

THE STRATEGIC ASSET ALLOCATION FOR FOREIGN EXCHANGE RESERVES MANAGEMENT IN NATIONAL BANK OF RWANDA

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1. Background

One of the complex businesses dedicated to the Central Banks is the management of foreign exchange reserves because of its requirements in terms of tight follow up of the global economy and financial markets trend and the challenges involved in its strategic asset allocation. “Formulating Strategic Asset Allocations (SAA) is of fundamental importance to investors, as numerous studies show that SAA is the primary determinant of performance in diversified portfolios”¹. Strategic asset allocation is well defined as the long-term allocation of capital to different asset classes such as bonds, equity, real estate and other investment opportunities with an aim of increasing the capital and making an appreciable and optimum return.

The National Bank of Rwanda (BNR) herein referred as a case study, is the Central Bank of the Republic of Rwanda with the missions that include among others holding and managing the foreign exchange reserves². To fulfill that, Central banks use to choose an appropriate strategic asset allocation of the foreign exchange reserves in agreement with the overall policy and corporate objectives. The chosen SAA impacts the overall performance and risk management over time. Basically, formation of a portfolio in the area of foreign exchange reserves investment is subject to decisions on the currency composition

¹ Brinson, Gary,L. Randolph Hood and Beebower, Gilbert, (1986) “Determinants of Portfolio Performance”, Financial Analysts Journal, No 5 , pp. 39-44.

² BNR, mission statement available at [http://:www.bnr.rw](http://www.bnr.rw) accessed on 4th September 2010

and, within each currency, there has to be a range of assets that include less risky and fixed income securities like government bonds and other highly liquid and secured instrument types.

2. Problem statement

There are several reasons why the Central banks hold foreign exchange reserves. They include the maintenance of the capacity to intervene in exceptional circumstances in currency markets, liquidity assurance to support the local currency and adopted exchange rate regime and the reduction of the external vulnerability by taking into consideration the external debt stock. From the mentioned motivations of holding the foreign exchange reserves, it is indeed understood that not only they provide confidence to the economy but also they are used by any country to meet its external obligations. Furthermore, in several cases which include also the case of BNR, the foreign exchange reserves are utilized to generate the returns, the reason why the foreign exchange reserves are often referred as the main source of income for the countries' custodian institutions. Without giving a prejudice to the asset-liability management which is the important focus of Central Banks, the foreign exchange reserves are subject to a strict and optimum management. When analyzing the BNR's reports, it was found that there is a lack of efficient diversification of foreign exchange reserves allocation for the investments purposes³. In fact, it is observed that the term deposits are the most preferred domain of investment at BNR. Furthermore, since 2003, it is apparent that BNR entrusted a portion of the Nation's foreign exchange reserves to the external managers. This provides evidence on the Bank's attitude on the financial market which seems to be of non active behavior. Hence, the research focuses on the critical analysis of the investment decisions of the BNR related to the foreign exchange reserves management and assess the reasons why it is not active on the market. Given the current status of the global financial markets in general, it was felt important to conduct a research on the Rwandan custodian of the foreign exchange reserves to assess the strategies adopted in line with the reserves management during this economic

³ National Bank of Rwanda (2008), Annual report, Kigali, Rwanda, pp 23-25

recovery. In this regard, the research aims at making a critical analysis of the strategic asset allocation within BNR.

An in depth review of theories and concepts related to foreign exchange reserves management, portfolio and risk management may help in better understanding the various practices. It also helps to understand well the implications and techniques involved in foreign exchange management and further provide the guidelines for better analysis and interpretation.

3. Foreign Exchange Reserves Management

According to Jay W. Pao⁴, reserve management plays an important role in any country's economy. First and foremost, it provides confidence to the monetary and exchange rate policies of any country's economy. It brings trust by the international community to the country's economy as far as external obligations are regularly met. Liquidity in foreign currency is maintained during the shocks periods when reserve management is effectively done. Government does not encounter difficulties in meeting its foreign obligations when reserve management is well done.

There are a number of challenges involved to achieve the mentioned objectives and indeed are challenging for Central Banks. Besides this, most of the authors in the area of reserves management argue on the most recurring question in the domain of reserve management which is reserves adequacy level that should be maintained by a Central bank. Foreign exchange reserves level varies from one country to another which means that adequacy does not relate to a single accumulated amount of foreign exchange

⁴ Jay W. Pao, (2003), Foreign Reserves Management: The Case of Macao, Monetary Authority of Macau, p.19.

reserves. According to Grubel⁵, there are a lot factors that impact on the selection of a country's level of reserve adequacy which include among others the quantity theory of the money.

Boorman and Ingves in their working paper on Issues in Reserves Adequacy and Management⁶ argue that there should be enough reserves to cover imports of at least three or four months. Therefore, the reserve-to-import ratio or import coverage is always referred to as a key ratio in the formulation of reserves management policies. In an illustration to that, in India⁷ at the end of September 2009 the ratio stood at 12.4 months while the benchmark is 3 months clearly showing the surplus reserve level.

On the other hand, Heller⁸ in his famous article, analyses the needed level of foreign exchange reserves for an effective management by emphasizing on an optimal reserves level which takes into account the import coverage ratio.

According to Calvo⁹, an effective assessment of the country's vulnerability should consider also the monetary aggregates focusing mainly on the money supply and money demand whereby broad money comes in as an appropriate scaling variable.

⁵ Grubel, H. (1971) "The Demand for International Reserves: A Critical Review of the Literature," *Journal of Economic Literature*, Vol. 9, issue No. 4, December, Pp. 1148-66.

⁶ Boorman, J. and S. Ingves, (2001) *Issues in Reserves Adequacy and Management*, Monetary and Exchange Affairs Department and Policy Development and Review Department, International Monetary Fund, Working Paper, October, pp 35-38

⁷ M. Rama Krishna Prasad and G. Raghavender Raju (2010): *Foreign Exchange Reserves Management in India: Accumulation and Utilisation*, *Global Journal of Finance and Management*, ISSN 0975 - 6477 Volume 2, Number 2 (2010), pp. 295-300

⁸ Heller, R. (1966) "Optimal International Reserves," *Economic Journal*, No.76, 296311., Pp. 20-25.

⁹ Calvo, G. (1966) "Capital Flows and Macroeconomic Management: Tequila Lessons," *International Journal of Finance and Economics*, Vol. 1, No. 3, July, 207-23,

Broad money which is the utmost tool for money supply measurement has got different types and they vary according to the inclusion of components in its determination. Broad money ascertains the real financial condition of a given nation. For example, Jay W. Pao¹⁰ states that the broad money (M1) coverage ratio in Macao was between 319.9 and 539.9 for the period from 1995 to 2002 whereas the broad money (M2) coverage was situated between 24.4 and 31.4 for the same period. In India also¹¹, the money based indicator which enhances the confidence in domestic currency was situated ratio is found to be 0.89 while the benchmark is 0.05 to 0.20.

