

The Papua New Guinea Kina's Fear of Floating[◇]

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JEL classification: F31; G15

Keywords: foreign exchange; currency behaviour

This Version: 6 June 2005

Abstract: Calvo and Reinhart (2002) demonstrated that there is a pervasive 'fear of floating' to be found in emerging market currencies, and that officially announced currency regimes may diverge from actual central bank practice. The Papua New Guinea kina is officially a floating currency, but there are a number of reasons why this is unlikely to be the case in practice. This analysis uses the Calvo and Reinhart method to show that, like many other emerging market 'floating' currencies, the kina more closely resembles a managed regime.

[◇] The author wishes to thank Satish Chand for input throughout the development of this paper. This paper was funded by an AusAID research grant. The opinions expressed here are those of the author and do not represent those of AusAID or the Commonwealth of Australia.

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1. Introduction

Recent studies have questioned the usefulness of categorising currency regimes based on government policy statements, as many currencies seem to deviate from their declared behaviours. The seminal work on this topic is that of Calvo and Reinhart (2002), who popularised the notion that while many governments declare the nature of their currency, the actual dynamics of the currency indicate that the true nature of the currency is not as specified. During the 1990s, currency regimes appeared anecdotally to trend toward the 'hard corners' of pegs and floats advocated by economists in the belief that intermediate regimes were unsustainable in the wake of increased international capital mobility. Fischer (2001) demonstrated the trend using the exchange rate regime declarations made by central banks to the IMF: between 1991 and 1999 the number of declared 'floating' regimes more than doubled to make up 42% (77) of the 185 currencies monitored and to become the most prevalent currency regime. However, the Calvo and Reinhart study showed that while many countries claimed to have a floating currency, there was evidence that central banks were still managing currencies to an extent that many could not be considered floating currencies at all. They described this as a 'fear of floating', caused by central bank concerns that a free market for the currency might introduce levels of exchange rate volatility that would negatively impact on economic performance.

A floating regime can be defined as one which is independent of exchange rate targets, and which is not used as an instrument for macroeconomic management. A floating exchange rate should be set by the market, and in its purest sense should have no form of government or central bank control exercised over it. In reality, many central banks, such as those of Australia and Japan, will intervene in the exchange

rate, and Calvo and Reinhart concede that a true float is 'an artifact of economics textbooks'¹. Perhaps in recognition of this, Calvo and Reinhart chose the Australian dollar as the benchmark for floating currencies – a float in which the central bank maintains some element of control, but this control is exercised only in situations of 'excessive' exchange rate volatility and it is arguable as to how effective this intervention is (Rogers and Siklos, 2003). The float makes up one of the two hard corners of exchange rate regimes, the opposite corner belonging to the hard peg or fixed exchange rate regime. In this case the currency is fixed to that of another country. The 'bipolar' view of exchange rate regimes became popular in the 1990s, leading to Fischer's finding that 66% of all currencies could be described as either a float or a hard peg in 1999.

However, the 'mid-range' of exchange rate regimes incorporates a number of options, and Calvo and Reinhart were motivated to write their paper by a suspicion that many countries were not completely committed to a corner option. Hard pegs are easy to monitor, and it is obvious when a country has adopted one. But floating currencies are more ambiguous and central banks do not typically make their interventions known to the market. Calvo and Reinhart use other techniques to find evidence of central bank management, finding that emerging market economies are particularly prone to a 'fear of floating'. As a result, studies relying on government classifications to define currency regimes may come to erroneous conclusions.

¹ Calvo and Reinhart (2002), p. 382

The desire to manage a currency is often predicated on assumptions that currency volatility is bad for trade. Frankel and Wei (1998), for example, observe that Europe pursued exchange rate stabilisation in order to promote bilateral trade. Fixed exchange rates are thought to eliminate price uncertainty, stimulating trade and investment and lowering the real interest rate (Levy-Yeyati and Sturzenegger, 2003). As a result, some researchers (N, V) argue that a more managed exchange rate may benefit emerging market economies, which are particularly reliant on foreign investment for technological development and growth (Meyer, 2004; Liu, 2002).

