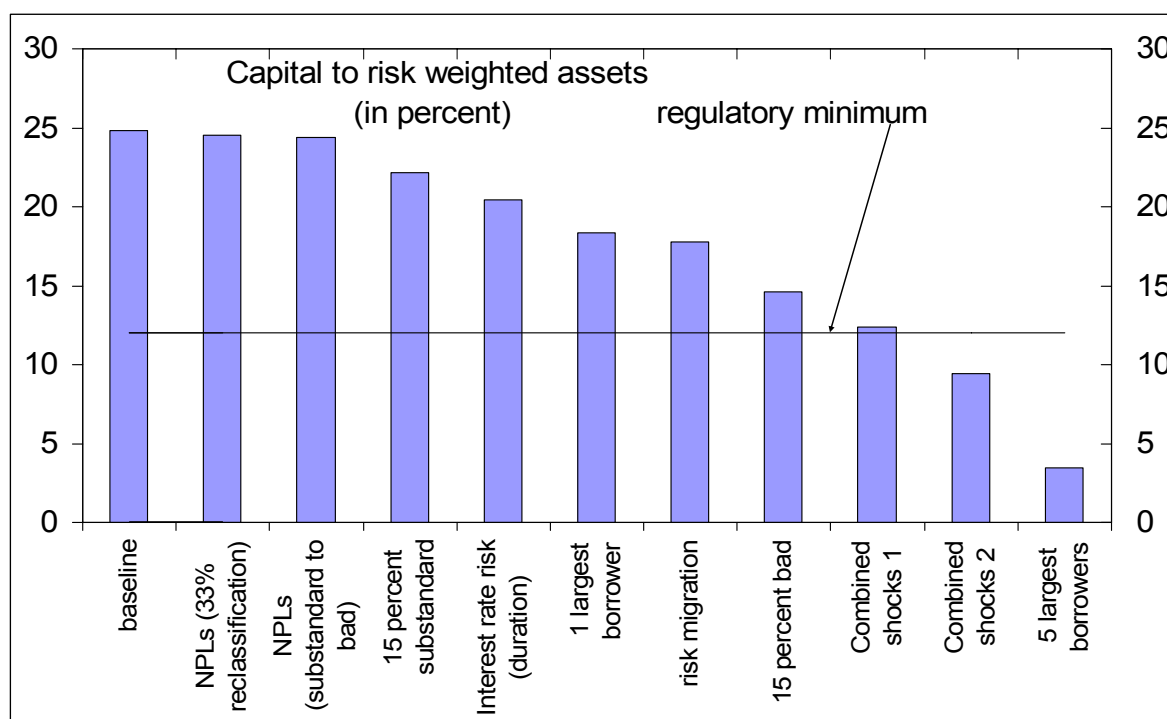
26. **In order to examine the vulnerability of the banking sector, stress tests were performed.** Our analysis uses the 2006 audited annual reports of the four commercial banks as well as end-2006 banks' financial statements provided by BPNG. The sensitivity analysis replicates plausible scenarios from the late 1990s Papua New Guinea economic and financial crisis as well as aspects of the 1997 Asian crisis that include a rise in the share of nonperforming loans to total loans to 15–20 percent and a near doubling of interest rates. Looking forward, these events could arise in an environment of weak domestic policies and rapid decline in commodity prices. The main focus of the analysis is on (i) credit and borrower concentration risk; (ii) risk arising from migration of assets from low to high risk-weight groups; and (iii) interest rate risk. Foreign exchange risk is not analyzed since we do not have

sufficient individual bank data on foreign exchange (FX) assets and FX liabilities. From the aggregate data that is available on banks, it appears that the risk is not high at present (FX deposits comprise only 8–10 percent of total deposits and FX loans constitute around 6–10 percent of total loans). Moreover, liquidity risk does not seem to be a concern at present since the liquid assets to total deposits were 76 percent in 2006.

27. Individual stress test analysis shows that the banking system is resilient to moderate shocks:¹⁰ (i) Starting with baseline capital asset ratio of 24.8 percent (regulatory minimum is 12 percent), the reclassification of *existing NPLs* indicating a higher degree of impairment for each NPL category¹¹ (i.e., 33 percent in each category) only shows a marginal decline in the capital asset ratio; (ii) The capital asset ratio falls to 22.1 percent under the condition that all *existing NPLs* shift from substandard to bad; (iii) While the current NPLs to total loans is low at the present time, the deterioration of loans so that 15 percent of *current loans* become substandard NPLs reduces the capital to risk weighted assets ratio to 22.2 percent. This scenario is similar to the events that marked the 1997 Asian crisis (see Hussain and Wihlborg, 1999) and the late 1990s Papua New Guinea crisis; (iv) The interest rate risk test (duration test) for a doubling of interest rates (as in the Papua New Guinea crisis) reduces the ratio to 20.4 percent; (v) The stress tests indicate that the risk from large borrower exposure is high. The loss of the single largest borrower of each bank reduces capital adequacy ratios to 18.3 percent; (vi) The test for migration of assets from low to high risk weights (by 25 percent) reduces the capital asset ratio to 17.7 percent; (vii) In the case that 15 percent of *current loans* become “loss” or bad loans (delinquent for more than 360 days), the capital asset ratio declines to 14.6 percent; and (viii) An extreme crisis scenario involving the loss of each bank’s five largest borrowers almost exhausts the capital of the banking system.

¹⁰ The discussion for individual stress tests in this paragraph corresponds to declining capital assets ratios in the figure below (from left to right).

¹¹ According to Papua New Guinea’s prudential standards, loans are classified as (i) pass, or acceptable; (ii) special mention (past due for 60–90 days); (iii) substandard (past due for 90–180 days); (iv) doubtful (past due for 180–360 days); and (v) loss (past due for more than 360 days).



28. **The integrated approach using “scenario” analysis combining some of the above individual tests shows a greater degree of vulnerability in the banking system.** We examined two combined shock scenarios (see figure above); (ix) ***Combined shocks 1:*** 15 percent of current loans become substandard, doubling of interest rates, and migration of assets from low to high risk weights (by 25 percent) reduces the capital adequacy ratio to 12.4 percent (to the required regulatory minimum); and (x) ***Combined shocks 2:*** loss of the largest borrower, doubling of interest rates, and migration of assets from low to high risk weights (by 25 percent) leads to a deterioration of capital adequacy ratio to 9.4 percent (below the required regulatory minimum). Although not included in the figure, the extreme scenario, which involves the loss of the five largest borrowers in each bank, along with the interest rate and migration risk, completely exhausts the banking system capital.

F. Conclusions and Implications

29. **The backward looking soundness indicators show that the financial system is sound.** However, stress test analysis finds that while the system can absorb moderate shocks, a combination of shocks brought about by weak macro policies and an unfavorable external environment (with declining commodity prices) could add significant vulnerability. Our examination of the financial system illustrates that financial deepening is still low despite high credit growth in recent years. Looking forward, continued high credit growth and growing international investment opportunities for financial institutions requires that these institutions strengthen their internal risk management systems in addition to improved supervision by the authorities. In this regard, the authorities are appropriately considering the establishment of a credit bureau. The authorities should also ensure that due diligence and fit and proper criteria

are applied for all new applicants for licenses, including for the Development Bank. Moreover, prudent macroeconomic policies are the only means of averting financial crisis given past experiences of Papua New Guinea and other countries. In order to enhance financial deepening, the authorities should reduce structural rigidities in the system, including improved rules for collateral and procedures for insolvency and debt recovery, and further develop the securities markets. In this regard, a Financial Sector Assessment Program (FSAP) conducted jointly by the IMF and World Bank could be useful to provide an assessment of recent developments and recommendations for the way forward.

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Appendix Table I. Summary Evaluation of Processes for Debt Recovery

	Papua New Guinea	Bangladesh	Indonesia	Korea	Malaysia	Philippines	Taiwan Province of China	Thailand
	1 = low cost (or not expensive), easy, very efficient, quick; 3 = very expensive, very difficult, inefficient and very slow							
1. Process for acquiring security (collateral) over land	1.50	3.00	2.75	1.25	1.25	1.50	1.50	1.50
2. Process for acquiring security over other property	1.50	2.55	2.75	1.25	1.25	1.50	1.50	1.50
3. Process for enforcement of security over land	2.50	3.00	3.00	1.25	1.25	2.00	1.75	1.25
4. Process for enforcement of security over other property	2.00	2.50	2.50	1.25	1.25	2.00	1.50	1.75
5. Process for debt collection	2.50	2.75	2.50	1.25	1.25	3.00	2.00	1.50
6. Process for winding up insolvent corporation	2.00	3.00	2.50	1.25	2.00	3.00	2.00	1.50
7. Process for reorganization/restructuring	2.50	3.00	2.50	1.75	2.00	2.25	2.25	1.50
8. Time for winding up	6-12 months	7-8 months	4-6 months	6-12 months	6-12 months	>6 months	>6 months	>6 months
9. Time for formal reorganization	6-12 months	7-8 months	12-18 months	2-4 months	8-12 months	>18 months	8-12 months	>18 months (since 98)
10. Time for informal workout	6-12 months	7-8 months	4-8 months	2-4 months	2-4 months	12-18 months	12-18 months	>18 months
11. Incidence of bankruptcy/liquidation	Low	Very low	Very low	Low	High	N/A	Very low	Low
12. Incidence of reorganization/restructuring	Low	N/A	N/A	High	High	N/A	Very low	Very low (since 98)
Workouts preferred because:								
13. Bankruptcy procedures are a real alternative	Not really	No	Adverse effect	Government encourages workout	Yes	No	No	Yes
14. Better outcome than under formal procedures	In most cases	No	No	No, for secured creditors	Yes	No	Yes	No
Predictability of positive outcome of:	1 = very high 5 = very low							
15. Process for security enforcement; land	3.00	5.00	5.00	2.00	2.00	2.00	2.00	2.00
16. Process for security enforcement; other than land	3.00	4.50	5.00	4.00	2.00	2.00	1.00	3.00
17. Judicial handling of security enforcement	3.00	5.00	5.00	3.00	2.00	3.00	2.00	2.00
18. Judicial handling of debt collection	2.00	5.00	5.00	3.00	2.00	3.00	1.00	2.00
19. Judicial handling of bankruptcy/liquidation	3.50	5.00	5.00	4.00	2.00	4.00	5.00	4.00
20. Judicial handling of rehabilitation	3.50	5.00	5.00	4.00	3.00	4.00	5.00	5.00

Sources: Asian Development Bank, Local Study of Insolvency Law Regimes (1998) for Asian economies prior to the crisis (Hussain and Wihlborg, 1999); banking expert in Bangladesh (2001); and banking expert in Papua New Guinea (2007).