In fact many authors have explored the area of foreign exchange reserves management by selecting the key measures that should be observed for an effective management of a Central bank and these include also reserves to short term external debt ratio as argued by Alan Greenspan¹². Indeed, Foreign exchange reserves should be enough to provide confidence to external lenders.

4. BNR's Foreign Reserves Management Strategy

Each central Bank considers the objective setting as a milestone to the effective foreign exchange management.¹³ The investment guidelines manual of BNR disclose the objective of holding the foreign exchange reserves. They include among others the preservation of capital, liquidity and the generation of a reasonable income. Capital preservation is achieved through the implementation of adequate of tools of management and risk control by handling a market assessment before any investment decision. Liquidity is assured whenever it is possible to transform some the made investments into cash to settle their liabilities at no significant cost. However, carrying costs of the reserves should be possibly minimized and

¹⁰ Jay W. Pao, opcit. P. 23

¹¹ M. Rama Krishna Prasad and G. Raghavender Raju (2010), OpCit. P.299

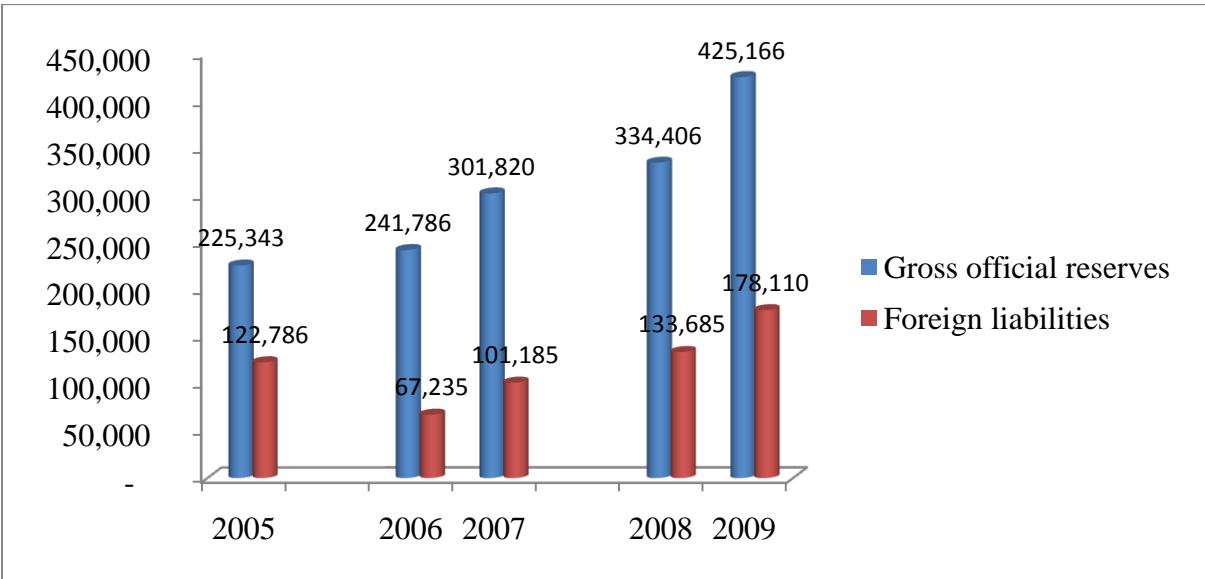
¹² Greenspan, A. (1999), "Currency Reserves and Debt," BIS Review, No. 47/1999, P.9

¹³ Jay W. Pao, Opcit, p. 21

a reasonable return should be aimed at a tolerable risk thus, the realization of a reasonable income to meet the operational and investment expenditures of the bank. To meet these objectives, investment principles and policy guidelines have been developed specifying the portfolio tranches in which the foreign exchange reserves are allocated and performance measures are set.

Setting and defining a benchmark is a primary next task towards the effective management of foreign exchange reserves and relevant portfolios are formed consequently, therefore reserves are then kept in a prudential objective by applying the asset liability policy.

Figure 1: BNR’s Foreign Exchange Reserves, 2005-2009



Source: Financial Markets Department, BNR, Rwanda

As depicted in the above figure, the highest scored foreign exchange reserves occurred in 2009. Yet, this rise corresponded to the increases in major BNR’s foreign exchange inflows, namely the budget support, SDR allocation and bank deposits, leading to an amount of over RWF 400 billion of the foreign exchange reserves in 2009.

5. Asset Allocation for Central Banks

A country's foreign reserves represent the national wealth of the nation. According to Joachim Joche et al. in their working paper¹⁴, they state that foreign reserves can be employed in the following ways, depending on the objective of the nation:

- To purchase foreign goods and services
- To service the nation's foreign debt
- To manage the level of the exchange rate through market intervention
- To invest reserves to generate future wealth
- To fund domestic fiscal spending programmes
- To rebate reserves to citizens through lump-sum transfers and tax cuts.

In general, Central Banks view their stewardship role in a highly conservative way and their investment philosophy reflects this. As stated by Arizonan, J. and Marion, N. , they are highly risk-averse investors in general, with the bulk of their assets invested in short-dated securities such as T-bills, time deposits and highly rated government bonds.¹⁵ The desire to protect the level of reserves from short-term volatility has led these investors into relatively low-return investment programmes. This approach would seem to be acceptable for Central Bank with relatively low reserve levels and whose main concern is maintaining sufficient liquidity to cover import costs, debt service obligations and intervention requirements. Capital preservation is a common investment objective for the majority of Central Banks. Nations with significant reserve positions have little difficulty financing imports or funding debt service obligations. According to Mathias Drehman and Kleopatra Nikolaou in their working paper, the level of 'free reserves' (i.e. the amount of reserves in excess of what is needed for import, debt and intervention purposes) can be many times greater than the nation's liabilities¹⁶.

¹⁴ Joachim Joche et al. (2006): Foreign reserves management subject to a policy, working paper vol 624, ECB, p.6.

¹⁵ Aizenman, J. and Marion, N. (2002) "The High Demand for International Reserves in the Far East: What Is Going on?", University of California, Santa Cruz, Working Paper, pp.26-29

¹⁶ Mathias Drehman and Kleopatra Nikolaou , (2009) "Funding liquidity risk, Definition and measurement", ECB, Working paper, vol. 1024, pp. 10-12

6. Research Objective

This study will examine the challenges that arise from the foreign reserves management at a central bank and studies the implications this has for the optimal reserves allocation. Furthermore, the research in its findings will show the weaknesses in the reserves management of the NBR for improvement and the strengths to sustain them. Ultimately, we intend to critically analyze the asset liability management of this bank to assess its future perspectives in line with the current trend of development in Rwanda.

