

THE DEMAND FOR INTERNATIONAL RESERVES IN NAMIBIA

by

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Abstract

Central banks hold the nation's stock of international reserves for meeting trade related transactions, meeting short-term debt repayment obligations and as a precaution against any unexpected capital outflows. This paper reviews the reserves situation in Namibia as a member of the Common Monetary Area and investigates the main determinants of reserves holding. Among others, the paper concludes that the current level of reserves held is inadequate. It also establishes that trade related obligations are the most important determinants of reserves holding in Namibia.

1. Introduction

The subject of foreign reserves build-up is receiving renewed global interest among policy makers and economists against the backdrop of increasing globalization of economies, integration of financial markets, and the financial and currency crises of the 1990s. There is no unique definition of foreign reserves due to different views in terms of coverage of items, ownership and liquidity of assets. However, for policy and uniformity purposes, most countries around the world adopt the definition by the IMF. Accordingly, foreign reserves refer to external assets that are readily available and that are controlled by monetary authorities for direct financing of external imbalances. Four types of assets qualify as reserves: official holdings of gold, special drawing rights (SDRs), convertible foreign exchange and the unconditional drawing rights with the IMF (the country's foreign position in the Fund). Further, reserves should possess two major qualities. First, if the authorities are to use it for financing of payments imbalances, they must be acceptable at all times to foreign economic units. Secondly, their value must be expressed in foreign units and should be known with certainty.

Many economists believe that the idea for a country to hold lots of reserves is partly a hangover from the Breton Woods system, when it was expected from central banks to defend their currency pegs against the dollar by intervening to smooth the exchange rates. However, the demand for reserves continues to rise at steady pace, even though most countries have shifted away from fixed exchange rates to more flexible exchange rates including the freely floating exchange rates.

¹ The views expressed in this paper are mainly the author's and not that of the Bank of Namibia.

Global reserves holdings are on an increasing trend and were equivalent to 17 weeks of imports at the end of 1999, six per cent of global GDP, (3.5 times what they were at the end of 1960) and 50 per cent higher than in 1990 (Robert Flood and Nancy Marion, 2002). As discussed above, there seems to be little evidence that a country's need for reserves depends to any great extent on its exchange rates arrangement.

Namibia is a small open economy with its exchange rate pegged to the Rand and is also a member of CMA that allows free flow of capital among member countries. The Rand, to which the Namibia Dollar is pegged, is not stable. It went through a volatile period over the last few years with its worse volatility experienced in the second half of 2001 when the Rand depreciated by about 40 per cent against the major currencies.

Notwithstanding the uncertain long run relationship between countries' need for reserves holdings and their exchange arrangements, a high quantity of reserves is necessary for an open economy like Namibia for the country's overall macroeconomic policies, for the assessment of the credit agencies of a country's creditworthiness, to honor external debt obligations and to defend her in the event of untimely capital flights.

However, there is an overall economic cost involve in holding reserves. The cost of holding reserves is the investment that nations must forego in order to accumulate reserves. Moreover, the large reserves held by many emerging markets and developing countries are mostly borrowed reserves and their acquisition involves substantial cost on the borrowing countries. This cost is more of an opportunity cost in foreign earnings forgone or borrowing cost incurred for holding reserves.

Thus, the main objective of this study is to explore the main determinants of reserves holding in Namibia.

The study is divided into six sections as follows: Section 1 is the introduction. Sections 2 attempts to provide a rationale for the build-up of reserves in the case of Namibia.. Section 3 will focus on the concept of reserve adequacy. Section 4 explores, using econometric analysis, the determinants of the demand for reserves in Namibia. In Section 5 we provide the conclusion to the study

2. Why does Namibia need to build up her foreign reserves?

The decision to hold reserves, and in what quantities, is always a difficult cost-benefit trade-off particularly for a developing economy.² Historically, countries have held foreign currency reserves to support the exchange rate system. Most often, reserves are used to intervene directly in foreign exchange markets to influence the exchange rate. However, with many countries moving to a floating exchange rate arrangement, monetary policy has also shifted away from direct intervention in the foreign exchange market to influence the level of the exchange rate.³ Why would developing countries continue to hold substantial reserves in view of this finding?