V. Tax Summary 2008¹

A. Direct Taxation

Taxation of Individuals

1. **The tax year coincides with the calendar year. Residence is defined as physical presence in Papua New Guinea (PNG) for more than six months out of a given tax year.** Resident individuals are taxed on global income from all sources, subject to double-taxation treaties. Nonresident individuals are liable for tax only on income derived from PNG sources. The maximum number of dependents for whom a tax rebate may be claimed was reduced from four to three in the 2004 Budget.
2. **There are two separate types of assessment:** (i) a fortnightly salary or wages tax assessment; and (ii) an annual non-salary or wages income assessment. Expenses of earning income are fully deductible, and there are no capital gains or gift taxes. The tax rates on assessed income are shown in Table IV.1.

Table IV.1. Individual Resident Income Tax Rates From 1 January 2008

Income Bracket	Marginal Tax Rate (Percent)
Below K7,000	0
K7,001 to K18,000	22
K18,001 to K33,000	30
K33,001 to K70,000	35
K70,001 to K250,000	40
Above K250,000	42

Taxation of Companies

3. **Tax years generally correspond to calendar years, unless there is a sufficient reason to deviate from that rule** (e.g., if the parent company has a different tax year). A company is considered resident for tax purposes if it is incorporated in PNG, has its management in PNG, or is controlled by PNG residents. A resident company is taxed on its global income from all sources. Nonresident companies pay tax only on PNG sourced income.
4. **The general company tax rate is 30 percent, except for authorized superannuation funds**, for which the applicable rate is 25 percent. Taxable income generally corresponds to accounting income. Company income tax is payable as advanced payment tax (APT), so that companies pay tax on the current year's income. Advanced payment tax is payable in three equal installments on the last business day of April, July, and October each year. Business losses can be carried over for up to 20 years; they cannot be carried back.

¹ The information to this annex has been provided by the authorities of Papua New Guinea. For additional information see the Internal Revenue Commission website: <http://www.irc.gov.pg/index.htm>

5. **Special Temporary Rates for Agriculture and Tourism** apply. The 2004 Budget introduced a 20 percent tax rate would apply for 10 years to agricultural projects with an investment of K5 million or more commencing between 1 January 2004 and 31 December 2006. The 2006 Budget extended the eligibility period for this temporary concessional tax rate from **31 December 2006 to 31 December 2011**. The 2006 Budget also reduced the amount needed to be invested to qualify from K5 million to K1 million. The 2007 Budget introduced a temporary concessional tax rate of 20 percent for 10 years from the date of operation and the availability of infrastructure tax credits for an indefinite period but limited in amount to 1.5 percent of gross income in each year and to the income tax liability for large scale tourist accommodation facilities involving investment of US \$10 million or more where construction commences within five years from 1 January 2007 and the resulting facility has at least 150 guest rooms.

6. **Other assistance measures for tourism and agriculture have been introduced since 2005, including** a double deduction for export market development costs for tourism operators and accelerated depreciation for capital expenditure. These concessions were expanded in 2007. A double deduction for staff training costs was introduced. The depreciation allowable for the first year was increased to 55 percent in 2007. The purchase by foreign tourists of travel and accommodation in PNG while outside the country will be exempt from GST from 1 January 2007. A 150 percent tax deduction for research and development and agricultural extension services, was introduced in the 2004 Budget. The level of infrastructure tax credits available to agriculture was increased from 0.5 percent of assessable income to 0.75 percent of assessable income in 2005. This was further increased to 1.5 percent of assessable income in 2006.

7. **Dividend withholding tax** of 17 percent is applicable to all dividends paid by resident companies and received by resident companies from sources outside of Papua New Guinea. Dividend withholding tax on dividends paid to nonresidents, resident individuals and resident trust estate is a final tax. While the standard rate of dividend withholding tax on dividends paid to nonresidents is 17 percent, under some of PNG's bilateral double tax treaties, a lower rate is prescribed. A DWT of 10 percent applies to dividends from mining companies. Dividends from petroleum and gas operations are not subject to DWT.

8. **Interest withholding tax** of 15 percent was introduced in 1999. Interest withholding tax on interest paid to nonresidents is a final tax. Interest paid by mining and petroleum companies to nonresident financial institutions is exempt.

Taxation of Mining and Petroleum Companies

9. **Mining and petroleum companies are subject to different rates of taxation than non-resource companies** as summarized in Table IV.2. Corporate income tax for mining companies is payable as APT, as for non-resource companies. At the beginning of each year, the Internal Revenue Commission (IRC) assesses the APT estimate lodged by the tax payer and issues an APT assessment to the mining company. The company then pays this assessment

(in Kina) to the BPNG account at the Federal Reserve Bank in New York in three equal installments in April, July, and October. Any differences between the APT assessment and final income tax assessment (also known as wash-up) for mining companies are requested to be paid in U.S. dollars. The payment mechanism of corporate income tax for petroleum companies is same as for mining companies, except that APT lodgment, assessment and payment are all made in U.S. dollars. Any differences between the APT assessment and final income tax assessment or “wash-up” for petroleum companies are requested to be paid in U.S. dollars.

10. Business losses can be carried over indefinitely.

Table IV.2. Taxation Rates of Petroleum, Gas and Mining Companies

	Mining Companies	Gas Companies	Petroleum Companies
Income tax	30 percent (applicable for resident companies only)*	30 percent	Operations that began before 2001: 50 percent Operations that arise from a prospecting license granted between 2003 and 2007 and developed before 2018: 30 percent Operations not included above: 45 percent: 50 percent
Dividend withholding tax	10 percent	None	None
Mining levy	Mining levy to be reduced by 5 percentage points every year until it expires in 2008	None	None
Royalties	2 percent on the f.o.b. sales	2 percent on gross revenues from gas sales	2 percent on gross revenues from petroleum sales

**Rate for nonresident mining companies is 40 percent, no distinction between resident and nonresident companies for petroleum and gas companies.*

Other Provisions for the Mining and Petroleum Sectors

11. A mining levy was introduced in July 1999 to capture the windfall gain of the mining industry from the introduction of the VAT, which resulted from the zero-rating of their exports in conjunction with the removal of the 11 percent basic import duty for all sectors of the economy. In 2002 the government commenced phasing out the mining levy over a

four-year period, intending to reduce it by one-fourth of the original amount every year. However, phase out of the mining levy was temporarily suspended in 2003. In 2004 the government reinstituted the phase out at the rate of 5 percentage points, and an additional 5 percentage points per annum every year thereafter, with the phase out to be complete by 2008. However, some payments for previous years assessments are expected to be received in 2008.

12. **To promote new petroleum projects, the rate of corporate income tax was reduced from 50 percent to 45 percent and then effectively to 30 percent for petroleum projects.** The reduced rate does not apply to projects that existed at the time of reduction in January 2001. The government has also introduced special fiscal incentives for Petroleum Prospecting Licenses issued before January 1, 2008, which convert to Petroleum Development Licenses before January 1, 2018. This practically entitles all petroleum projects that commence operation between 2003–17 to a reduced petroleum corporate tax rate of 30 percent for the life of the project. The reduced corporate income tax rate is aimed at providing incentives for new petroleum exploration.

13. **Additional profit taxes**, which were applied to mining and petroleum company income that exceeded an internal rate of return of at least 20 percent, have been abolished for mining and petroleum projects but not gas ones such as the prospective Gas to Australia project.

14. **A national resource tax is imposed by the national government** but paid to provincial governments and landowners as a royalty of 2 percent of the net value of output from mining, petroleum and gas projects.

15. **Resource companies are allowed a full credit for the cost of approved infrastructure developments that they undertake for the benefit of communities.** This Infrastructure Tax Credit (ITC) applies to the region in which they operate or elsewhere. The deduction is limited to the lesser of 0.75 percent (reduced from 2 percent from Jan 2001) of assessable income or tax payable for the year.

Taxation of Superannuation Funds

16. **All companies employing 20 or more persons are required to provide superannuation for their employees.** Employee contributions are deducted from gross basic salary at a minimum rate of 5 percent, while the employer contributes 7 percent of the employees' gross salary. Civil servants contribute to the Public Officers Superannuation Fund, where contribution rates of 6 percent for the employee and 8.4 percent for the employer apply.

17. **Superannuation funds are subject to income tax.** The corporate income tax rate for authorized superannuation funds was reduced from 30 percent to 25 percent in 2004. This is expected to increase domestic savings, and boost member returns and benefits over time. To further encourage savings, the government also introduced concessional taxation arrangements in 2004, allowing the retention of funds in the newly established Retirement Savings Accounts

(RSAs) up to a maximum of K 100,000. Under the new arrangement, employees exiting a superannuation fund can voluntarily transfer their savings to RSAs. These savings can be drawn down on a periodic basis free of income tax, providing an income stream in retirement. Draw-down rules limit the rate at which monies can be withdrawn in order to protect savings from dissipation. The earnings of RSAs are also free from income tax, subject to the maximum draw-down rules.

18. **The 2004 Budget also introduced concessional tax rates for employer contributions and fund earnings at the benefit stage** in accordance with Table IV.3. Previously, only employees who have been with a fund for more than 15 years benefited from the concessional tax rate of 2 percent.

