

The Demand for International Reserves in Lesotho

Senei Solomon Molapo^a, Retselisitsoe Isaiiah Thamae^{b,*}

^aMinistry of Finance, Government of Lesotho, Maseru 100, Lesotho

^bDepartment of Economics, National University of Lesotho, P.O. Roma 180, Lesotho

ABSTRACT

The study examines Lesotho's demand for holding international reserves and assesses the country's reserve adequacy position over the period 1981-2012. The results from the standard reserve adequacy benchmarks reveal that Lesotho generally has sufficient stock of foreign reserves to satisfy the minimum adequacy requirements, with the level of reserves in other periods being relatively higher than what is required. Furthermore, the estimates of Lesotho's reserve demand function from the cointegration analysis suggest that the long-term reserve demand policies for Lesotho are positively related to average propensity to import, economic growth and export volatility while negatively associated with exchange rate volatility and opportunity cost of holding reserves. The former finding confirms that the precautionary motive plays a significant role in determining Lesotho's demand for holding international reserves, while the latter indicates that reserve accumulation in Lesotho is based on profitability considerations. The results also show that although the demand for foreign reserves increased in the years of democracy, the country sometimes uses part its international reserves to finance government infrastructure projects.

ARTICLE INFO

Keywords:

International Reserves, Reserve Adequacy, Cointegration, Lesotho

**Corresponding author:*

rthamae@gmail.com
(Retselisitsoe Isaiiah Thamae)

Article history:

Article Submitted 14-04-2015
Article Accepted 20-06-2015

**Article previously published in
EJEM 2015, vol 2, No. 3

1. INTRODUCTION

Over the past three decades, Lesotho has generally experienced an upward trend in international reserves in an attempt to boost international confidence on domestic economy and smooth out random fluctuations in external payment imbalances. Since 1981, nominal (real) foreign reserves have increased from M0.3 (M2.9) billion to M8.5 (M5.1) billion in 2012, reaching a peak of M9 (M6.4) billion in 2008 (2001) (see figure 1). However, there are observable declines in international reserves in some periods that could be attributed to the effects of internal or external shocks on reserves. On the other hand, when compared with other countries within the Southern African Customs Union (SACU)¹ for the period 2010-2014, Lesotho has the second highest stock of foreign reserves as a percentage of GDP with an average of 46%, following Botswana with the average of 55%. On the other hand, Swaziland, Namibia and South Africa have the averages of 19%, 14% and 12%, respectively (see table 1). As a result, questions arise regarding adequacy and demand drivers for international reserves in

¹ SACU member states include Botswana, Lesotho, Namibia, South Africa and Swaziland.

Lesotho. First, what is Lesotho’s position in terms of reserve adequacy? Second, what are the country’s motives for foreign reserve accumulation?

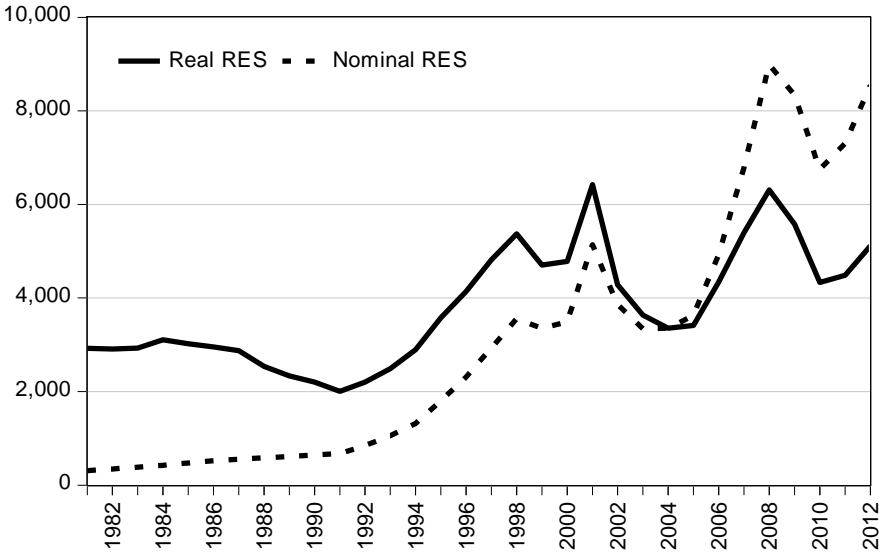


Figure 1: Trends in real and nominal international reserves (RES) in Lesotho (Million Maloti)

Table 1: International reserves (as % of GDP) in SACU countries (2010-2014)

Country	2010	2011	2012	2013	2014	Average
Botswana	54	58	54	54	54	55
Lesotho	44	42	45	51	51	46
Swaziland	18	16	19	22	19	19
Namibia	14	16	14	13	12	14
South Africa	10	12	12	14	13	12

Source: Own calculations using data from the international financial statistics of the International Monetary Fund (IMF).