The need to hold reserves in a floating arrangement is dictated by the fear that foreign exchange market liquidity could in the face of certain extreme shocks contract dramatically. When this occurs, the contraction of liquidity in the foreign exchange market could have significant potential to damage users of the market and initiate unstable exchange rate behavior. Thus, one could conclude by saying that foreign exchange market intervention could still be undertaken by central banks irrespective of the exchange rate arrangement to maintain liquidity and hence guarantee convertibility. Secondly, it could be undertaken to restrict movements in exchange rates that are due to any dynamics initiated by liquidity problems. Thus, holding reserves to limit external vulnerability during times of crises or when access to borrowing is reduced will help to reduce shocks.

² The foreign currency that a country must hold in foreign reserves is money that cannot be spent on health, education, or on physical infrastructure or on the promotion of private investment.

³ Sterilized interventions, as an independent tool, have been found to have very little effects on exchange rates except where they are combined with monetary policy (Greenspan, 1999)

For countries in a fixed exchange rate arrangement, holding foreign reserves to defend the values of their currency is still a valid practice. This is more so for the so-called hard pegs as exemplified by a currency-board arrangement. This arrangement requires the backing of domestic currency fully by external assets. A currency crisis could be a nuisance in this arrangement. If a country backs its currency with foreign reserves, then theoretically, anybody can go to the central bank and get her domestic currency exchanged for the foreign currency at the pegged exchange rate. Because the holder of the domestic currency is assured of receiving the "more stable" foreign currency, she is not under any stress to change her currency. The moment people begin to suspect that the government no longer has enough reserves to support the pegged exchange rate, they may want their money in the reserve currency and a crisis will ensue. This could precipitate a real currency crisis as people exchange their domestic currency for the foreign currency. A currency board is credible only if a country's central bank holds sufficient official foreign exchange reserves to cover at least its entire monetary liabilities, thereby assuring financial markets and the public at large that every domestic-currency bill is backed by an equivalent amount of foreign currency in the official coffers. Demand is higher for a "currency-board currency" than for currencies without guarantees because holders know that, come rain or sunshine, their liquid money can easily be converted into a major foreign currency. Suppose the existing exchange rate is 1:1 and government cannot fulfill everyone's request at this rate, people will not be willing to hold the domestic currency or may be willing to do so only at a discount. This could trigger off a real crisis e.g. Thailand, 1997, Argentina, 2002. Countries like Namibia must hold substantial quantities of reserves to enable them cope with the possible occurrence of a balance of payments shock (which could occur as a result of adverse weather conditions resulting in higher than normal food imports) and support its existing exchange rate regime (an obligation it must fulfill by virtue of its membership of the CMA arrangement).

Slightly related to the above reason for holding reserves is the observed volatility of exchange rates, a phenomenon that has become more pronounced with financial globalization. This has spilled over to the fluctuations of the Rand which is

Namibia's peg currency. The globalization of financial markets has posed serious challenges to the management of the foreign reserves and the exchange rate of SA as an emerging market. That globalized financial markets expose countries to deficient economic policies in other countries is no longer in doubt. Moreover, problems experienced in other countries could have contagious effects even in relatively healthy economies (see box article). The debate on the phenomenon of international financial contagion is rife in both the academic literature and the popular press (Karolyi, 2003). The debate relates mostly to the existing evidence on co-movements in international asset prices, on the growth and volatility of international capital flows and on the relationship between flows and asset prices. It is very difficult for a developing economy to maintain exchange rate stability in the present environment of world-wide floating exchange rate regimes. A policy aimed at maintaining exchange rate stability in these circumstances will require an unreasonably large amount of official foreign exchange reserves. The willingness of global investors to hold claims on emerging market economies in recent years because of the fluctuations in the yield on their instruments has continued to wane. This is particularly so with countries operating a fixed or pegged exchange rate system. Relatively large holdings of foreign reserves in this system create international confidence in a currency. Although Namibia is not strictly classified as an emerging market, the tying of her currency to the SA Rand and its trade relations with SA exposes her to the vagaries of the SA financial markets. The adverse developments in the Asian financial markets in 1998 spilled into the South African market depressing real economic activity in the country. In both the third and fourth quarters of that year, South Africa experienced declines in total economic activity. Though short-lived, the financial globalization and South Africa's participation in the process, therefore, had a negative or adverse effect on the South African economy⁴ and by association the Namibian economy. This is a compelling reason to build sufficient reserves.