Table IV.3. Tax Rates Applying to Superannuation Earnings

Years of contribution	Marginal tax rate (percent)
Less than 5 years	Income tax rates as shown in Table IV.1
At least 5 years but less than 10 years	15 percent
At least 10 years but less than 15 years	8 percent
15 years or more	2 percent

B. Indirect Taxation

Goods and Services Tax

19. **The goods and services tax (GST) has a uniform tax rate of 10 percent on the price of goods sold by a business, with zero-rated exports, including for the mining and petroleum sectors.** Exempted goods and services are mainly medical services, financial services, education services and supplies, fine metals and public transportation fees. GST is levied on all imported goods, with the exception of imports by aid donors and diplomatic missions and for the mining and petroleum sectors. All businesses with an expected turnover in excess of K 100,000 must register for GST. Registration for other businesses is voluntary.

20. **From 2004, inland GST collections (net of refunds) are distributed between national government and provinces on the basis of 40 percent to the national government and 60 percent to provincial governments.**² Each provincial share of the net inland collection is calculated in accordance with the formula set out in the GST Revenue Distribution Act. Up until 31 December 2006 these distributions were based on an estimate of the revenue to be received in the year. For 2007 and future years the distribution will be based on the actual net revenue received two years previously, provided the distribution is no less than the actual distribution to a province in 2006.

² Except for Bougainville where the distribution is on the basis of 70 percent to the national government and 30 percent to the province.

Excise Taxes

21. **Excise taxes are applied to alcoholic beverages (beer, wine, and spirits), cigarettes, other manufactured tobacco products, and fuels.** Since the 1999 tax and tariff reform, excise taxes also apply to a few products that were previously protected by high tariffs, such as motor vehicles and audio-visual electronic equipment. The excise rates for alcohol and tobacco products were indexed by 4 percent every six months from May 1, 2003. However, the 2004 Budget froze the indexation for 12 months until November 31, 2004. From December 1, 2004, the excise indexation for alcohol and tobacco products resumed at 2.5 percent. From December 1, 2005, the excise indexation for alcohol and tobacco products became the lesser of 2.5 percent or the increase in the Consumer Price Index every six months, with the rates applying from December 1st 2008 shown in Table IV.4.

22. **From the beginning of 2004, an excise duty exemption was granted to business and individual importing tractors for use in agricultural and forestry work as well as pedestrian controlled tractors.** The excise rate was reduced from 10 percent to 0 percent.

Table IV.4. Excise Tax Rates

Commodity	Excise Rate
Alcohol (per liter of alcohol)	
Beer (dependent on strength)	K 34.52–59.73 (new rates from end-Nov. 2007)
Wine and spirits	K 63.43–68.07
Tobacco products	
Cigars (per Kg)	K 150.90
Regular cigarettes (per 1,000)	K 150.90
Spear no filter (per 1,000)	K 75.45
Spear filter (per 1,000)	K 94.16
Smoking tobacco (leaf, per kg.) Coarse	K 50.30
Shredded Tobacco (per Kg)	K 29.18
Others	K 50.30
Petroleum products	
Gasoline	K 0.61 per liter
Aviation gasoline	Abolished from 1 January 2007
Diesel	K 0.06 per liter (K 0.03 for commercial fishing vessels) K0.02 per liter
Jet A1-	K 0.30 per liter until 31 December 2008 (trialed in 2007).
Zoom (Gasoline and oil mix)	Policy to be reviewed in 2009 Budget.
Other	
Pearls, diamonds, and some metals	40 percent
Drying, dictating and answering machines, microwave ovens	30 percent
Motor vehicles	0–110 percent
Arms	60 percent
Poker machines	50 percent

Import Duties

23. **The Harmonized Commodity Description and Coding System (HS Tariff) was adopted in January 1991.** The tariff classifications will be revised in 2008 to reflect the latest international standards. Papua New Guinea became a member of the World Customs Organization in 1998, and is implementing the WTO agreement on Customs Valuations. Papua New Guinea bound its entire tariff schedule during the Uruguay Round. A seven-year tariff reform program (TRP) commenced in July 1999, rationalizing the tariff structure and setting a schedule for the phased reductions of tariffs. Under the TRP, tariff rates were reduced to the current rates of 15, 25, and 40 percent in January 2006. A review of the TRP was concluded in 2007 and recommendations will be considered for implementation in the 2009 budget. Domestic sugar production is protected with a specific 70 percent tariff, which will be maintained until the end of 2010 while domestic canned mackerel production is protected with a specific 20 percent tariff, which will be maintained until the end of 2010.

24. **Preferential import tariff arrangements exist with members of the Melanesian Spearhead Group, and a bilateral arrangement with Fiji.**

Table IV.5. Tariff Rates (in percent)

Tariff Category	Current Tariff Rate	Tariff Rate Prior to July 1999
Duty free	0	0
Input rate	Abolished	5
Basic rate	Abolished	11
Intermediate rate	15	40
Protective rate	25	55
Prohibitive rate	40	75–125

The descriptions of the tariff categories are as follows:

- Duty free items: more than three-fourths of all lines fall into this category.
- Intermediate rate items: intermediate goods.
- Protective rate items: goods that are produced, or potentially can be produced, in Papua New Guinea and are seen as requiring a level of protection.
- Prohibitive rate items: these include fresh vegetables, fruits and nuts (whether or not preserved), beer, cigarettes and cigars, veneer and plywood, articles of jewelry and pearls, prefabricated buildings and sugar. Tariffs for some of these products (plywood, and veneer sheets) will be higher than the prohibitive rate during the phased reduction, but set at the general prohibitive rate in 2006. There is a specific tariff on beer, spirits, cigarettes, matches, shelled birds' eggs and certain tobacco products.

Import Levy

25. **In 2004, a temporary levy of 2.0 percent was imposed on imports**, except imports by the mining and petroleum sectors, by churches and charitable groups, and pharmaceuticals and medical goods. The levy was operative until December 31, 2004 only.

Export Duties

26. **Export duties are levied only on unprocessed logs, sandalwood, crocodile skins and mineral ores**; the duty varies depending on the product. Export duties are calculated on an f.o.b. basis and are payable before shipment. A pre-shipment inspection system on the export of round logs has been supplied by a private contractor since late 1994. Up until 31 December 2006 the log export duty was imposed on a progressive rate scale. A new forestry revenue sharing arrangement was introduced in 2007, which lowered the export duty on logs from 35 percent to 28.5 percent. Landowners are intended to benefit from this change as the export tax reduction is designed to be offset by the payment of an export development levy of K8 per cubic meter. Plantation logs are exempt from export duty. Crocodile skins are charged an export tax set at 5 percent, and sandalwood is charged at a rate of 15 percent.

C. Other Taxes

27. **Gaming machine tax (Tax on Pokies)** was introduced in October 1996 as a general revenue measure, and last increased by the Gaming Machine (Amendment) Act of 2002. In May 2007, the new Gaming Control Act amended the distribution of the turnover of gaming machines to all stakeholders as shown in Table IV.6.

Table IV.6. Distribution of Poker Machine Tax

Recipient	Share (Percent)	Share (Percent)
	As Per Gaming Machine (Amendment) Act of 2002	As Per the Gaming Control Act 2007
National government	74	46
Operators	4	10
Site owners	22	25
Gaming Board	Not Applicable	5
Community Benefit Fund Account	Not Applicable	14

28. **The 2008 budget abolished stamp duty on a number of items.** Stamp duties are imposed by the national government on the execution of certain documents. The rates vary by type of document. Stamp duty is abolished on the following items from January 1, 2008: loan agreements or contracts; loan securities, mortgages and foreign securities, hire and credit

purchase agreements; bills of lading; and certificates of incorporation. Stamp duty on insurance contracts and debits tax will also be abolished from April 1, 2008.³

29. **Departure tax** of K 30 is payable by all persons departing Papua New Guinea. Departing international passengers also pay a K 30 terminal facility charge to the Civil Aviation Authority.

30. **Land tax** may be imposed by provincial governments although this tax is difficult to implement and collect.

D. Tax Concessions and incentives

31. **To encourage investment a number of tax concessions are offered.** Sector specific concessions in the agriculture, forestry, fisheries, manufacturing, petroleum, and mining sectors are noted above. In addition, and to try to avoid previous practices where ad hoc concessions were granted in particular project agreements, generally applicable tax concessions have been introduced. These include:

- A research and development incentive, where a 150 percent income tax deduction is allowed for expenditure on research and development;
- A double deduction for staff training costs, which allows a double deduction against company income tax for the payment of salaries and wages of registered apprentices or other employees attending full-time training at a Government training institute or prescribed tertiary institution;
- A duty drawback, which is a rebate paid to exporting manufacturers when they export goods equal to the amount of duty already paid on new materials;
- An export sales exemption, which exempts profits from export sales for the first three years and income from increases in exports for the following four years; and
- Accelerated and flexible depreciation, which allows for capital assets to be written off at a faster rate than their effective lives. New industrial plant is eligible for increased depreciation up to 100 percent of cost. The taxpayer may elect the amount to be claimed in any year, but not so as to create a loss. To qualify, the plant must have a life exceeding five years, and can be used by the taxpayer or any other person.

32. The Government has over successive budgets estimated and reported on the size of its tax concessions. Table IV.7 shows the estimated size of the tax concessions for the past five years. Details of the amounts forgone are set out in budget documents.

³ The debit tax was introduced during 2003, and applied to withdrawals of K50 and over from financial institutions.

Table IV.7. Estimated revenue foregone due to tax concessions

Year	2002	2003	2004	2005	2006
Amount	34.4	76.7	34.9	37.7	30

Source: Department of Treasury, 2008 Budget documents.

