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MONETARY POLICY AND FINANCIAL STABILITY STATEMENT

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EXECUTIVE SUMMARY

During the Year 2009, the National Bank of Rwanda implemented its Monetary Policy in unprecedented turmoil of the international and national economic and financial environment. In 2009, the world real GDP declined by 1.1% mainly due to weak performance in leading developed economies, the most affected by the global financial crisis. Like many other developing countries, Rwanda was also affected by this global economic recession and negative effects were particularly observed in its export sector through low international commodity prices. Although the liquidity crunch in the domestic banking system prevailing at the beginning of the year 2009 originated mainly from a duration mismatch (short- term liquidity and long- term investment mismatch) in domestic credit markets, spillover effects of the global economic recession in the domestic banking system exacerbated the situation.

The economic growth declined significantly from 11.2% recorded in 2008 to 6.0% in 2009. While the agriculture sector performed well (10.4%) boosted by favorable weather conditions and Government Green Revolution Program, the Industry and services sectors performed badly due to the fall in global demand and tightened credit conditions in the banking system. Their growth rates were 1.1% and 4.3% respectively. Despite the low growth rate achieved in 2009, inflation has significantly declined as a consequence good performance in food production, decline in worldwide consumer goods' prices, the stable exchange rate of RWF and the limited money supply growth. On annual basis, the overall inflation fell from 22.3% in December 2008 to 5.74% in December 2009.

Despite the negative effect of the global economic recession on the external sector, Rwanda managed to record a positive balance of payments of USD 57.05 millions by the end of 2009, thanks to relatively important foreign capital inflows. These inflows offset the current account deficit, and allowed BNR to keep a comfortable

external position with gross official reserves representing 6.2 months of imports of goods and services. This development contributed to maintaining a stable exchange rate in 2009.

To avoid deeper decline of the growth rate, policy measures were undertaken by Government and BNR. While Government kept momentum to stimulate agriculture production, appropriate policy measures have been taken by the Central Bank addressing the liquidity crunch and credit to private sector conditions, with the objective of restoring confidence in the banking system. Indeed, banks benefited from important liquidity injection through the reduction of the Reserve Requirement Ratio from 8% to 5% in February 2009, followed by the decision to suspend rolling over Government T-bills that matured in 2009. Furthermore, the establishment of the Central Bank refinancing and Government deposit facilities were put in place to help banks to maintain lending operations to the economy. These measures resulted in significant improvement in banking liquidity and lending operations recovered their normal trend in the second half of 2009.

Following the publication of the new banking law, the regulations on liquidity ratio, capital adequacy requirements and regulation on accreditation and other requirements for external auditors of banks and Insurance and Insurance Brokers have been issued to all banks. In line with microfinance best practices compliance and the professionalization of microfinance sector, the new microfinance Law establishing the organization of microfinance activities was published in the Official Gazette as well as its implementing regulations. With regard to the supervision of banks, the risk- based supervision approach continued to focus on identifying risky management practices in the financial sector.

The soundness indicators of the banking system and Micro finance sector remained strong in 2009. All banks are compliant with the minimum capital required of 5 billion RWF, the capital adequacy ratio increased to 19.4% against 15.9% in

December 2008 and the NPLs stood at 12.8% from 12.6% in 2008. With regard to microfinance sector, total assets increased by 20% and equity by 28.8%. The gross loans and deposits increased also by 16.4% and 18.8 % respectively.

In 2009, BNR and stakeholders continued to work on the payment system modernization program to ensure that payment systems are efficient and reliable. This program involves introduction of new payment instruments, mechanisms (systems) and improving the legal environment. To ensure that time critical payments are settled in real time, BNR is working on the implementation of a real time settlement system-the Rwanda Integrated Payments Processing System, encompassing the Automated Clearing House (ACH), the Real Time Gross Settlement (RTGS) and the Central Securities Depository (CSD), all three running on the same platform. The Rwandan banks continued to issue payment cards and SIMTEL as a common platform ensures that the infrastructure on which they are used is interoperable.

In 2010, BNR will continue to implement a proactive monetary policy to ensure that the level of the banking system liquidity, as well as the Central Bank policy rate will contribute to stimulate domestic savings and support the higher economic growth perspectives for 2010 while maintaining the headline inflation in single digit number. The BNR policies will support Government and financial institutions initiatives aimed at increasing financing to the agriculture sector and related activities by reforming the management of the Agriculture Guarantee Facility and other Government Financial Facilities to make them more suitable and accessible by farmers and other SMEs operating in rural areas.

The financial sector deepening reforms will be strengthened in 2010, focusing more on increasing access to financial services through the expansion of the banks branches network and a full implementation of Umurege SACCO program. A partnership between banks and MFIs will be stimulated in order to increase availability of viable financial services in the rural areas. BNR will continue to

strengthen the prudential surveillance of the financial system. The publication of all regulations implementing the new banking and insurance laws will be completed in 2010, while intensifying on-site inspections and strengthening the surveillance system and the resolution framework. The legal framework to supervise the pension sector will be established as well.

BNR will work closely with CMAC to push forward the development of the domestic capital market. The enactment of the collective investment schemes law as well as the reform of the pension sector will create a new institutional framework to stimulate long term domestic saving, creating an enabling environment for the diversification of securities to be traded on the Rwanda OTC market.

Concerning payment system modernization, BNR will endeavour to have the following laws passed: the Electronic Transactions law and the Book entry securities holding (CSD) law. About retail payment systems, concerted effort will be put in the following areas: International connectivity, International acquiring, International issuing, Cards acquisition, ATM and POS deployment based on the principle of interoperability. Implementation of the Rwanda Integrated Payments Processing System (RIPPS) will kick off.

OVERVIEW OF ECONOMIC ENVIRONMENT IN 2009

I.1 INTERNATIONAL ECONOMIC ENVIRONMENT

I.1.1 Economic growth

The world economy in 2009 has been in deep recession, following the global financial crisis which occurred in the second half of 2007 and became acute in 2008. According to the IMF estimates, world real GDP declined by 1.1% on average in 2009 after an increase of 3% and 5.2% in 2008 and 2007 respectively. This underperformance initially concerned developed economies, but later extended to emerging and developing countries. In the United States, after a growth of 2.1% and 0.4% recorded respectively in 2007 and 2008, IMF estimates real GDP to decline by 2.7% in 2009. In the Euro Zone, real GDP contraction was estimated at 4.2% against a growth of 0.7% in 2008 and 2.7% in 2007. In Japan, real GDP declined by 5.4% in 2009 after a slight contraction of 0.7% in 2008 against a growth of 2.3% in 2007.

However, following concerted financial stimulus and encouraging policy measures aimed at improving the financial conditions, the world economy started to show signs of a slow recovery in the third quarter of 2009 and is expected to recover by 3.1% in 2010. In the USA, economic growth was 2.8% in the third quarter of 2009 and it is expected to increase by 1.5% in 2010. In the Euro Zone, the economy is also expected to slightly recover by 0.3% in 2010 and by 1.7% in Japan. The economic activity in emerging and developing economies is also expected to increase by only 1.7% in 2009 and by 5.1% in 2010 against 6% and 8.3% in 2008 and 2007. In China, the economy is expected to grow by 8.5% and 9% respectively in 2009 and 2010 against 9% and 13% respectively in 2008 and 2007. In Africa, the economic growth would decelerate to 1.7% in 2009 and rebound to 4.0% in 2010 against 5.2% and 6.3% recorded respectively in 2008 and 2007.

I.1.2 Inflation and commodity prices

Concerning price developments, World inflation pressures eased in 2009 thanks to the diminishing commodity prices after important inflationary shock in 2008 caused by high oil and food prices. In the USA, prices are expected to decline by 0.4% in 2009 after an increase of 3.8% in 2008. In the euro zone, harmonized inflation would stand at 0.3% in 2009, after 3.3% recorded in 2008. In Japan, inflation would fall to -1.1% in 2009 against 1.4% recorded in 2008.

With regard to commodity markets, after the historical level of 147.5 dollars per barrel in July 2008 on London market, oil prices have been declining since then following the effect of global economic crisis. During the first quarter of 2009, oil prices declined by 19.5% but started to recover since the second quarter, reflecting the increasing optimism in economic perspectives and thus in oil demand. On average in 2009, oil prices declined by 36.6% after respective increase of 36.4% and 10.7% in 2008 and 2007. For non energy commodities, prices fell by 21.6% in 2009 after an increase of 21% in 2008 in low and middle income countries. In aggregate terms, world prices of non energy commodities denominated in dollars were expected to decrease by 20.3% in 2009 in comparison with 2008.

I.1.3 Financial markets

In the financial markets, central banks in developed economies cut policy rates with the objective of improving credit provision. The USA Federal Reserve policy rate has been kept in the range of 0 and 0.25% since December 17th 2008. Three Months interest rates fell to 0.25% in December from 0.3% in September 2009 and ten year government bond yield increased to 4.17% in December from 3.61% in September 2009.

The European Central Bank maintained its discount rate unchanged at 1.0% in its meeting on 3rd December 2009, and the three months (EULIBOR) rate declined to 0.71% in December from 0.77% in September 2009. The same trend has been observed in Japan where the policy rate is still at 0.1%, three months interest rates stood at 0.28% in December from 0.36% in September the same year and the ten year government bond yield slipped to 1.42% in December against 1.45% in

September 2009. With regard to exchange market, on annual average, the US dollar has been depreciating vis-à-vis the euro. However, according to Eurostat estimates, after an appreciation of 7.3% in 2008, the Euro depreciated by 5.2% in 2009 against USD. Compared with the Euro, the Japanese Yen continued to appreciate in 2009 as in 2008, by 14.5% and 5.5% respectively.

I.2. NATIONAL ECONOMIC PERFORMANCE

I.2.1. ECONOMIC GROWTH

During the year 2009, Rwandan economy has been affected by unfavorable international economic environment, exacerbated by the liquidity crunch experienced by the banking sector at the beginning of the year 2009. According to MINECOFIN estimates, the 2009 real GDP growth declined to 6.0% after the high growth of 11.6% recorded in 2008. While the agriculture sector performed well (+7.7%) boosted by favorable weather conditions and ongoing Government Green Revolution program, industries (+1.3%) and services (+5.7%) underperformed, due mainly to the fall in global demand and tightened banking system credit conditions.

Table 1: Real GDP Growth, in %

	2005	2006	2007	2008	2009
Real GDP	9.4	9.3	7.7	11.6	6.0
Agriculture	6.5	2.8	2.7	6.4	7.7
Food crops	7.9	1.4	4.0	6.2	9.4
Export crops	-22.5	32.8	-29.2	29.3	-15.3
Industry	9.3	11.7	9.1	15.1	1.3
Manufacturing	8.5	13.4	0.8	5.6	3.1
Mining and quarrying	30.4	-1378.8	42.8	-15.7	-17.9
Construction	9.1	13.1	15.0	28.2	1.4
Services	11.9	13.3	12.3	14.8	5.7
Wholesale and retail trade	13.3	18.2	14.7	19.8	3.8
Transport, storage, communication	16.8	22.5	15.0	24.0	9.1
Real estate, business services	8.1	4.3	11.3	16.0	8.7

Source: MINECOFIN, Macroeconomic Unit

In 2009, the business environment was affected as evidenced by low level of turnovers compared to previous years. Total turnover of large companies of industry and service sectors slightly rose by 1.41% and 4.95% against 30.73% and 37.33% in 2008. The total sales slightly increased by 3.91% after significant increase of 35.31% and 30.70% in 2008 and 2007 respectively.

Table 2: Annual % changes for the Industry and Services sector's total turnovers of large companies

	2005	2006	2007	2008	2009
INDUSTRIES	13.81	34.77	31.53	30.73	1.41
Manufacturing	10.07	23.01	18.84	30.82	-3.12
Energy	46.72	87.90	8.21	36.41	26.14
Mining	4.79	187.01	68.02	35.03	-13.86
Construction	2.64	25.73	77.23	26.34	8.32
SERVICES	19.46	25.50	30.41	37.33	4.95
Trade Services	10.86	26.95	43.20	34.02	3.30
Banks & Insurance comp.	36.81	26.10	32.71	36.61	13.75
Transport and Storage	10.51	16.93	27.04	25.31	35.73
Garage Services	-4.30	-37.08	35.82	206.42	-36.53
Petroleum companies	27.80	36.65	1.03	50.01	-14.31
Posts & Telecommunication	17.56	21.37	47.13	28.83	22.93
Other Services	38.59	2.18	21.34	41.3	20.12
TOTAL SALES	17.80	28.14	30.70	35.31	3.91

Source: RRA, Department of Large Tax Payers

II.2.2 External Sector

The external trade of the Rwandan economy was seriously affected by the global economic and financial crisis. Export activities have been affected mainly by low international prices of minerals, while imports volumes continue to increase.

Exports

The total export declined by 29.3% in value and by 15.09% in volume against an increase of 41.06% and 37.23% in 2008 respectively. Rwandan exports remained dominated by traditional export products such as coffee, tea and minerals, constituting more than 72.7% of total export earnings in 2009. The value of major mineral exports was USD 54.58 million representing 28.31% of total export earnings, while coffee and tea totalized USD 85.53 millions, which represent 44.36% of total export earnings.

Coffee exports performed poorly, falling by 20.75% from a value amounting USD 47.05 millions in 2008 to USD 37.29 million in 2009. The underperformance of coffee is mainly in volume, even if prices slightly declined as well. However, tea exports performed better with international prices increasing from an average of 2.27USD/kg to 2.58 USD/Kg. The value of tea exports increased by 7.31% reaching USD 48.24 millions.

Table 3: Export developments, Value in USD millions, Volume in tons)

	2008		2009		Annual % Change	
	Volume	Value	Volume	Value	Volume	Value
Coffee	18.19	47.05	14.99	37.29	-17.58	-20.75
Tea	19.10	40.05	18.69	48.24	-5.74	7.31
Tin	4.12	41.15	4.27	28.58	1.81	-30.71
Coltan	1.22	37.21	0.95	20.24	-20.20	-43.83
Wolfram	1.67	12.90	0.87	5.76	-48.80	-57.03
Hides and skins	1.93	2.85	1.79	1.96	-7.34	-31.16
Pyrethrhum	3.30	0.38	3.18	0.64	-3.64	68.08
Others	61.60	36.34	57.48	27.74	-5.7	-18.44
Re-exports	12.72	43.83	4.18	22.38	-69.15	-57.62
Total	123.85	261.76	106.40	192.82	-15.09	-29.30

Source: BNR, Statistics Department

The mining sector was the most affected by the declining international prices. The value of exported tin, coltan and wolfram declined respectively by 30.71%; 43.83% and 57.03% compared to 2008. The average price of tin and coltan dramatically decreased, respectively by 31.9% and 29.6%. Except for pyrethrum export value that increased by 68.08%, the downward trend of exports was also observed in non-traditional Rwandan exports like hides and skins (-31.2%) as well as re-exports (-57.62%).

a. Imports

Imports in 2009 increased by 8.19% in value and 17.02% in volume compared to 2008. This upward trend is mainly due to the import of consumer goods as well as energy and lubricants which value increased by 20.52% and 31.43% respectively.