It is against the above background that the study examines Lesotho’s demand for holding international reserves and assesses the country’s reserve adequacy position. Although studies like that of Sula (2011), Pina (2011) and Elhiraika and Ndikumana (2007) provide the empirical investigation of the demand for foreign reserves in developing countries, including Lesotho, they suffer from methodological problems related to cross-country analyses such as the influence of outliers and the heterodoxy of sample countries under study. Therefore, this paper contributes to empirical literature on international reserve holdings by using time series data covering the period 1981-2012 from Lesotho, which is a small but highly open economy operating under a fixed exchange rate regime. Furthermore, the findings of this study could help policy-makers in Lesotho to better understand some of the fundamental developments affecting the country’s motives for foreign reserve accumulation and may serve as a reference for the design of Lesotho’s international reserve policy. The rest of the paper

is then organised as follows. Section 2 reviews the literature on the demand for foreign reserves while section 3 provides Lesotho's brief economic context and analyses the country's reserve adequacy position. Section 4 estimates the reserve demand function for Lesotho and offers the discussion of the results. The last section concludes the study with implications for further research.

2. LITERATURE REVIEW

International (or foreign) reserves are regarded as indispensable financial resources of an economy and they exist in every independent economy that is open to international transactions. However, the amounts of foreign reserves held by the authorities in various economies are different depending on the array of policy-determined and objective factors. The existing literature thus outlines several objectives for holding international reserves. These motives are commonly allocated in two components, namely the precautionary and mercantile motives (see Aizenman and Lee, 2007; Chan, 2007). The former is based on the fact that economies with a high degree of openness are likely to come across random shocks to their external balance, which builds temporary discrepancies between international payments and receipts or creates balance of payments (BOP) imbalance. Under such condition, the foreign reserves can be used as a shock absorber, representing the economy's ability to finance the payments deficit without resorting to painful and undesirable adjustments.

Kenen and Yudin (1965) further argue that for countries which borrow heavily abroad to finance BOP deficits, the foreign reserves informally carry out the function of collateral for external liabilities. Nonetheless, this function is considered to be notional since the external assets of an economy, which include the international reserves, are the ultimate resources for settling foreign liabilities in order to achieve sustainable external balance. Alternatively, international reserves are regarded to play a central role in enhancing confidence in national currencies of small economies that are in a process of liberalising their external accounts. This is because the loss of confidence as a result of foreign reserves falling below a certain band could induce currency-holders to export capital, thus causing disruption in external balance and monetary stability. Therefore, the precautionary motive directly links foreign reserve accumulation in different economies to exposure to unanticipated sudden-stop crises, capital flight and volatility.

On the other hand, the mercantile motive views the accumulation of international reserves as a foundation for promoting export competitiveness. Under this motive, the country's reserve accumulation is considered to facilitate export growth by slowing or preventing the appreciation of domestic currency against other foreign currencies. In this context, reserve accumulation is therefore regarded as a residual of an industrial policy aimed at imposing adverse effects on the export capabilities of other trading partners. Nevertheless, the holding of large foreign reserves – irrespective

of the motive – involves a high degree of risk (see Chan, 2007). First, the appreciation of domestic currency increases the risk of loss of value of the international reserves and this may require adjustment mechanisms, which often come with a cost in aggregate income or welfare foregone. Second, the holding of foreign reserves has an opportunity cost since part of these financial resources could be used in a number of alternative ways such as servicing short-term debt or financing investment projects. According to Mishra and Sharma (2011), this opportunity cost could be high especially in developing countries where the demand for funds to finance developmental projects always exceeds the available supply.

Given that there are both benefits and costs in accumulating international reserves, a number of studies have been undertaken to determine either the adequacy of reserves or their demand in different countries. For example, Mishra and Sharma (2011), Drummond and Dhasmana (2008) as well as Bird and Rajan (2003) assess the adequacy of reserves in emerging economies using simple rules of thumb such as maintaining reserves equivalent to three months of imports, short-term external or total amount of broad money. The former reserve adequacy measure serves as a guarantee of no hindrance in external trade transaction even in a case of complete cut-off from foreign inflows while the latter provides a useful measure of the potential for capital flight from the country. Alternatively, the ratio of reserves to short-term external debt could be a relevant measure of risks associated with adverse developments in international capital markets. The use of these traditional reserve adequacy ratios could therefore help the central banks to follow a rational and cautious approach by not allowing the reserves to cross beyond the required thresholds while at the same time using them for alternative purposes to avoid the opportunity costs of holding large amounts of foreign reserves.