STATISTICAL APPENDIX

Table 1. Papua New Guinea: GDP by Sector at Current Market Prices, 2002–06

	2002	2003	2004	2005	2006
(In millions of kina)					
Nominal GDP 1/	11,656	12,567	12,652	15,263	17,051
Mineral	2,150	2,252	2,391	3,555	4,686
Nonmineral	9,506	10,316	10,261	11,708	12,365
Of which: Nonagricultural	5,078	5,496	5,710	6,024	6,542
Agriculture, forestry and fishing	4,428	4,819	4,551	5,684	5,823
Mining, quarrying, and petroleum	2,150	2,252	2,391	3,555	4,686
Manufacturing	729	821	848	943	1,000
Electricity, gas and water	194	229	264	284	302
Construction	996	1,129	1,177	1,246	1,437
Wholesale and retail trade	746	850	891	945	1,021
Transport, storage and communication	268	294	305	317	326
Financing, insurance, real estate and business services	407	423	415	449	502
Less: Imputed bank service charge	185	188	196	215	230
Community, social and personal services	1,352	1,403	1,395	1,427	1,521
Import duties	575	539	615	632	666
Less: Subsidies	3	3	3	3	3
(In percent of GDP)					
Memorandum items:					
Nominal GDP	100.0	100.0	100.0	100.0	100.0
Mineral	18.4	17.9	18.9	23.3	27.5
Nonmineral	81.6	82.1	81.1	76.7	72.5
Of which: Nonagricultural	43.6	43.7	45.1	39.5	38.4
Agriculture, forestry and fishing	38.0	38.3	36.0	37.2	34.2
Mining, quarrying, and petroleum	18.4	17.9	18.9	23.3	27.5
Manufacturing	6.3	6.5	6.7	6.2	5.9
Electricity, gas and water	1.7	1.8	2.1	1.9	1.8
Construction	8.5	9.0	9.3	8.2	8.4
Wholesale and retail trade	6.4	6.8	7.0	6.2	6.0
Transport, storage and communication	2.3	2.3	2.4	2.1	1.9
Financing, insurance, real estate and business services	3.5	3.4	3.3	2.9	2.9
Less: Imputed bank service charge	1.6	1.5	1.5	1.4	1.3
Community, social and personal services	11.6	11.2	11.0	9.4	8.9
Import duties	4.9	4.3	4.9	4.1	3.9
Less: Subsidies	0.0	0.0	0.0	0.0	0.0

Sources: Data provided by the National Statistical Office through 2004; Treasury Department estimates for 2005 and 2006.

1/ Sum of industries less imputed bank service charge, plus import duties less subsidies.

Table 2. Papua New Guinea: GDP by Sector at 1998 Constant Prices, 2002–06

	2002	2003	2004	2005	2006
(In millions of 1998 kina)					
Real GDP 1/	7,728	7,896	8,111	8,383	8,598
Mineral	943	969	972	1,020	959
Nonmineral	6,786	6,927	7,139	7,364	7,638
Of which: Nonagricultural	3,997	3,999	4,077	4,246	4,500
Agriculture, forestry and fishing	2,789	2,927	3,062	3,118	3,139
Mining, quarrying, and petroleum	943	969	972	1,020	959
Manufacturing	560	587	600	660	694
Electricity, gas and water	107	121	126	130	134
Construction	805	849	876	918	1,028
Wholesale and retail trade	526	539	556	579	613
Transport, storage and communication	206	210	215	222	233
Financing, insurance, real estate and business services	324	313	303	318	345
Less: Imputed bank service charge	149	153	158	162	167
Community, social and personal services	1,174	1,133	1,106	1,124	1,152
Import duties	448	403	455	461	471
Less: Subsidies	2	2	2	2	2
(Annual percentage change)					
Memorandum items:					
Real GDP	-0.2	2.2	2.7	3.4	2.6
Mineral	-15.9	2.8	0.3	5.0	-5.9
Nonmineral	2.5	2.1	3.1	3.1	3.7
Of which: Nonagricultural	7.7	0.1	1.9	4.2	6.0
Agriculture, forestry and fishing	-4.1	5.0	4.6	1.8	0.7
Mining, quarrying, and petroleum	-15.9	2.8	0.3	5.0	-5.9
Manufacturing	-5.8	4.8	2.3	10.0	5.0
Electricity, gas and water	-0.4	13.4	4.3	2.7	3.0
Construction	34.0	5.4	3.2	4.8	12.0
Wholesale and retail trade	22.7	2.6	3.2	4.0	6.0
Transport, storage and communication	-2.0	2.1	2.6	3.0	5.0
Financing, insurance, real estate and business services	-5.5	-3.4	-3.4	5.0	8.5
Less: Imputed bank service charge	-1.9	2.9	2.9	3.0	3.0
Community, social and personal services	2.9	-3.5	-2.4	1.7	2.5
Import duties	1.6	-10.1	12.9	1.3	2.3
Less: Subsidies	0.0	0.0	0.0	0.0	0.0

Sources: Data provided by the National Statistical Office through 2004; Treasury Department estimates for 2005 and 2006.

1/ Sum of industries less imputed bank service charge, plus import duties less subsidies.

Table 3. Papua New Guinea: Production of Major Commodities, 2002–05

	2002	2003	2004	2005
Production volumes				
Crude oil (millions of barrels)	15.4	15.0	12.6	13.3
Copper (thousands of tonnes)	170.1	230.6	173.9	226.1
Gold (tonnes)	59.1	68.4	67.3	70.5
Silver (tonnes)	11.5	12.7	13.6	16.0
Cocoa (thousands of tonnes)	34.9	40.3	41.5	44.2
Coffee (thousands of tonnes)	63.1	68.8	63.0	72.1
Tea (thousands of tonnes)	5.2	6.6	8.1	6.9
Copra (thousands of tonnes)	15.8	8.4	19.2	22.3
Copra oil (thousands of tonnes)	28.2	47.7	45.1	54.4
Palm oil (thousands of tonnes)	323.9	326.9	339.0	345.8
Rubber (thousands of tonnes)	3.8	4.2	3.8	4.8
Logs (millions of cubic meters)	1.8	2.0	2.0	2.3
(In millions of kina)				
Production values				
Crude oil	1431	1632	1652	2283
Copper	1019	1415	1544	2498
Gold	2295	2811	2780	2834
Silver	29	32	32	37
Cocoa	226	258	218	199
Coffee	277	299	284	471
Tea	18	19	23	20
Copra	11	7	17	17
Copra oil	33	67	81	94
Palm oil	390	421	439	391
Rubber	9	12	14	18
Logs	366	370	356	405

Source: Data provided by the Papua New Guinea authorities.

Table 4. Papua New Guinea: Employment by Sector, 2003–June 2007

	2003	2004	2005	2006	2007 June
(March 2002=100, annual average)					
Total	108.5	109.2	111.0	119.1	131.9
Retail	96.9	93.1	93.7	97.7	113.6
Wholesale	113.3	123.8	130.7	145.6	154.4
Manufacturing	110.9	117.7	127.5	132.6	139.7
Building and construction	124.1	107.9	98.4	118.9	142.5
Transportation	106.1	106.8	106.1	108.2	117.0
Agriculture, forestry, and fisheries	114.1	112.9	112.9	123.3	143.9
Financial and business services	100.8	104.7	105.7	112.4	112.0
Mining 1/	97.6	95.6	101.5	111.1	119.7
(Change from corresponding period of previous year in percent)					
Total	6.2	0.6	1.6	7.3	9.6
Retail	-1.0	-3.9	0.6	4.3	18.2
Wholesale	9.7	9.3	5.6	11.4	6.0
Manufacturing	6.5	6.1	8.3	4.0	4.3
Building and construction	25.4	-13.1	-8.8	20.8	14.4
Transportation	-0.2	0.7	-0.7	2.0	10.5
Agriculture, forestry, and fisheries	9.8	-1.1	0.0	9.2	13.3
Financial and business services	1.7	3.9	1.0	6.3	-0.6
Mining 1/	-1.2	-2.0	6.2	9.5	9.4

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

1/ Not included in overall index; excludes subcontractors.

Table 5. Papua New Guinea: Consumer Price Index by Expenditure Group, 2002–June 2007

	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)									
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
December	4.6	7.6	11.2	-2.0	5.2	-3.7	-6.2	2.2	3.3
2006									
March	2.7	3.5	-1.5	1.4	12.3	-3.6	3.3	-1.2	1.5
June	2.3	4.7	1.0	1.8	4.7	-6.8	0.9	0.8	1.4
September	5.3	9.2	4.6	-0.4	14.2	-3.1	1.1	-1.0	1.2
December	-1.0	4.0	-14.6	-2.6	9.5	-2.1	6.1	2.5	1.6
2007									
March	1.0	2.6	-2.5	3.8	3.7	-5.7	4.9	7.5	2.3
June	1.0	1.1	-4.1	3.4	3.0	-7.6	5.4	10.3	2.8
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 6a. Papua New Guinea: Central Government Budget, 2003–07

(In millions of kina)

	2003	2004	2005	2006	2007 Rev. Budget 1/
Revenue and grants	3,664	4,315	5,307	6,288	7,167
Tax	2,678	3,220	3,744	4,945	5,693
Mineral taxes	498	736	1,150	2,003	2,410
Nonmineral taxes	2,180	2,484	2,594	2,942	3,283
Nontax	239	245	279	429	460
Of which: mineral nontax revenue	74	60	138	271	302
Grants	747	850	1,283	915	1,013
Project Grants	747	850	1,283	915	1,013
Expenditure	3,811	4,104	4,747	5,133	6,845
Recurrent	2,677	2,831	3,050	3,019	3,571
Noninterest recurrent expenditures	1,987	2,461	2,718	2,712	3,198
National departments	1,189	1,576	1,833	1,666	2,229
Salaries and wages	618	681	691	698	848
Arrears payments	14	37	93	109	71
Education funding	19	40	41	42	143
Goods and services	528	752	904	787	1,098
Structural adjustment payments	10	67	105	30	70
Provinces	594	678	678	812	748
Salaries and wages	504	589	543	663	576
Goods and services	61	65	55	65	63
Conditional grants	29	24	80	84	108
Statutory authorities	203	207	207	234	222
Interest	690	370	333	307	373
Domestic	528	239	216	187	253
Foreign	161	131	117	120	120
Development budget and net lending	1,134	1,273	1,696	2,114	3,275
Development budget	1,144	1,283	1,699	2,118	3,279
Project grants	747	850	1,283	915	1,013
Concessional Loans	134	74	134	145	163
Nonconcessional loans	56	25	2	0	0
Domestic Funds	207	334	280	1,058	2,102
o/w "Additional Priority Expenditures" 2/	0	0	0	587	1,593
Net lending	-10	-10	-3	-4	-4
Overall balance (from above the line)	-147	211	560	1,156	321
Errors, omissions, and discrepancy	-84	-216	18	-190	0
Overall balance (from below the line)	-231	-5	578	966	321
Financing	231	5	-578	-966	-321
Foreign financing (net)	-266	-222	-163	-226	-355
Domestic financing (net), excl. float & asset sales	458	72	-415	-740	34
Float	-1	130	0	0	0
Asset sales	40	25	0	0	0
Memorandum item:					
Nominal GDP (in millions of kina)	12,567	12,652	15,263	17,051	18,551

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

1/ Includes Supplementary budget passed in November 2007.