Table 4: Imports developments (Value CIF in millions of USD, Volume in thousands of tons)

	2008		2009		Annual Change (%)	
	Volume	Value	Volume	Value	Volume	Value
CONSUMER GOODS	253.66	284.08	354.81	342.38	39.87	20.52
Of Which: Food product	172.07	87.07	261.57	115.86	52.01	33.07
	21.43	66.50	26.12	100.93	21.88	51.78
CAPITAL GOODS	39.86	367.29	39.75	362.69	-0.28	-1.25
Of Which: Transport Material	11.77	63.30	8.94	58.34	-24.01	-7.83
Machines, devices and tools	19.55	249.80	18.07	235.89	-7.57	-5.57
Other capital goods	8.55	54.20	12.74	68.45	49.02	26.31
INTERMEDIARY GOODS	367.94	323.87	408.80	313.14	11.11	-3.31
Of Which: Construction materials	241.18	136.19	243.22	128.15	0.84	-5.91
Industrial products	100.85	139.23	108.67	124.59	7.75	-10.52
Fertilizers	14.63	19.07	45.65	30.80	212.04	61.52
ENERGY AND LUBRICANTS	186.72.08	161.48	189.63	208.83	1.36	31.43
Of which: Fuels	181.26	152.93	183.51	199.37	1.30	32.62
TOTAL	848.54	1134.14	992.99	1227.04	17.02	8.19

source: BNR, Statistics Department

Compared to last year, the value of imports of intermediary goods and capital goods fell by 3.31% and 1.25% respectively in 2009 reflecting poor performance of industry and services sectors of the economy. The sharp increase in both value and volume in fertilizers with respective growth rates of 61.52% and 212.04% is mainly due to the Government policy that aims at increasing agricultural production, so that fertilizers are abundantly imported and distributed to farmers on subsidized prices.

Consumer goods represents 27.90% of total imports value, and remained dominated by food products with a share of 34%. Compared to 2008, Food Products increased by 33% in value due especially to high increase in imports of cereals, flour and seeds. The value of health and care products increased sharply (+51.78%), and 21.88% in value and volume respectively.

In addition to formal exports and imports, there are other significant imports and exports, as evidenced by the results from the current survey on cross border trade with neighbouring countries conducted since May 2009. Until end September 2009, this survey showed the country's net export RFW 5,178.03 millions. Nevertheless, except with DRC, where a positive trade balance of USD 11.3 millions is recorded, Rwanda has recorded a trade deficit with all other neighbouring countries during that period of May-Sept. 2009. The most important deficit was registered in trade with Uganda.

The results of this survey indicate that Rwanda exports mainly food products in neighboring countries increased as the crop intensification program generated significant production volume for some crops like cassava and maize. These dynamics call for strengthening the crop intensification program to take advantage of market opportunities in the region.

Table 5: Imports and exports from cross board survey (in thousands of USD)

	BURUNDI	DRC	TANZANIA	UGANDA
May	310.58	3 274.87	1.63	148.45
June	361.14	2 709.82	1.67	215.79
July	450.57	3 301.13	1.54	246.54
August	435.77	2 886.61	1.03	270.98
September	654.55	2 477.66	1.99	331.39
Exports	2 212.61	14 650.06	7.86	1 213.15
May	389.65	685.09	19.34	535.78
June	422.69	409.41	11.80	539.36
July	555.33	972.01	13.62	524.12
August	547.77	614.50	11.04	611.37
September	715.74	703.30	12.11	675.49
Imports	2 630.14	3 384.30	68.11	2 886.49
Trade balance	-417.53	11 265.76	-60.25	-1673.34

Source: BNR, Statistics Department

b. Overall Balance of Payments

Beside the deterioration of current account deficit from USD 241.26 to 362.52 million between 2008 and 2009, an estimated positive overall balance of USD 57.05 million was recorded by the end 2009, thanks to important capital transfers. Net current transfers reached USD 593.45 million from 518.57 million in 2008, driven by official transfers and remittances, which increased respectively by 15.78% and 39.21%.

Table 6: Net Current Transfers (in USD millions)

	2006	2007	2008	2009 estim.	% Change
Current transfers (net)	325.54	461.32	518.57	698.60	34.71
Current private transfers (net)	77.15	98.82	72.61	79.71	3.37
Remittances from Diaspora	25.01	98.50	63.31	88.13	39.20
Private transfers for churches and associations	72.87	32.67	45.20	34.80	23.02
Current officials transfers (net)	248.39	362.50	445.96	513.74	15.20
Current support net	128.35	259.27	339.76	410.63	20.86
Humanitarian aid	122.77	107.11	110.32	110.47	0.14

Source: NBR, Statistics Department

Capital and Financial Account balance increased by 34.75% in 2009 compared to 2008, Capital account balance fell by 4.74% while financial transactions account balance increased by 113.05% due especially to the level of long term private debt disbursement and foreign direct investments. Globally, a comfortable external position was maintained in 2009, with sufficient gross official reserves estimated at 6.2 months of imports of goods and services.

Table 7: Estimate BOP 2009 summary (in USD millions)

	2006	2007	2008	2009
Trade balance	-299,02	-404,39	-624,16	-769,54
Services and income (net)	-160,95	-140,38	-135,67	-186,43
Current account balance	-134,43	-83,45	-241,26	-362,52
Capital and Financial account balance	216,0	196,7	316,12	425,97
Errors et Omissions	-0,03	-2,66	-16,86	-6.40
Overall balance	81,52	110,60	58,01	57,05

MONETARY SECTOR DEVELOPMENTS IN 2009

II.1 INFLATION

After high inflationary pressures, particularly in the first three quarters of 2008, Rwanda experienced low inflation in 2009, due to good performance in food production, a decline in import prices, stable RWF against USD and limited growth of money supply. From a high inflation rate of 22.3% in December 2008, the annual headline inflation fell to 5.74% in December 2009. The underlying inflation, which excludes fresh foods and energy, dropped to 3.5% in December 2009 from 22.1% in December 2008. The objective of keeping inflation in one digit number in 2009 was largely achieved.

The annual average inflation dropped to 10.3% in December 2009 from 15.4% in December 2008 and the underlying average inflation has come down to 8.5% from 17.8% during the same period. The price index for locally produced goods significantly declined from 22.9% in December 2008 to 6.3% in December 2009 on annual change, and prices for imported goods fell from 21.6% in December to 1.4% in December 2009. Due to the improvement in agriculture production for the last two years, prices for food and non alcoholic beverages declined on annual basis from 30.9% in December 2008 to 9.0% in December 2009. Energy prices also fell significantly from 19% in December 2008 to 1.3% in December 2009.

Chart 1: Overall inflation (annual % change in CPI, base 2009:100)



Source: BNR, Statistics Department

II.2 MONETARY AGGREGATES DEVELOPMENTS

II.2.1 Money Supply

While the 2009 Monetary Program projected an increase of 17% in Broad Money supply in consistency with an expected increase of 23% of credit to private sector, annual Broad Money supply increase reached only 6.7% in 2009 and the credit to private sector contracted by 1.8%. The slight increase in money supply was generated exclusively by the increase in net foreign assets of the banking system.

Table 8: Monetary aggregates developments in 2008-2009(end period, in RWF billion)

	2008	2009	Annual Change (%)
Net foreign assets	403.8	441.7	9.4
Net domestic assets	61.6	54.1	--12.2
Domestic credit	199.3	187.6	-6.4
Government (net)	-142.0	-147.1	-3.6
Autonomous Agencies	-0.4	-1.9	328.7
Public enterprises	1.8	3.0	69.6
Private sector	340.0	333.7	-1.8
Other items net	-137.7	--133.5	3.0
BROAD MONEY (M3)	466.4	497.7	6.7
Currency in circulation	80.9	77.0	-4.8
Deposits	385.5	420.7	9.1
of which: Transferable	167.7	180.3	7.5
Nontransferable	135.5	143.4	5.8
Foreign currency	82.3	97.0	17.9

Source: BNR, Statistics Department

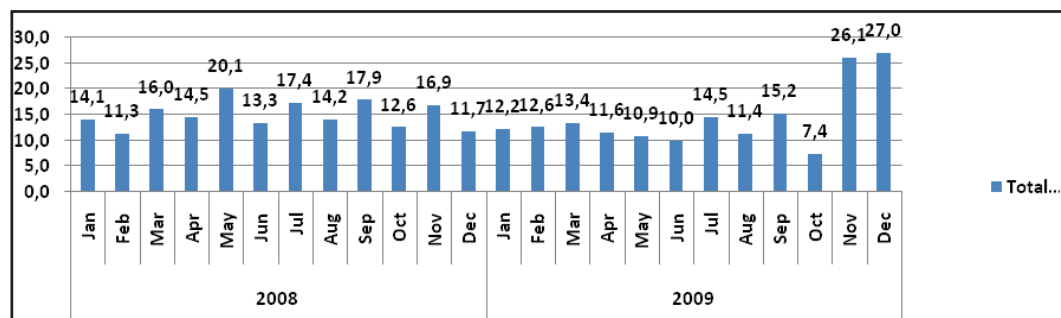
a. Foreign assets

The increase of foreign assets in the banking system resulted from the important external budget support disbursements, as well as private capital inflows via the banking system. Budget support disbursed in 2009 reached USD 409.63 million against USD 370.5 million in 2008, which is an increase of 10.6%. In commercial banks, foreign assets increased by 9.8% in 2009, against 11.3% in 2008. As a result, the Net Foreign Assets strongly increased during the second and third quarters respectively by 11.7% and 8.9%, before a moderate increase of 4.1% during the last quarter.

b. Credit to the economy

Contrary to 23% planned at the beginning of the year, the outstanding credit to private sector fell by 1.8% as a consequence of the liquidity problem experienced by the banking system between the last quarter 2008 and the second quarter 2009. The outstanding credit to private sector was on a declining trend during the first 3 quarters of 2009, as it declined successively by 0.5%, 3.3% and 1.2% respectively. However, from the last quarter 2009, particularly in November and December, the credit to private sector has been increasing. For example, between September and December of 2009, the outstanding credit to private sector increased by 2.65% following the regained confidence in the banking system, stimulated by different measures taken by BNR and the Government, which include the reduction of reserve requirement, the introduction of BNR refinancing facility against collaterals as well as the Government long term deposit facilities.

Chart 2: New loans authorized by commercial banks in 2009 (in RWF billions)



Source: BNR, Financial Stability Directorate

This improvement in the credit market is reflected in the significant increase of new authorized loans to the economy by commercial banks since the third quarter of this year. The new authorized loans increased by 26.4% and 47.2% during the last quarters of 2009 respectively and reached at RWF 60.5 billion in last quarter, which

is the double of its level in second quarter. The new authorized loans to public works and building industry increased by 48.5% and 51.7% in the last two quarters of 2009 respectively, while it increased by 14.5% and 6.4% respectively for the commerce, and restaurant and hotels sector.

Table 9: Authorized new loans to the economy by commercial banks
(in RWF billion)

ACTIVITY BRANCH	2007	2008	2009	% weight	% change
			Total		2008-09
AGRICULTURE,ANIMAL HUSBANDARY & FISHING	3.59	1.91	2.17	1,3	13.6
MINING INDUSTRIES	0.01	0.00	0.00	0,0	-
MANUFACTURING INDUSTRIES	13.67	9.96	15.58	9,0	56.4
ENERGY AND WATER	0.17	0.23	1.81	1,1	687.0
PUBLIC WORKS AND BUILDING INDUSTRY	26.47	53.86	35.98	20,9	-33.2
COMMERCE,RESTAURANT & HOTELS	60.85	73.04	61.45	35,7	-15.9
TRANSPORT,WAREHOUSING & COMMUNICATIONS	14.06	17.82	30.46	17,7	70.9
O.F.I,INSURANCES AND OTHER NON-FINANCIAL SERVICES	2.56	1.99	5.02	2,9	152.3
SERVICES PROVIDED TO THE COMMUNITY	2.92	9.37	3.56	2,1	-62.0
ACTIVITIES NOT CLASSIFIED ELSEWHERE	7.99	11.99	16.26	9,4	35.6
TOTAL	132.3	180.18	172.3	100,0	-4.4

Source: Statistics Department

II.2.2 Money Demand

On the demand side, Broad Money growth recorded in 2009 was driven by the growth in deposits which stood at 9.1%, while currency in circulation declined by 4.8%. Foreign exchange deposits recorded the highest growth rate of 17.9%, while transferable and non transferable deposits in RWF increased by 7.5% and 5.8% respectively.

In addition to slowing down economic activity in 2009, the important decline in currency in circulation would be explained by the financial deepening with

fast-expanding banks' branches and microfinance institutions countrywide, as well as the administrative measures undertaken to use more banks accounts in payments rather than using cash. 22 New commercial banks branches were opened and Deposits in microfinance institutions increased by 18.8% in 2009.

II.3 LIQUIDITY MANAGEMENT AND INTEREST RATES

II.3.1 Liquidity management

BNR proactive monetary policy

Contrary to the previous years, the banking system has experienced tight liquidity conditions since the last quarter of 2008. Starting from the first quarter 2009, BNR and Government implemented different measures allowing banks to rebuild significantly their liquidity conditions and lending capacity. In view of the liquidity shortage, BNR reduced the Reserve Requirement rate from 8% and 5% and all T-bills maturing in 2009 were not rolled over. Two liquidity facilities have been put in place: the 3 to 12 months BNR refinancing facility and the 5-year-Government long term deposit facility. In addition, a Master swap agreement between BNR and International Finance Corporation (IFC) has been signed. IFC and BNR agreed to enter into Dollar /Rwanda Francs cross-currency swap transactions to facilitate long term lending to the Private sector.

Table 10: Disbursed amount in facilities (RWF billion, end January 2010)

Facility	Amount (RWF billion)	Using the facility
3 to 12 month BNR liquidity facility	8.73	4
5-year-Government long term deposit facility	6.99	5

Source: BNR, Financial Markets Department

These measures produced progressively significant positive impact on banking system liquidity conditions as well as the capacity of banks to finance the economy. The net total borrowing by BNR from commercial banks to absorb short term excess

liquidity increased from 0 at end March 2009 to RWF 60.0 billion by end 2009. Today, it fluctuates between RWF 40 and 50 billion, a level which gives confidence to banks to extend their lending operations to the economy with minimum risk of liquidity shortage. At the same time, the interbank money market became very dynamic facilitating the distribution of available liquidity within the banking system. The volume of interbank transactions has reached the level never recorded in the previous years.

Table 11: Interbank market operations (RWF billion)

Year	2007	2008	2009					% change
			Q1	Q2	Q3	Q4	Total	2008-09
Amount	23.65	169.24	195.41	130.41	87.92	123.95	537.69	217.71%

Source: BNR, Financial Markets Department

In January 2009, BNR increased its Key Repo Rate (KRR) from 8% to 9% to stimulate domestic saving. Taking into consideration the improvement in banking liquidity condition and the current downward trend of inflation, BNR reduced its KRR on 18th December 2009 from 9% to 7.5% and decided to use effectively the KRR as the maximum rate at which the BNR mops up liquidity from the banking system and as the minimum rate for injecting liquidity. BNR has also decided to set the discount rate as the KRR+4%. As a result, the discount rate has been reduced from 12.5% to 11.5%. This reduction of the cost of funds for commercial banks is expected to be transmitted in credit markets by lowering bank's lending rates.