On the other hand, the empirical evidence on the demand for reserves from studies like that of Sula (2011), Mishra and Sharma (2011), Elhiraika and Ndikumana (2007), Badinger (2004) as well as Aizenman and Marion (2003) has identified the following variables, among others, for inclusion in estimating the reserve demand function: the size of the international transactions (represented by the average propensity to import), the standard of living (proxied by the overall economic growth), the volatility of international receipts and payments (captured by export volatility), and that of nominal exchange rate (as measures of uncertainty), the opportunity cost of holding reserves (proxied by the difference between domestic interest rate and yield on foreign reserves) and the size of short-term external debt. Since most of these variables are found to significantly explain the demand for foreign reserves not only in developed countries but also in emerging economies, they are therefore suitable to capture the motives for international reserve holdings in the context of Lesotho.

3. ECONOMIC BACKGROUND AND RESERVE ADEQUACY IN LESOTHO

3.1. Economic Context

Lesotho is a lower-middle income country with a per capita income of about US \$1000. It has experienced an annual GDP growth rate of approximately 4% over the past three decades (Thamae, 2013). The country's economic progress depends mainly on the developments in the neighbouring Republic of South Africa (RSA), which surrounds it entirely, through the remittances of workers employed in the RSA mines as well as the sale of water resources to RSA. Lesotho's economy is also anchored by strong performance in the mining and quarrying sector and the existence of a preferential agreement with the United States (US) under the African Growth and Opportunity Act (AGOA) that boosts the output in the textile sector (IMF, 2012). Furthermore, Lesotho is a beneficiary of SACU's free trade agreement and the SACU receipts account for about half of total government revenues (Masenyetse and Motelle, 2012). These transfers from SACU constitute the main channel through which the country accumulates international reserves, especially in a form of Rands from RSA.

Since 1974, Lesotho has also been a member of the Rand Monetary Area (RMA) – now known as the Common Monetary Area (CMA) from 1986, whereby the currencies of each member state were 100% backed by the RSA Rands and were pegged at par with it. In addition, the country has entered into a bilateral agreement with RSA, which gives a provision for the RSA Rands to be a legal tender in Lesotho. According to CBL (2012), about 90% of foreign reserves in the cash balance portfolio are therefore in RSA Rands, while the remaining 10% is in US Dollars, Euros, British Pounds and other foreign currencies. This could be expected since RSA is Lesotho's major trading partner, with Lesotho importing approximately 80% of its goods and services from RSA (IMF, 2012). On the other hand, the US Treasury bills dominate Lesotho's investment portfolio of international reserves, which still includes the RSA Treasury bills. The last portfolio of Lesotho's foreign reserves is made up of the IMF accounts such as IMF quotas, SDR holdings and fund reserve tranche, and the interest accrued on RSA Rands.

3.2. Reserves in Months of Imports

The study adopts two among various traditional rules of thumb for reserve adequacy to analyse Lesotho's position². The first one examined under this sub-section is the import cover, which is a ratio of foreign reserves to total imports. It represents number of months for which the country's reserves could support its current level of imports, if all other inflows and outflows stop. According to Fischer

² Only two measures of reserve adequacy are considered due to lack of data on some variables such as short-term external debt.

(2001), different countries are recommended to hold international reserves that could cover at least 3 to 4 months of their imports. Thus, this ratio postulates that the demand for reserves is expected to grow with the level of international trade.

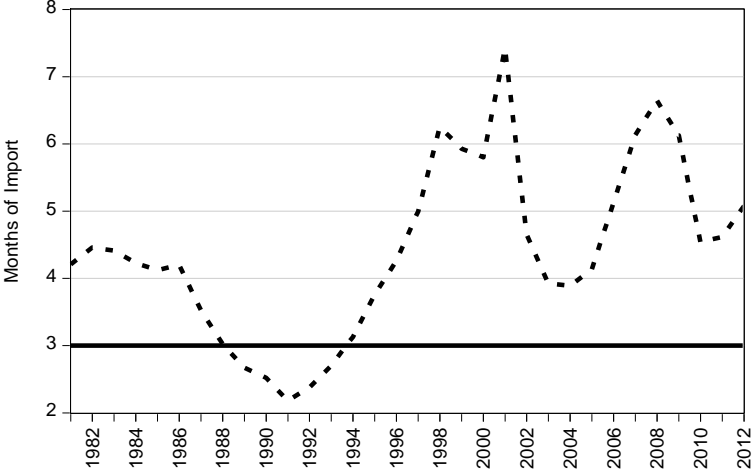


Figure 2: International reserves in months of imports

Using the yearly data on international reserves and total imports over the period 1981-2012³, figure 3 reveals that Lesotho’s stock of foreign reserves has continuously stayed above the minimum required level of 3 months of imports except during the period 1986-1994 when it fell below the required benchmark. Prior to 1993, the level of reserves reached the maximum of 4.5 months of imports in 1982 and then fell in the subsequent years to a minimum of 2.2 months of imports in 1991. However, since the beginning of the democratic regime in 1993, Lesotho accumulated sufficient amount of foreign reserves, peaking 6.2, 7.4 and 6.6 months of imports in 1998, 2001 and 2008, respectively. Thus, these observed cycles in the import cover could imply that Lesotho holds international reserves as a buffer stock against external shocks, whereby it accumulates reserves in times of abundance and depletes them in times of scarcity.