7. Methodology

The methodology is the part of the research that indicates whether the research adheres to the scientific regulations. It describes the data to be collected and methods of collection, the techniques used in their analysis and interpretation. We shall carry out an interview with the managers of foreign reserves at the National Bank of Rwanda. A questionnaire will be elaborated and distributed to the people implicated in the daily management of the NBR's foreign reserves. We will analyze the financial documents prepared by the National Bank of Rwanda and then find out the simulation between the foreign reserves investment and its performance from the year 2005 to 2009. The variance and standard deviation are utilized in Finance to measure the riskiness of the investment. Further we shall apply the statistical tools such as regression analysis to trace the efficiency and effectiveness in decision making as far as the reserves management are concerned. We will also measure the spread or variation of the returns derived from the investment trenches of BNR.

In fact, our motive to conduct a research on the reserves management within the National Bank of Rwanda derive from the current status of the world's financial markets after an experience of a serious

and dramatic turbulences. In this regard, we shall make a critical analysis of its strategic asset allocation with the help of the three-step process through which the strategic asset allocation may be seen.

In the first step, we will look at the importance of a sound organizational set-up for managing reserves efficiently. In terms of an active investment style, we will argue for a three-tier governance structure where the responsibilities for strategic, tactical asset allocation and actual portfolio management are clearly segregated. Once in place, this framework will facilitate a disciplined implementation of the asset allocation decision and should help in clarifying accountability, managing risks and promoting a risk awareness culture across the organization.

In the second step, we will analyze the three alternative investment philosophies for central banks whereby policy requirements can be translated into investment principles to assess if they are embedded in the investment culture of the National Bank of Rwanda. We will first look at the individual currency approach, where the primary objective for reserves management is to ensure efficient risk-return combinations on the level of individual currency sub-portfolios.

In contrast to these first two asset-only approaches, the asset and liability perspective seeks to derive objectives by taking into consideration central banks' ability to bear financial risks and or the country's external debt.

In the third step, the reserves' long-term risk-return profile is derived from the previously established investment principles. Therefore, we will measure the performance of the investment decisions made by the central banks from the year 2005 until 2009.

8. Data Analysis and Interpretation

8.1 Liquidity management and backing ratios of the BNR's foreign exchange

reserves, 2005-2009

The management of the BNR's foreign exchange reserves considers the macroeconomic development and investment policy defined by the Investment committee and presented for consideration and approval. Before analyzing the performance and policies related to BNR's foreign exchange reserves, it is vital to look at the evolution of the components of key ratios that serve as backing ratios to the foreign exchange reserves management.

Table 1: Evolution of the BNR foreign exchange reserves and foreign liabilities for the period of 2005 to 2009 in millions of RWF

Item	2005	2006	2007	2008	2009
Gross official reserves	225,343	241,786	301,820	334,406	425,166
Foreign liabilities	122,786	67,235	101,185	133,685	178,110
GDP	1,166,200	1,349,500	1,826,200	2,437,200	2,948,000
% increase of reserves		7	25	11	27
% increase of foreign liabilities		-45	50	32	33
% increase of GDP		16	35	33	21

Source: Research Department, BNR, Rwanda

As the GDP of the country increased, the foreign exchange reserves also increased from 2005 to 2009. Substantially, the foreign exchange reserves held by BNR increased at a percentage of 7 percent, 25 percent, 11 percent and 27 percent respectively in 2006, 2007, 2008 and 2009. The details for the increase in the foreign exchange reserves are examined in the following tables. Foreign liabilities decreased by 45 percent in 2006 before keeping an increasing trend of 50 percent, 32 percent and 33 percent respectively in 2007, 2008 and 2009. The GDP kept increasing for the period of our study. It tapped to an increase of 16 percent, 35 percent, 33 percent and 21 percent respectively in 2006, 2007, 2008 and 2009.

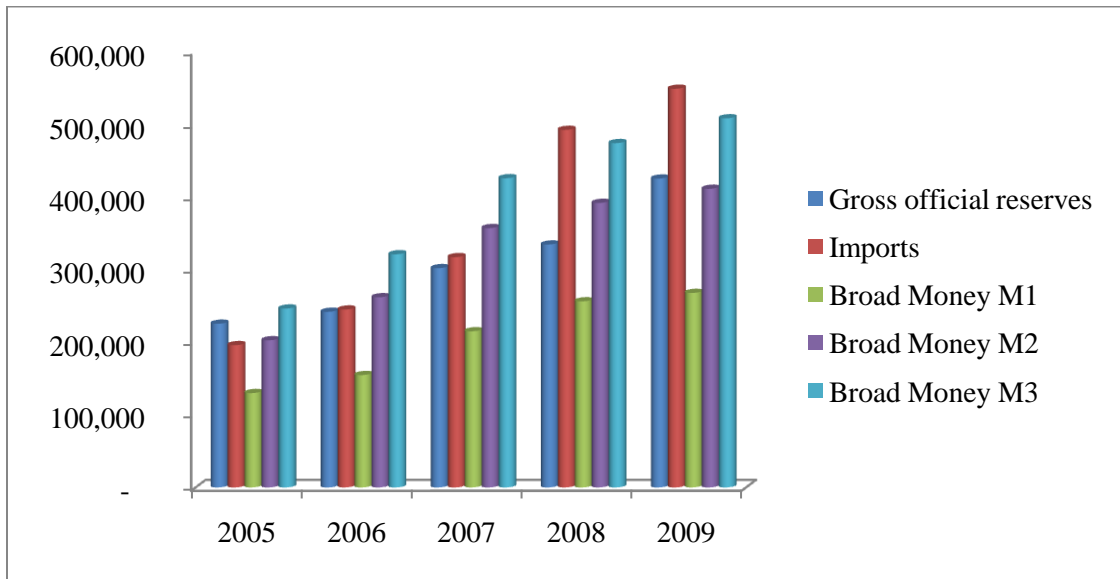
Table 2: BNR's foreign exchange reserves backing ratios, 2005-2009

Period	2005	2006	2007	2008	2009
Gross official reserves	225.343	241.786	301.820	334.406	425.166
Imports	195.859	244.917	316.995	492.233	548.817
Broad Money M1	129.892	154.673	214.970	256.155	267.731
Broad Money M2	202.554	261.794	357.020	391.673	411.105
Broad Money M3	246.227	320.972	425.654	474.011	508.142
GDP	1.166.200	1.349.500	1.826.200	2.437.200	2.948.000
Import coverage ratio	13,8	11,8	11,4	8,2	9,3
Broad money M1 coverage ratio	1.73	1.56	1.40	1.31	1.59
Broad money M2 coverage ratio	1.11	0.92	0.85	0.85	1.03
Broad money M3 coverage ratio	0.92	0.75	0.71	0.71	0.84
GDP to foreign exchange reserves ratio	0.19	0.18	0.17	0.14	0.14