Improvement of Communication strategies

Bearing in mind that monetary policy is most effective when it is effectively communicated, BNR has improved its communication strategy with the public by deciding to release quarterly monetary policy decisions made by the Central Bank Monetary Policy Committee. This decision reinforces the existing communication channels including periodic monetary policy statements and other communication

events. Communication is a vital tool in the implementation of monetary policy as it significantly contributes to shape expectations and influence the behavior of the public in ways that support the policy outcomes.

II.3.2 Interest rates developments

With the consolidation of comfortable short term liquidity in the banking system since the second half of 2009, money market interest rates have been recording a declining trend. The average Repo rate fell from 7.3% in January 2009 to 4.4% in December 2009. Regarding the commercial banks' rates, banks became aggressive in deposits collection and increased deposit interest rates between January and December 2009, from a monthly weighted average of 5.5% to 8.54%, after reaching a high level of 9.94% in July. Lending rates have also been increasing since January 2009 to reach 17.4% on average, before declining to 15.77% in December 2009. This upward trend in lending rates in 2009 is due to the uncertainties in credit markets, on both demand and supply sides, as the nonperforming portfolio has increased. As inflation rate in Rwanda has been significantly declining during 2009, positive real interest rates were restored in the second half of the year.

Table 12: Interest rates developments in 2009 (%)

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
BNR Policy Rates												
Key Repo Rate	8.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Discount Rate	12.80	12.00	12.00	12.00	12.00	12.00	12.50	12.50	12.50	12.50	12.50	12.50
Money Market												
Repo rate	7.28	6.50	5.02	2.38	4.63	5.50	4.68	4.37	4.27	4.61	4.50	4.39
Refinancing Facility	-	-	-	-	-	-	-	10.76	10.50	10.50	10.5	10.5
Treasury Bills Rate	7.62	7.66	7.57	7.68	8.85	9.13	10.34	10.59	9.90	9.39	8.15	7.75
Commercial Banks												
Interbank Rate	8.67	9.15	7.49	4.95	5.47	6.40	5.95	5.10	5.88	5.22	5.41	4.89
Deposit Rate	5.51	5.61	6.57	7.58	9.15	9.44	9.94	8.77	8.86	8.84	8.91	8.54
Lending Rate	16.33	16.18	15.74	16.81	16.64	16.89	17.28	17.41	17.56	17.63	16.44	15.77

Source: BNR, Financial Markets Department

II.4 EXCHANGE RATE AND FOREX MARKET

II.4.1 EXCHANGE RATE

After some volatility during the first half of 2009, Rwandan Franc has recovered its stability against the USD since July. From December 2008 to December 2009, the RWF slightly depreciated by 2.82% against USD, while when compared with other strong foreign currencies, RWF depreciated against the Euro and GBP by 12.31% and 11.98% respectively. The relatively stable exchange rate of Rwandan Franc against USD reflects the sufficient level of foreign assets in the banking system compared to the prevailing demand for forex. Higher depreciation against EUR and GBP mainly reflects the depreciation of the USD against these currencies on international forex markets.

II. 4.2 BNR INTERVENTION MECHANISM IN FOREX MARKET

Before 2007, BNR used to intervene on Foreign Exchange Market by selling to commercial banks a given amount using the auction system. This intervention mechanism was abandoned in June 2007 and replaced by a new arrangement whereby the BNR sells forex to commercial banks on demand basis.

However, during the year 2009, the volume of BNR forex sales to commercial banks was dramatically declining, from the total amount of USD 376.4 million in 2008 to USD 228.1 million in 2009. This new development in domestic foreign exchange market was explained by the existence of other sources of forex for commercial banks, as well as the improvement in interbank foreign exchange market operations. Compared to the total amount of USD 2.0 million recorded in 2008 and USD 2.85 million during the first half of 2009, the foreign exchange interbank market operations increased significantly to a total of USD 24.15 million during the second half of 2009. This was a positive signal that further developments of the interbank market were possible.

With a view to encourage the development of the interbank market, BNR decided to reform its intervention mechanism in the foreign exchange market in such a way to avoid unnecessary competition with interbank transactions. Thus, starting from September 21st, 2009, BNR sells foreign exchange on demand to banks only on specific days when the level of liquidity in the market justifies BNR intervention. The new policy aims at stimulating further the already growing foreign currency interbank market.

In addition, to enhance further the foreign exchange interbank market, other important measures are being implemented, such as promulgating a Code of Conduct and creating an Association of the Foreign Exchange Dealers. Finally, the process of fully liberalization of the Rwandan foreign exchange market was completed by the end of 2009 with the removal of some remaining restrictions on capital account.

FINANCIAL SYSTEM STABILITY IN 2009

III.1 BANKING SYSTEM

The Rwandan banking system comprises of 12 financial institutions, including 8 commercial banks (KCB, BANCOR, COGEBANQUE, BCR, BK, BPR, FINA BANK, ECOBANK) and 4 other banks and financial intermediaries (BRD, BHR, Urwego Opportunity Bank and Continental Discount House Rwanda (CDHR)).

III.1.1 Financial soundness

The Rwandan banking system regulation aims at achieving financial stability. There have been specific requirements looking for controlling risk in financial institutions for many years. Since 1999 internal controls, limits for clients' exposure, loss provisions, credit risk control, and solvency among others have been required and continuously checked by the Central Bank. Nowadays the regulation requires specific structures in each financial institution to manage credit and operational risk.

The effect of the global financial crisis on Rwandan banks was mild demonstrating the importance of risk management. In 2009, the banking system showed few signs of distress as banks were not directly affected by the crisis reflecting favorable starting positions. All banks are now compliant with the minimum capital required of 5 billion RWF. As at December 2009 paid up capital had reached 53.5 billion RWF and registered an annual growth of 14.4 percent.

Similarly, shareholders funds reached 78.6 billion RWF recording an annual growth of 17.4 percent. The capital adequacy ratio (CAR) on a consolidated basis increased to 19.4% against 15.9% in December 2008. The increase in capital ratios was due to capital injection. Generally, the banking system is well capitalized and all banks are in compliance with the required minimum capital adequacy ratio of 15%, this capital level is well above the Basel minimum requirement of 8%. During 2009 stress testing showed a resilience of banks' capital to shocks in terms of increase NPLs.

However a declining asset quality was observed through a slight increase in NPLs with a ratio of Non Performing loans (NPL) to total loan portfolio (gross) of 12.8% at end December 2009 compared to 12.6% in 2008. The net NPL ratio stood at 11% if the interest in suspense (Interest on NPL) is not taken into account while the 2009 objective was to reduce this indicator to 7%. To address this issue, the Central Bank reinforced its monitoring of bank's NPL recovery plans in order to reach the threshold of 7% for each bank by end 2010. At the same time, BNR increased its monitoring of sectoral concentration in loan portfolio risk correlation through off/on site supervision and prudential meetings (risk management monitoring).

During the same period profitability was eroded, and at end December 2009 consolidated net profit after tax was RWF 4.2 billion RWF compared to 12 billion in December 2008. This deterioration is due to the loss registered by some commercial banks following the deterioration of their assets quality.

Table 13: Consolidated financial soundness indicators of commercial banks (in %)

Indicators	2008	2009			
	December	March	June	September	December
Solvency ratio	15.9	19.1	19.3	20.5	19.4
NPLs / Gross Loans	12.6	13.9	13.4	13.6	12.8
NPLS net/Net loans	10.5	9.8	11.1	11.7	11.0
Provisions / NPLs	66.3	66.9	70.9	65.9	56.5
Earning Assets / Total Assets	81.3	78.4	77.3	77.1	79.2
Large Exposures / Gross Loans	17.4	18.4	17.5	16.9	15.5
Return on Average Assets	2.4	1.6	0.9	1.0	0.8
Return on Average Equity	18.5	11.4	6.4	7.0	5.4

Regarding the establishment of a Private Credit Reference Bureau in Rwanda, the draft law on the Rwandan credit bureau industry is ready for cabinet consideration. Market driven initiative to select one credit bureau service provider is being finalized by the Bankers' Association. The Central Bank will foster the licensing and oversee the operation of the selected service provider. The Central Bank will also sensitize the public on the importance of the credit bureau industry in Rwanda.

III.1.2 Access to financial services: development of the banks' branches network

In response to the 2008 Rwanda Finscope survey which called on improving the access to financial services, BNR has registered a marked expansion of the current banks branches network. During 2009, 22 additional branches were opened by commercial banks. The total number of banks' branches is now 105 across the country. Banque Populaire du Rwanda has 102 sub-branches and 80 counters. During the same period the number of deposit accounts operated by the commercial banks (including BPR) increased by 8% from 1,176,140 at the end of December 2008 to 1,270,654 at end 2009.

III.1.3 Legal and regulatory framework reforms

Following the publication of the new banking law, the process to update the prudential regulations has been ongoing during 2009. As of end august 2009, the regulations on liquidity ratio, capital adequacy requirements and regulation on accreditation and other requirements for external auditors of banks and Insurance and Insurance Brokers have been issued to all banks. With regard to the supervision of banks, the risk based supervision approach adopted by BNR continued to focus on identifying risky management practices in the financial sector. As this approach emphasizes on understanding and assessing the quality of risk management systems, the recommendations of offsite and onsite supervision reports requested banks' management to address the highlighted specific weaknesses.

III.2 MICROFINANCE SECTOR

During the year 2009, the development of MFIs focused on overcoming financial exclusion due to various barriers as evidenced by Rwanda Finscope 2008 survey. Licensing new MFIs, off-site and on-site examinations have been performed on ongoing basis. In order to improve the efficiency of MFI's operations, during the year 2009, on-site examinations were conducted in 28 MFIs including the 5 biggest ones.

III.2.1. Legal and regulatory framework

In line with microfinance best practices compliance and the professionalization of microfinance sector, the new microfinance Law n°40/2008 of August 26th, 2008, establishing the organization of microfinance activities adopted by the Parliament in 2008 was published in the Official Gazette No 13 of March 3rd, 2009. The implementing regulation of this Law was published in the Official Gazette of the Republic of Rwanda no 28 of July 13th, 2009.

Considering the consolidated financial position of MFIs, total assets increased by 20% from December 31st, 2008 to September 30th, 2009 while equity has increased by 28.8%. This situation is coupled with an increase of gross loans and deposits by 16.4% and 18.8 %, respectively. Cash and equivalent increased by 64.3% between the two periods. The increase in cash and equivalent is mainly due to the increase in deposits of 18.8% while gross loans increased only by 16.4%. The loan portfolio has deteriorated with an increasing delinquency rate moving from 5% at the end of December 2008 to 8.4% at the end of September 2009.

The consolidated financial position of the microfinance sector CSS excluded, shows a positive trend with the exception of the NPL rate which deteriorated. It increased to 10.9% at the end of September 30th, 2009 against 7.5% at the end of December 31st, 2008.

Table 14: MFIs Consolidated financial situation (in millions RWF)

MFIs (CSS included)	Dec-08	Sep-09	% Change
Total Assets	60,134.4	71,971.4	19.7
Cash and cash equivalent	10,144.2	16,664.1	64.3
Gross Loans	42,321.0	49,261.0	16.4
Non Performing Loans (Gross)	2,120.1	4,115.8	94.1
Provisions	1,065.5	2,265.6	112.6
Net Loans (Net of Provisions)	41,255.5	46,995.4	13.9
Delinquency Rate, in %	5.0	8.4	3.4 points
Total Deposits	38,317.0	45,503.8	18.8
Equity	16,237.0	20,916.1	28.8
Capital adequacy, in %	27.0	29.1	2.1 points
Liquidity Ratio (Quick), in %	37.2	48.9	11.7 points

Source: Microfinance Institutions Supervision Department

In order to professionalize the microfinance sector and to improve the Management Information System (MIS) of MFIs, the Association of Microfinance Institutions in Rwanda (AMIR) has put in place a computerization strategy for the MFIs.

This strategy has been sent to CGAP for comments and CGAP agreed to finance the services of an expert who will support MFIs to implement the strategy during the pilot phase.

Table 15: Compliance with prudential norms

	Dec-08			Sep-09		
	Nbr of MFIs	% of MFIs	Respect(R)/ non respect (NR)	Nbr of MFIs	% of MFIs	Respect(R)/ non respect (NR)
MFIs with NPL <10%	51	68.00%	R	38	50.67%	R
MFIs with NPL >=10%	24	32.00%	NR	37	49.33%	NR
LIQUIDITY>=30.00%	56	76.09%	R	52	69.33%	R
LIQUIDITY<30.00%	19	23.91%	NR	23	30.67%	NR
SOLVENCY>=15.00%	60	80.0%	R	54	72.00%	R
SOLVENCY<15.00%	15	20.0%	NR	21	28.00%	NR

Source: Microfinance Institutions Supervision Department

It was planned to reduce the number of MFIs which do not comply with prudential standards by 50% at the end of 2009. However, the comparison between the two periods (December 2008 and September 2009) shows deterioration. In fact, the number of MFIs which comply with the capital adequacy ratio decreased from 80% to 72% of all MFIs. The deterioration has been also observed for the other indicators such as NPL rate and liquidity ratio as shown in the table above.

This situation would be due to the combination of many factors including the negative impact of the global financial crisis as well as the bad governance which characterised many MFIs according to the BNR on-site examination reports.

The liquidation process of the 9 closed MFIs in June 2006 is ongoing. At the end of December 2009, more than 1 billion RWF was used to compensate depositors

for 50% of their deposits. End of July 2009 has been set as the final deadline for depositors to declare their deposits. The objective of the year 2010 is to close this operation and distribute the liquidation proceeds to the depositors. In line with the Government's strategy of domestic savings mobilization and building an inclusive financial system in Rwanda, the "UMURENGE SACCO program" was adopted. The main objective of the program is to allow unbanked but bankable people access to financial services at low transaction costs. At the end of December 2009, the implementation of UMURENGE SACCO was at the stage of sensitizing members and collecting capital shares. In an effort to mobilize people to adhere to this program, BNR jointly with FSDP/MINECOFIN and Rwanda Cooperative Agency (RCA) visited all the provinces of the country in November / December 2009. In order to accelerate the licensing process of SACCOs created in line with UMURENGE SACCO program, a simplified licensing procedure has been set up by BNR.

According to the report from Rwanda Cooperative Agency (RCA), 230 SACCOs out of 416 sectors have obtained their legal status as of the end of January 2010. However, only 63 SACCOs so far submitted their application files requesting a license to BNR and 25 of them have completed the licensing requirements and others are in the process of doing so.

III.3 NON-BANK FINANCIAL SECTOR

The inclusion of NBFIs supervision within the mandate of BNR was in recognition of the valuable role that these institutions play in the stability of the financial system and in the economic growth of the country. The BNR aims at developing and regulating NBFIs as an important component of a broad, balanced and efficient financial system that provides a sound base for the country's economic growth and prosperity.