2/ For 2005–07 the government classified earmarked funds that are transferred to government trust funds as expenditure.

Under the staff's cash presentation, the outturns for 2005–06 reflect a cash accounting basis (consistent with Government Finance Statistics) where expenditure occurs only when money is disbursed from these trust funds.

Table 6b. Papua New Guinea: Central Government Budget, 2003–07

(In percent of GDP)

	2003	2004	2005	2006	2007
					Rev. Budget 1/
Revenue and grants	29.2	34.1	34.8	36.9	38.6
Tax	21.3	25.4	24.5	29.0	30.7
Mineral taxes	4.0	5.8	7.5	11.7	13.0
Nonmineral taxes	17.3	19.6	17.0	17.3	17.7
Nontax	1.9	1.9	1.8	2.5	2.5
Of which: mineral nontax revenue	0.6	0.5	0.9	1.6	1.6
Grants	5.9	6.7	8.4	5.4	5.5
Project Grants	5.9	6.7	8.4	5.4	5.5
Expenditure	30.3	32.4	31.1	30.1	36.9
Recurrent	21.3	22.4	20.0	17.7	19.2
Noninterest recurrent expenditures	15.8	19.5	17.8	15.9	17.2
National departments	9.5	12.5	12.0	9.8	12.0
Salaries and wages	4.9	5.4	4.5	4.1	4.6
Arrears payments	0.1	0.3	0.6	0.6	0.4
Education funding	0.2	0.3	0.3	0.2	0.8
Goods and services	4.2	5.9	5.9	4.6	5.9
Structural adjustment payments	0.1	0.5	0.7	0.2	0.4
Provinces	4.7	5.4	4.4	4.8	4.0
Salaries and wages	4.0	4.7	3.6	3.9	3.1
Goods and services	0.5	0.5	0.4	0.4	0.3
Conditional grants	0.2	0.2	0.5	0.5	0.6
Statutory authorities	1.6	1.6	1.4	1.4	1.2
Interest	5.5	2.9	2.2	1.8	2.0
Domestic	4.2	1.9	1.4	1.1	1.4
Foreign	1.3	1.0	0.8	0.7	0.6
Development budget and net lending	9.0	10.1	11.1	12.4	17.7
Development budget	9.1	10.1	11.1	12.4	17.7
Project grants	5.9	6.7	8.4	5.4	5.5
Concessional Loans	1.1	0.6	0.9	0.9	0.9
Nonconcessional loans	0.4	0.2	0.0	0.0	0.0
Domestic Funds	1.6	2.6	1.8	6.2	11.3
o/w "Additional Priority Expenditures" 2/	0.0	0.0	0.0	3.4	8.6
Net lending	-0.1	-0.1	0.0	0.0	0.0
Overall balance (from above the line)	-1.2	1.7	3.7	6.8	1.7
Errors, omissions, and discrepancy	-0.7	-1.7	0.1	-1.1	0.0
Overall balance (from below the line)	-1.8	0.0	3.8	5.7	1.7
Financing	1.8	0.0	-3.8	-5.7	-1.7
Foreign financing (net)	-2.1	-1.8	-1.1	-1.3	-1.9
Domestic financing (net), excl. float & asset sales	3.6	0.6	-2.7	-4.3	0.2
Float	0.0	1.0	0.0	0.0	0.0
Asset sales	0.3	0.2	0.0	0.0	0.0
Memorandum items:					
Nominal GDP (in millions of kina)	12,567	12,652	15,263	17,051	18,551
Nonmineral fiscal balance	-6.4	-6.3	-4.7	-7.7	-12.9

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

1/ Includes Supplementary budget passed in November 2007.

2/ For 2005–07 the government classified earmarked funds that are transferred to government trust funds as expenditure.

Under the staff's cash presentation, the outturns for 2005–06 reflect a cash accounting basis (consistent with Government Finance Statistics) where expenditure occurs only when money is disbursed from these trust funds.

Table 7. Papua New Guinea: Central Government Revenue and Grants, 2003–07

(In millions of kina)

	2003	2004	2005	2006	2007
				Rev.	Budget 1/
Total revenue and grants	3,664	4,315	5,307	6,288	7,167
Tax revenue	2,678	3,220	3,744	4,945	5,693
Taxes on income and profit	1,786	2,223	2,771	3,824	4,387
Personal tax	758	827	841	907	994
Company tax	335	437	517	551	633
Dividend withholding tax	117	123	155	201	183
Mineral and petroleum taxes	396	634	1,077	1,947	2,362
Other direct	55	79	72	92	95
Interest withholding tax	41	33	18	22	19
Gaming tax	83	91	92	104	100
Indirect taxes	892	997	973	1,121	1,307
Excise tax	175	203	256	324	336
VAT plus mining levy	414	417	399	457	602
VAT	312	316	326	401	554
Mining levy	102	101	73	56	48
Other indirect	1	1	2	3	2
Taxes on international trade	302	376	316	337	366
Import duties	74	151	101	90	124
Export duties (logs)	112	102	136	163	153
Import excises	110	123	79	84	89
Import levy	7	0	0	0	0
Nontax revenue	239	245	279	429	460
Property income	160	165	188	339	375
Dividends	86	105	50	68	74
Mining and petroleum	74	60	138	271	302
Interest and fees	4	3	1	1	3
Other	75	78	91	89	82
Asset sales costs	0	0	0	0	0
Foreign grants	747	850	1,283	915	1,013
Project grants	747	850	1,283	915	1,013

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

1/ Includes Supplementary budget passed in November 2007.

Table 8. Papua New Guinea: Central Government Fiscal Financing, 2003–07

(In millions of kina)

	2003	2004	2005	2006	2007 Rev. Budget 1/
Total Financing	231	5	-578	-966	-321
Foreign financing (net)	-266	-222	-163	-226	-355
New borrowing	190	181	136	145	163
Project loans	190	99	137	153	163
Concessional financing	0	82	0	0	0
Amortization	456	403	300	371	518
Domestic financing (net), excl. float & asset sales	458	72	-415	-740	34
Bank of Papua New Guinea					
Net credit to central government	-306	-270	-512	-121	...
Securities	-310	-180	30	37	...
Treasury bills	-291	-180	0	0	...
Inscribed stock	-19	0	30	37	...
Temporary advance	-4	-91	0	-1	...
Deposits	7	1	-542	-157	...
Commercial Banks					
Net credit to central government	193	310	332	-27	...
Securities	212	346	419	228	...
Treasury bills	232	-90	-40	-106	...
Inscribed stock	-20	436	459	335	...
Loans	-1	-1	0	10	0
Deposits	-18	-34	-87	-266	...
Nonbanks					
Net credit to central government	571	31	-235	-592	...
Securities	575	39	-219	-592	...
Treasury bills	645	-249	-400	-539	...
Inscribed stock	-70	288	181	-53	...
Loans	-5	-7	-16	0	0
Float	-1	130	0	0	0
Asset sales	40	25	0	0	0

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

1/ Includes Supplementary budget passed in November 2007.

Table 9: Papua New Guinea: Central Government Domestic Debt, 2003–September 2007

(In millions of kina; end of period)

	2003	2004	2005	2006	2007	
					Jun.	Sept.
Central government domestic debt: by creditor						
Bank of Papua New Guinea						
Net credit to central government	243	-26	-538	-659	-540	-1,100
Securities	256	76	106	143	194	204
Treasury bills 1/	180	0	0	0	0	0
Inscribed stock 2/	76	76	106	143	194	204
Temporary advance	94	3	2	1	42	5
Less: Deposits	106	105	646	803	776	1,310
Other Depository Corporations						
Net credit to central government	1,010	1,320	1,652	1,625	1,367	1,086
Securities	1,248	1,593	2,013	2,241	2,092	1,802
Treasury bills 1/	1,248	1,157	1,118	1,012	668	482
Inscribed stock 2/	0	436	895	1,229	1,425	1,320
Loans	2	1	1	11	1	1
Less: Deposits	240	275	361	627	726	717
Nonbanks						
Net credit to central government	1,479	1,511	1,275	684	663	631
Securities	1,426	1,465	1,246	654	634	601
Treasury bills 2/	1,328	1,079	679	139	128	80
Inscribed stock 2/	98	386	567	515	506	522
Loans	53	46	30	30	30	30
Central government net domestic debt: total	2,732	2,804	2,390	1,649	1,490	617
Total gross domestic debt						
Securities	2,930	3,134	3,364	3,038	2,920	2,607
Total treasury bills	2,755	2,236	1,797	1,151	795	562
Total inscribed stock 2/	175	898	1,568	1,887	2,124	2,045
Loans	149	49	33	42	73	36
Less: Central government deposits	346	380	1,008	1,430	1,503	2,026

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

1/ Discount value.

2/ Face value.