Source: Financial Reports of 2005-2009, BNR, Rwanda

The above table contains the main ratios which serve as a measure of the adequacy in foreign exchange reserves. The calculations show that the import coverage ratio which is expressed in months of imports evaluated at 13.8 months of imports in 2005, 11.8 months of imports in 2006, 11.4 months of imports in 2007, 8.2 months of imports in 2008 and 9.3 months of imports in 2009. Though there is a decrease trend in the ratio for the three consecutive years, the ratio was above the standard which is 6 months of imports. The broad money M1 coverage ratio is above hundred percent along the years for the period of the study. It reached a percentage of 1.73 in 2005, 1.56 in 2006, 1.40 in 2007, 1.31 in 2008 and 1.59 in 2009. The Broad money M2 coverage ratio varied between 0.85 and 1.11 for the five years. It reached a percentage of 1.11 in 2005, 0.92 in 2006, 0.85 in 2007 and 2008 and 1.03 in 2009 (Fig 2).

Figure 2: Foreign exchange backing ratios



Source: Financial Reports of 2005-2009, BNR, Rwanda

The data contained in Table 3 indicates on the foreign exchange reserves inflows and outflows. Mainly, the inflows are composed of the budget support from various donors, commercial bank deposits and other revenues. On the other side, the outflows of foreign exchange reserves are mainly composed of the current expenditure disbursements, sales to commercial banks, external debt repayment and commercial banks withdrawals.

Table 3: Inflows and outflows of the BNR's foreign exchange reserves in millions of USD

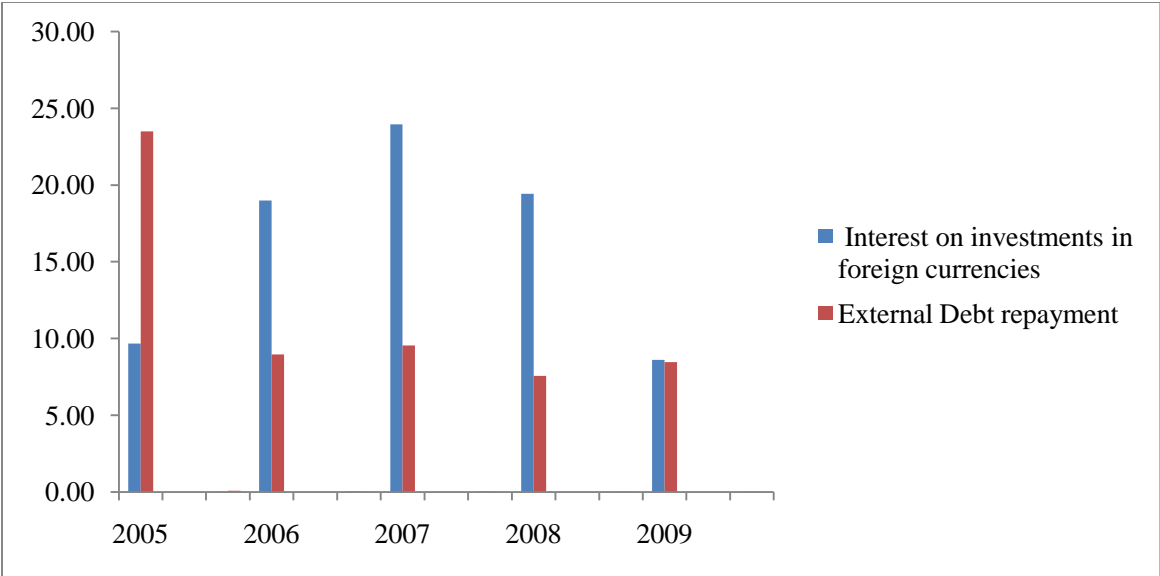
Inflows	2005		2006		2007		2008		2009	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Opening balance	314.50		407.98		440.69		547.37		577.52	
Inflows	445.39	100	448.04	100	656.01	100	940.64	100	975.69	100
1. Budget support	199.01	45	121.22	27	234.91	36	370.50	39	410.63	42
2. Drawings on SDR	0.00	0	0.00	0		0		0		0
3. Draws on IMF credits	1.70	0	2.52	1	3.43	1	3.70	0	1.72	0
4.SDR Cumulative Allocation	0.00	0	0.00	0		0		0	100.31	10
5. Draws on NBB overdraft	14.67	3	22.63	5		0	40.04	4		0
Interest on investments in foreign currencies	9.66	2	18.99	4	23.96	4	19.44	2	8.61	1
7. Purchases from banks	19.15	4	6.48	1	16.11	2	16.44	2	14.61	1
8. Bank deposits	44.39	10	76.77	17	94.84	14	125.46	13	173.95	18
9. Government Projects		0	150.70	34	150.97	23	207.49	22	200.30	21
10. Other revenue	155.98	35	45.39	10	123.38	19	148.70	16	59.35	6
11. Adjustment	0.83	0	3.34	1	8.41	1	8.88	1	6.23	1
Outflows	351.91	100	415.33	100	549.34	100	910.49	100	836.32	
Current expenditure	145.68	41	111.49	27	143.05	26	274.30	30	253.23	30
Non Banking Clients		0	61.68	15	60.06	11	91.94	10	139.16	17
External Debt repayment	23.50	7	8.96	2	9.54	2	7.56	1	8.46	1
Sales to banks	117.60	33	137.05	33	235.72	43	376.40	41	228.29	27
Bank withdrawals	44.48	13	92.16	22	99.86	18	135.39	15	184.73	22
Adjustment	20.65	6	3.98	1	1.11	0	24.90	3	22.44	3
Closing balance	407.98	0	440.69	0	547.37	0	577.52	0	716.90	
Performance criteria (PRGF)	182.04		311.36		326.06		505.87		537.66	

Source: Financial Reports of 2005-2009, BNR, Rwanda

As depicted Fig 3, it is important that BNR managed the mismatch between the interest received on foreign exchange reserves investments and the external debt repayment. In fact, the later that amounted at USD 23.50 million was bigger than the interest income of USD 9.66 millions in 2005. In the following years except in 2009, the interest income exceeded the external debt repayment reaching USD 18.99 against 8.96 million in 2006, USD 23.96 against 9.54 millions in 2007, and USD 19.44 against 7.56

millions in 2008. However, the year 2009 in which the consequences of global financial crisis were being felt recorded an interest income of USD 8.61 against 8.46 millions of the external debt repayment. The table indicates also that the balance of foreign exchange reserves held at the end of each year of the study period is far greater than the PRGF criterion for the reserves adequacy. Substantially, in 2005 the closing balance of foreign exchange reserves amounted at USD 407.98 million against USD 182.04 million for PRGF. In 2006, they reached an amount of USD 440.69 million against 311.36 million of PRGF, 547.37 million of USD against USD 326.1 million in 2007, 577.52 million of USD against USD 505.872 in 2008 and 716.90 million of USD against USD 537.66 million of PRGF in 2009. Briefly, the BNR respected the PRGF criterion in its daily decisions on foreign exchange management.