⁴ For instance, the yield on long-term government bonds increased from below 13 per cent in April 1998 to over 20 per cent in September 1998, the outflow of capital forced a depreciation of the rand against foreign currencies of about 20 per cent, short-term interest rates including the prime and mortgage rates increased from about 17 to 25 per cent and the rate of inflation increased from 5 per cent in April to about 9.5 per cent in November of the same year.

The structure of Namibia's foreign trade is another factor that dictates a more active concern about the level of its foreign exchange reserves. Close to 70 per cent of Namibia's exports consist of minerals out of which diamonds account for close to 80 per cent. Any changes particularly in the price of diamonds impact on the economy's reserves. In addition, nearly 75 per cent of the remaining merchandise exports consisting of agricultural (food and live animals), manufacturing (mainly fish processing), and other primary commodities (mainly non-precious metals) are subject to fluctuating internationally determined prices. The prices of these goods are to a large extent determined on international commodity markets, either directly or indirectly by means of contract prices based on developments in international commodity prices.

Moreover, about 15 per cent of Namibia's imports consist of consumer goods, whereas imports of capital and intermediate goods are responsible for the remaining 85 per cent. For a developing economy, this should be expected as capital goods are needed for development purposes. As the economy grows, an upturn in imports should be the norm. Furthermore, Namibia is a very open economy. Its openness index currently put at about 98 percent ranks among the highest in Africa. In view of the relative importance of foreign trade, developments in the international business cycle may at times adversely affect domestic policy objectives, hampering in particular the effective management of foreign reserves. This structure of Namibia's trade and the requirement for development dictate that both the level of its foreign reserves (to support growing imports even in the face of uncertainties in export prices) and the management of the reserves (given that excessive holding of reserves have a real cost to the economy given growth considerations) dictate that the central bank should be interested in the build-up and effective management of reserves.

The occurrence of "leads" and "lags" in the foreign exchange market is another reason for the build-up of reserves by the central bank. "Leads" are advance payments for imports to avoid the risk of having to pay more local currency if the local currency depreciates. "Lags" involve the slowing down by exporters of foreign

receipts based on the expectation that, if the currency depreciates, the transfer of proceeds at a later stage will realize larger local currency receipts. Leads and lags affect foreign reserves through an increase in their average length or by an increase in the amount of foreign trade to which they are applied. An increase in the average length of leads and lags or in the amount of trade to which they apply increases the demand for foreign reserves of importers and reduces the supply of foreign exchange by exporters. A shortening of the average length of leads and lags or a reduction in the amount of trade to which they apply reduces the demand for foreign exchange and increases its supply. A country's foreign reserves may be materially influenced by leads and lags in foreign payments and receipts. One major cause of leads and lags in foreign payments and receipt is expectation of changes in exchange rate. Where such expectations become self-fulfilling, the cumulative impact on a country's foreign reserves could be substantial. It is highly speculated that the behavior of the NAD and ZAR in recent years may have generated a built-in tendency on the part of importers and exporters to take undue advantage with attendant effect on reserves.

One constraint of the current exchange rate arrangement is the limitation it places on the ability of government to borrow to finance its programs. When the government runs a deficit without an option to print money to finance such deficits, it must resort to debt financing. Neither foreign borrowing nor domestic borrowing has mild effects on foreign reserves. External debts are denominated in foreign currencies and spending reserves to pay for such debts when they fall due, deplete the level of reserves. On the other hand, when domestic debt is spent on government imports, it also drains foreign reserves. Having used some of her money to pay for debt, government will not have adequate foreign reserves and this might precipitate a currency crisis. Where government finds it increasingly difficult to balance its budget, it must think of a way to build up its reserves to safeguard the value of its currency. A currency crisis that leads to a devaluation could have untold hardships on the people.

3 Reserve adequacy

The level of the adequacy of reserves varies from country to country. This is brought by the fact that different countries have different exchange rate systems and variant access to financial markets. Studies on reserves adequacy dates back 50 years ago. These studies have revolved on three main measures of Reserve Adequacy which are classified as follows: Import Based Measures, Money Based Measures, and Debt Based Measures, these three measures are discussed below.