While the Bank of Papua New Guinea states that the kina is a floating currency, there is evidence that a soft peg is being maintained. Since the float, the peg appears to have been to the US dollar (Bowman, 2004) and it is likely that more recently it has moved to a combination of the Australian dollar and the US dollar (Section 3.1.1). Inflation has been a significant problem in the economy of Papua New Guinea, and some researchers (De Brouwer, 2000; Xu, 1999) have called for more formal dollarization, or 'aussification', as a way of 'importing' lower inflation, as is implied by the Barro-Gordon framework (Tavlas, 2003). However, it is not clear that a fixed regime will create the much desired outcome of increased trade. Frankel and Wei show that the trade effects observed in prior studies, that trade is lower in countries with volatile exchange rate regimes, seem to have been eliminated in the 1990s with the advent of greater international capital movement and more financial instruments with which to hedge transaction risk. Levy-Yeyati and Sturzenegger (2003) further find that emerging markets with less flexible exchange rate regimes experience slower rates of growth than those with floating regimes. While active currency management may improve exchange rate volatility, it may not create the desired outcome of increased

trade and resultant economic growth. Trade and growth is a priority for the Government of Papua New Guinea, and its interest in increasing trade is reinforced in its Export Driven Growth Strategy, currently being implemented, which includes a range of reforms aimed specifically at increasing export revenues.

The Bank of Papua New Guinea moved from a fixed peg to a (nominally) floating regime in October 1994. In the past, Papua New Guinea's central bank has exercised significant exchange conversion controls. These controls effectively stop the value of the kina from being dictated by market forces simply because, as King and Sugden, (1997) state, 'the day-to-day value of the kina is not market determined...the single largest player in the kina market is the Central Bank'². The IMF, in Article IV consultations with Papua New Guinea, observed that there was 'frequent intervention by the central bank' during a period of kina depreciation in 2002 (IMF, 2003). Other research also illustrates that in the past, the kina has not behaved much like a floating currency. Bowman (2004) uses a simple Frankel and Wei (1994) style OLS regression of the kina against other major currencies to find a weighting of 0.93 assigned to the US dollar, the type of result expected in a pegged regime. These observations make it seem less likely that the kina is behaving like a freely floating currency, but as Calvo and Reinhart did not include the kina in their study, it is useful to see if the kina conforms to their beliefs about a 'fear of floating' in emerging market currencies.

This study initially assesses the kina using the 'fear of floating' methodology, and contrasts its behaviour with that of the Australian dollar. It finds that there is evidence

² King and Sugden (1997), p. 24

that the kina has experienced some management in the past decade. But the climate in Papua New Guinea is changing: fiscal stability and a booming commodity market have created a promising climate for economic growth and development. The outlook for Papua New Guinea the best it has been in years. The current dismantling of exchange rate controls and the more controlled inflation environment is creating the climate for a less managed exchange rate over the next decade. Given that more recent studies of the relationship between trade and exchange rates are less supportive of previous beliefs that a stable exchange rate was a precursor for increased trade, it is possible that the kina will behave more like a float in future.

2. Method and Data

The study period used here for the Calvo and Reinhart (2002) analysis runs from January 1995 to January 2004 (the months immediately after the float of the kina have been omitted to allow for a 'settling in' period). Both Papua New Guinea and Australia have officially nominated floating currency regimes throughout this period. Monthly data is used for this study (when quarterly data, such as CPI data, is used, it is assumed to be constant over the three months of the associated quarter).

While official policy nominates the kina as a float, it is likely that the effects of exchange controls result in behaviour more akin to a managed float or soft peg. The Calvo and Reinhart methodology can be used to examine the behaviour of the currency and other macroeconomic indicators to see if government policy reflects the actual management of the currency. They propose a model of exchange rate management based on central bank credibility, pass-through levels and inflation targeting. They suggest that a lack of credibility is associated with higher variance in

risk premium shocks and inflation targeting manifests itself in interest rates. To demonstrate this, exchange rate, interest rate and reserve variability are examined. As per Calvo and Reinhart, IMF International Financial Statistics are used for each series. Exchange rates are monthly end-of-period bilateral exchange rates vs. the US dollar (IFS line AE, used as monthly percentage change), reserves are gross foreign exchange reserves minus gold (IFS line 1L.D, used as monthly percentage change), nominal interest rates are obtained from IFS line 60B (Interbank rates) and 60C (182 day T-Bill rates) for Australia and Papua New Guinea respectively, and consumer prices were obtained from IFS line 64 to deflate nominal interest rates.