Table 10: Papua New Guinea: Monetary Survey, 2003–September 2007

(In millions of kina; end of period)

	2003	2004	2005	2006	2007 Sept.
Net foreign assets	1,621	2,165	2,929	4,648	6,297
Bank of Papua New Guinea	1,322	1,869	2,367	4,319	5,546
Foreign assets	1,743	2,072	2,368	4,326	5,552
Less: Foreign liabilities	421	203	1	6	6
Other Depository Corporations	299	296	562	329	751
Net domestic assets	1,789	1,750	2,141	2,392	1,485
Domestic credit	3,046	3,066	3,329	3,975	3,699
Net credit to central government	1,253	1,293	1,114	966	-14
Bank of Papua New Guinea	243	-26	-538	-659	-1,100
Claims on central government	350	79	108	144	209
Less: Central government deposits	106	105	646	803	1,310
Other Depository Corporations	1,010	1,320	1,652	1,625	1,086
Claims on central government	1,250	1,594	2,014	2,252	1,803
Securities	1,248	1,593	2,013	2,241	1,802
Loans	2	1	1	11	1
Less: Central government deposits	240	275	361	627	717
Claims on other sectors	1,793	1,773	2,215	3,009	3,713
Claims on the private sector	1,707	1,724	2,133	2,947	3,654
Claims on official entities	79	48	81	60	59
Claims on nonmonetary financial institutions	6	1	1	1	0
Other items, net	-1,256	-1,316	-1,188	-1,582	-2,215
Broad money	3,410	3,915	5,069	7,041	7,782
Narrow money	1,707	2,232	3,017	3,792	4,379
Currency outside banks	388	400	445	520	599
Demand deposits	1,319	1,832	2,572	3,272	3,780
Quasi money	1,704	1,683	2,052	3,249	3,402
Memorandum items:					
Narrow money growth rate 1/	6.7	30.8	35.2	25.7	27.2
Broad money growth rate 1/	-4.4	14.8	29.5	38.9	25.2
Private sector credit growth rate 1/	-4.1	0.9	23.7	38.2	35.6
Nominal nonmineral GDP/broad money	3.0	2.6	2.3	1.8	...

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

1/ Percent change from corresponding period of previous year.

Table 11: Papua New Guinea: Balance Sheet of the Central Bank, 2003–September 2007

(In millions of kina; end of period)

	2003	2004	2005	2006	2007 Sept.
Net foreign assets	1,322	1,869	2,367	4,319	5,546
Foreign assets	1,743	2,072	2,368	4,326	5,552
Less: Foreign liabilities	421	203	1	6	6
<i>Of which: Non-IMF liabilities</i>	13	1	1	6	6
Net domestic assets	-653	-998	-1,432	-3,181	-4,423
Domestic credit	308	7	-502	-601	-1,067
Net credit to government	243	-26	-538	-659	-1,100
Securities	256	76	106	143	204
Treasury bills	180	0	0	0	0
Inscribed stock	76	76	106	143	204
Advances	94	3	2	1	5
Less: Central government deposits	106	105	646	803	1,310
Credit to other sectors	64	34	36	58	34
Claims on the private sector	7	9	11	32	10
Claims on deposit money banks	50	24	24	26	24
Claims on nonmonetary financial institutions	6	1	1	1	0
Other items net	-961	-1,006	-929	-2,580	-3,356
Reserve money	669	871	935	1,138	1,123
Currency in circulation	512	531	606	693	761
Deposits of other depository corporations	153	332	322	442	359
ESA deposits	66	231	184	246	142
CRR deposits	87	101	138	196	217
Other deposits	4	8	8	3	3
Memorandum items:					
Reserve money growth 1/	-0.1	30.2	7.4	21.7	16.0
Use of fund credit (millions of U.S. dollars)	121.5	64.3	0.0	0.0	0.0
Gross international reserves (millions of U.S. dollars)	522.9	663.1	764.9	1,427.5	1,887.7
Exchange rate (U.S. dollar/kina)	0.30	0.32	0.32	0.33	0.34

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

1/ Percent change from corresponding period of previous year.

Table 12. Papua New Guinea: Consolidated Balance Sheet of Other Depository Corporations, 2003–September 2007

(In millions of kina; end of period)

	2003	2004	2005	2006	2007 Sept.
Net foreign assets	299	296	562	329	751
Foreign assets	356	364	658	430	885
Foreign liabilities	56	69	96	101	134
Reserves	153	332	322	442	359
CRR accounts	87	101	138	196	217
ESA accounts	66	231	184	246	142
Currency	124	131	160	173	162
Domestic credit	3,136	3,788	4,655	7,038	7,774
Net credit to central government	1,010	1,320	1,652	1,625	1,086
Claims on central government	1,250	1,594	2,014	2,252	1,803
Securities	1,248	1,593	2,013	2,241	1,802
Treasury bills	1,248	1,157	1,118	1,012	482
Inscribed stock	0	436	895	1,229	1,320
Inscribed stock of maturity < 3 years	0	278	572	785	1,159
Inscribed stock of maturity > 3 years	0	157	323	444	160
Loans	2	1	1	11	1
Less: Central government deposits	240	275	361	627	717
Claims on other sectors	2,126	2,469	3,003	5,413	6,687
Claims on BPNG	347	706	800	2,437	2,984
Claims on the private sector	1,700	1,715	2,122	2,916	3,644
Claims on official entities	79	48	81	60	59
Claims on NFPE's	73	44	79	57	55
Claims on provincial governments	6	4	2	3	5
Claims on nonmonetary financial institutions	0	0	0	0	0
Other items, net	-645	-1,019	-1,062	-1,443	-1,845
Deposits	3,017	3,505	4,614	6,516	7,177
Demand	1,293	1,781	2,513	3,224	3,677
Term	1,724	1,724	2,101	3,292	3,500
Central bank credit	50	24	23	24	24
Memorandum items:					
Deposits subject to reserve requirements	3,244	3,720	4,917	7,115	7,817
Implied cash reserve ratio (percent)	3	3	3	3	3
Kina facility borrowings (-deposits)	0	0	0	0	6
Liquid assets	1,438	1,798	2,034	2,216	1,945
Excess ESA balances	66	231	184	246	142
Total ODC assets	4,420	4,960	6,351	8,872	10,150
Claims on central government/total assets (percent)	28	32	32	25	18

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

Table 13. Papua New Guinea: Commercial Bank Loans by Sector, 2003–September 2007

	2003	2004	2005	2006	2007 Sept.	2003	2004	2005	2006	2007 Sept.
	(In millions of kina; end of period)					(In percent of total credit; end of period)				
Total	1495	1421	1797	2515	2968	100.0	100.0	100.0	100.0	100.0
Business	1331	1223	1548	2185	2540	89.0	86.1	86.2	86.9	85.6
Agriculture, forestry, and fishing	51	64	74	141	140	3.4	4.5	4.1	5.6	4.7
Coffee	3	1	2	6	11	0.2	0.1	0.1	0.3	0.4
Cocoa	1	24	10	10	5	0.1	1.7	0.5	0.4	0.2
Coconut products	0	1	0	0	0	0.0	0.0	0.0	0.0	0.0
Palm oil	0	0	2	2	0	0.0	0.0	0.1	0.1	0.0
Fisheries	7	19	22	23	30	0.4	1.4	1.2	0.9	1.0
Forestry	21	8	18	37	17	1.4	0.5	1.0	1.5	0.6
Other 1/	20	12	21	63	77	1.3	0.8	1.1	2.5	2.6
Manufacturing	99	95	114	124	166	6.6	6.7	6.4	4.9	5.6
Engineering and metal processing	6	3	25	28	39	0.4	0.2	1.4	1.1	1.3
Food, drink, and tobacco processing	71	45	45	53	79	4.8	3.2	2.5	2.1	2.7
Textile, leather, and wood products	9	10	5	10	12	0.6	0.7	0.3	0.4	0.4
Chemicals, paints, and gases	1	0	4	12	2	0.1	0.0	0.2	0.5	0.1
Other 2/	12	36	36	21	34	0.8	2.5	2.0	0.8	1.1
Transport and communication	124	72	123	202	243	8.3	5.1	6.8	8.0	8.2
Finance	13	25	28	60	14	0.9	1.7	1.6	2.4	0.5
Commerce	373	384	438	479	600	25.0	27.0	24.4	19.0	20.2
Retail trade	265	214	280	134	140	17.7	15.1	15.6	5.3	4.7
Buyers, processors, and exporters	75	94	113	42	71	5.0	6.6	6.3	1.7	2.4
Wholesale trade	33	76	45	303	389	2.2	5.3	2.5	12.1	13.1
Building and construction	66	66	106	125	150	4.4	4.7	5.9	5.0	5.1
Mining and quarrying	20	6	14	144	55	1.3	0.4	0.8	5.7	1.9
Metals and other mining	6	6	14	141	50	0.4	0.4	0.8	5.6	1.7
Petroleum and natural gas	14	0	0	4	6	0.9	0.0	0.0	0.1	0.2
Other business 3/	587	511	652	911	1172	39.2	36.0	36.3	36.2	39.5
Government	8	5	3	15	6	0.6	0.3	0.2	0.6	0.2
Central government 4/	2	1	1	11	1	0.1	0.1	0.1	0.5	0.0
Provincial government	3	2	1	3	4	0.2	0.1	0.1	0.1	0.1
Local government	3	2	1	1	1	0.2	0.1	0.1	0.0	0.0
Persons	156	193	246	315	422	10.4	13.6	13.7	12.5	14.2
Advances for housing	103	121	145	176	202	6.9	8.5	8.1	7.0	6.8
Other personal loans	52	73	101	140	220	3.5	5.1	5.6	5.5	7.4

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 14. Papua New Guinea: Reserve Requirements, March 1997–September 2007

(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 2007	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 15. Papua New Guinea: Interest Rates, 2003–September 2007