3.3. Reserves as Ratio of Broad Money

The other reserve adequacy benchmark considered under this sub-section is the ratio of reserves to broad money (M2 in the case of Lesotho), which reflects the country’s exposure to capital flight risk. Flood and Marion (2001) argue that the risk that domestic liquidity could be converted into foreign assets is greater for countries with the currency peg than those with the flexible exchange rate regime. The conventional range of reserves to broad money ratio is said to be 5-15% and its low and falling figure is a leading indicator of currency crisis (see Kaminsky & Reinhart, 1999).

³ The dataset on reserves and imports is obtained from the Central Bank of Lesotho and the Ministry of Finance, respectively.

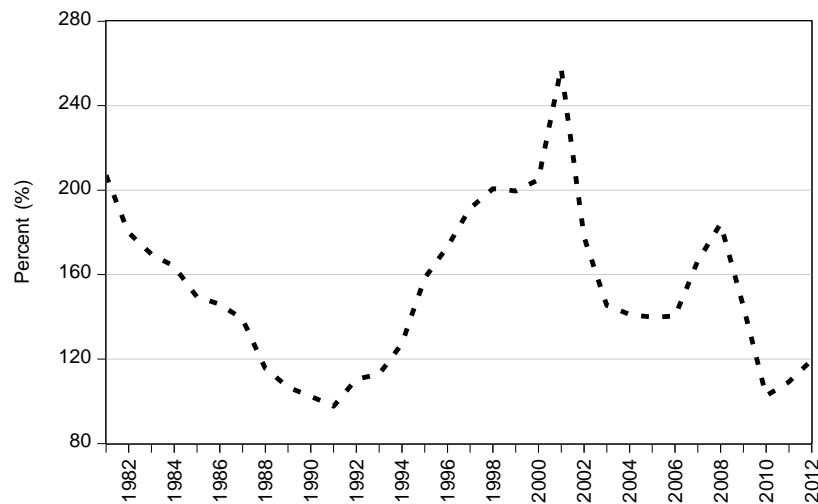


Figure 3: Ratio of international reserves to broad money (M2)

Figure 3 shows that foreign reserves in Lesotho have been far above the conventional range of 5-15% of the broad money⁴ over the entire period, with a minimum of about 100% in 1991 and 2010. This is expected since Lesotho’s currency needs to be 100% backed by the RSA Rands (which constitute about 90% of Lesotho’s international reserves in the cash balance portfolio) in order to maintain the peg under the CMA agreement. Nevertheless, the fact that foreign reserves at times could reach a peak of about 260% of broad money and 7.4 months of imports (see figure 2), just like in 2001, indicates that there is a need to determine other motives for holding international reserves in Lesotho.

4. ESTIMATING LESOTHO’S RESERVE DEMAND FUNCTION

4.1. Model Specification and Estimation Strategy

The study follows the works of Mishra and Sharma (2011) as well as Aizenman and Marion (2003) to assess various motives of demand for foreign reserves in Lesotho. The standard long-run model for international reserves (RES) is then specified as a function of average propensity to import (API), economic growth (GDP), export volatility (EXV), exchange rate volatility (ERV) and opportunity cost (OPC) as follows⁵:

$$RES_t = \beta_0 + \beta_1 API_t + \beta_2 GDP_t + \beta_3 EXV_t + \beta_4 ERV_t + \beta_5 OPC_t + \beta_6 Z_t + \mu_t \quad (1)$$

where μ is the error term, the β 's are parameters to be estimated, t denotes the time period and Z captures the impact of exogenous conditions on foreign reserves. Given that reserves holding should

⁴ The dataset on M2 is obtained from the Central Bank of Lesotho for the period 1981 to 2012.