In the second part of the analysis (3.1.1), the relationship between the Australian dollar, the US dollar and the kina is analysed for the period of January 2000 – January 2004. Monthly currency data is used, and was obtained from Datastream. Currencies for analysis are converted into a neutral currency (the Swiss franc).

3. Results

The Calvo and Reinhart 'Fear of Floating' methodology uses the Australian dollar as the benchmark for a floating currency, and it is used here for contrast with the behaviour of the kina. Calvo and Reinhart initially examine exchange rate volatility for evidence of activity designed to smooth or minimise currency fluctuations. Exchange rate volatility is likely to be lowest in countries with a highly managed regime, such as a hard or soft peg, while a floating regime is likely to be highly volatile as market forces, not exchange rate targets, set the value of the currency. Calvo and Reinhart determine that a managed currency has a greater probability of remaining within a volatility band, set by the authors at $\pm 2.5\%$, than a floating

currency. If the kina is being actively managed, it is expected that the monthly price movements are more likely to remain within the $\pm 2.5\%$ band than those of the Australian dollar. They show that the more managed the regime, the higher the likelihood of fluctuations falling within the $\pm 2.5\%$ band – their managed floating regime has exchange rate changes falling within the band around 87.5% of the time. They find that the average for a floating exchange rate is around 77% - higher than the Australian benchmark probability of 70%, and higher than the Australian results found here of 66.67%. Over this time period, the kina's probability of variance within the band is lower still (55.56%), and indicates a greater degree of volatility than that of the managed and pegged regimes - indeed, during this period the kina is more volatile than the Australian dollar. This evidence fits with the official assertion that the kina is a floating currency.

Further indications of government intervention can be extrapolated from the levels of foreign exchange reserves. The level of reserves gives some indication as to the degree of intervention by the respective central banks in the management of the currency, and more managed currencies are accompanied by a greater degree of fluctuation in the level of reserves as foreign exchange is bought or sold in attempts to manage the domestic exchange rate. Calvo and Reinhart find that a more managed a currency has a lower probability that reserves will fluctuate within a narrow $\pm 2.5\%$ band. Instead, reserves will be subject to greater fluctuations as central banks intervene in the currency market to stabilise their currencies. Some fluctuation is expected: reserves may fluctuate if their assets change in value or accrue interest, and Calvo and Reinhart note that changes in the value of New Zealand's reserves are a result of foreign currency debt management rather than exchange rate management.

Previous governments in Papua New Guinea have left significant debts that have been undergoing rationalisation, and improved fiscal management has resulted in a focus on debt reduction. It is likely that this explains some of the reserve movements: however, it is also likely that some of the reserve variance is caused by exchange rate management.

The Australian benchmark for reserve variance in the Calvo and Reinhart study is 50%, with some floating currencies experiencing much greater reserve stability (such as Japan, at 74%). The results found here for Australia indicate that perhaps slightly more government intervention has taken place during this period, with reserve fluctuations falling within the $\pm 2.5\%$ band only 45.37% of the time. Papua New Guinea, with reserves in the band only 25% of the time, is below that of Calvo and Reinhart's average floating result of 37.79%. This does not necessarily indicate great market intervention: as noted previously, it is possible that "original sin" has occurred and these changes actually reflect the management of foreign currency-denominated debt. Additionally, Calvo and Reinhart find an interesting anomaly: the average of the managed float currencies (39.2) is actually higher than that of the floating currencies (37.79), implying that floating currencies have less stable reserves than managed ones. However, they do show that those countries with the most stable exchange rates also tend to have the most volatile reserve holdings. Since the kina has more volatile exchange rate, coupled with more volatile levels of reserves, firm conclusions cannot be drawn at this point.