During the year 2009, a number of activities were done to ensure the stability of non bank financial institutions. The activities range from legal framework to

financial performance monitoring. The existing private pension schemes lack legal and regulatory framework for both individual and occupational pension schemes hence less assurance of effective and efficient operation due to lack of clear rules of the game. To fill the current gaps, the Bank drafted a law regulating pension funds (public and private) which was presented to the Minister of Finance for cabinet approval in June 2009. The law will enhance transparency, accountability and professionalism which are core to the development of the financial sector as a whole.

In 2009, the National Bank of Rwanda (BNR) drafted a law governing Collective Investment Schemes that is, mutual funds, unit trusts and investment companies. The draft law was presented to minister of Finance in July 2009 and a decision was made to handover the responsibility to regulate and supervise collective investment schemes to the Capital Market Advisory Commission.

BNR's endeavours since its new NBFIs supervisory and regulatory role includes also drafting a new law governing organization and supervision of the activity of insurers and insurance intermediaries. This law was adopted by the Parliament and published in the Official Gazette on 31st March 2009. Additionally, BNR drafted all Insurance Core Regulations provided within this law, and a number of them have been published on the Bank's web.

A comprehensive financial and management audit has been conducted for all insurance companies operating in the country. Major findings of the audit range from non separation of short and long term insurance businesses, capital inadequacy, improper valuation of assets and liabilities to corporate governance issues. Key recommendations include separation of short from long term insurance businesses, increasing share capital for each insurance business, continuous capacity building at all levels, actuarial valuation of long term insurance contract liabilities and observance of good corporate governance standards and best practices.

III. 4 CAPITAL MARKET

The Rwanda over the Counter (ROTC) Market has been in existence since early 2008. A number of achievements have been registered within the framework of Capital Market Development, including:

- Capital market legal framework: the law establishing the Capital Market Authority, the laws to regulate the Capital Markets and the Collective Investment Schemes were drafted.
- National public Education and awareness campaigns have been organized for both Government and Private Institutions. A total of 3 493 people have received the basics on Capital Market.
- New Listings: There has been an increase in the number of listed securities on the ROTC following the privatization of government shares in some enterprises. To facilitate the privatization of BRALIRWA, the Minister of Finance and Economic Planning put in place a Capital Market Privatization Committee to provide the over-all guidance and coordinate the privatization process of BRALIRWA on behalf of the Government.
- Capital Market Incentives: A package of both fiscal and non-fiscal incentives have been approved by the Cabinet. RRA and MINECOFIN are working together to amend the tax law.
- Regional Integration: Following Rwanda's joining of the EAC, the Capital Market Advisory Council (CMAC) has signed a Memorandum of Understanding with the East African Securities Regulatory Authorities (EASRA), the regional body of capital market regulators. CMAC has also joined East Africa Stock Exchange Association.

Today, the securities which are listed at the Capital Market include the 2 -year Government Bond (2.5 billion RFW) which was issued in January 2010, 3 -year Government Bond(5 billions) issued in 2008, BCR's Corporate Bond (5 billions RFW) and Kenya Commercial Bank shares which are Cross-listed in the EAC

Region. The Rwanda Diaspora Mutual Fund was licensed and successfully launched during the last Diaspora Convention which took place on 13-15th December 2009.

III.5. PAYMENT SYSTEM MODERNIZATION

In 2009, BNR and stakeholders continued to work on the payment system modernization program to ensure that payment systems are efficient and reliable. This program involves introduction of new payment instruments, mechanisms (systems) and improving the legal environment.

To this end a robust legal framework is highly desirable because this raises public confidence in Payment Systems. In 2009, a lot of work was done in this regard; the Payment system Law was passed by Parliament and is now at the stage of being published in the Official Gazette; the regulation governing the Payment Service Providers was approved by the BNR board. To ensure that time critical payments are settled in real time, BNR is working on the implementation of a real time settlement system-the Rwanda Integrated Payments Processing System, encompassing the Automated Clearing House (ACH), the Real Time Gross Settlement (RTGS) and the Central Securities Depository (CSD), all three running on the same platform. In 2009, the tender process was finalized, selection of the vendor was done and the contract negotiated successfully.

The Rwandan banks continued to issue payment cards and SIMTEL as a common platform ensures that the infrastructure on which they are used is interoperable. In addition, the two banks (BK and ECOBANK) obtained the Visa international issuing and acquiring licences as principal members and the others have either taken up associate membership with parent companies (KCB) or will simply do domestic business. On the other hand to ensure that domestic transactions are performed electronically, SIMTEL has developed a domestic CHIP and PIN card. This has been tested and will be launched in the First quarter 2010. At the close of 2009, 10 Ecobank ATMs could accept international cards and all ATMs will be able to

accept all kinds of cards when the Host-to-host-connectivity between SIMTEL and E-process and MSCC are completed.

The year 2009, also saw several initiatives in mobile payments and remittances being licensed. MTN was given the authorisation to operate the “MTN Mobile Money” as a mobile payment service and other stand alone Remittance Services Providers (RSP) were licensed. Notable among them are: Dahabshill money transfer and Express Union Money transfers. This will ensure that the Rwandan Diaspora can easily remit funds back home and will also enhance the compilation of our remittances statistics.

MONETARY POLICY AND FINANCIAL SECTOR REFORMS IN 2010

IV.1 MONETARY AND EXCHANGE RATE POLICY ORIENTATION

In 2010, the BNR monetary policy will be conducted in a good international and national environment compared to last year. According to the IMF estimates, the world economic activity would recover by 3.1% in 2010 against a decrease of 1.1% on average in 2009 and come back to the normal trend as the global real GDP has increased by 3% and 5.2% in 2008 and 2007 respectively. This recovery in the world economic activities will have a positive impact on Rwandan external sector as well as the private transfers to Rwanda.

As mentioned earlier, the banking liquidity conditions and the capacity of banks to give loans to private sector have recovered to normal levels since mid-2009 and lending activity has been increasing since the third quarter of 2009. In addition, Rwanda expects an important budget support estimated at USD 519.03 million in 2010 against USD 409.63 million in 2009, which is an increase of 26.7%. Based on these developments and expectations, the credit to private sector is expected to increase by at least 20%, coming back to the high growth rates observed before 2009. Indeed, annual growth of the credit to private sector between 2005 and 2008 was 29% on average and fluctuated between 26.1% and 36.3%. With this estimated

level of credit to private sector, real GDP growth could be expected in the range of 7 – 8%, as observed in average during the period 2004-2008.

IV.1.1 Interest Rates and Liquidity Management

The BNR monetary policy in 2010 will focus more on supporting the gradual economic recovery consistent with higher economic growth perspectives for 2010 while maintaining the headline in one digit number. To this end, BNR will continue to implement a proactive monetary policy during the year 2010 to ensure that the level of the banking system liquidity, as well as the Central Bank policy rate will be kept at such levels which will give strong confidence to the banking system and stimulate domestic savings and lending to private sector. In terms of monetary program, Broad Money supply is expected to grow by 15% in 2010, accommodating gradually a strong recovery in private sector credit after a contraction in 2009.

For the first quarter 2010, the Key Repo Rate was reduced from 9% to 7.5% and the discount window rate has been also revised downward, from 12.5% to 11.5%. We do expect that this reduction of the cost of funds for commercial banks will stimulate the reduction of bank's lending rates. According to market conditions developments, the BNR will adjust its policy rate on a quarterly basis, with the main objective of maintaining interest rates positive in real terms to stimulate domestic savings while keeping the cost of funds at reasonable levels to encourage productive investments. Monetary Policy in 2010 will also pay attention to building a credible yield curve for Government securities to be used as benchmark for pricing private securities in capital market.

The Agriculture sector performance has been recently the main booster of the Rwandan economic growth and constitutes the important stabilizing factor of inflation in Rwanda. With its contribution to the achievement of the BNR monetary policy objective of maintaining low and stable inflation, the Central Bank policies will support Government and financial institutions initiatives aimed at increasing financing to the agriculture sector and related activities, such as Agro-processing

and distribution. In view of these, BNR is working with other stakeholders to reform the management of the Agriculture Guarantee Facility to make it more suitable and accessible by farmers and other SMEs operating in the Agri-business industry. BNR is also in discussion with BRD, BPR and AMIR to identify the constraints to agriculture lending. The results of these consultations will help BNR to restructure its facilities to improve incentives for agricultural lending. They will also be used to advise Government on policy actions to be taken to address the supply side constraints especially agricultural supply chain.

IV.1.2 Exchange rate policy

Concerning the exchange rate policy for 2010, the priority of the National Bank of Rwanda remains to maintain a stable and predictable exchange rate of the RWF, and ensure that it remains fundamentally market driven. Thus, BNR will continue to intervene on the market by selling and buying foreign exchange to banks to smooth the RWF exchange rate volatility depending on the market demand and the volume of official foreign exchange reserves available.

Thus, in case there is an unexpected balance of payments pressures, it will require policy flexibility to maintain macro-economic stability and adjust to shocks. More specifically, flexible exchange rate policy and proactive monetary policy will be reinforced, in order to avoid possible strong external shocks from higher imports or declining foreign exchange inflows which could lead to excessive reserve losses.

However, as previously, the BNR's interventions on foreign exchange market should be in line with its monetary policy objective of low inflation. Indeed, the Central Bank sales and purchases to or from commercial banks will be maintained among important tools to be used in 2010 to regulate the banking system liquidity. Regarding the Forex market infrastructure development, the BNR will continue the process of modernization of operations, by introducing a communication platform such as Reuters and other market technologies to enhance the market-determined Foreign exchange system.

IV.2. FINANCIAL SECTOR DEEPENING

The lessons from the financial crisis for Rwanda financial sector are that, even if the financial sector (banking, microfinance and NBFIs) in Rwanda is fully liberalized and at the same time closely regulated in order to protect depositors, we need to strengthen the macro prudential surveillance of our financial system. At the same time we need to improve risk management and corporate governance in the financial sector. Before the end 2010 BNR will put in place a crisis management framework which will include more stress testing, a strengthened surveillance system and a resolution framework. To monitor the financial sector trend regionally we will also develop via EAC MoU a cross border crisis framework. At the same time financial inclusion and long term finance mobilization will remain at the center of our policies.

IV.2.1 Banking sector reforms

During 2010, we will complete the update of prudential regulation in order to have in place a comprehensive legal and regulatory framework for the entire financial sector. In order to increase the banks outreach, BNR will encourage the banking sector to continue to expand their branch network in order to increase access to finance especially in the rural area.

A partnership between banks and MFIs will be stimulated in order to increase availability of viable financial services in the rural areas. BNR will also participate actively in the restructuring of the Rwanda Housing Bank (RHB). In order to improve the quality of bank's portfolio, the central bank will continue to monitor closely the recovery of non performing loans. In view of the global economic crisis that affected our banks, BNR has decided to maintain the benchmark of maximum level of 7% of non performing loans by end 2010. At the same time, the Central Bank will continue to play its role in the discussions to establish financial schemes or collective investments funds in order to boost lending to mortgage industry and agri- business.

In order to use the credit bureau, as a tool for managing risk and thereby increasing access to credit, the Central Bank will modernize the Public Credit Registry and reinforce the quality of information on credit by assisting the Rwanda Banker's Association to establish a Private Credit Bureau which will include information on banks credit and the microfinance segments. At a later stage this credit bureau will involve as well the insurance sector and other participants. The feasibility Study to establish a deposit guarantee scheme in the Rwandan banking system will be undertaken in 2010.

IV.2.2 Microfinance sector reforms

During the year 2010, in order to improve access to financial services, BNR will join efforts with its partners in order to closely monitor the MFI sector in particular the UMURENGE SACCO program via its licensing and the support to its capacity building program. In order to promote compliance with prudential norms, BNR will reinforce its onsite and offsite supervision of MFIs via risk based supervision and will conduct a study to establish a stabilization fund aimed at protecting deposits in case of MFIs failure.

IV.2.3 Non-Banking Financial Sector reforms in 2010

During 2010, BNR will continue its onsite and offsite supervision activities and its monitoring of capital build up and separation of short and long term insurance business in order to maintain a safe and sound insurance sector. The Bank will also ensure that the insurance contract law and the mandatory insurance law are completed in 2010. The National Bank of Rwanda (BNR) will undertake an on-site inspection for the Social Security Fund of Rwanda (CSR) and the off-site examination of its 2008 and 2009 financial reports. At the same time we do expect that the law governing pension schemes and accounts will be enacted shortly. The bank will also ensure that all the core pension regulations are provided to support the implementation of the pension law.

IV.2.4 Capital market

A number of activities have been planned for 2010-2011. According to CMA action plan, it is envisaged that the number of Active investors will increase significantly as a result of the Public Education. The Legal framework is expected to be completed and have all laws concerning the Capital Market published.

The number of listed securities will increase following the new Treasury Bond issuance program which has been approved by the Ministry of Finance and Economic Planning. It is also expected that the first Rwanda Unit Trust will be in place by December 2010. Besides, due to fiscal and non-fiscal incentives which will be introduced, new debt instruments such as the Corporate Bonds, Municipal Bonds, Government shares in companies to be privatized and foreign securities will be listed on the Rwandan Market. Capacity Building, aimed at availing sufficient professionals in the industry have been programmed.

IV.2.5 Payment system modernisation

Concerning the legal and regulatory framework, in 2010, the BNR shall endeavour to have the following laws passed: the Electronic Transactions law and the Book entry securities holding (CSD) law. Several regulations will be drafted and passed based on the above mentioned laws and more importantly the BNR will carry out an assessment of the present legal framework with a view to identifying all the gaps and be able to work towards filling them in order to have a robust legal framework that can support modern payment systems.

Concerning retail payment systems, concerted effort will be put in the following areas: International connectivity, International acquiring, International issuing, Cards acquisition, ATM and POS deployment based on the principle of interoperability. As a first step to 'card' issue to their clients, all the banks have plans to issue a debit card; either a 'family' card in the case of the regional banks or a proprietary card for domestic purposes and deploy ATMs at their branches and remote areas as

well. The banks that use other switches outside the country for various reasons will implement a host-to-host strategy so as to be able to accept both international and domestic non VISA branded cards on their infrastructure.

Implementation of the Rwanda Integrated Payments Processing System (RIPPS) will kick off in March 2010 and it is envisaged to take 10 months to complete. This is an integrated system comprising the Automated Clearing House (ACH), the Real Time Gross Settlement System (RTGS) and the Central Securities Depository (CSD). BNR intends to link the RTGS part of RIPPS to the East African Payment System (EAPS) that links the other RTGS systems of Uganda, Kenya, Tanzania and Burundi (when Burundi implements one).

IV.2.6. EAC Monetary Union

The Central Bank will continue to participate and play a leading role in all activities related to the establishment of regional Monetary Union. These include among others the implementation of the recommendations of a report of study on EAC Monetary Union by the European Central Bank (ECB), which has been reviewed by Experts from EAC Central Banks. Among them include: Protocol for the establishing the EA Monetary Union (EAMU), the economic convergence criteria that are crucial for the full attainment of the EAMU, and the establishing of EA Monetary Institute (EAMI) to spearhead the Monetary Union process.