⁵ The variable on short-term external debt is not included in the model due to unavailability of data.

increase with the size of international transactions and the standard of living, the signs of the coefficients β_1 on API and β_2 on GDP are expected to be positive. If that is the case, the former variable would be a proxy for the economy's openness and vulnerability to external shocks. In addition, if the international receipts and payments are expected to help cushion the economy, their increasing volatility would imply holding more reserves and as a result, β_3 on EXV is expected to be positive. On the other hand, β_4 on ERV is expected to be negative since greater volatility in exchange rate should reduce the demand for reserves under a fixed exchange rate regime, whereby the central bank does not need large amounts of reserves to manage the exchange rate. β_5 on OPC is also expected to be negative since increases in the opportunity cost of holding reserves would lead to a fall in their demand. Lastly, the expected sign of the coefficient β_6 on exogenous conditions (Z) is ambiguous.

The paper employs the Johansen's (1988, 1995) multivariate cointegration procedure to estimate Lesotho's reserve demand function provided by equation (1). This technique is adopted because it performs better in terms of determining the long-run relationship among variables of the same order of integration. The Phillips-Perron (PP) test is then used to ascertain the presence of unit root among the series (Phillips and Perron, 1988). If the series are integrated of the same order, that is, I(1), the maximum likelihood estimation of the following unrestricted vector autoregression (VAR) model is undertaken to determine the existence of cointegrating relationships:

$$Y_t = \delta + \sum_{k=1}^p \Pi_k Y_{t-k} + \psi Z + \mu_t \quad (2)$$

Given that Y is non-stationary and must be differenced in order to become stationary, equation (2) can be written in an error-correction form as follows:

$$\Delta Y_t = \delta + \sum_{k=1}^{p-1} \Gamma_k \Delta Y_{t-k} + \Pi Y_{t-1} + \psi Z + \mu_t \quad (3)$$

where Y_t is a 6 by 1 vector containing endogenous variables RES, API, GDP, EXV, ERV and OPC, all at time period t . δ , Γ_k and ψ are parameters to be estimated, p is the lag length, Π is a matrix of the long-run parameters, Z is a matrix of exogenous variables and μ is a vector of white noise errors. The optimal lag length p is selected on the basis of the information criterion while the trace and maximum eigenvalue statistics are used to establish the cointegrating rank. Under cointegration, the matrix Π has a rank of r and it can be decomposed as $\Pi = \alpha\beta'$, where α is a 6 by 1 matrix of the adjustment coefficients and β is a 6 by 1 matrix of the coefficients in the cointegrating equation. Lastly, the Engle

and Granger (1987) causality test within the vector error-correction model (VECM) is applied to examine the causal relationship between the endogenous variables included in the model.

4.2. Data and Unit Root Test Results

The study uses annual time-series data for the period 1981-2012, with all real variables in 2004 constant prices. The dataset on total imports and exports as well as economic growth (proxied by real per capita GDP) is sourced from the Ministry of Finance (MOF) while that on international reserves, Loti/US Dollar exchange rate and domestic interest rate (proxied by the 91-day Treasury bill rate) is obtained from the Central Bank of Lesotho (CBL). The yield on foreign reserves is proxied by the RSA discount rate and the data is obtained from the South African Reserve Bank (SARB). On the other hand, the volatility of exports and exchange rate is calculated as the conditional variance of the regression of the trend series of exports and exchange rate. The PP unit root test is then used to determine the order of integration of the variables included in the model, with the optimal lag length selected by the Schwarz information criterion (SIC). The null hypothesis states that the series is non-stationary and failure to reject it indicates that there is a unit root. Table 2 reports the unit root test results in both levels and first differences. On the basis of the p-values, all variables are found to be integrated of order one at the 5% level of significance. This implies that a long-run and stable relationship might exist between the level of international reserves and its determinants in Lesotho.

Table 2: Phillips-Perron (PP) unit root tests

Variable	H_0 : non-stationary in levels		H_0 : non-stationary in first differences	
	Test statistic	p-value	Test statistic	p-value
RES	-1.964	0.597	-3.909	0.024
API	-0.753	0.382	-10.04	0.000
GDP	-1.981	0.589	-7.354	0.000
EXV	-2.386	0.154	-9.522	0.000
ERV	-1.989	0.290	-5.441	0.000
OPC	-1.454	0.543	-9.205	0.000

Note: All variables except OPC are in logarithmic form.

4.3. Cointegration Test Results

Given that the variables included in the reserve demand function are found to be integrated of the same order, the Johansen multivariate cointegration method is then applied to determine the presence of long-run cointegrating relationship among them. Table 3 presents the cointegration test results, with the optimal lag length of 1 chosen by the SIC. The trace test results in part A of the table confirm the existence of cointegration among the variables. Part B of the table provides the results for the

estimated parameters of the normalised cointegrating equation as well as their adjustment coefficients from the restricted VECM. The Lagrange multiplier (LM), the White heteroskedasticity and the Jarque-Bera diagnostic tests, given at the bottom of the table, indicate that the residuals are approximately white noise, even at the 10% significance level.