Evidence of monetary policy interactions can be found in nominal interest rates. If interest rates are being managed to stabilise the exchange rate, it is likely that they

will be more volatile than those not being used to manage exchange rates. The available rate most closely influenced by monetary policy is selected for examination: in the case of Australia, this is the Interbank rate, while in the absence of this the Papua New Guinea 182-day T-bill rate is used instead. Calvo and Reinhart find that while interest rates are most stable for limited flexibility regimes, this is not always the case in emerging markets. A lack of central bank credibility will result in volatile interest rates when expectations about inflation targets and exchange rate volatility incite negative investor sentiment. Evidence from Calvo and Reinhart (2001) indicates that interest rate variance is highest for emerging market countries with managed exchange rate regimes. If the kina is a soft peg or managed float, higher interest rate variance can be expected, while interest rate variance should be low in Australia as the central bank is credible and investors are unlikely to receive any nasty surprises. For interest rate variance, a band of $\pm 4\%$ is used, and Calvo and Reinhart find that floating regimes typically have a low level of interest rate variance. Notable outliers (Mexico, Peru) generate an average result of 8.52%, which is higher than the median of 2.8%, and in general it can be said that interest rate volatility is very low for floating regimes. Consistent with this story are the results for Australia –large interest rate fluctuations are non-existent (0%).

The results for Papua New Guinea indicate a greater level of interest rate variance (4.63%), higher than the median of the floating regimes and much higher than the benchmark set by Australia. This is, however, consistent with its status as a less developed country, as these countries are more likely to have higher interest rate variance. Real interest rates tell a similar story, with some movement outside the band (6.48%), while again the Australian real interest rate does not move outside the $\pm 4\%$

band during the study period. Calvo and Reinhart observe that the managed floating regimes have the most volatile exchange rates – and this category also contains more emerging market countries than other categories. If the Bank of Papua New Guinea is in fact trying to stabilise the exchange rate through domestic open market operations and is afflicted by a lack of credibility, as Calvo and Reinhart propose is the reason for interest rate volatility (and which is consonant with the argument of King and Sugden), then these results support the premise that the kina is behaving like an emerging market managed regime.

In general, the evidence is mixed. With high levels of exchange rate volatility, there does not seem to be government intervention in the currency. However, reserve levels are also volatile. While intuitively this may indicate government intervention in the currency market, there are other reasons why reserve levels may fluctuate, particularly given that original sin is likely, and no firm conclusion can be drawn from this despite reserve volatility being significantly greater than that of Australia and the Calvo and Reinhart floating average. Like emerging market managed floating currencies, both nominal and real exchange rates are volatile.

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rates are highly volatile. Further, Calvo and Reinhart show that a lack of central bank inflation targeting credibility can lead to both increased interest rate variance and increased foreign exchange volatility in emerging markets. They show that the change in the exchange rate can be described as

$$\sigma_E^2 = \frac{\sigma_S^2}{b^2 k^2}$$

where S is the variance of a random shock describing the risk premium, b represents the credibility of the inflation target, and k is a constant money multiplier. Under their assertion that the effects of risk premium shocks on the currency can be offset completely by setting nominal interest rates, the variance of the exchange rate is independent of the risk premium and is instead governed by the credibility of the inflation rate target. As credibility increases, or $b \rightarrow \infty$, $\sigma_E^2 \rightarrow 0$ so expected exchange rate volatility reduces. A lack of credibility in inflation targeting may explain the paradox of volatile reserves coupled with a volatile kina.

There are policy statements indicating that the Bank of Papua New Guinea may be inflation targeting. In a recent Monetary Policy Statement, the Bank of Papua New Guinea states that 'the Bank of PNG's objective of monetary policy is 'achieving and maintaining price stability' ... Stability in price is therefore taken to mean stability in inflation, which can be defined as low inflation attained over a reasonable period of time... Price stability requires steady movements in the exchange rate and other price variables.' (Bank of Papua New Guinea, 2005).