Figure 3: Histogram of the interests paid and earned respectively on debt and investment



Source: Financial Reports, 2005-2009, BNR, Rwanda

Table 4: Investment trenching of the BNR portfolio in foreign exchange reserves.

Tranche		2005		2006		2007		2008		2009	
		Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Available cash	Amount	72.80	35	39.09	17	32.82	11	92.19	28	106.51	26
	% change			-46		-16		181		16	
+/- month placements	Amount	8.09	4	62.24	28	158.27	54	48.24	15	28.92	7
	% change			670		154		-70		-40	
Liquid	Amount	76.41	37	105.37	47	74.86	25	131.31	40	184.41	45
	% change			38		-29		75		40	
Investment	Amount	51.45	25	18.49	8	27.80	9	58.68	18	89.12	22
	% change			-64		50%		111		52	
Total	Amount	208.75	100	225.19	100	293.76	100	330.42	100	408.96	100
	% change			8		30		12		24	

Sources: Financial Reports, 2005-2009, BNR, Rwanda

The composition of the BNR portfolio is the result of the following trenching policies adopted by the investment committee¹⁷:

Table 5: Portfolio trenching of BNR

Tranche	Horizon	Objective
Working Capital	1 month	Provide liquidity 100 percent cash (intervention, payment, currency mix adjustments)
Liquidity	1 year	Maximize returns subject to avoiding negative returns at a 99 percent confidence
Investment	over 1 year	Maximize returns subject to a shortfall of 100 bps with probability of 95 percent

Source: Financial Markets, BNR, Rwanda, 2009

A great proportion of the BNR's foreign exchange reserves is kept in working capital tranche for the reason of avoiding a conflict in government disbursements schedules and BNR's investment policy. In fact, the working capital composed mainly by the available cash and the less or equal month placements situated between 33 percent and 65 percent. Substantially, working capital was at a percentage

¹⁷ BNR, Regulations and guidelines in Investment decisions, Financial Markets department, 2009.

of 39 percent in 2005, 45 percent in 2006, 65 percent in 2007, 43 percent in 2008 and 33 percent in 2009. The high score in working is in 2007 with 65 percent due mainly to good interests rates recorded on the international market as can be seen in the following table. The fewer score which 33 percent is registered in 2009 due mainly to the global financial crisis which impacted severely the interest rates on the international market then, pushing the BNR to put more money in liquid tranche. The liquid tranche evaluated between 25 percent and 75 percent for the entire study period. As can be seen in the above table and compared to the portfolio, the liquid tranche tapped at a percentage of 37 percent in 2005, 47 percent in 2006, 25 percent in 2007, 40 percent in 2008 and 45 percent in 2009.

On the side of investment, it is situated at a proportion between 8 percent and 25 percent. In fact, the tranche which composed the funds entrusted to the external managers and the investments in financial instruments was at 25 percent in 2005, 8 percent in 2006, 9 percent in 2007, 18 percent in 2008 and 22 percent in 2009. The investment tranche decreased by 64 percent in 2006 due to the decision of the Bank to reduce investment in financial instruments. The same tranche increased by 18 percent due mainly to the decision of BNR to allocate a portion of its funds to another external manager namely RAMP, Reserve Advisory and Management Program.

8.3 Evolution of the foreign exchange rates of the BNR's main currencies.

The fluctuation is one of the factors that lead BNR to decide on the currency in which to hold most of the foreign exchange reserves. The following table indicates the behavior of the foreign exchange rates of the BNR's main currencies.

The high fluctuating currencies which are the less preferred currencies of the BNR are the EUR and GDP. The EUR fluctuated by 10% of increase in 2006, 11% in 2007, -1% in 2008 and 3% in 2009 whereas the GDP increased by 13% in 2006, decreased to 1% and -26% in 2007 and 2008 before resuming at 12% in 2009. The USD seems to have been stable, varying between -1% and 3%. The SDR

in which the IMF allocations are held, recorded a decrease of 4% in 2006 and 2007, decreased by 1% in 2008 before resuming at 3% in 2009. It is important to note that BNR uses a controlled floating rate in the exchange rate determination.

8.4. Asset- Liability management at BNR

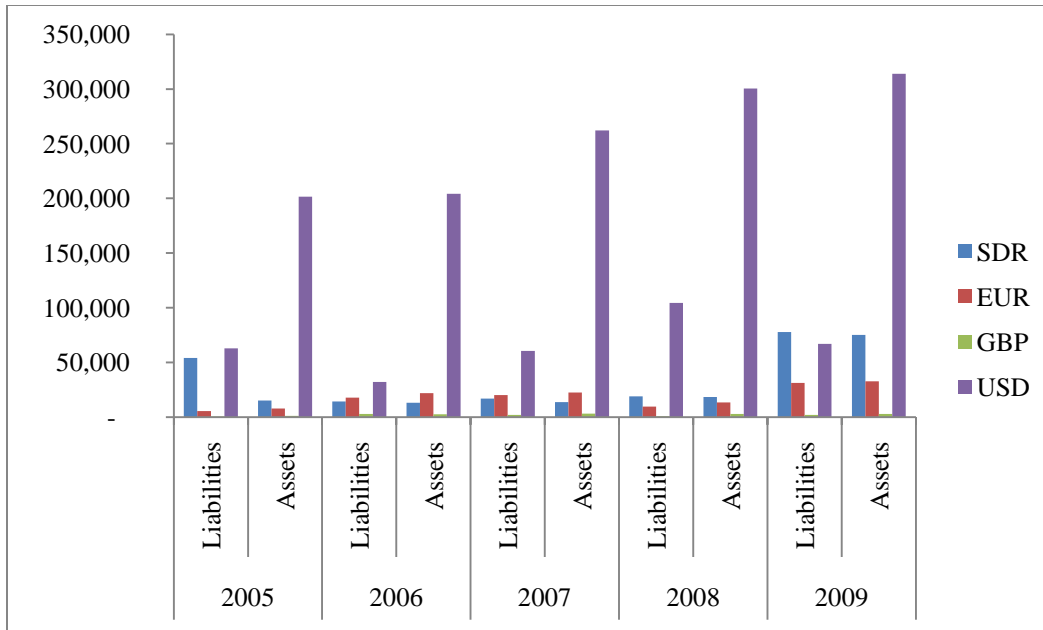
The most liabilities of BNR are in USD followed by the SDR, EUR and GBP. In fact, the year 2005 recorded 51% in USD of the total liabilities, 48% in 2006, 61% in 2007, 78% in 2008 and 38% in 2009. The liabilities which are in SDR are of a percentage of 44% in 2005, 21% in 2006, 17% in 2007, 14% in 2008 and 44% in 2009. The EUR reached at 4% of the total liabilities in 2005, 27% in 2006, 20% in 2007, 7% in 2008 and 18% in 2009. The liabilities in GBP are at almost zero percent in 2005, 4% in 2006, 2% in 2007, 1% in 2008 and 2009. The figure and table below exhibit clearly the matching policy utilized by BNR in its asset-liabilities management