Import-Based Measures of Reserve Adequacy

The basis for using reserves in months of import of goods and services is to determine the number of months that a country can continue to support its import needs assuming that other inflows and outflows ceases. This measure is useful to gauge the vulnerability of countries especially with limited access to capital markets. It should be noted that the main focus of reserve in months of imports is on the current account. Appropriate level of reserves cannot be determined without reference to the capital account. For instance recent studies have revealed a weak relation between reserves over imports and the occurrence of depth of the crises in recent periods of financial turmoil. It is therefore imperative to measure reserves against some monetary aggregates and external debt.

Money-Based Measures of Reserve Adequacy

This indicator uses the ratio of reserves to broad money. Money based indicators provide a measure of resident-based capital flight from the currency, i.e. measure the potential impact of a loss of confidence in the domestic currency. This measure is useful where the banking sector is weak, and where there is risk of capital flight. Money-based indicators however suffer from a number of drawbacks. In economies with stable demand for money, domestic money demand tends to be larger and thereby resulting into a small money ratio. A sizable money stock in relation to reserves suggests a high potential for capital flight; however this does not necessarily predict actual capital flight well. In addition these indicators do not take into account the potential for residents to shift out of short-term debt of the public

sector into foreign assets, or of residents taking derivative positions in exchange rates in relation to the monetary authorities. Because of these shortcomings, a measure that takes into account short-term debt was therefore suggested.

Debt-Based Measures of Reserve Adequacy

This measure compares the reserves to the maturity of the remaining short-term debt. The essence of this measure is to evaluate the risks associated with adverse developments in international capital markets. Short term external debt by remaining maturity measures all debt repayments over the coming year, and thus it is a useful measure of how quick a country would be forced to adjust if it were cut off from external borrowing facilities. Different studies have concluded that debt to reserve is the single most important indicator of reserve adequacy in countries with significant but uncertain access to capital markets. A smaller reserves to short-term debt ratio is associated with a greater incidence and depth of financial crises.

Using these measures, we have attempted to gauge the level of adequacy of Namibia's reserves below. For purposes of comparison, we have also provided information on reserves holding for other members of the CMA

Table: 2.1 Imports cover (reserves/imports)

	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99
Botswana	89.05	99.53	104.82	120.48	139.42	127.59	151.33	130.59	129.65	149.01
Lesotho	5.60	7.37	9.11	15.12	22.93	24.01	23.93	29.01	35.18	33.25
Namibia	3.33	2.68	2.01	5.85	8.81	7.42	6.59	8.07	9.33	11.37
South Africa	2.85	2.48	2.61	2.65	3.75	4.80	1.63	7.58	7.74	12.38
Swaziland	16.99	12.47	18.57	15.75	16.66	14.04	11.32	12.87	16.15	17.12

From Table 2.1 above it can be noted that South Africa and Namibia's reserves were below the acceptable benchmark of three months of import cover. Their reserves levels are therefore inadequate when one uses the single import cover measure of adequacy. On the other hand, Botswana Lesotho and Swaziland have done very well on this front.

Table 2.2 Reserves Assets as a ratio to Broad Money (Reserve/M2)

	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99
Botswana	4.0	3.4	3.2	4.7	4.9	4.8	5.2	5.0	4.4	4.0
Lesotho	0.3	0.5	0.6	0.9	1.3	1.5	1.5	1.8	1.8	1.8
Namibia	0.1	0.1	0.1	0.1	0.2	0.2	0.1	8.2	0.2	0.2
South Africa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Swaziland	0.9	0.6	0.9	0.8	0.9	0.9	0.8	0.8	1.0	1.0

From Table 2.2 above, Namibia's international reserves for the years 1990 to 1993 and 1996 covered only 10 percent of broad money (M2). However this has increased slightly to 20 percent in 1994, 1995, and 1997 to 1999.

Table 2.3 Reserves as a ratio to Short term external debt (Reserves/short term debt)

	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99
Botswana	574.4	-	-	525.3	393.0	460.3	838.0	141.9	802.8	319.7
Lesotho	25.9	-	-	43.6	50.4	57.8	57.6	72.4	72.8	67.5
Namibia	0.1	0.1	0.1	0.4	0.6	0.5	0.4	0.7	1.3	1.7
South Africa	0.2	0.2	0.2	0.1	0.2	0.3	0.1	0.4	0.4	0.5
Swaziland	47.1	-	-	34.8	31.6	25.1	121.0	1.9	12.7	7.1

From Table 2.3 above, and for Namibia, Reserves as a ratio of short term external debt was very low between 1990 and 1997 covering between 10-70 per cent of short-term external debt. However, this has improved over time to reach above 100 percent since 1998 although there was a steep decline in 1999. One notable development here is that the ability to cover STED actually depend on the borrowing habit of government. Government short-term external debt declined considerably especially since 1996. Recent developments, however, point to the contrary and this may have implications for reserves.