Inflation has been a problem for Papua New Guinea, and there has been considerable volatility in the headline rate over the last decade. Double-digit inflation has been experienced in several years (Figure 2), and investor uncertainty about inflation rates

is high. However, it is less likely that the monetary operations of the Bank of Papua New Guinea have sufficiently advanced to make a credible inflation targeting regime likely. Indeed, in the authors discussions with a variety of informed officials on a recent study trip, it became clear that the Bank of Papua New Guinea was most likely targeting stable exchange rates, and was unlikely to have moved on to effective inflation targeting strategies. This may change over time as the economy becomes more stable and fiscal management strengthens: in the meantime, it seems most likely that the operations of the central bank are focused on foreign exchange stability.

3.1.1. Currency Relationships

If the kina is being managed, how is this taking place? The most likely scenario is that the kina is being soft pegged to a foreign currency, and some believe that this is the Australian dollar. The recent economic assessment from the Australian Department of Foreign Affairs and Trade states that the kina 'tracks closely' the Australian dollar³. Previous research (Bowman, 2004) demonstrated that the value of the kina was determined to a large part by the US dollar between 1993 and 2003, with no evidence of a relationship with the Australian dollar. However, this period commenced prior to the floating of the kina, and more recent activity may have changed this situation. From a visual inspection of nominal price movements in the kina and the Australian dollar (Figure 1) it appears that a 'parting of ways' took place in 1998, and the kina has devalued significantly against both the US dollar and the Australian dollar. A more robust analysis of the more recent period of currency management is useful to

³ DFAT, 2004 p. 27

assess the likelihood of currency management in the light of the 'fear of floating' findings.

Monthly currency series show that the relationship between the Australian dollar and the kina is likely to have strengthened over the last 5 years. Correlation statistics (Table 2) show that the kina is highly correlated with both the Australian dollar and the US dollar (as the kina is a much less traded currency, assumptions about causality can be made confidently). The US dollar is more strongly correlated with the kina, at 0.78, while the Australian dollar is somewhat less correlated at 0.29. This supports the findings of Bowman (2004) that the US dollar is the currency with the strongest relationship to the kina, although unlike the findings of Bowman, the Australian dollar is now taking a role in determining the value of the kina. The kina is also significantly cointegrated (Johansen and Juselius, 1990) with both currencies at 1%, with two lags for the Australian dollar and four for the US dollar. This finding has much intuitive resonance, and indicates significant long-run relationships with both currencies (although it does not give an indication of the relative importance of either currency to the value of the kina).

Additionally, Frankel and Wei (1994) style regression tests (Table 3) indicate that the Australian dollar now has a weighting in the kina's currency basket, although it should be noted that the R^2 measure of fit is not strong (0.27). The findings of the Frankel and Wei regression over this time period support the results of the correlation tests, with the weighting of the US dollar in the kina's currency basket (β_1 , 0.57) larger than that of the Australian dollar (β_2 , 0.29). Again this test demonstrates that

there is now an Aussie influence on the kina's behaviour, but it is still dominated by the US dollar.

It is likely that the composition of any basket peg changes over time in response to changing monetary policy. When a range of periods are examined, the Frankel and Wei regression is found to strengthen considerably during some periods. It appears, for example, that there was a period of much tighter currency management between June 2001 and January 2004, where the regression R^2 measure of fit was strong (0.52), a result seen in basket pegged regimes (Table 4). During this time, the US dollar was dominant (0.82) and these results certainly indicate that the Bank of Papua New Guinea is not pursuing a "hands-off" management strategy. This raises a very important issue for those interested in the Papua New Guinea business environment: how predictable is the value of the kina? Certainly it appears that very accurate kina forecasts should be possible with the appropriate models. This is left as an avenue for further study.

The evidence here shows that the kina was both correlated and cointegrated with the US dollar and the Australian dollar over the most recent five year period. It is fairly clear that the US dollar remains the dominant currency over this period. There is no evidence that the kina 'tracks' the Australian dollar 'closely'.