Table 5: Exhibit of asset-liability management of BNR in millions of RWF

Period	2005		2006		2007		2008		2009	
	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets
SDR	54,064	15,094	14,192	13,069	16,742	13,647	18,832	18,234	77,809	75,103
EUR	5,498	7,702	17,827	21,700	19,996	22,480	9,597	13,175	31,152	32,653
GBP	428	921	2,831	2,569	1,866	3,150	771	2,880	2,047	2,815
USD	62,727	201,586	32,186	204,282	60,566	262,028	104,425	300,310	66,981	313,955
Total	122,717	225,303	67,037	241,620	99,170	301,305	133,625	334,599	177,989	424,526

Source: BNR, *Financial reports, 2005-2009, Rwanda*

Figure 4: Asset-liability management of BNR



Source: Financial Reports, 2005-2009, BNR, Rwanda

8.5. Performance measurement of the BNR portfolio

The data in Table 12 indicates on the returns or earnings generated by the different tranches composing the portfolio formed out of the foreign exchange reserves of the BNR. The tranche which generates higher returns is the liquid one followed by the investment tranche +/- month placements.

Table 6: Performance measurement of BNR's portfolio in billions of RWF

Tranche		2005		2006		2007		2008		2009	
		Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Available cash	Amount	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
	% change										
+/- month placements	Amount	1.21	23	1.93	19	1.69	13	0.70	6	0.13	3
	% change			59		-12		-59		-82	
Liquid	Amount	2.49	47	6.26	60	9.13	71	6.84	63	1.52	31
	% change			152		46		-25		-78	
Investment	Amount	1.63	31	2.16	21	2.12	16	3.39	31	3.31	67
	% change			33		-2		60		-2	
Total	Amount	5.33	100	10.35	100	12.94	100	10.92	100%	4.95	100
	% change			94		25		-16		-55	

Source: Financial Reports, 2005-2009, BNR, Rwanda

Substantially, the liquid contributed 47 percent to the total investment income in 2005, 60 percent in 2007, 71 percent in 2007, 63 percent in 2008 and 31 percent in 2008. The investment tranche generated 31 percent of the total investment income in 2005, 21 percent in 2006, 16 percent in 2007, 31 percent in 2008 and 67 percent in 2009. The +/- month placements which the less generating return contributed 23 percent to the total investment returns, 19 percent in 2006, 13 percent in 2007, 6 percent in 2008 and 3 percent in 2009. Apparently, there is a decreasing trend in the returns generated by the different tranches because of the low interest rates prevailing on the financial markets because of the global financial crisis. The following table will assess the sufficiency of the returns to sustain the operations and investment of the BNR.

8.6. Investment income compared to operating and capital expenditure of BNR

Table 7 shows the comparison between the income derived from BNR's investments operations and the expenditure incurred by the same institution for the period from 2005-2009. The investment income contributed in the total revenues of BNR to a percentage between 27 percent and 72 percent from 2005 to 2009. In fact, it reached at 72 percent of the total revenues in 2005, 63 percent in 2006, 64 percent in 2007, 48 percent in 2008 and 27 percent in 2009. Though the foreign exchange reserves increased along the years of the study period increased and the investment income seemed to have increased, the later exhibits a decreasing trend of its contribution to the total revenues of BNR. Compared to the BNR's operating expenses, it is observed that the investment income did not cover fully even the operating expenditure. Ideally, the investment income which is regarded as the main source of revenues of BNR covered 53 percent of the operating expenses in 2005, 77 percent in 2006, 99 percent in 2007, 61 percent in 2008 and 33 percent in 2009. However, there is a positive improvement of the contribution of the investment to BNR's operating expenses for the first three years of the study period before it started deteriorating in 2008 and 2009 due to the lower interest rates on the financial markets following the credit crunch announced by the end of 2007. Basing on the above highlighted facts, it is obvious to conclude

that the returns generated from the invested foreign exchange reserves are not enough to sustain the BNR's operations which are an indicator of the inefficiencies and ineffectiveness in management of foreign exchange reserves.

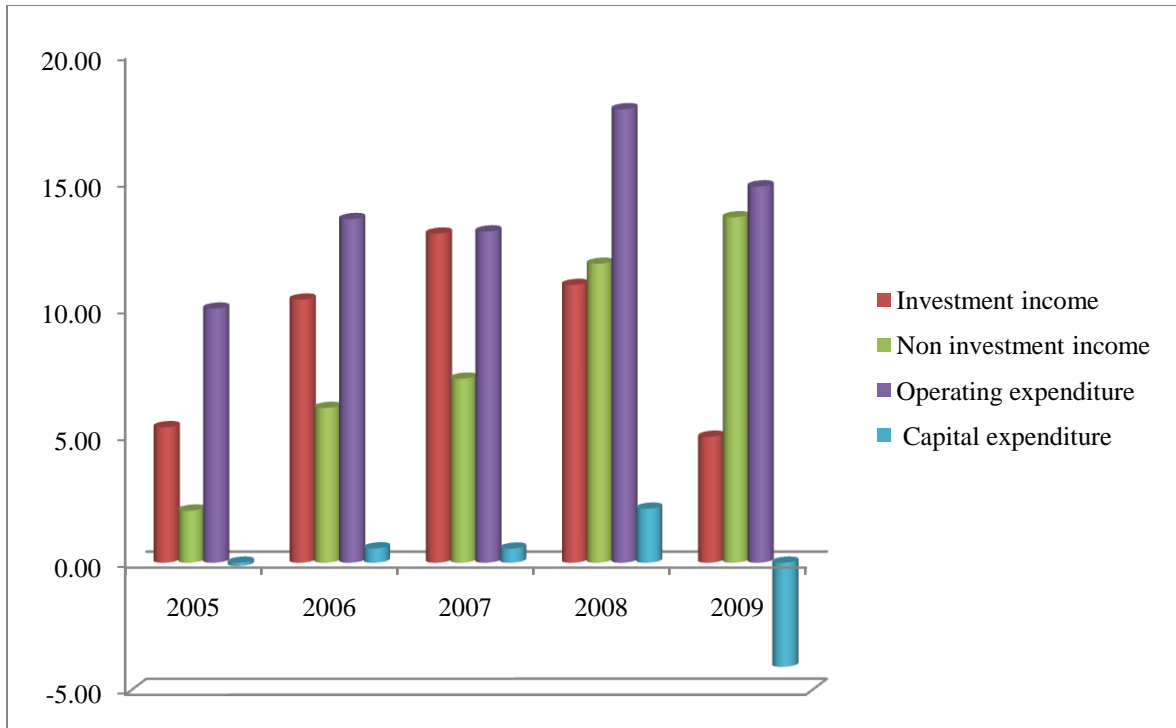
Table 7: Investment income compared to operating and capital expenditure of BNR in billions of RWF