Establishing a benchmark for Reserve Adequacy in Namibia.

Namibia is a member of the CMA, and hence the Namibia Dollar is pegged at parity to the South African Rand. Of relevance to Reserve Adequacy is Article 4, of the bilateral agreement between the Bank of Namibia and the South African Reserve

Bank, which requires the Bank of Namibia to maintain a reserve equivalent in form of Rand assets and freely usable foreign currencies against the aggregate amount of Namibia Dollar currency issued by the monetary authority. This therefore is the first benchmark of reserve adequacy as prescribed by the CMA.

However this is not sufficient in the context of our study. There is a need to develop a composite measure of reserve adequacy that will take account of Namibia's membership of the CMA and her other reserves needs. The ratio of reserves to short-term external debt has recently received attention in attempts to find a single benchmark that countries should satisfy in order to minimize their vulnerability to a financial crisis. This is supported by recent studies of the IMF which found that the ratio of short-term debt over reserves preceding the financial crises period explains a significant part (32 per cent) of the crises than the imports cover ratio (0.088 percent) or money ratios (0.0406 percent).

In addition to the stock of short term external debt, we need to also take into account various factors that serve to enhance or mitigate the need for reserves. We therefore enhance the stock of short term external debt with the stock of currency in circulation (CIC), to take into account the reserve backing requirements as prescribed in the CMA agreement. We then add to this an estimate of potential capital outflow. The essence of the latter is that residents will require domestic liquidity to enable them to purchase the foreign currency that latter will engender capital flight. It becomes logical to assume that a certain fraction of broad money supply provides a potential for capital flight.⁵ Any form of "internal drain" will affect reserves. Two categories of "internal drain" can be identified. The first is over-invoicing of imports where the domestic monetary authorities pay for artificially higher reported imports. Second, and more relevant for our situation, where foreign currency deposits constitute part of broad money and their withdrawal may affect

⁵ Not all forms of capital flight affect M2 or official reserves. For instance the transfer of foreign currency assets which in the first instance are foreign assets will not affect reserves. The non-repatriation of profits earned abroad characteristically called under-invoicing of exports will not affect reserves as these are not converted into domestic currency.

reserves. This would be the case in co-circulating currencies such as the Namibian dollar and the South African Rand.

It has to be noted that it is difficult to determine the actual amount of the country's broad-money supply to take as a buffer against domestic capital flight. In this example we assume that the fraction of domestic money to be covered by reserves is between 10-20 percent of M2. This is based on the Reserves/ M2 ratio over the last ten years, which falls within 10-20 percent.⁶ We therefore include this in our formula.⁷

The final element of the benchmark is to complement the short-term external debt, the currency in circulation and capital flight with the assumption that capital will leave a country based on the riskiness attached to that country.⁸ This information is captured by the country's risk index. To incorporate this element, we adjust the fraction of M2 (between 10-20 percent) for an index of Namibia's country risk. We use the Economist's country risk index (CRI), which takes into account 77 different indicators ranging from monetary, fiscal and political stability. This index is expressed in a scale of 0-100, where 0 refer to less risk, while 100 refer to more risk. The calculations based on these formulas are given by the table below.

Table 2.4 Estimated Adequate and Actual Reserve for Namibia. 1996-2001.

Year	1.STED	2.CIC	R%M2	CRI	ADEQUATE RESERVES	ACTUAL RESERVE S	RESERVES-CIC/Imports Weeks
1996	2041.5	452.4	667.6-1335.2	0.40	2497.70-2497.78	907.7	3.56
1997	1628.4	529.3	718.5-	0.39	2501.60-	1219.0	4.74

⁶ This average may actually be underestimated . For instance, Reserves/M2 ratio for 2001 and 2002 stood at 26.4 and 26.7 respectively.