Table 3: Cointegration test results

Part A: Johansen trace test for cointegration						
Maximum rank	Eigenvalue		Trace statistic		0.05 critical value	
0	0.823		135.16**		83.94	
1	0.644		83.16**		60.06	
2	0.569		52.20**		40.17	
3	0.484		26.94**		24.28	
4	0.208		7.08		12.32	
Part B: Normalised cointegrating coefficients						
Variables	RES	API	GDP	EXV	ERV	OPC
α	-0.442** (-4.241)	0.069 (1.284)	- -	- -	0.962* (2.119)	-1.869 (-0.704)
β	1.000 -	-2.191** (-3.347)	-1.178** (-24.12)	-0.728** (-6.665)	0.167* (2.435)	0.043* (1.880)
$\chi^2 = 0.867$ [0.648]						
LM-statistic = 327.02 [0.422]						
Jarque-Bera statistic = 13.24 [0.352]						
White test statistic = 408.78 [0.643]						

Notes: t-statistics in parentheses and p-values in square brackets; ** and * denote significant at 5% and 10% critical level, respectively.

Since the adjustment coefficients for economic growth and export volatility were highly insignificant, the model was re-estimated with the restriction of weak exogeneity on these variables. The p-value of the chi-square test statistic from table 3 justifies that both variables are weakly exogenous (even at the 10% critical level) and hence, their behaviour is only be explained by the short-run dynamics. On the other hand, the adjustment coefficient on international reserves has the expected (negative) sign and it is statistically significant at the 5% level. Thus, about 44% of the deviation from the equilibrium was corrected within one year. This relatively moderate magnitude of the speed of adjustment could indicate a rather active reserve management of the CBL. The cointegration results also show that all the long-run coefficients are significant and have the expected signs as suggested by the theory. For example, the international reserves are found to be positively

related to average propensity to import, economic growth and export volatility while negatively associated with exchange rate volatility and opportunity cost of holding reserves.

The positive relationship between foreign reserves and average propensity to import suggests that the precautionary motive plays a significant role in determining Lesotho's demand for holding international reserves. This means that Lesotho holds reserves as buffer stock against external shocks and that is why it accumulated reserves in times of abundance and depleted them in times of scarcity (see figures 1 and 2). This is also plausible given the persistent current account deficit faced by the country over the sample period. Furthermore, the positive coefficient on economic growth indicates that Lesotho's demand for foreign reserves is also driven by the standard of living while that on export volatility points to the country's dependence on international receipts and payments to help cushion the economy. These findings are similar to that of Mishra and Sharma (2011) on India and Elhiraika and Ndikumana (2007) on African countries, who concluded that the reserve demand policies of those countries depend mainly on the level of international transactions and economic growth.

On the other hand, the uncertainty brought by the exchange rate volatility has a negative effect on international reserves and this shows that the CBL does not need to hold large amounts of reserves to manage the exchange rate since it operates under fixed exchange rate regime. Aizenman and Marion (2003) also found a similar result that greater exchange-rate variability significantly reduces foreign reserve holdings in developing countries. Lastly, the negative association between foreign reserves and opportunity cost suggests that the long-run demand for reserves in Lesotho is also based on profitability considerations. As a result, the CBL seems to resort to other alternative ways of using international reserves (such as financing developmental projects) when their opportunity cost increases. This finding therefore contradicts that of Elhiraika and Ndikumana (2007), who reported that reserve accumulation in African countries (including Lesotho) is not motivated by returns.

4.4. Error-correction and Granger Causality Estimation Results

Along with other long-run determinants of Lesotho's reserve demand, the study also focuses on the role played by exogenous conditions such as the years of democracy (since 1993), the political instability of 1998, the duration of the Phase I of the Lesotho Highlands Water Project (LHWP) (1986-2002), the 2008 US financial crisis, the 1997 Asian financial crisis and the 1991 Indian economic crisis. The estimated short-run dynamics of the VECM (provided in table 3) are given in table A1 in the appendix. It is evident from those results that the years of democracy in Lesotho had a positive and significant effect on reserves while initiation of the LHWP had a negative and significant impact. The latter finding confirms that Lesotho sometimes uses part its international reserves to finance

government infrastructure projects. Other exogenous shocks, however, are found to be less important in influencing Lesotho's demand for foreign reserves.

Table 4: Granger causality test results

Variables	ΔRES	ΔAPI	ΔGDP	ΔEXV	ΔERV	ΔOPC
ΔRES	-	0.047	1.373	0.534	0.339	1.256
ΔAPI	0.112	-	2.677	0.302	1.954	0.076
ΔGDP	1.728	1.095	-	0.001	2.835*	0.068
ΔEXV	0.112	7.946***	0.093	-	0.873	2.845*
ΔERV	3.582*	1.149	0.264	0.477	-	0.918
ΔOPC	0.749	1.756	0.214	4.423**	0.434	-

Notes: Wald statistics are reported; first row (column) presents the dependent (independent) variables; ***, ** and * denote significant at 1%, 5% and 10% critical level, respectively.