Tranche		2005		2006		2007		2008		2009	
		Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Investment income	Amount % change	5.33	0.72	10.35	0.63	12.94	0.64	10.92	0.48	4.95	0.27
Non investment income	Amount % change	2.05	0.28	6.09	0.37	7.24	0.36	11.76	0.52	13.58	0.73
Sub Total	Amount % change	7.38	1.00	16.44	1.00	20.18	1.00	22.68	1.00	18.54	1.00
Operating expenditure	Amount % change	9.99		13.51		13.03		17.83		14.80	
Investment income/Operating expenditure		53		77		99		61		33	
Capital expenditure	Amount % change	-0.13		0.56		0.55		2.12		-4.09	

Source: Financial Reports, 2005-2009, BNR, Rwanda

Graphically, the contribution of the investment income to total revenues and expenditure of BNR is here below depicted:

Figure 5: Graphical representation of BNR's investment income and expenditure



Source: Financial Reports, 2005-2009, BNR, Rwanda

8.7 Risk management of the BNR's investment

Table 14 shows the status of the key statistical tools that are used to test the risk variation in the investment. Ideally, it considers the returns in percentage compared to their corresponding tranche of investment.

Table 8: Risk management of the BNR's investment

Year		Available cash	+/- month placements	Liquid	Investment	Average portfolio return
2005	% of return	0.00	15.02	3.26	3.16	2.55
	Weight	34.87%	3.87%	36.60%	24.65%	
2006	% of return	0.00	3.10	5.94	11.70	4.60
	Weight	17.36%	27.64%	46.79%	8.21%	
2007	% of return	0.00	1.07	12.19	7.64	4.41
	Weight	11.17%	53.88%	25.48%	9.46%	
2008	% of return	0.00	1.44	5.21	5.77	3.31
	Weight	27.90%	14.60%	39.74%	17.76%	
2009	% of return	0.00	0.44	0.82	3.71	1.21
	Weight	26.04%	7.07%	45.09%	21.79%	

Source: Researchers data base

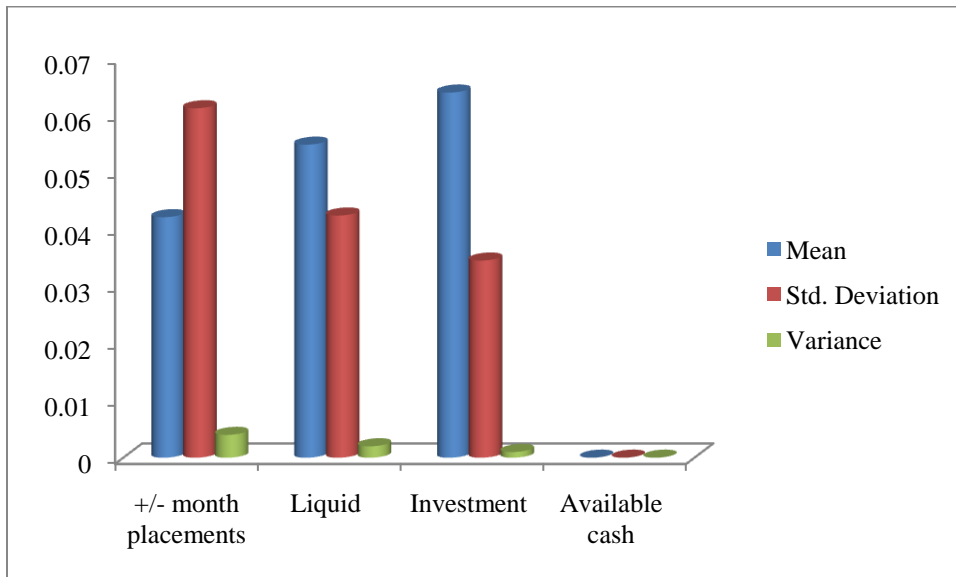
Table 9: Basics results for risk management of BNR's foreign exchange reserves

	+/- month placements	Liquid	Investment	Available cash
Mean	.042131	.054838	.063965	.00
Std. Deviation	.0612118	.0424230	.0345351	.000
Variance	.004	.002	.001	.000

Source: Researchers database, SPSS calculations

The variance for the investment tranches of BNR is composed between 0.00 and 0.001 whereas the standard deviation, the famous measure of riskiness for any investment is situated between 0.00 and 0.03. The standard deviation is 0.00 for the cash available, an indicator of zero risk on that tranche, 0.06 for the +/- cash placements, 0.04 for the liquid investments and 0.03 for the investment tranche. The yearly average portfolio return is between 1.21 percent and 2.55 percent for the period between 2005 and 2009. The year 2009 recorded a very low average portfolio return (1.21 percent) due to the global financial crisis. Indeed, the portfolio return recorded an average percentage of 2.55 percent, 4.6 percent in 2006, 4.41 percent in 2007 and 3.31 percent in 2008. The following figure illustrates the evolution of averaged portfolio returns for the period from 2005 to 2009. The following figure illustrates more on the basics results for risk management of BNR's foreign exchange reserves management.