Inflation Forecasting in Rwanda

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I. Summary executive

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Since 1995, the National Bank of Rwanda (BNR) pursued a monetary targeting regime with broad money supply M_3 as a nominal anchor to achieve the objective of controlling inflation without any prejudice to growth. In this framework, forecasting inflation is crucial for NBR to adjust its monetary policy.

The necessity of an accurate and reliable inflation forecast is perhaps even more relevant now, because BNR decided since last year, to adjust its Key Repo Rate (KRR) every quarter according to the developments in different macro economic variables including inflation. In line with this policy decision, starting with 2010, BNR has embarked on inflation modeling with the view to identify the main determinants of inflation and set up a inflation forecasting framework in Rwanda. This paper is the first contribution to achieve this objective and it proposes an ARMA model to forecast inflation in 2010.

Forecasting inflation is fundamental for central banks to control inflation and adjust their monetary policy. Numerous studies have investigated the relative accuracy of alternative inflation forecasting models both in developed, emerging and developing countries. Vector Autoregressive (VAR) models have been widely used to forecast inflation and run policy simulation as the forecasting of inflation takes into consideration different macro economic variables which intuitively contain information about inflation. ARMA models for inflation have also been used and are well known for being simple, robust, and parsimonious and for providing good results. These models are chosen on the basis of simplicity and less data requirement as compared to VAR. The objective of this research paper is to present a practical framework to forecast inflation by using ARMA model. After describing different steps for using ARMA model to forecast inflation, we illustrate them using Rwandan monthly inflation data.

Out of 48 candidate ARMA models, two of them namely ARMA (2, 1) and ARMA (1, 5) emerged better than others using AIC and SC criteria. The two competing

models have been submitted to a set of diagnostic tests including the determination coefficient R^2 , Jarque-Berra test and Langrage Multiplier (LM Test) and it appears that the two models yield similar results. However, after estimating the two models, ARMA (1, 5) contains one non-significant parameter at 5%. This makes ARMA (2, 1) a more appropriate model to forecast inflation. The projected inflations rates using ARMA (2, 1) model were 2.69; 3.26 and 3.76 in April, May and June respectively and the actual inflation in April is 2.74 which is close to the projection. In practice, these projections are revised monthly, after having the realized inflation for a month ahead of the sample.

I. Introduction

Economic forecasting is important for real world decision making and it is in this regard that forecasting inflation is fundamental for central banks, since expectations of inflation affect their decisions regarding the future path of monetary policy and in turn private sector consumption and investment decisions. Thus, forecasting inflation is a key tool for central banks to control inflation and adjust their monetary policy.

Numerous studies have investigated the relative accuracy of alternative inflation forecasting models in developed, emerging and developing countries.

Vector Autoregressive (VAR) models have been widely used to forecast inflation as they offer a good framework to forecast inflation taking into consideration different macro economic variables which intuitively contain information about inflation such as interest rates, money aggregates, exchange rates and output. ARMA models for inflation forecasting have also been used and are well known for being simple, robust, parsimonious and for providing good results. These models are chosen on the basis of simplicity and less data requirement as compared to VAR as they assume that the time series has been generated by a probability process with future values related to past values, as well as to past forecast errors. Some central banks improve their inflation forecasting using ARMA models by considering trends in some leading indicators, which are variables that are considered to either cause or predict inflation.

Recent studies using ARMA models to forecast inflation include those realized by Kenji M. and Abdul N. (2009) in Sudan (IMF Working Paper), Muhammad A.S., Shazia S. and Mete F. (2006) in Pakistan and Wayne Robinson (1998) in Jamaica, A.Mehrotra and J.R. Sánchez-Fung (2008) in China, Riccardo C., Fabrizio V. and Giuseppe S. (2008) in the Euro Area and Ippei F. and Maiko K. (2002) in Japan.

In order to evaluate forecasts, out-of-sample forecast evaluation is performed using different criteria consisting in minimizing the forecast errors. These include the Mean Square Error (MSE) and Mean absolute Error (MAE).

Since 1995, the National Bank of Rwanda (BNR) pursued a monetary targeting regime with broad money supply M_3 as a nominal anchor to achieve the objective of keeping inflation low and stable. The usefulness of an accurate and reliable inflation forecasts is perhaps even more relevant now in Rwanda, because BNR decided since last year, to adjust its Key Repo Rate (KRR) every quarter according to the developments of different variables including inflation. In line with this policy decision, starting with 2010, BNR has embarked on an inflation modeling and forecasting exercise in Rwanda and this paper is a contribution to this program. It presents a practical framework to forecast inflation by using ARMA model.

The rest of this paper is organized as follows; Section 2 presents the theoretical framework of ARMA models, Section 3 uses Rwandan inflation data to forecast inflation using ARMA models and the final section draws conclusion.

I. Literature review on ARMA models to forecast inflation.

ARMA models for forecasting inflation do not assume knowledge of any structural relationship between inflation and other macroeconomic variables. They assume that past values of inflation plus previous error terms contain information for the purposes of forecasting. Thus, they are not constrained by timeliness of data contrary to the structural models. They have proven to be relatively robust especially when generating short-run inflation forecasts and they frequently outperform more sophisticated structural models in terms of short-run forecasting ability (Stockton and Glassman, 1987; Letterman, 1986; Stockton and Glassman, 1987). It is why most central banks use ARMA models to forecasting inflation in their regular need of adjusting their monetary policy. The main disadvantage of ARMA is the lack of underlying theoretical structural relationships. This explains why contrary to structural models, ARMA models can't be used to run any policy simulation.

1.1 Specification of ARMA model

The ARMA model is decomposed into Autoregressive (AR) and Moving average (MA) components. The AR component captures the correlation between the current value of the time series and some of its past values, and the MA component represents the influence of a random (unexplained) shock.

$$\text{inf}_t = \beta_0 + \sum_{i=1}^p \beta_i \text{inf}_{t-i} + \varepsilon_t + \sum_{j=1}^q \theta_j \varepsilon_{t-j} \quad (1)$$

The equation (1) represents an ARMA (p,q) and defines inflation at period t as the linear projection of (i) inflation from period t-1 to t-p, autoregressive (AR) part, and (ii) white noise from period t to t-q, moving average (MA) part, given an assumption that inflation is a stationary process. The parameters are estimated by using the Maximum Likelihood Estimates (MLE) method, assuming that error term is white noise and follows the normal distribution.

The model specified by equation (1) requires criteria to determine the number of autoregressive terms (p) and moving average terms (q). One of the used methods is the Autocorrelation Function (ACF) and Partial Autocorrelation Function (PCF) following the rules summarized in the following table:

Table 1: Characteristics of ACF and PACF for stationary process

Process	ACF	PACF
AR(p)	Tails off as exponential decay or damped sine wave	Cuts off after lag p
MA(q)	Cuts off lag q	Tails off as exponential decay or damped sine wave
ARMA(p,q)	Tails off after lag (q-p)	Tails off after lag (p-q)

Source: Wei, 2005

Time lags p and q are also determined by using a number of alternative objective methods and the most used are penalty function statistics such as Akaike Information Criterion [AIC] (Akaike, 1974) and Schwarz Criterion [SC], which help in reconciling the need to minimize errors with the conflicting desire for model parsimony. These statistics take the form minimizing the sum of the residual sum of squares plus a ‘penalty’ term which incorporates the number of estimated parameter coefficients to factor in model parsimony. These criteria are defined as follow:

$$SIC = \log\left(\frac{SSR_j}{n}\right) + (j+1)\frac{\log(n)}{n} \quad (2)$$

$$AIC = \log\left(\frac{SSR_j}{n}\right) + (j+1)\frac{2}{n} \quad (3)$$

To ensure that the specified ARMA model (1) is consistent with the assumptions of the MLE, different diagnostic tests are used like Jarque-Bera test for the normality

of the error term, Breusch-Godfrey Lagrange Multiplier test for serial correlation of residuals and different tests for homoscedasticity.

Since ARMA models are not based on any economic theory, it would not be relevant to interpret the individual parameter estimates, but rather, the focus is put on the plausibility of the model as a whole and its capacity to provide a satisfactory description of the data and produce accurate forecasts. The performance of inflation forecasts is realized considering forecast error defined as the difference between the actual values (inf) and the forecasts (finf). Two important statistics are used for this purpose: The Mean Squared Error (MSE) and the Mean Absolute Error (MAE). The idea is to select model with the smallest MSE or MAE.

$$MSE = \frac{1}{n - (n_1 - 1)} \sum_{t=n_1}^n (\text{inf}_{t+s} - f \text{inf}_{t,s})^2 \quad (4)$$

$$MAE = \frac{1}{n - (n_1 - 1)} \sum_{t=n_1}^n |\text{inf}_{t+s} - f \text{inf}_{t,s}| \quad (5)$$

n : total sample size; $n-1$: first out of sample forecast observation

2.2. Fan Charts

Forecast is burdened with uncertainty due to, among others, the future changes in the underlying structure of the economy, misspecification of the model, inaccuracies in the estimates of the model's parameters, the accumulation of future shocks to the economy. Estimating and publishing this uncertainty is important for central bank's communication with the public as it enables to shift the focus from the central path of which probability is zero towards medium-term risks.

No single projection of inflation at a future date has much chance to be realized. Policy decisions need to take account of the full range of possibilities. This is realized by using what is called 'Fan charts', defined as a representation of the

probability density of inflation. This tool has become the most popular quantitative representation of forecasts along with their uncertainty. The use of a fan chart means that the process forces the policy makers to consider not just a single possible outcome for the economy, but a range of possibilities in areas where the central view is most likely to be wrong. Considering a set of key assumptions which are consistent with most likely view of developments in the economy, the central projection of inflation is interpreted as being the mode of the statistical distribution.

Fan charts are based on a particular form of statistical distribution called two-piece normal which has a degree of asymmetry in the form of a variable skew. This form of distribution represented by a probability density function (pdf) is given in the Appendix 2 and easily generated by different econometric software such as PcGive and WinSolve.

III. FORECASTING INFLATION IN RWANDA FOR 2010

In this paragraph we forecast inflation in Rwanda using ARMA models based on monthly data from January 2004 to December 2009. As mentioned we follow the Box-Jenkins (1976) approach to identify, estimate, realize diagnostics and forecasting a univariate time series.

3.1 Data analysis

Rwanda has managed to achieve one digit inflation rate since the second quarter of 2005 up to now except for the year 2008 marked by high inflationary pressures due essentially to international inflation (appendix). This situation explains structural break observed from 2008 to the first quarter 2009. To take this into consideration in the modeling process we used a dummy variable.

Figure 1: Monthly inflation



3.2 Stationarity test

The first step in choosing an appropriate ARMA model is to identify the correct order of integration of the variables. The time series under consideration must be stationary before one can attempt to identify a suitable ARMA model. We tested for unit roots in monthly inflation time series using Augmented Dickey-fuller. The ADF test gives a test statistic of -3.66193 which is less than the 5% critical value of -2.904848. The null hypothesis of unit root is rejected, indicating that the monthly inflation time series in Rwanda is stationary. This suggests that although Rwandan inflation may regularly deviate from its mean, there is a tendency for it to stabilize to its average levels later.

Table 2: ADF test for unit root

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.661983	0.0069
Test critical values:		
1% level	-3.530030	
5% level	-2.904848	
10% level	-2.589907	

*MacKinnon (1996) one-sided p-values.

3.3. Model identification and estimation

The maximum order used was 6 and was considered exhaustive enough since the study uses monthly data. Considering different combinations of lags, the total number of candidate models were 48 and based on AIC and SC criteria, two models namely ARMA(2,1) and ARMA(1,5) emerged better than others (appendix1). The two competing models have been submitted to a set of diagnostic tests including the determination coefficient R^2 , Jarque-Berra test and Langrage Multiplier (LM Test). The latter two give a descriptive statistics of the residuals, Jarque-Bera tests the normality of error term (the distribution) and the LM tests the autocorrelation of the error-term.

Table 3: Estimation of ARMA (2,1) and ARMA(1,5) models

	Coefficient	Std. Error	t-Statistic	Prob.
C	10.72702	0.785903	13.64930	0.0000
AR(1)	1.876508	0.067876	27.64626	0.0000
AR(2)	-0.925511	0.061620	-15.01956	0.0000
MA(1)	-0.778166	0.121607	-6.399007	0.0000
R-squared	0.913076	Mean dependent var		10.79857
Adjusted R-squared	0.909125	S.D. dependent var		4.492877
S.E. of regression	1.354401	Akaike info criterion		3.500041
Sum squared resid	121.0706	Schwarz criterion		3.628527
Log likelihood	-118.5014	Hannan-Quinn criter.		3.551077
F-statistic	231.0942	Durbin-Watson stat		2.300145
Prob(F-statistic)	0.000000			

	Coefficient	Std. Error	t-Statistic	Prob.
C	10.35059	1.655214	6.253324	0.0000
AR(1)	0.679426	0.111403	6.098795	0.0000
MA(1)	0.262195	0.132348	1.981095	0.0519
MA(2)	0.664305	0.106411	6.242811	0.0000
MA(3)	0.715132	0.099164	7.211582	0.0000
MA(4)	0.491099	0.100388	4.891995	0.0000
MA(5)	0.499109	0.119839	4.164836	0.0001
R-squared	0.923833	Mean dependent var		10.84648
Adjusted R-squared	0.916693	S.D. dependent var		4.478898
S.E. of regression	1.292744	Akaike info criterion		3.444797
Sum squared resid	106.9560	Schwarz criterion		3.667879
Log likelihood	-115.2903	Hannan-Quinn criter.		3.533510
F-statistic	129.3772	Durbin-Watson stat		1.982321
Prob(F-statistic)	0.000000			

The table below gives a summary of the different statistics used in selecting the best ARMA model out of the two that passed the identification stage. Generally, following the Jarque-Bera and LM test, the two models aren't different from one another. However, after estimating the two models, ARMA (1, 5) has some non-significant parameters at 5%, while ARMA (2, 1) exhibit highly significant parameters. This makes ARMA (2, 1) a more appropriate model to forecast inflation.

Table 4: Model Identification and Diagnostics

(P,q)	AIC	SCHZ	R ²	Jarque Bera	LM test
(1,5)	3.45	3.67	0.92	0.24	0.66
(2,1)	3.50	3.62	0.91	0.71	0.14

3.3 Forecast evaluation and forecast accuracy criteria

This section is meant to assess the out-of-sample forecasting ability of the model. An approach used in this study was to estimate the model recursively and forecast ahead a specific number of observations. Each forecast ahead gives a summary statistics of the forecast errors. The mean absolute error (MAE) and root mean squared error (RMSE) were used to assess the quality of the forecasts. Based on the table below, it appears that no model outperforms the other significantly. However taking into consideration the parsimonious principle of less lag requirement and the fact that after estimating both models ARMA(1,5) showed one insignificant parameter, it was deemed appropriate to retain ARMA(2,1) as the best model fit to forecast inflation².