On the other hand, table 4 reports the Granger causality test results within the estimated VECM. It is found that there exists unidirectional causality running from exchange-rate volatility to international reserves, export volatility to average propensity to import, and economic growth to exchange-rate volatility, whereas a bi-directional causality exists between opportunity costs and export volatility. The former finding on exchange-rate volatility, together with its observed positive and significant immediate effect on reserves (see table A1 in the appendix), indicates that when the uncertainty in exchange-rate increases, the immediate response of the CBL is to increase foreign reserves. However, given that the CBL does not need to hold large stockpiles of reserves to manage the peg, this behaviour disappears in the long-run as shown by a negative and significant coefficient on exchange-rate volatility from the cointegration results (reported in table 3).

5. CONCLUSION

The paper examines Lesotho's demand for holding international reserves and assesses the country's reserve adequacy position over the period 1981-2012. The results from standard reserve adequacy benchmarks reveal that Lesotho generally has sufficient stock of foreign reserves to satisfy the minimum adequacy requirements, with the level of reserves in other periods being relatively higher than what is required. Furthermore, the estimates of Lesotho's reserve demand function from the cointegration analysis suggest that the long-term reserve demand policies for Lesotho are positively related to average propensity to import, economic growth and export volatility while negatively associated with exchange rate volatility and opportunity cost of holding reserves. The former finding confirms that the precautionary motive plays a significant role in determining Lesotho's demand for holding international reserves, while the latter indicates that reserve accumulation in Lesotho is based

on profitability considerations. The results also show that although the demand for foreign reserves increased in the years of democracy, the country sometimes uses part its international reserves to finance government infrastructure projects. However, the study modelled Lesotho's demand for international reserves in isolation from the money market, which can be incorporated in future research since money disequilibrium could affect reserves in the short-run (see Badinger, 2004).

References

- Aizenman, J. and Lee, J. (2007), "International reserves: precautionary versus mercantilist views, theory and evidence", *Open Economies Review*, Vol. 18 No. 2, pp. 191-214.
- Aizenman, J. and Marion, N. (2003), "The high demand for international reserves in the Far East: What is going on?" *Journal of the Japanese and International Economics*, Vol. 17 No. 3, pp. 370-400.
- Badinger, H. (2004), "Austria's demand for international reserves and monetary disequilibrium: The case of a small open economy with a fixed exchange rate regime", *Economica*, Vol. 71 No. 281, pp. 39-55.
- Bird, G. and Rajan, R. (2003), "Too much of a good thing? The adequacy of international reserves in the aftermath of crises", *The World Economy*, Vol. 26 No. 6, pp. 873-891.
- CBL (2012), Annual Report 2011, Central bank of Lesotho, Maseru, March.
- Chan, S. S. (2007), "The basic framework for international reserves and its application to Macao", *Monetary Research Bulletin No. 2*, Monetary Authority of Macao, Macao, January.
- Drummond, P. and Dhasmana, A. (2008), "Foreign reserve adequacy in Sub-Saharan Africa", Working Paper, International Monetary Fund, Washington, June.
- Elhiraika, A. and Ndikumana, L. (2007), "Reserves accumulation in African countries: sources, motivations, and effects", *Economics Department Working Paper Series*, University of Massachusetts, Amherst, December.
- Engle, R.F. and Granger, C. W. J. (1987), "Cointegration and error correction: representation, estimation, and testing", *Econometrica*, Vol. 55 No. 2, pp. 251-276.
- Fischer, S. (2001), "Opening remarks", *IMF/World Bank International Reserves: Policy Issues Forum*, Washington, 28 April.
- Flood, R. and Marion, P. N. (2001), "Holding international reserves in an era of high capital mobility," Collins, S. M. and Rodrik, D., *Brookings Trade Forum*, Brookings Institution Press, Washington, pp. 1-68.
- IMF (2012), "Kingdom of Lesotho: poverty reduction strategy paper – national strategic development plan", Country Report No. 12/102, International Monetary Fund, Washington.
- Johansen, S. (1988), "Statistical analysis of cointegration vectors", *Journal of Economic Dynamics and Control*, Vol. 12 No. 2-3, pp. 231-254.