	Kina Facility Rate	Treasury Bills					Commercial Banks						
		Weighted Average Auction Yield					Weighted Average Deposit Rate	Weighted Average Lending Rate	Indicative Overdraft Rate	Passbook Accounts	Term Deposits (less than K50,000)		
		28-day	63-day	91-day	182-day	365-day					3-6 Months	6-12 Months	12-24 Months
2003 (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 (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	7.13	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	7.30	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	5.55	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	2.25	0.8	11.1	8.00	1.00-2.00	0.35-4.00	0.50-2.82	0.75-2.50
October	6.00	--	--	0.95	2.00	3.88	0.7	10.9	8.00	1.00-2.00	0.25-4.00	0.35-2.50	0.50-2.85
November	6.00	--	--	1.48	2.78	3.65	0.7	11.0	7.20	1.00-2.00	0.35-5.25	0.50-2.50	0.50-1.25
December	6.00	--	--	3.84	4.91	5.69	0.8	10.7	7.20	1.50-2.00	0.35-2.85	0.50-1.55	0.75-1.25
2006													
January	6.00	--	--	2.64	4.29	5.45	0.8	10.5	7.20	1.50-2.00	0.25-2.85	0.35-1.25	0.50-1.25
February	6.00	--	--	2.00	3.85	4.82	0.8	11.0	7.20	1.50-2.00	0.25-2.85	0.35-1.25	0.50-1.25
March	6.00	--	--	1.99	3.13	4.55	0.8	11.3	7.20	1.50-2.00	0.25-1.25	0.35-1.35	0.50-1.25
April	6.00	--	--	2.97	2.86	3.00	0.8	11.0	7.20	1.50-2.00	0.25-1.25	0.35-1.25	0.75-1.25
May	6.00	--	--	--	--	--	0.9	10.4	7.20	1.50-2.00	0.35-1.25	0.25-2.00	0.75-1.25
June	6.00	--	--	--	--	--	1.0	10.5	7.20	1.50-2.00	0.20-0.65	0.25-2.00	0.75-1.25
July	6.00	--	--	--	--	--	1.0	10.5	7.20	1.50-2.00	0.20-0.75	0.25-2.00	0.75-1.25
August	6.00	--	--	--	--	--	1.1	10.5	6.70	1.50-2.00	0.35-0.75	0.25-2.00	0.75-1.25
September	6.00	--	--	--	--	--	1.1	10.4	6.70	1.50-2.00	0.25-0.65	0.35-2.00	0.75-1.25
October	6.00	--	--	--	4.00	--	1.2	10.3	6.70	1.50-2.00	0.25-2.00	0.35-1.55	0.75-1.75
November	6.00	--	--	--	4.50	5.05	1.3	10.2	6.70	0.50-1.50	0.35-1.25	0.50-1.55	0.75-2.00
December	6.00	--	--	--	3.30	4.49	1.0	10.2	6.70	0.50-1.50	0.35-1.25	0.50-1.50	0.75-1.75
2007													
January	6.00	--	--	--	4.00	4.26	1.0	10.2	6.70	0.25-1.50	0.35-1.25	0.50-1.00	0.75-1.25
February	6.00	--	--	--	4.06	4.24	0.9	10.2	6.70	0.15-1.50	0.35-1.25	0.15-4.00	0.75-4.00
March	6.00	--	--	--	4.49	5.01	1.0	10.3	6.70	0.15-1.50	0.35-0.75	0.50-1.00	0.72-1.25
April	6.00	--	--	--	4.13	4.44	1.0	10.1	6.70	0.15-1.50	0.35-0.75	0.50-1.00	0.75-1.25
May	6.00	--	--	--	4.18	4.33	0.9	10.0	6.70	0.15-1.50	0.35-0.75	0.50-1.00	0.75-1.25
June	6.00	--	--	--	4.00	--	0.9	10.2	6.95	0.15-1.50	0.35-0.75	0.50-1.00	0.75-1.25
July	6.00	--	--	--	--	--	1.0	9.9	6.95	0.15-1.50	0.35-0.75	0.50-1.00	0.75-1.25
August	6.00	--	--	--	--	--	1.0	9.8	6.95	0.15-1.50	0.35-0.75	0.50-1.00	0.75-1.25
September	6.00	--	--	--	--	--	1.0	9.7	6.95	0.15-1.50	0.35-2.25	0.15-2.00	0.35-1.00

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

Table 16. Papua New Guinea: Balance of Payments, 2003–06

(In millions of U.S. dollars)

	2003	2004	2005	2006
Current account balance	159	88	207	163
Mineral	728	793	1,044	1,364
Nonmineral	-569	-705	-837	-1,201
Trade balance	718	760	816	1,400
Exports (f.o.b.)	2,153	2,554	3,278	4,205
Mineral	1,635	1,863	2,467	3,391
Nonmineral	518	690	811	814
Imports (c.i.f.)	-1,435	-1,794	-2,462	-2,805
Mineral	-325	-482	-693	-795
Nonmineral	-1,109	-1,312	-1,769	-2,010
Services	-388	-485	-674	-882
Income	-407	-368	-369	-632
Current Transfers	235	182	434	276
Official	199	142	393	299
Private	36	40	41	-23
Capital and financial account balance	-23	35	0	470
Direct investment	97	26	68	193
Other investment	-120	10	-68	277
Medium- and long-term loan disbursements	-151	-213	-175	-137
Commercial banks	-60	-1	-87	77
Other	90	224	194	337
Net errors and omissions	52	82	-46	29
Overall balance	187	206	161	662
Financing	-187	-206	-161	-662
Reserve assets	-184	-140	-102	-662
Use of IMF credit	-6	-62	-59	0
Purchases	0	0	0	0
Repurchases	-6	-62	-59	0
Other foreign liabilities	3	-4	0	0
Memorandum items:				
Current account (in percent of GDP)	4.5	2.2	4.2	2.9
Mineral	20.6	20.2	21.2	24.4
Nonmineral	-16.1	-17.9	-17.0	-21.5
Gross official reserves (end-year)				
In millions of U.S. dollars	523	663	765	1,427
In months of nonmineral imports	5.7	6.1	5.2	8.5
In months of imports of goods and nonfactor services	2.7	2.8	2.4	3.8
Public external debt-service-exports ratio (in percent)	7.5	8.7	6.0	3.5
Public external debt-GDP ratio (in percent) 1/	42.9	36.8	25.8	21.2

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 17. Papua New Guinea: Exports of Major Commodities, 2003–06

	2003	2004	2005	2006
Copper				
Value (in million of U.S. dollars)	393.0	478.7	805.5	1413.5
Volume (thousands of tons)	230.6	173.9	226.1	216.7
Unit value (U.S. dollars per ton)	1704.2	2753.0	3562.7	6522.9
Unit value (U.S. cents per pound)	77.3	124.9	161.6	295.9
Gold				
Value (in million of U.S. dollars)	780.0	861.8	913.7	998.2
Volume (tons)	68.4	67.3	70.5	56.7
Unit value (U.S. dollars per ounce)	354.7	398.3	403.1	547.6
Petroleum				
Value (in million of U.S. dollars)	452.5	512.6	735.5	967.4
Volume (thousands of barrels)	14983.4	12564.7	13299.8	14521.1
Unit value (U.S. dollars per barrel)	30.2	40.8	55.3	66.6
Silver				
Value (in million of U.S. dollars)	9.3	10.1	12.4	12.3
Volume (tons)	64.2	46.7	52.1	48.0
Unit value (U.S. dollars per ounce)	4.5	6.7	7.4	8.0
Logs				
Value (in million of U.S. dollars)	102.6	110.3	130.5	179.9
Volume (thousands of cu. meters)	2016.0	2012.0	2270.0	2653.0
Unit value (U.S. dollars per cubic meter)	50.9	54.8	57.5	67.8
Coffee				
Value (in million of U.S. dollars)	82.8	88.0	151.8	145.0
Volume (thousands of tons)	68.8	63.0	72.1	52.3
Unit value (U.S. dollars per ton)	1203.5	1396.9	2106.1	2773.4
Unit value (U.S. cents per pound)	54.6	63.4	95.5	125.8
Cocoa				
Value (in million of U.S. dollars)	71.5	67.6	64.1	65.7
Volume (thousands of tons)	40.3	41.5	44.2	44.0
Unit value (U.S. dollars per ton)	1774.2	1629.0	1449.3	1492.4
Palm oil				
Value (in million of U.S. dollars)	116.9	136.0	126.1	149.9
Volume (thousands of tons)	326.9	339.0	345.6	362.3
Unit value (U.S. dollars per ton)	357.6	401.3	364.9	413.7
Copra				
Value (in million of U.S. dollars)	1.8	5.3	5.6	3.0
Volume (thousands of tons)	8.4	19.2	22.3	12.7
Unit value (U.S. dollars per ton)	214.3	277.8	250.1	235.8
Copra Oil				
Value (in million of U.S. dollars)	18.7	25.1	30.2	22.7
Volume (thousands of tons)	47.7	45.1	54.4	41.5
Unit value (U.S. dollars per ton)	392.0	556.9	555.3	546.5
Tea				
Value (in million of U.S. dollars)	5.4	7.1	6.5	7.0
Volume (thousands of tons)	6.6	8.1	6.9	6.6
Unit value (U.S. dollars per ton)	818.2	876.7	943.8	1054.2
Unit value (U.S. cents per kilogram)	81.8	87.7	94.4	105.4
Rubber				
Value (in million of U.S. dollars)	3.4	4.3	5.8	8.0
Volume (thousands of tons)	4.2	3.8	4.8	4.4
Unit value (U.S. dollars per ton)	809.5	1126.2	1209.0	1818.8
Unit value (U.S. cents per pound)	36.7	51.1	58.8	82.5
Other				
Value (in million of U.S. dollars)	115.0	246.6	290.3	232.6
Total exports (in million of U.S. dollars)	2153.0	2553.7	3278.0	4205.2
Minerals and petroleum	1634.8	1863.3	2467.1	3391.5
Nonmineral	518.2	690.4	810.9	813.7

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

Table 18. Papua New Guinea: Direction of Trade, 2003–06 1/

(In percent of total)

	2003	2004	2005	2006
Exports (f.o.b.) by destination				
Australia	45.7	45.6	43.2	40.7
Japan	12.8	10.8	11.3	14.3
Philippines	3.5	4.0	5.3	9.7
Germany	6.6	7.1	7.3	4.5
South Korea	5.4	6.1	7.4	4.4
People's Republic of China 2/	6.7	4.9	3.7	3.7
Great Britain	2.5	3.5	1.9	1.4
Indonesia	1.7	1.2	0.4	1.2
United States	2.7	2.2	1.4	1.1
Italy	1.6	1.1	0.7	0.9
Spain	0.6	0.7	0.3	0.6
Singapore	2.1	2.2	1.1	0.6
Malaysia	0.4	0.9	0.7	0.5
Other	7.7	9.8	15.5	16.4
Imports (c.i.f.) by origin				
Australia	54.8	55.3	44.8	34.2
United States	9.6	8.1	13.8	21.0
Singapore	6.6	6.0	6.4	19.2
Japan	4.8	4.4	3.9	5.0
New Zealand	5.2	3.3	5.0	2.8
People's Republic of China 2/	4.6	3.2	2.0	2.2
Malaysia	2.3	1.7	1.7	2.1
Indonesia	2.0	1.5	1.5	1.2
Hong Kong	0.9	0.8	1.2	1.1
Great Britain	1.0	0.7	0.4	0.7
Germany	0.3	0.1	0.7	0.5
Taiwan P.O.C.	0.2	0.2	0.2	0.3
Philippines	0.3	0.2	0.5	0.3
Other	7.6	14.5	18.0	9.5

Source: Data provided by the Papua New Guinea authorities.