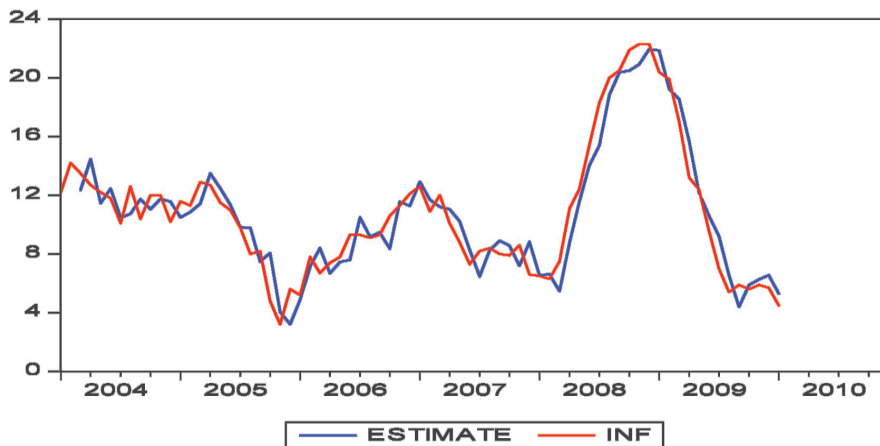
Table 5: Forecast Error statistics for Identified Models

(P,q)	RMSE	MAE
(1,5)	1.23	1.05
(2,1)	1.29	1.04

² In practice, it can be recommended to keep an eye on the forecasting based on ARMA (1,5) as their quality is not very different from those of ARMA(2,1).

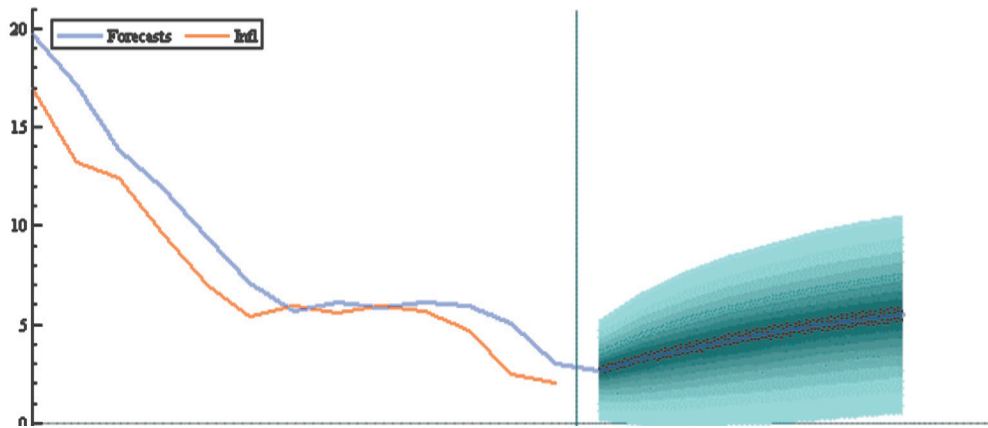
The quality of the estimated ARMA model is found sound and assured on three grounds namely; R^2 and adjusted R^2 are large meaning that over 90% of fluctuation in inflation is explained by the ARMA model. The standard error of this regression is 1.35 implying that 95% of the confidence interval in the sample period is at most plus/minus 2.7% points from inflation based on the estimated model. Secondly, as observed in figure 2 below, estimated inflation and realized inflation in the sample period using the ARMA (2, 1) move closely to one another implying that the quality of the model to give reliable forecasts is assured.

Figure 2: Monthly inflation: realized and forecasted



As mentioned, the ARMA (2, 1) model was identified as more appropriate to forecast inflation in Rwanda. By using PcGive software, we generate the below fan chart to forecast inflation from April 2010 to December 2010. It is important to note that in order to avoid the influence of the shocks observed in 2008, we introduce a dummy variable. The blue line gives a central projection of monthly inflation. The projected inflation rate was 2.69 in April and the realized inflation rate was 2.74 which is close to the projection.

Figure 3: Inflation projection from April 2010 to December 2010



Conclusion

Forecasting inflation is fundamental for central banks to control inflation and adjust their monetary policy. Numerous studies have investigated the relative accuracy of alternative inflation forecasting models in developed, emerging and developing countries. Vector Autoregressive (VAR) models have been widely used to forecast inflation and run policy simulation as the forecasting of inflation takes into consideration different macroeconomic variables which intuitively contain information about inflation. ARMA models for forecasting inflation have also been used and are well known for being simple, robust, and parsimonious and for providing good results. These models are chosen on basis of simplicity and less data requirement as compared to VAR. The objective of this research paper was to present a practical framework to forecast inflation by using ARMA model. After describing different steps for using ARMA model to forecast inflation, we illustrate them using Rwandan monthly inflation data.

Out of 48 candidate ARMA models, two of them namely ARMA (2, 1) and ARMA (1, 5) emerged better than others using AIC and SC criteria. The two competing models have been submitted to a set of diagnostic tests including the determination coefficient R^2 , Jarque-Berra test and Langrage Multiplier (LM Test) and it appears that the two models yield similar results. However, after estimating the two models, ARMA (1, 5) has some non-significant parameters at 5%. This makes ARMA (2, 1) a more appropriate model to forecast inflation. The projected inflations using ARMA (2, 1) model were 2.69; 3.26 and 3.76 in April, May and June respectively and the actual inflation in April is 2.74 which is close to the projection. These projections will be revised monthly, after having the realized inflation for a month ahead the sample.

Appendix 1. Various ARMA models, 2004 – 2009

ARMA specification	R ²	SE	AIC	SIC	Jarque-Bera	LM Test
(0,1)	0.64	2.70	4.850	4.913	0.186	0.0000
(0,2)	0.80	2.03	4.291	4.386	0.258	0.0000
(0,3)	0.85	1.74	3.999	4.126	0.425	0.0000
(0,4)	0.88	1.59	3.831	3.989	0.345	0.0210
(0,5)	0.91	1.35	3.521	3.710	0.211	0.1673
(0,6)	0.91	1.35	3.533	3.754	0.208	0.0797
(1,0)	0.88	1.55	3.749	3.813	0.854	0.0001
(1,1)	0.88	1.54	.737	3.833	0.749	0.0001
(1,2)	0.90	1.42	3.599	3.727	0.882	0.1633
(1,3)	0.91	1.40	3.583	3.742	0.594	0.2085
(1,4)	0.91	1.41	3.600	3.791	0.784	0.1057
(1,5)	0.92	1.29	3.445	3.668	0.238	0.8280
(1,6)	0.92	1.31	3.475	3.732	0.304	0.4474
(2,0)	0.89	1.49	3.688	3.784	0.758	0.0078
(2,1)	0.91	1.35	3.500	3.628	0.706	0.1385
(2,2)	0.92	1.31	3.449	3.610	0.568	0.7269
(2,3)	0.92	1.35	3.526	3.719	0.669	0.1500
(2,4)	0.92	1.36	3.544	3.769	0.661	0.0950
(2,5)	0.93	1.25	3.400	3.657	0.149	0.1302
(2,6)	0.93	1.23	3.377	3.666	0.575	0.0000
(3,0)	0.91	1.36	3.514	3.643	0.764	0.0354
(3,1)	0.92	1.31	3.447	3.609	0.715	0.6021
(3,2)	0.92	1.31	3.468	3.662	0.722	0.8905
(3,3)	0.93	1.29	3.439	3.666	0.704	0.2028
(3,4)	0.94	1.19	3.294	3.553	0.764	0.0000
(3,5)	0.93	1.28	3.459	3.750	0.601	0.0001
(3,6)	0.93	1.26	3.426	3.750	0.395	0.0000
(4,0)	0.92	1.31	3.449	3.612	0.649	0.8908
(4,1)	0.92	1.32	3.477	3.673	0.683	0.7724
(4,2)	0.92	1.33	3.505	3.733	0.667	0.7873
(4,3)	0.94	1.17	3.259	3.517	0.374	0.5246
(4,4)	0.93	1.28	3.461	3.755	0.668	0.8529
(4,5)	0.93	1.29	3.489	3.815	0.663	0.9484
(4,6)	0.92	1.23	3.399	3.759	0.644	0.0173
(5,0)	0.92	1.33	3.493	3.691	0.659	0.6794
(5,1)	0.93	1.27	3.420	3.650	0.663	0.7304
(5,2)	0.93	1.24	3.376	3.639	0.678	0.0000
(5,3)	0.93	1.27	3.437	3.733	0.399	0.2308
(5,4)	0.94	1.15	3.261	3.591	0.284	0.2397
(5,5)	0.94	1.25	3.437	3.799	0.860	0.5128
(5,6)	0.94	1.23	3.415	3.810	0.714	0.0003
(6,0)	0.92	1.35	3.533	3.765	0.584	0.7286
(6,1)	0.94	1.20	3.317	3.582	0.779	0.0225
(6,2)	0.93	1.29	3.475	3.773	0.653	0.2520
(6,3)	0.95	1.16	3.268	3.599	0.280	0.0002
(6,4)	0.93	1.28	3.479	3.844	0.688	0.0000
(6,5)	0.93	1.24	3.432	3.830	0.707	0.0000
(6,6)	0.94	1.21	3.394	3.825	0.921	0.2214

Appendix 2: Category statistics on inflation

Period 2005M07 to 2008 m04

INFL	Count	Mean	Std. Dev.
[2, 4)	1	3.200000	NA
[4, 6)	3	5.200000	0.400000
[6, 8)	10	7.180000	0.601480
[8, 10)	12	8.750000	0.603776
[10, 12)	5	10.80000	0.469042
[12, 14)	3	12.23333	0.321455
All	34	8.420588	2.171828

Period: 2005M07 to 2009M12

INFL	Count	Mean	Std. Dev.	Std. Err. of Mean
[0, 5)	2	4.000000	1.131371	0.800000
[5, 10)	31	7.506452	1.378147	0.247523
[10, 15)	11	11.70000	0.960208	0.289514
[15, 20)	4	17.65000	1.912241	0.956121
[20, 25)	6	21.23333	1.046263	0.427135
All	54	10.50741	5.061466	0.688778

Appendix 3: Functional form for a normal distribution used to generate fan charts

The functional form for a normal distribution is as follows:

$$pdf = \frac{1}{\sqrt{2\pi} \sigma} e^{\left[\frac{-(x-\mu)^2}{2\sigma^2} \right]}$$

where μ is the mean of the distribution, σ^2 its variance and x is the normally distributed random variable. The fan chart distribution incorporates an extra parameter γ , to measure its skewness (where γ lies between 1 and -1). The parameter

γ is incorporated into the normal distribution as follows:

$$S = \frac{1}{\sqrt{2\pi}} e^{\left[\frac{-1}{2\sigma^2} \left\{ (x-\mu)^2 + \gamma \left(\frac{x-\mu}{|x-\mu|} \right) (x-\mu)^2 \right\} \right]}$$

But with non-zero skewness, the integral of this function is not equal to one. So the distribution also requires a multiplicative area correction to ensure that, whatever the value of γ , the integral equals one:

$$A = \frac{2}{\left(\frac{1}{\sqrt{1-\gamma}} \right) + \left(\frac{1}{\sqrt{1+\gamma}} \right)}$$

So the pdf for the fan chart is equal to:

$$pdf = \mathcal{A} = \frac{2}{\left(\frac{1}{\sqrt{1-\gamma}} \right) + \left(\frac{1}{\sqrt{1+\gamma}} \right)} \frac{1}{\sqrt{2\pi}} e^{\left[\frac{-1}{2\sigma^2} \left\{ (x-\mu)^2 + \gamma \left(\frac{x-\mu}{|x-\mu|} \right) (x-\mu)^2 \right\} \right]}$$

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Banking liquidity and monetary policy effectiveness: the case of Rwanda³

By NIZEYIMANA Willybrold and GICHONDO Ananias

³ This study has been conducted under the supervision of the Director of Research and Policy Analysis Department, and benefited from valuable comments and orientations of the Chief Economist and Senior Director of Monetary Policy and Research.

Abstract

This paper has analyzed causes and consequences of the observed excess liquidity during the period 2004-2008. The paper concludes that banks' demand for excess liquidity in Rwanda is for both precautionary and involuntary purposes, confirming the role of structural factors and demand conditions as determinants of excess liquidity in Rwandan. Excess reserves demand for precautionary purposes is mainly due to the volatility of private and government deposits, the maturity structure of the deposit base and the cash to deposit ratio. Another important feature of the Rwandan banking system analyzed in this paper is the reaction of the aggregate commercial banking system's liquidity preference to the change of loan rate. This paper shows that commercial banks require a minimum mark-up (around 16%) interest rate in the loan market before lending to the marginal borrower due to the oligopoly power banks possess in that market.

One of policy implications of this loan market feature is the ineffectiveness of indirect monetary policy over the flat range of the liquidity preference curve. This means that reserve shocks like change in the reserve level by open market operations can only have desirable effects on the loan rate when that rate is very high (above 16%). Unfortunately, the downward sloping portion is globally associated with very high interest rates with their adverse consequences on economy.

This result is to take with some caution, because the liquidity preference curve indicates also that banks some times decide to hold excess liquidity above the minimum loan rate. This highlights the existence of other factors like limited opportunities for lending, asymmetric information, risk aversion, etc. The plentiful supply of deposits by commercial banks in Rwanda during the period under review, coupled with the limited ability to expand their loan portfolios and underdeveloped financial market has pushed banks to expand their investment in money market on which they are net lenders. This limits the impact of change in short term interest rates on deposits and lending rates.

It can be recommended that ongoing efforts to develop the Rwandan financial market (including payment systems) be accelerated for an efficient allocation of financial resources. In this regard, the entrance to the market by international banks is to encourage as it will stimulate competition, introduce innovation and break the quasi-oligopoly situation in the financial industry. There is also a

need to diversify the range of collaterals accepted for the mobilization of loans on the capital market. The structure of the economy needs to be modernized in line with a modernized financial market. In fact, the credit culture is not widespread over the country, and most of economic activities don't use it to supplement investor's own capital. This has the consequence of low production and low consumption.

I. Introduction

From 2004 to the second quarter of 2008, Rwanda has experienced an important excess of liquidity as a result of an increase of capital inflows, especially owing to increases in aid inflows. In fact, following a general good performance in macroeconomic management, particularly the use of public funds, Rwanda benefited from significant foreign aid for budget support. Combined with increasing remittances and foreign direct investments, these flows contributed to money creation through domestic government and households' expenditure, and played a major role in building-up banks liquidity.

Consequently, the National Bank of Rwanda has been obliged to intensively intervene on the market to mop up the liquidity. Since the second half of 2008, the banking liquidity in Rwanda started a declining trend in such a way that in January 2009 BNR was obliged to inject liquidity in the system for the first time since 2004 and in February 2009 the reserve requirement ratio was reduced from 8% to 5%. In 2008, broad money increased by only 9.6% against 32.6% in 2007, while total borrowing by the BNR from commercial banks to absorb excess liquidity that stood at RWF 58.6 billion at end December 2007 fell at RWF 16.6 billion at end December 2008.