Figure 6: Basic results for risk management at BNR



Source: SPSS calculations

Table 10: Correlations among the investment trenches of BNR’s foreign exchange reserves

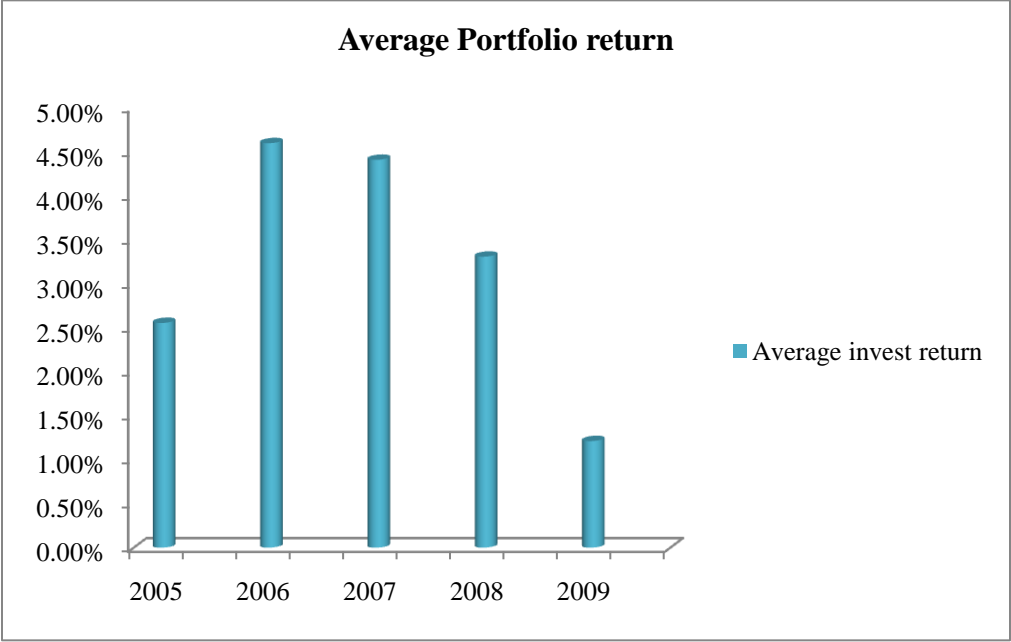
		Available cash	+/- month placements	Liquid	Investment
Available cash	Pearson Correlation	N/A	N/A	N/A	N/A
	Significance (2-tailed)		.	.	.
	Covariance	.000	.000	.000	.000
+/- month placements	Pearson Correlation	N/A	1	-.263	-.389
	Significance (2-tailed)	.		.669	.517
	Covariance	.000	.004	.000	.000
Liquid	Pearson Correlation	N/A	-.263	1	.523
	Significance (2-tailed)	.	.669		.366
	Covariance	.000	.000	.002	.001
Investment	Pearson Correlation	N/A	-.389	.523	1
	Significance (2-tailed)	.	.517	.366	
	Covariance	.000	.000	.001	.001

Source: Researchers database, SPSS calculations

As can be red from the above table, a range number of investable trenches of BNR are negatively correlated and others positively correlated. Thus, an opposite movement for any change in either market

conditions or investment amount is apparent for those negatively correlated like +/-month placements, liquid and investment tranches. Explicitly, the results produced by SPSS indicate that the +/-month placements are negatively correlated with the liquid and investment tranches to an extent of -0.263 and -0.389 respectively. Only, the investment tranche was found to be positively correlated with liquid tranche to an extent of 0.523.

Figure7: Average investment return



Source: Financial Reports, 2005-2009, BNR, Rwanda

9. Summary

The inflows in terms of foreign exchange reserves are still low and most of them are in terms of government support which would not be relied on but yet the Rwanda’s reserves shows a growing trend since 2005. In fact, 45 percent of the inflows recorded by BNR were found relating to the budget support incoming reserves. It is also observed that the imports which are in large volume compared to the exports which underlines a threat to the country’s balance of payment. Furthermore the imports scored an increase

between 11.5 percent and 55.28 percent for the entire period of the study whereas the trend of exports reached a rate between -26.43 percent and 55.28 percent. It was noted the increase in imports was catered for by the foreign exchange reserves which did not cease to grow since 2005 despite the financial turbulences and economic shocks encountered by the country in particular or the world in general. The import coverage ratio has been kept to a normal ratio i.e. between 8.2 and 13.8 months of the imports from 2006 to 2009.

Though there were a shortage in the interest earned from the reserves investment, it is very important to note that BNR managed to cope the interest payable on the different governmental liabilities with the investment income which was showing a decrease trend due to the global financial turbulences. In real terms, the interest rates scored a decrease in 2008 of -94 percent,

-38 percent, -75 percent respectively on deposits in USD, EURO and GBP.

The movement of the exchange rate usually impacts the foreign exchange reserves especially on the reporting side when the conversion in the local currency is required. It was noted that the USD which is the main currency in which most the reserves are held (more than 85 percent of reserves are in USD) did not fluctuate much which is a signal of the stability and strength of the local currency (RWF) against the American Dollar. The asset liability management is well performed at the National Bank of Rwanda.

Performance measurement of the foreign exchange reserves is the utmost motive of the researcher to undertake the analysis of asset allocation at the National Bank of Rwanda. It was found then found that asset diversification is not optimally achieved within the Bank which later underlines the low income generated though the reserves investment transactions with a risk of non coverage of the expenditures incurred by BNR. Visibly, the coverage of operating expenditures by the reserves investment income is between 0.33 and 0.99.

Risk management of the foreign exchange reserves has been analyzed and the problem of the non diversification was apparent. In fact, only the fixed term deposits are the current preferred domain of the investment of BNR followed by the allocation of a certain portion of the reserves to the external managers namely RAMP and CAIML. Finally, the research noted that BNR refers to the Meryl Lynch as its benchmark for the reserves investment arrangement.

10. Conclusions

At the end of this study, it was found that the foreign exchange reserves are not invested optimally since the returns from them do not cover the expenditures that BNR may incur for its operating activities or investment. In fact, if no change is made in foreign exchange reserves management as it is today, there is a prediction of non- operating sustainability. There is also an apparent risk connected to a low diversification among the foreign exchange reserves investment made by BNR which later lead to a poor performance. Taking advantage of training opportunities provided by the partnering external managers is very low; hence the recommendations to improve the management of foreign exchange reserves in BNR need to be formulated as follows:

- The BNR staff has to benefit from the expert skills and start at least with a pepper portfolio which will lead them to cease depending on the external managers and then get involved actively on the market,
- The BNR should update the currency arbitrage practice by focusing on spot and forward currency management to minimize risky mismatches and transaction costs, hence the staff has to be given a training on use of currency forwards and swaps and other money market instruments such as floating rate notes and reverse repos,

- BNR should improve its investment horizon which currently at 1 to 2 years and let it be at 3 to 5 years,
- BNR has to set up mechanisms and systems that aim at strengthening the investment process of foreign exchange reserves,
- It is important that the BNR monitors and evaluate the performance of the external managers to ensure if they are not relying on their leftovers only.
- In the near time, it wouldn't be possible to cease working with the external managers but the amount given to the external managers which is between 8 percent and 25 percent of the total reserves for the period from 2005 to 2009 should be reduced.
- BNR should diversify the foreign exchange reserves among the investable currencies to mitigate the non diversification risk,

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