1/ Ranked based on the 2006 data.

2/ Excluding Hong Kong SAR.

Table 19. Papua New Guinea: Net Services and Transfers, 2002–06

(In millions of U.S. dollars)

	2002	2003	2004	2005	2006
Services balance (net)	-345.4	-388.1	-484.9	-674.1	-881.5
Freight, insurance (receipts)	7.3	22.4	29.8	33.5	33.8
Travel payments	-32.1	-51.3	-51.7	-75.9	-33.5
Mineral	-1.4	-1.6	-2.8	-4.7	-3.5
Nonmineral	-30.7	-49.7	-48.9	-71.2	-30.0
Other	-271.8	-279.0	-398.1	-480.3	-528.5
Receipts	154.7	208.0	175.3	199.7	238.5
Mineral	32.5	41.4	45.6	70.0	88.8
Nonmineral	122.2	166.6	129.7	129.7	149.7
Payments	-426.5	-487.0	-573.4	-680.0	-767.0
Mineral	-228.5	-276.3	-344.0	-420.0	-462.0
Nonmineral	-198.0	-210.7	-229.4	-260.0	-305.0
Other misc. services payments	-48.8	-80.2	-64.9	-151.4	-353.4
Income (net)	-225.9	-406.7	-368.2	-369.3	-631.8
Interest	-79.2	-52.9	-41.9	-21.5	-78.4
Receipts	19.9	9.6	16.0	35.4	67.2
Mineral	9.6	1.7	10.2	13.7	35.6
Nonmineral	5.3	0.7	0.8	0.7	1.3
Official	5.0	7.2	5.0	21.0	30.3
Payments	-99.1	-62.5	-57.9	-56.9	-145.6
Mineral	-33.5	-12.8	-10.2	-10.1	-98.6
Nonmineral	-15.0	-0.9	-4.0	-7.5	-8.6
Official	-50.6	-48.8	-43.7	-39.3	-38.5
Concessional	-45.7	-44.5	-40.0	-37.6	-37.5
Nonconcessional	-1.3	-1.4	-0.8	-0.7	-0.6
IMF charges	-3.6	-2.9	-2.9	-1.0	-0.4
Dividends	-131.3	-353.8	-326.3	-347.8	-553.4
Receipts	7.3	6.2	2.1	0.9	2.1
Mineral	4.2	5.2	0.5	0.0	0.0
Nonmineral	3.1	1.0	1.6	0.9	2.1
Payments	-138.6	-360.0	-328.4	-348.7	-555.5
Mineral	-92.6	-259.1	-222.7	-227.8	-440.0
Nonmineral	-46.0	-100.9	-105.7	-120.9	-115.5
Other income payments	-15.4	0.0	0.0	0.0	0.0
Current Transfers (net)	196.6	235.1	181.7	434.3	276.4
Official	174.6	199.1	141.8	393.3	299.2
Receipts	174.6	199.1	141.8	393.3	299.2
Australia budgetary support	0.0	5.8	0.0	0.0	0.0
Project & Commodity aid	169.2	193.3	141.8	393.3	299.2
Other grants	5.4	0.0	0.0	0.0	0.0
Payments	0.0	0.0	0.0	0.0	0.0
Private	22.0	36.0	39.9	41.0	-22.9
Receipts	80.8	116.4	117.1	122.0	80.1
Payments	-58.8	-80.4	-77.2	-81.0	-103.0

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

Table 20. Papua New Guinea: External Debt Outstanding, 2002–06

(In millions of U.S. dollars)

	2002	2003	2004	2005	2006
Total external debt	2304	2311	2158	2048	2175
Public external debt 1/	1570	1617	1492	1273	1195
Central government	1430	1473	1411	1245	1194
Multilateral creditors	841	865	861	818	801
Of which: World Bank Group	363	348	334	326	318
Asian Development Bank	419	443	452	428	416
Bilateral creditors	541	553	496	385	352
Of which: Australia	99	87	40	7	3
Japan	391	412	406	335	310
Commercial creditors	48	55	54	43	41
Central bank	115	124	64	0	0
Of which: IMF liabilities	115	120	64	0	0
Commercial statutory authorities	25	20	17	27	0
Private external debt	733	694	667	776	980
Of which: mineral sector	454	415	372	504	703
(In percent of GDP)					
Memorandum items					
Total external debt	79.4	61.3	53.3	41.6	38.7
Total public external debt 1/	54.2	42.9	36.8	25.8	21.2
Central government external debt	49.3	39.1	34.8	25.3	21.2
Multilateral creditors	29.0	22.9	21.3	16.6	14.2
Bilateral creditors	18.7	14.7	12.3	7.8	6.3
Commercial creditors	1.7	1.5	1.3	0.9	0.7
Central bank	4.0	3.3	1.6	0.0	0.0
Commercial statutory authorities	0.9	0.5	0.4	0.6	0.0
Private external debt	25.3	18.4	16.5	15.7	17.4

Sources: Data provided by the Papua New Guinea authorities.

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

Table 21. Papua New Guinea: Public External Debt Service, 2002–06

(In millions of U.S. dollars)

	2002	2003	2004	2005	2006
Total public sector	142.5	182.7	241.1	212.1	158.3
Principal	92.2	133.9	197.4	172.8	119.8
Interest	50.3	48.8	43.7	39.3	38.5
Central government	139.2	174.3	176.0	151.9	157.9
Principal	92.2	128.4	135.2	113.6	119.8
Interest	47.0	45.9	40.8	38.3	38.1
Multilateral creditors	73.8	74.2	73.1	71.1	109.6
Principal	48.6	50.7	51.9	48.8	83.1
Interest	25.2	23.5	21.2	22.3	26.5
World Bank Group	37.3	35.4	34.2	36.5	40.8
Principal	26.8	25.8	26.1	26.4	27.5
Interest	10.5	9.6	8.1	10.1	13.3
Asian Development Bank	31.1	31.8	34.0	31.5	64.9
Principal	18.2	19.2	22.3	20.7	52.6
Interest	12.9	12.6	11.7	10.8	12.3
Other	5.4	7.0	4.9	3.1	3.9
Principal	3.6	5.7	3.5	1.7	3.0
Interest	1.8	1.3	1.4	1.4	0.9
Bilateral creditors	55.4	86.0	94.0	74.7	42.3
Principal	34.9	65.0	75.2	59.4	31.3
Interest	20.5	21.0	18.8	15.3	11.0
Australia	19.9	48.2	52.6	35.0	4.3
Principal	12.4	40.3	47.1	32.1	3.9
Interest	7.5	7.9	5.5	2.9	0.4
China	0.6	0.6	0.6	0.6	0.6
Principal	0.4	0.4	0.4	0.4	0.4
Interest	0.2	0.2	0.2	0.2	0.2
Japan	29.9	31.5	31.3	32.8	31.4
Principal	18.7	20.1	19.6	21.7	21.8
Interest	11.2	11.4	11.7	11.1	9.6
Other	5.0	5.7	9.5	6.3	6.0
Principal	3.4	4.2	8.1	5.2	5.2
Interest	1.6	1.5	1.4	1.1	0.8
Commercial creditors	10.0	14.1	8.9	6.1	6.0
Principal	8.7	12.7	8.1	5.4	5.4
Interest	1.3	1.4	0.8	0.7	0.6
Banks	7.5	6.8	4.8	0.0	0.0
Principal	7.1	6.4	4.8	0.0	0.0
Interest	0.4	0.4	0.0	0.0	0.0
Other	2.5	7.3	4.1	6.1	6.0
Principal	1.6	6.3	3.3	5.4	5.4
Interest	0.9	1.0	0.8	0.7	0.6
Central bank	3.3	8.4	65.1	60.2	0.4
Principal	0.0	5.5	62.2	59.2	0.0
Interest	3.3	2.9	2.9	1.0	0.4
Memorandum item:					
Public debt-service ratio	7.9	7.5	8.7	6.0	3.5

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

Table 22. Papua New Guinea: Medium Term Development Strategy–Performance Management Framework, 2000–06 1/

Sector	Performance 2/		Data Assessment 3/			
	Trend	Latest Performance	Well-defined plan	Established Performance Indicators	Regularity of Data	Reliability of Data
Primary and preventive health	-2	2	S	S	S	N
HIV/AIDS prevention	0	0	S	N	S	N
Basic education	1	1	S	S	N	N
Development oriented adult education	-3	3	N	N	N	N
Transport, maintenance, and rehabilitation	0	2	S	N	P	P
Income earning opportunities	1	0	P	N	S	S
Law and justice	-2	1	S	S	S	S
Gender	-1	1	N	N	N	N
Environment	1	1	N	P	N	N
Microeconomic	4	5	S	S	P	S
Governance	-3	-1	N	N	N	N
Public expenditure management	2	3	P	P	P	S
Public sector reform	1	-1	S	S	N	N

Source: Data provided by the Papua New Guinea authorities.

1/ Or latest data available.

2/ Scored between -5 and 5 with positive score indicates that development is taking place and a negative scores indicates that the sector is in decline.

3/ S=satisfactory; N=need improvement; P=partially effective.