Over the period under review, Rwanda has recorded good economic performance with real GDP growth rates ranging from 7.1% in 2005 to 11.2% in 2008 and strengthened its macroeconomic environment. In this context, the growing banking excess liquidity could fuel inflationary pressures and weaken the monetary policy transmission mechanism (Agénor et al 2004, Nissanke and Aryeetey 1998). Indeed, if there is a sudden improvement in demand conditions, banks will gain in expanding lending with possible adverse consequences for inflation. The abundance of liquidity is also likely to limit the ability of monetary policy to influence demand conditions because it becomes difficult to regulate the money supply using the required reserve

ratio and the money multiplier in the presence of excess banking liquidity (Nissanke and Aryeetey, 1998).

This paper has two main objectives: to identify the causes of banking liquidity in Rwanda and analyze its impact on the effectiveness of monetary policy in Rwanda over the period under review.

The rest of this paper is organized as follows: Section 2 presents theoretical and empirical literature review on banking excess liquidity. Section 3 highlights facts and causes of excess liquidity in Rwanda; in section 4 we analyze the impact of excess liquidity on the effectiveness of monetary policy, and the estimation of a demand for excess liquidity function is presented in section 5 before conclusion and recommendations.

II. Theoretical and empirical literature review

2.1. Theoretical literature review

Excess liquidity is defined as the quantity of reserves deposited with central bank by deposit banks plus cash in vaults in excess of the required or statutory level. Generally, this excess is not remunerated and one can assume that it reflects the holding for precautionary purposes and the commercial banks' optimizing behavior. This behavior results from the risk of default, institutional factors, poorly developed inter-bank markets; difficulties encountered by banks in tracking their position at central bank and problem with payment system. In Sub-Saharan African countries, transportation problem is also cited as a factor which can oblige branches of commercial banks to hold excess liquidity.

Recent literature classifies factors that lead to excess liquidity into structural and cyclical factors. Structural factors are those that result from the structure and the level of the development of the country's macro-economic and financial sector, while cyclical factors are those associated with the production cycles or with sudden changes in the banking system liquidity inflows.

One of the structural factors that is commonly identified is a low degree of financial sector development. In countries with underdeveloped financial systems such as inter-bank market and market for government securities, banks will tend to have a greater demand for excess liquidity. As pointed out by Ganley (2004), the cost of participating in financial markets such as processing information, evaluating projects and monitoring borrowers, has an impact on the management of liquidity by banks, hence on the demand for reserves. Moreover, countries with slower and less predictable money payment and securities settlement linked to less developed payment and settlement systems will face higher financial participation costs and poor inter-bank liquidity. Poorly developed inter-bank markets also make it difficult for banks to borrow in order to cover contingencies, pushing banks to hold high precautionary excess reserves.

The banking sector market forces also matter in influencing the demand for reserves and the interest rate pass-through. This situation is likely to happen where the banking operations are concentrated in the hands of a few dominant institutions, thus the lack of competition causes banks to build up excessive reserves to the extent that the banking system does not respond to the intervention rates of the central bank. This structural factor is viewed as one of the main explanation of the high and persistent levels of excess liquidity in some low-income countries, where opportunities for portfolio allocation are limited (Saxegaard, 2006).

The second factor is a high degree of risk aversion that is mainly associated to asymmetric information and leads to high risk premia and a low demand for credit. As mentioned by Agénor and Aynaoui (2008), the degree of risk aversion may be directly related to chronic macroeconomic instability that may explain a positive correlation between high inflation and excess liquidity.

High inflation has been designated as one of the factor that may cause a cyclical excess liquidity. A surge of high inflation that is accompanied with higher volatility

in relative prices, to the extent that it causes an increase in the riskiness of investment projects, may raise uncertainty about the value of collateral and lead banks to charge a high risk premium. Higher lending rate may lead to a contraction in credit demand and thus translate into an involuntarily accumulation of excess reserves.

Another important cyclical factor is large capital inflows, which may be linked to trade revenue inflows, foreign direct investment, exchange rate speculation and disbursement of international aid. In the case of trade flows, reserves usually increase following a sustained current account surplus in a fixed or managed exchange rate regime. Countries that are big commodities exporters and that fix or manage their exchange rates, accumulate surplus reserves because the central bank intervenes to offset the upward pressure on the local currency by supplying more domestic liquidity and mop up the foreign currency (Ganley, 2004). This case is especially frequent in oil exporting countries and big minerals exporters; however it is not the case for freely floating exchange rate regime (Gray, 2006).

Another source of capital inflows, which may be related to capital liberalization, is foreign direct investment. As pointed out by Agénor and Aynaoui (2008), a number of countries, low and middle income alike, have in recent years implemented measures to foster opening of the capital account, lifting restrictions on capital movements for non-residents, and have faced large capital inflows often associated with the privatization of large-scale state enterprises. Large capital flows resulting from international aid has been identified as a cause of surplus liquidity in some developing countries. This has been a consequence of absorption constraints that are present in these countries that causes banks to hold large excess liquidity instead of extending the supply of loans for production purposes. Debt relief to Highly Indebted Poor Countries under the HIPC initiative of the IMF and the World Bank has also resulted into the problem of excess reserves in some of the banking systems. The transfer of aid and a debt relief allow recipient countries to increase government spending which creates excess liquidity.

Lastly, the monetization of fiscal deficit has been put forward as a cyclical factor that induces the banking system excess liquidity. Historically, many governments have borrowed from central banks, although this practice has decreased nowadays following the trend of the central banks' independence and high and long lasting inflation that followed monetary financing in some countries. Budget deficits are ideally funded through borrowing from the private sector. However, where this source dries up, the central bank is the last resort to provide funds below the market rates, especially in the form of overdrafts or securities. This is the case for central banks which are not independent from the government and have no choice other than providing funds which the government will spend, thus increasing liquidity, particularly when the given funds are spent on domestically produced goods and services.

Recent literature distinguishes two concepts of excess liquidity: excess liquidity by banks for precautionary purposes and involuntary excess liquidity. Precautionary excess reserves are those held by banks to meet potential demand and hedge against unexpected spending, while liquidity in excess of that is referred to as involuntary excess liquidity as for example a consequence of reduction in the demand for credit (Dollar and Hallward-Driermeir, 2000; Wyplosz, 2005). There may be impediments to the efficient functioning of financial market that lead these banks to hold involuntary excess reserves. Commercial banks may be unable or unwilling to expand lending to reduce involuntary reserves even if interest rates are positive and in many Sub Sahara African countries, bonds markets are underdeveloped in such a way that banks can't reduce involuntary excess reserves by buying government bonds which carry a higher yield than reserves. There is a certain consensus that involuntary excess reserves carry with it more inflationary risk because it is likely to be rapidly lent out when demand conditions improve, than reserves for precautionary purposes representing a structural problem that entails an inefficient allocation of resources.

For an effective monetary policy implementation, changes in central bank rates must be fully and rapidly reflected in changes in inter-bank rates, then in other rates of the banking system, and finally in aggregate demand and inflation. This transmission mechanism is usually underpinned by the presence of liquidity shortage on the inter-bank market that induces transactions which allow the central bank to exploit its monopolistic power as the supplier of domestic currency and set the marginal price of banks' liabilities. With surplus reserves however, banks are not forced to transact with the central bank to meet liquidity requirements and therefore the central bank loses ability to influence short-term rates and hence long-term rates and credit growth. Thus, the central bank's ability to transmit its preferred interest rate into the market is weakened and can reach the level where the transmission mechanism can break down.

Finally, persistent excess liquidity over long periods has implications on the financial results of the central bank, since the later has to always sell its liabilities to absorb excess reserves and incurs cost which are not offset elsewhere on its balance sheet. This affects central banks' income, for the case of a central bank that bears all costs associated with its operations; while for the case of central banks whose market intervention costs are born by the governments, it can undermine the central bank independence from the government.

Having pointed out a number of implications that can result from the presence of excess liquidity in the banking system, in practice, the extent to which the impact can be felt varies according to the countries macro-economic and financial structure and development. The above potential threats point to the need for an assessment of excess liquidity conditions in Rwanda and an analysis of the impact of excess liquidity on the transmission mechanism of the monetary policy.

2.2. Empirical literature review

Most of empirical studies undertaken on the estimation of excess liquidity demand are related to the developed countries. For the developing countries we can mention

studies of Agenor et.al. (2004) in the case of Thailand, Fielding and Shorthand (2005) in the case of Egypt, Saxegaard (2006) in case of CEMAC member countries, Nigeria and Uganda, Aikaeli (2006) in the case of Tanzania and Khemraj (2007) in the case of Guyana. It is important to point out that all these studies were inspired by the empirical model of Agenor. These studies identified the following determinants of excess liquidity: the contraction in supply of credit by banks (credit crunch), the risk of default and institutional factors which led banks to shy away from providing loans after crisis, the increase in the intensity of political conflict, the level of interest rate in the loan market and in the treasury bills market, etc.

The study of Saxegaard (2006) has some particularities as it allows separating precautionary and involuntary components of bank demand for excess liquidity. He extended the empirical model of Agenor et.al, (2004), by including explanatory variables for involuntary excess reserves, which was not taken account in the later study. He therefore corrects this by estimating a demand function for both precautionary and involuntary excess reserves using a VAR model. The separation of precautionary and involuntary excess liquidity was based on the following model

$$EL_t = \alpha_1 X_t^1 + \alpha_2 X_t^2 + \varepsilon_t \quad (1)$$

Where EL_t is the ratio of excess liquidity to total deposits, X^1 and X^2 are vectors of variables explaining respectively the precautionary motive for holding excess reserves and the involuntary accumulation of excess liquidity and ε_t is an error term.

$$X^1 = \{RR, Outg, CtoD, Privsd, GovD, DtoSD, Y, IR\} \quad (2)$$

$$X^2 = \{Dep_{PS}, Dep_{Gov}, Cred_{PS}, Cred_{Gov}, Aid, Lr\} \quad (3)$$

Where:

RR is the ratio of required reserves to bank commercial reserves, Outg: is a moving averages of the standard deviation of the Output gap which measures the volatility

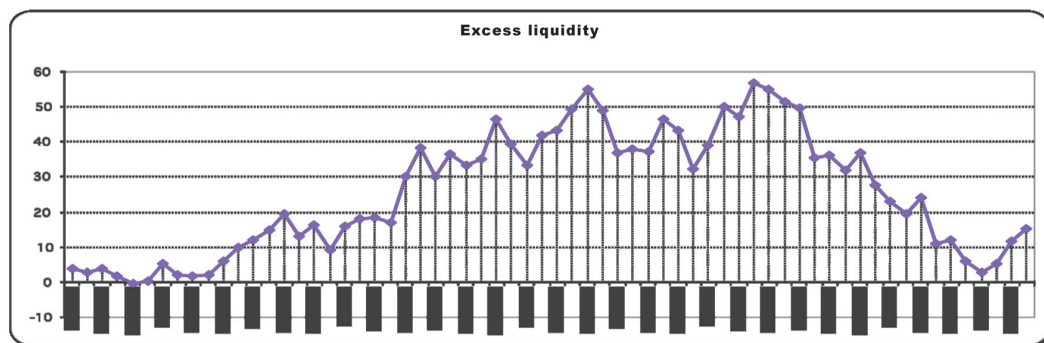
of the GDP, CtoD: is a moving averages of the standard deviation of the cash to deposit ratio, Privsd and Govd: are moving averages of the standard deviation of private sector and government deposits divided respectively by moving average of these variables, DtoSd is the ratio of demand to savings deposits, Y is the output gap, IR is the central bank discount rate. Contrary to the studies we mentioned, we chose interbank rate not the discount rate because during the period covered by our study the discount rate was constant. Dep_{ps} and Dep_{Gov} : are respectively, private sector and government deposits, expressed as a fraction of GDP. Increased government and private sector deposits can be major sources of excess liquidity in banks. CredPS and CredGov are respectively the ratio of private sector credit and banks credit to central government and public enterprises to GDP. Aid is the ratio of aid inflows to GDP and Lr is the commercial bank landing rate.

III. Excess liquidity: facts and causes

The period of liquidity analysis is tracked back to August 2004 when the BNR stopped injecting liquidity in the banking system. The volume of the BNR interventions on the money market to sterilize excess liquidity in the banking system has exhibited an increasing trend since the first quarter of 2005 reflecting the level of excess liquidity as a result of an increase of capital inflows, especially following increase in aid inflow. However, since June 2008 the banking liquidity in Rwanda has been diminishing in such a way that BNR was obliged, in January 2009, to inject liquidity in the system for the first time since 2004. In terms of outstanding debt, total borrowing by the BNR from commercial banks to absorb excess liquidity that stood at RWF 58.6 billion at end December 2007 fell at RWF 16.6 billion at end December 2008, which represents an annual decrease of 71.7%.

To address this issue of banking liquidity shortage different measures have been taken including the reduction of required reserve ratio from 8% to 5% and the decision to not roll over the short term Treasury bills maturing in 2009. As a consequence, the short term liquidity significantly increased in the banking system.

Figure1: Evolution of monthly excess form 2004 to April 2009



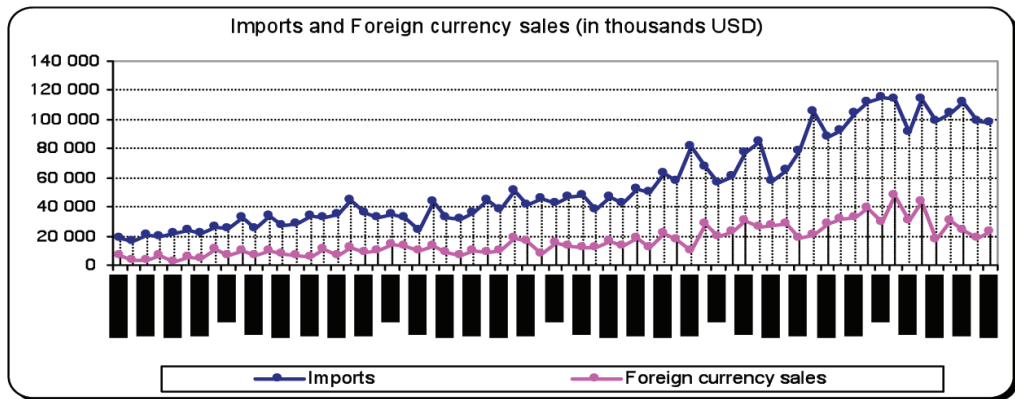
Sources: BNR, Research and Policy Analysis Directorate; Financial markets and Research and Policy Analysis Departments

As mentioned earlier, Rwanda has been enjoying increased foreign exchange inflows since 2004, related mainly to aid inflows. In fact, total disbursements for both budget and project supports increased by 88.8% between December 2004 and December 2008 standing at USD 577.9 million in December 2008 against USD 306.85 million in December 2004. This is also evidenced by a high share of Net Foreign Assets in broad money which fluctuated at around 80% during the same period under review. Combined with increasing remittances and foreign direct investments these flows contributed to money creation through domestic government and private expenditure, and played a major role in building up high banking liquidity.

The role of capital inflows in building up banking liquidity has been to some extent limited by the structural change in government spending specifically the GOR's absorption capacity and by the increase of foreign currency sales by the National Bank of Rwanda. Hence, the ratio of capital expenditure over GDP which stood at 7.3 percent in 2006 rose to 10 percent in 2008 and to 11 percent in 2009. In the same development, the share of import of capital goods as percentage of total import increased from 25.5% to 32.4% between 2006 and 2008. Combined with intermediary goods this share increased from 55 % to 61% during the same period.