4. Conclusion

Like many emerging market 'floating' currencies, it appears that the Papua New Guinea kina does not behave exactly as described by official policy. Just as Calvo and

Reinhart chronicled a 'fear of floating' in many emerging market currencies, it appears that the kina may be afflicted with the same fear. This will not be a surprise to most engaged in research on the kina, as exchange controls have always meant that the price of the kina could not be set purely by market forces. The evidence here suggests that the kina may be better described as a soft peg, and is perhaps afflicted by a lack of central bank credibility. This scenario is not uncommon in countries of similar structure – in fact, the findings of Calvo and Reinhart indicate that this is perhaps the norm.

It seems clear that there is some currency management continuing, and that this is based on the value of the US dollar and the Australian dollar. This makes sense – Australia continues to be a major trading partner for Papua New Guinea, and as a major mineral exporter, much of Papua New Guinea's exports and imports are likely to be denominated in US dollars. As the Bank of Papua New Guinea moves to lift currency conversion controls, it is possible that the characteristics of the kina may change further, and more closely resemble those of a floating currency. It will be interesting to re-evaluate the influences on the value of the kina once this occurs.

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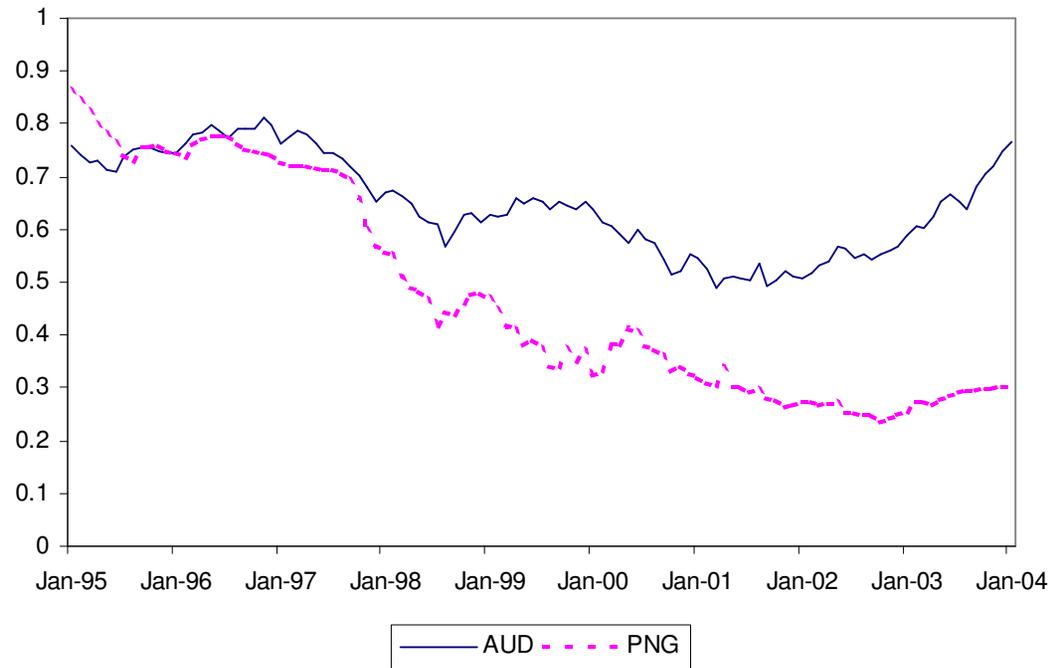
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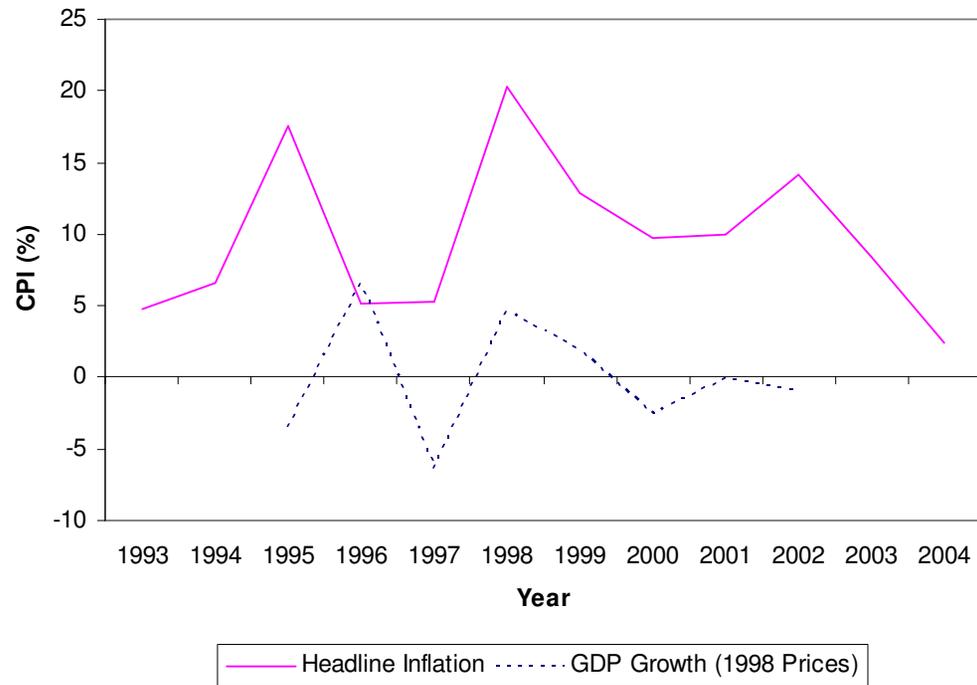
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Figure 1: Australian Dollar and Papua New Guinea Kina Nominal Price Movements 1995 – 2004 (in \$US)