⁷ The 10-20 per cent benchmark could also be established using the errors and omissions item in the balance of payments as a ratio of M2 over a period of say 10 years. One common measure of capital flight is the "errors and omissions" item in the balance of payments. For Namibia we found that this has oscillated between 5.1 and 41.4 per cent between 1990-2002. The 41.4 per cent figure for 1990 is an outlier value. Most figures were between 5.4-14.5 per cent. This enables us to establish the floor and ceiling. .

⁸ The assumption here is that the likelihood of capital flight is more entrenched in a country's risk index.

			1436.9		2505.50		
1998	1150.5	522.5	795.4- 1590.8	0.40	1677.00- 1681.00	1528.4	6.35
1999	1063.1	696.1	957.9- 1915.8	0.42	1763.40- 1767.60	1877.1	7.19
2000	1803.1	660.5	1079.8- 2159.7	0.44	2498.10- 2502.50	1985.6	6.93
2001	1318.6	787.3	1153.8- 2307.6	0.47	2110.60- 2115.30	2704.0	8.11

Where: STED= Short Term External Debt, CIC=Currency in Circulation, R%M2=Reserves as a percentage of M2, CRI=Country Risk Index for Namibia obtained from the Economist's country risk index report..

From Table 2.4, given the stock of short-term external debt and actual reserves, it is clear that for the period 1996-2001, Namibia's level of international reserves cannot be said to be adequate to withstand an externally induced financial crisis.⁹ To complement this we also provide adequacy estimates (last column table 2.5) based on import coverage after making allowance for currency coverage under the CMA agreement. Again, the requirement that we be able to cover at least 12 weeks of import is grossly violated.

4. Determinants of the demand for International Reserves.

The analysis in this section attempts to model the major factors that influence the holding of international reserves following the popular approaches adopted by researchers in this field. From the analysis undertaken in the previous sections, three major elements stand out as important considerations in a decision to hold international reserves. These are, the need to hold reserves to finance trade, the requirement to meet payment obligations on external debt when they fall due and the vulnerability of a country to crisis. While these considerations should ordinarily determine the amount of reserves held by a country, it should be borne in mind that

⁹ For most years, the upper bound for adequacy was not satisfied. This is important for our case since the ratio of reserves to M2 is lower than the actual level which in most cases. .For instance in 2001, 2002 it is 29.

holding reserves comes at a cost particularly for a developing country which has alternative uses of funds. Two of the costs commonly identified by central banks are the opportunity cost of holding reserves and the adjustment cost that is incurred whenever reserves reach some threshold.

The oldest model of reserves holding, the buffer stock model, takes the view that central banks should choose a level of reserves to balance the macroeconomic adjustment costs incurred in the absence of reserves with the opportunity cost of holding reserves. This model assumes that reserve holdings should be a stable function of the adjustment cost and the opportunity cost of holding reserves. The adjustment cost stems from the fact that some output or welfare is foregone by having to take some costly policy measures to restock when reserves hit their lower bound. Thus, when reserves hit some lower bound, it sends a signal to the central bank and the frequency (variability) with which this occurs precipitate some adjustment costs.

The issue of variability has been tackled in a number of ways. Generally, there is reasonable consensus among researchers that the demand for reserves is positively associated with the fluctuations in the level of reserves. In this study we have measured volatility as the standard deviation of the trend adjusted par values of reserves.¹⁰ Higher volatility means that reserves hit its lower bound more frequently and the central bank should therefore be prepared to restock a larger amount of reserves in order to incur the cost of restocking less frequently.

The volatility of the effective exchange rates has also been tried in many empirical works ((Flood and Marion, 2001, Disyata and Mathieson, 2001). The exchange rate regime a country pursues could be a crucial determinant for the demand for reserves. Greater exchange rate flexibility should reduce the demand for reserves since central banks no longer need a large reserve stockpile to maintain a peg or

¹⁰ Other measures of volatility using reserves include the mean absolute first difference of the trend-adjusted par values of reserves and the variance or standard deviation of the residuals obtained from estimating a first-order autoregressive process for the change in reserves We have used the standard deviation here because of the availability of daily measures of reserves since 1998.

enhance the peg's credibility. Conversely, countries, like Namibia, with fixed exchange rate arrangements must be prepared to hold more reserves to maintain the peg. Thus the co-efficient on exchange rate volatility should be positive since greater exchange rate rigidity should be associated with larger reserve holdings.