- Johansen, S. (1995), "Likelihood-based inference in cointegrated vector autoregressive models", Oxford University Press, Oxford.
- Kaminsky, G. and Reinhart, C. (1999), "The twin crises: the causes of banking and balance-of-payments problems", *American Economic Review*, Vol. 89 No. 3, pp. 473-500.
- Kenen, P. B. and Yudin, E. B. (1965), "The demand for international reserves", *The Review of Economics and Statistics*, Vol. 47 No. 3, pp. 242-250.
- Masenyetse, R. F. and Motelle, S. I. (2012), "Government revenue-expenditure nexus in Lesotho: the decline in SACU revenue", *American Journal of Economics*, Vol. 2 No. 1, pp. 8-14.
- Mishra, R. K. and Sharma, C. (2011), "India's demand for international reserve and monetary disequilibrium: reserve adequacy under floating regime", *Journal of Policy Modeling*, Vol. 33 No. 6, 901-919.
- Phillips, P. C. B. and Perron, P. (1988), "Testing for a unit root in time series regression", *Biometrika*, Vol. 75 No. 2, pp. 335-346.
- Pina, G. (2011), "The recent growth of international reserves in developing economies: A monetary perspective", *Job Market Paper*, Universitat Pompeu Fabra, Barcelona, November.
- Sula, O. (2011), "Demand for international reserves in developing nations: A quantile regression approach", *Journal of International Money and Finance*, Vol. 30 No. 5, 764-777.
- Thamae, R. I. (2013), "The growth of government spending in Lesotho" *Economic Analysis and Policy*, Vol. 43 No. 3, pp. 339-352.

Appendix

Table A1: Estimation results of the error-correction model (ECM)

Error-correction	ΔRES	ΔAPI	ΔGDP	ΔEXV	ΔERV	ΔOPC
α	-0.442** (-4.241)	0.069 (1.284)	- -	- -	0.962 (2.119)	-1.869 (-0.704)
ΔRES_{t-1}	0.293 (1.192)	-0.021 (-0.216)	-0.044 (-1.172)	0.464 (0.731)	0.428 (0.582)	-4.188 (-1.121)
ΔAPI_{t-1}	-0.148 (-0.334)	-0.072 (-0.416)	0.111 (1.636)	0.630 (0.550)	-1.855 (-1.398)	-1.863 (-0.276)
ΔGDP_{t-1}	2.138 (1.315)	0.663 (1.047)	0.025 (0.101)	0.127 (0.030)	-8.193 (-1.684)	6.471 (0.262)
ΔEXV_{t-1}	0.044 (0.335)	0.143 (2.189)	0.006 (0.305)	-0.049 (-0.147)	-0.363 (-0.934)	3.334 (1.687)
ΔERV_{t-1}	0.174* (1.893)	1.341 (0.958)	0.174 (1.893)	0.038 (1.072)	-0.383 (-1.390)	0.007 (0.518)
ΔOPC_{t-1}	-0.011 (-0.866)	0.007 (1.325)	-0.001 (-0.463)	-0.069 (-2.103)	0.025 (0.659)	-0.298 (-1.532)
<i>LHWP</i>	-0.176* (-2.260)	-0.026 (-0.862)	0.015 (1.239)	-0.026 (-0.128)	0.557 (2.396)	-0.567 (-0.488)
<i>Democracy</i>	0.168* (2.312)	0.018 (0.622)	0.023 (2.046)	0.014 (0.074)	-0.337 (-1.547)	1.283 (1.158)
<i>Instability</i>	-0.049 (-0.289)	-0.149 (-2.274)	-0.025 (-0.965)	0.070 (0.161)	-0.969 (-1.922)	-0.523 (-0.204)
<i>US crisis</i>	-0.219 (-1.632)	-0.106 (-2.019)	0.027 (1.297)	-0.255 (-0.736)	0.306 (0.761)	-1.495 (-0.732)
<i>Asian crisis</i>	-0.082 (-0.455)	-0.075 (-1.062)	-0.014 (-0.492)	-0.020 (-0.042)	0.507 (0.935)	-2.987 (-1.085)
<i>Indian crisis</i>	-0.063 (-0.345)	0.123 (1.721)	0.010 (0.367)	0.085 (0.180)	-0.351 (-0.640)	-2.482 (-0.889)
$\chi^2 = 0.867 [0.648]$ LM-statistic = 327.02 [0.422] Jarque-Bera statistic = 13.24 [0.352] White test statistic = 408.78 [0.643] Cointegrating vector: $v_{t-1} \equiv RES_{t-1} - 1.178GDP_{t-1} + 0.043OPC_{t-1} - 2.191API_{t-1} - 0.728EXV_{t-1} + 0.167ERV_{t-1}$						

Notes: t-statistics in parentheses and p-values in square brackets; ** and * (specified only where ΔRES is the dependent variable) denotes significant at 5% and 10% critical level, respectively.