Source: IMF International Financial Statistics

Figure 2: Papua New Guinea Headline Inflation and Real GDP Growth (Annual), 1993 – 2004



Source: Bank of Papua New Guinea

Table 1: Volatility of Selected Indicators

Country	Period	Prob(monthly % change within a $\pm 2.5\%$ band)		Prob(monthly % change $> \pm 4\%$)	
		Exchange Rate	Reserves	Nominal Interest Rate	Real Interest Rate
Australia	January 1995 – January 2004	66.67	45.37	0	0
Papua New Guinea	January 1995 – January 2004	55.56	25.00	4.63	6.48

Notes: Period runs from January 1995 – January 2004 inclusive. Monthly data were obtained from IMF Financial Statistics.

Table 2: Cointegration and Correlation Statistics

		PNG Kina	
		Correlation	Cointegration
January 2000 – January 2004			
	AUD	0.2927	32.03** ^B
	USD	0.7795	21.02** ^A

^A Intercept (no trend), 4 lags

^B Intercept and trend, 2 lags

** Significant to 1%

Notes: Statistics for monthly nominal currency series, all currencies denominated in Swiss francs.

Table 3: Regression Statistics

		α (t-statistic)	β_1 USD (t-statistic)	B_2 AUD (t-statistic)	R^2	DW
January 2000 – January 2004						
	PNG Kina	-0.0027 (-0.39)	0.6758 (2.69)	0.2357 (1.06)	0.24	1.98

Notes: Statistics for monthly nominal currency series, all currencies denominated in Swiss franc. Calculations made in logged differences as per Frankel and Wei (1994). It is clear that the US dollar retains a dominant role in the currency basket, reinforcing the findings of correlation analysis. The R^2 line of fit is not as strong as is often the case in currencies declaring a pegged exchange rate. While management may be taking place, it is likely to be less than that which occurs in a formally pegged regime, resulting in a weaker line of fit. Durbin-Watson statistics indicate that the analysis is robust to autocorrelation.

Table 4: Other Horizons Regression Statistics

		α (t-statistic)	β_1 USD (t-statistic)	B_2 AUD (t-statistic)	R^2	DW
June 2001 – January 2004						
	PNG Kina	-0.0025 (-0.42)	0.8184 (3.39)	0.2490 (1.30)	0.52	1.90

Notes: Statistics for monthly nominal currency series, all currencies denominated in Swiss franc. Calculations made in logged differences as per Frankel and Wei (1994). This period significantly reinforces evidence that the kina may be a pegged regime. The R^2 line of fit is strong, and indicates significant management during this time. Again the US dollar is the dominant currency, and its dominance appears to have increased during this period. Durbin-Watson statistics indicate that the analysis is robust to autocorrelation.