Beyond this, however, a higher stock of reserves which reduces the probability of having to adjust and thus reduces the expected cost of adjustment, comes at the cost of a higher foregone earnings. Optimal reserve holdings will involve finding a cost-minimizing level of reserves to hold once reserves have reached a lower bound. This implies that the rate of return on reserves had to be compared with the social return on capital proxied in many economies by a rough average of long-term yield on government bonds.¹¹ Generally, the buffer stock model of reserve holdings is specified as in equation 1. The model states that optimal reserve holding (R) increases with the volatility of reserves (σ), and decreases with the opportunity cost of reserves (r).

$$\log R = a_0 + a_1 \log (\sigma) + a_2 \log r + u \dots (1) \text{ where } u \text{ is an error term.}$$

Other variables have been identified that may affect the reserve holding behavior of central banks. For instance, there is reasonable consensus among researchers that the demand for reserves is also positively associated with the fluctuations in the balance of payments. Heller (1966) argued that in the absence of reserves, any temporary shortfall in the balance of payments would have to be corrected through a reduction in aggregate expenditure. Frenkel (1983) used as a surrogate for openness, the propensity to import of the economy and hence its vulnerability to external shocks. Thus, they posited that since a more open economy is more vulnerable to external shocks, greater openness will be associated with higher reserve holdings. In addition to the ratio of import to GDP, we have included a measure of openness defined as the ratio of exports plus imports to GDP as

¹¹ There is no consensus among researchers on what should be an appropriate opportunity cost for holding reserves. Among others, per capita income (capital is assumed to be scarce in developing countries and hence opportunity cost of holding reserves higher), net foreign indebtedness, government bond yield, treasury bill rate, and the spread between government bond yield and the treasury bill rate. The last two reflect the fact that reserves also generate investment income.

explanatory variables in this model. One other variable included by researchers is the real value of public debt to official creditors (Eaton and Gersovitz (1980)).¹²

The final form of the equation tested is as specified in (2) below.¹³

$$\log R_t = a_0 + a_1 \log (\sigma_t) + a_2 \log r_t + a_3 \log x_t + a_4 \log m_t + a_5 \log \sigma_{e_t} + a_6 \log R_{t-1} \dots (2)$$

where

R = international reserves,

σ = volatility of reserves

r = government bond yield

x = openness index

m = imports

σ_e = exchange rate volatility

R_{t-1} = lag of international reserves

The results reported below shows that the main determinants of reserves holding by the central bank are the economy's propensity to import, the openness of the economy, the opportunity cost of holding reserves proxied by the government bond yield, and the previous period level of reserve. The two measures of volatility are positively related to the level of reserves held though they came out insignificant in the regression. More importantly, the real effective exchange rate volatility index is positively related to the level of reserves indicating that volatile exchange rates do affect the demand for international reserves.

$$\text{Log } R_t = 5.980 + 0.0368 \sigma_t - 0.339r_t + 0.176x_t + 0.151m_t + 0.184\sigma_{e_t} + 0.634 R_{t-1}$$

(0.545) (-1.953) (1.879) (1.886) (0.455) (6.399)

$$R^2 = 0.75 \quad D. h \text{ stat} = -2.817 \quad LM = 41.803 \quad F \text{ Stat} = 25.1$$

We have reported the Durbin h stat because of the inclusion of the lagged dependent variable among the explanatory variables as this will tend to bias the DW stat towards 2. The reported Durbin h stat is less than the tabulated stat of 1.645

¹² The non-availability of monthly data on public debt precluded us from the use of this variable in our analysis.

¹³ The inclusion of the lagged dependent variable posits an error correction framework since expectations are revised by a proportion of the most recent error. This we think explains the behavior of a rational central bank given the need to balance adjustment costs and the opportunity cost of holding reserves.

(one tailed test). We have reported the LM test results showing that the calculated value of 41.803 is less than the tabulated value of 67.504. Both results are reported at the 5 per cent level of significance and they reject the presence of serial correlation. The results show that about 75 per cent of the changes in the demand for reserves are accounted for by our explanatory variables. Judging by the signs of the explanatory variables and the magnitude of the diagnostic tests, the results are quite satisfactory for such a simple model.

6. Conclusion

The paper attempted to examine the main determinants of the demand for international reserves in Namibia. To be able to do this, we started by examining the main purposes for holding international reserves by countries and concluded that in spite of the movement by many countries to a floating exchange rate arrangement, countries, particularly emerging and developing countries have continued to build up their reserves in the last few years. This we agreed is necessitated by the need to enhance the capability to intervene in support of their national currencies, limit external vulnerability by maintaining foreign currency liquidity to absorb shocks during times of crisis, provide a level of confidence to markets that a country can meet its external obligations, demonstrate the backing of domestic currency by external assets, assist the government in meeting its foreign exchange needs and external debt obligations and maintain a reserve for national disaster or emergencies.

Our estimates of reserves adequacy show that, Namibia's level of reserves are low. Going by import cover and making allowance for the requirement for full backing of domestic currency, Namibia's reserves could barely cover seven weeks of imports as at the end of 2002. This is against a recommended (international) standard of 3 months. The other two measures did not provide any solace either. Both the ratio of reserves to broad money supply as a measure of the vulnerability of the economy to financial crisis, and the ratio of reserves to short-term external debt are low. It is also instructive to note that these results are replicated in the other CMA countries.

Our regression results show that the demand for international reserves is positively linked to both imports and the openness of the economy, demonstrating the importance of trade related factors in holding reserves. We tested the buffer stock model which relates the demand for international reserves to an opportunity cost variable (yields on government bonds) and the adjustment cost measured by the volatility of reserves. The results confirm that there are real costs from a country holding reserves. Although, the adjustment cost variable was insignificant, it is shown to be positively related to the demand for reserves meaning that holding a higher stock of reserves reduces the probability of having to do costly adjustment as reserves hit their lower bound. The previous period level of reserves and the degree of capital outflow (not reported due to observed multicollinearity with openness index), came out with the right signs and are significant. Given the importance of trade to the economy of Namibia, the central bank must make concerted efforts to improve on its current level of reserves holding. In the mean time efforts at broader and deeper monetary integration must be pursued since this will decrease the need for higher levels of reserves holding.

References

Aizeman Joshua and Nancy Marion: (2002): International Reserves Holdings with Sovereign Risk and Costly Tax Collection. Preliminary Draft

Archer David and Jerse Halliday (2002): "The Rationale for Holding Foreign Currency Reserves." Reserve Bank of New Zealand Bulletin Vol.61 No 4

Baker Dean and Karl Walentin; (2001); "Money for Nothing: The Increasing Cost of Foreign Reserve Holdings to developing Nations." CEPR Briefing Paper. www.CEPR.NET

Disyatat, Piti and Donald Mathieson (2001): "Currency Crisis and the Demand for Foreign Reserves," Working Paper , Research Department, IMF.

Fischer Stanley (2001); IMF/World Bank International Reserves: Policy Issues Forum: Opening remarks. IMF Washington

Flood Robert and Nancy Marion: (2002): Holding International Reserves in an Era of High Capital Mobility. IMF Working Paper WP/02/62

Frenkel, Jacob (1983): "International Liquidity and Monetary Control' in George m.von Furstenberg (ed.) International Money and Credit: The Policy Roles, Washington: International Monetary Fund, 65-109

Greenspan Alan: (1999): Currency Reserves and Debt. <http://www.federalreserve.gov/boarddoc/speeches>.

Heller, Robert (1966): "Optimal International Reserves." Economic Journal 76 (June) 296-311

Kaiyrs, Joseph P. Jr. and Algirdas Sabunus (1999): "Prospects for the Litas: The Impact of the Russian Crisis". Lithuania Quarterly Journal of Arts and Sciences Vol. 45, No 3 Fall 1999. <http://www.lituanus.org/>

Karolyi, Andrew G. (2003): "Does International Financial Contagion Really exist?"
International Finance, Volume 6: Issue 2

SA Financial Sector Reform (1999): Management of the Gold and other foreign
Reserves. <http://www.finforum.co.za>

Sherwin Murray (2000); Foreign Reserves: Some Observations in Asian Context-
Current Issues in Reserves Management for Asian Central Banks

Wijnholds, J Onno de Beaufort and Arend Kapteyn: (2001): Reserve Adequacy in
Emerging Market Economies. IMF Working paper WP/01/143

Williams David 2003): "The need for Reserves" in How Countries Manage Reserve
Assets ed. by Robert Pringle and Nick Carver. Central Banking Publications, The
Royal Bank of Scotland