The forex selling in the exchange market by National Bank of Rwanda has been used as an important instrument to mop up the excess liquidity in the banking system depending on the market demand. Foreign exchange sales by BNR to commercial banks increased significantly over the period due to the rise in demand for imports which increased rapidly during the same period. The volume of foreign currency sold in 2008 amounted to the equivalent of Rwf 208.48 billions compared to Rwf 153.79 billions sold in 2007. These are the amounts of liquidity mopped up from the banking system which is correlated with the rise of the imports.

Figure 2: Imports and foreign currency sales



Source: Financial Markets and Statistics Departments

There are structural factors which also explain trends in banking liquidity during the period under review. The financial sector in Rwanda is dominated by a few commercial banks concentrated in Kigali city. As a matter of fact, the banking sector in Rwanda is composed of 10 commercial banks of which three can be considered as the game makers. As of end June 2009 these big three account for 60.7% of total bank assets, 65 % of all deposits and 62.7% of total loans to private sector. In this situation, the benefit of extending lending at the margin for those banks may be lower than the interest rate.

The financial market in Rwanda is limited to the interbank money market. Domestic foreign exchange and Treasury bills are the most active given that the capital market exists since January 2008 and is still at starting stage. Active financial markets are dominated by commercial banks. Table 1 below shows the distribution of T-bills and T-bonds between banks and non banks

Table 1: Distribution of T-bills and T-bonds between banks and non banks from 2004 to 2009 (in Rwf billion unless otherwise indicated)

Financial instrument/ Period	Dec 04	Dec 05	Dec 06	Dec 07	Dec 08	June 09
T-bills	58.7	76.5	85.0	48.1	9.3	6.1
Banks	65%	66.5%	71.8%	77.1%	69.9%	80.3%
Non banks	35%	33.5%	28.2%	22.9%	30.1%	19.7%
T-bonds					14.3	14.3
Banks					80.4%	80.4%
Non banks					19.6%	19.6%

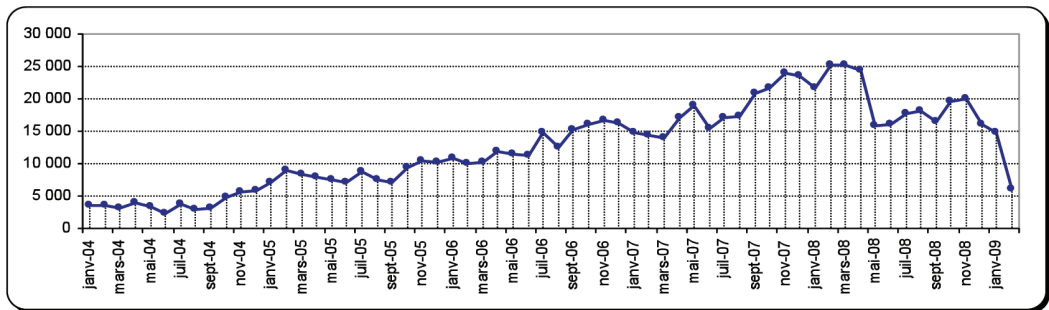
Source: Statistics Department

It appears from the table above that the banking sector has played a leading role in the securities market. Its share has been around 2/3 and above over the period under review. The non banking sector role is even smaller if we consider that before February 2008, Union des Banques Populaires du Rwanda was classified as non bank. The shrinkage of long and medium term liquidity in the banking system has shifted commercial banks operations from the securities market to the repo market, where the outstanding stock of repos amounted to Rwf 25.7 billion at end June 2009 (against Rwf 20.4 billion in all kind of securities).

The limited level of competition in the banking sector coupled with the underdeveloped inter bank operations may encourage some banks to hold precautionary reserves because they can not rely on the market to get resources to cover contingencies.

Commercial banks in Rwanda have been for long the only important way to invest for the public and big companies. They have also been the main source of funding. Thus, as long as one or more large depositors do not find alternative investment opportunities, their deposits contribute to keep high the level of the banks' liquidity. This structural factor explains why Rwandan banking system has enjoyed an important excess liquidity before 2008 and its current downward trend since the second half of 2008 after some institutions opted for alternative investment opportunities (abroad or in real estates), which has lead to significant withdrawals of their deposits from banks. The permanent deposits of large institutional depositors in the banking sector have also contributed to sustain the credit-deposit mismatch till mid 2008.

Figure 3: Evolution of the major institutions' deposits



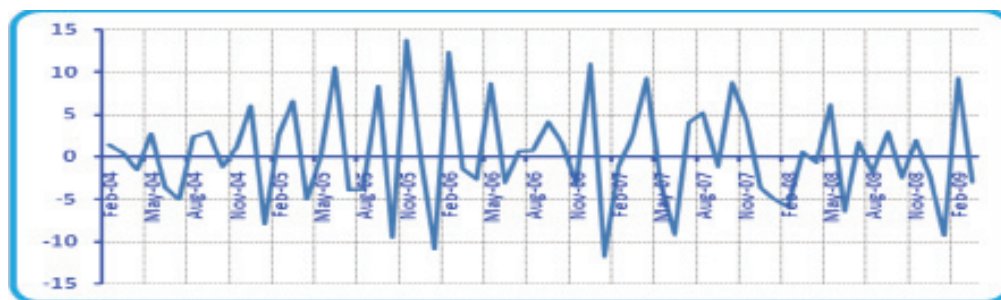
IV. Excess liquidity and monetary policy effectiveness

The BNR pursued a monetary targeting regime with broad money supply M_3 as a nominal anchor to achieve the objective of controlling inflation without any prejudice to growth. In this framework, the key variable of monetary policy implementation is the monetary base B which is the BNR's operational target. The control and management of the liquidity in the banking system are achieved by using different monetary policy instruments, namely required reserve ratio, REPOS (Repurchase Agreements) operations, Treasury bills and liquidity injection tenders. By mopping up the excess liquidity, BNR influences liquidity levels consistent with the targeted

growth of broad money (M3) and reserve money (or monetary base). One of the implications of permanent excess liquidity in open market operations is that BNR did not need to repurchase assets from the market from 2004 to 2008.

In the presence of persistent excess liquidity, the monetary policy is undermined when required reserve ratio and money multiplier are used to regulate the money supply. As shown by this chart, the money multiplier has largely fluctuated between -11.8% and 13.7% over the period 2004 – 2008, as an indication of the instability of money multiplier. This contributed to undermine the link between the monetary base and the broad monetary aggregate. The commercial banks' behavior in holding excess reserves and the frequent interventions of BNR on money market to sterilize the excess liquidity in the banking system have contributed to this instability (for details see BNR Economic Review, no 2, 2007).

Figure 4: Monthly variation of money multiplier (in %)



Another important feature of the Rwandan banking system analyzed in this paper is the reaction of the aggregate commercial banking system's liquidity preference to the change of loan rate. This is based on the fact that in principle the excess liquidity is expected to be transitory as banks will try to use the excess funds by buying financial instruments or extending loans in the inter bank market or to the private sector. By using locally weighted polynomial regressions (LOESS) of one degree we fitted the liquidity preference curves against an opportunity cost variable: the

loan rate. During the period under review, it fluctuated between 16.9 and 14.8 in average with 0.4 as standard deviation. This technique is used because it enables to extract underlying non linear relationships⁴.

As can be observed on figure 5, the liquidity preference curve analyzed against loans interest rates becomes flat around 16%. This means that commercial banks in Rwanda require a minimum rate of 16% in the loan market before making loan. In other words, they consider loans and unproductive excess liquidity as perfect or near perfect substitutes at a loan rate around 16%. This is an indication of a non competitive loan market. We can note that in a competitive and pure competitive loans market, excess liquidity and loans are substitutes at a zero loan rate (see for example Arestis and Demitriades, 1999). We can realistically assume that the banking sector in Rwanda is oligopolistic. In such a market, banks are in good position to mark-up the loan rate over an exogenous benchmark rate, transaction costs and also consider any risk of default associated with a specific type of borrowers.

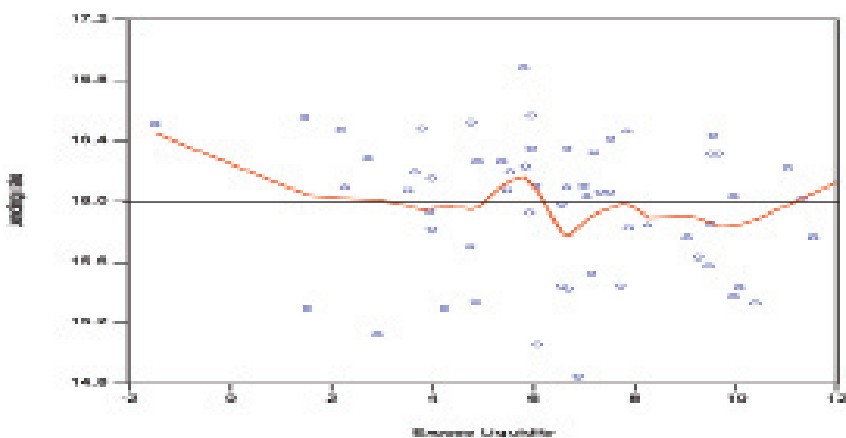
One of the policy implications is that BNR indirect monetary policy is effective only over the downward sloping portion of the curve and not over the flat range of the liquidity preference curve due to the oligopoly power banks possess in the loan market. This means that reserve shocks like change in the reserve level by open market operations can only have desirable effects on the loan rate when that rate is very high (upper 16%). Unfortunately, the downward sloping portion is globally associated with very high interest rates with their adverse consequences on economy.

This result is to take with some caution, because the liquidity curve indicates also that banks some time decide to hold excess liquidity above the minimum loan rate. This highlights existence of other factors like limited opportunities for lending, asymmetric information, underdeveloped inter bank and government securities

⁴ The locally weighted polynomial regression (Loess) was first proposed by Cleveland (1979) and further developed by Cleveland and Devlin (1988). It is used in recent researches for extracting underlying nonlinear relationships (see for example, Tarron Khemraj, 2007; 2008).

markets and risk aversion. The plentiful supply of deposits by commercial banks in Rwanda during the period under review, coupled by the limited ability to expand their loan portfolios and underdeveloped financial market has pushed banks to expand their investment in money market on which they are net lenders. This can be explained by the fact that any change in short term interest rates will not have significant impact on banks' cost of fund (for example, around 40% of deposits in banks are not remunerated) but instead affect their returns on investment. In such an economy, the ability of monetary policy to influence deposit and lending interest rates is limited.

Figure 5: Rwanda Loess fit bank liquidity and the loan rate



V. Demand function for excess liquidity

In this paragraph, we estimate a demand for excess liquidity in Rwanda with the objective of separating precautionary and involuntary excess liquidity components. We use the methodology proposed by Agenor et al (2004) and estimate, by using a VAR (3), a model of demand for excess liquidity for precautionary purpose while liquidity in excess of that is referred to as involuntary excess liquidity. The

VAR model is estimated using following variables: RR, Outg CtoD, Privsd, Govd, DtoSd, Discr, Dep_{PS}, Dep_{Gov}, CredPS, CredGov (see equations (2) and (3)). In this estimation, variables related to aid inflows are considered as exogenous.

The estimated VAR (3) indicates that a large share of banks demand of excess liquidity in Rwanda is for precautionary purpose ($R^2 = 79.9\%$). This confirms the important role of structural factors as determinants of excess liquidity in Rwandan banking sector as it is in other developing countries. Demand for excess reserves by Rwandan commercial banks for precautionary purposes is mainly due to the volatility of private (PRIVSD, coeff. = 1.057) and government (GOVD, coeff. = 0.129) deposits, the maturity structure of the deposit base (DTOSD, Coeff.= 0.383) and the cash to deposit ratio (CTOD, coeff. = 0.224). The role of volatility of cash to deposit ratio indicates that increase in liquidity risk lead to an increase in demand for excess reserves as banks try to protect themselves from sudden surges in the demand for cash. The discount rate (DISCR, coeff. = 0.013) plays also a role in build up excess of liquidity. In fact, although its impact is low due to the fact that it has not been used by BNR in liquidity injection, it is statistically significant suggesting that banks take it into account in their demand for excess liquidity.

Table 2: VAR (3) estimation

	RR	OUTG	PRIVSD	GOVD	CTOD	DTOSD	Y	DISCR	C
Coeff.	-0.089966	0.076407	1.057585	0.129292	0.22426	0.382946	-0.003518	0.013287	-0.564622
S.E	-0.30824	-0.00501	0.25474	0.08691	-0.04039	-0.0335	-0.0004	0.0024	
t-stat	[-0.29187]	[15.2599]	[4.15160]	[10.48761]	[5.55281]	[11.4318]	[-8.86150]	[5.53571]	

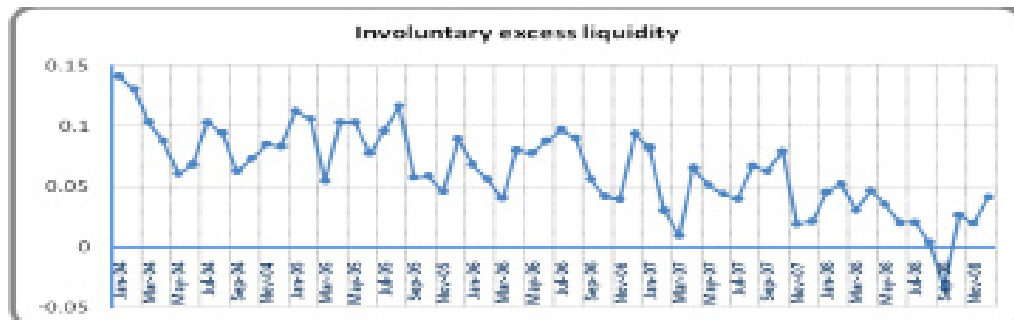
Heteroskedasticity test: LMtest = 74.3 ($p = 0.7$); Normality test: Jarque-Bera Stat = 5.7 ($p = 0.06$);

Autocorrelation Test (Q stat) = 189.5 (0.00)

The estimated model indicates also that there is an involuntary component in demand for excess liquidity by banks due to demand side of the economy (approximated by the difference between observed excess liquidity and its demand for precautionary

purposes). Through the chart below, it appears that the involuntary excess liquidity has a downward trend. This trend is associated with the improvement in demand condition over the period under review materialized by an important increase of credit to private sector, from 26.6% in 2005 to 31.6% in 2008.

Figure 6: Involuntary excess liquidity trend



5. Conclusion and Policy recommendations

This paper has analyzed causes and consequences of the observed excess liquidity during the period 2004-2008. The paper concludes that banks' demand for excess liquidity in Rwanda is both for precautionary and involuntary purposes, confirming the role of structural factors and demand conditions as determinants of excess liquidity in Rwandan. Excess reserves for precautionary purposes' demand is mainly due to the volatility of private and government deposits, the maturity structure of the deposit base and the cash to deposit ratio. Another important feature of the Rwandan banking system analyzed in this paper is the reaction of the aggregate commercial banking system's liquidity preference to the change of loan rate. This paper shows that commercial banks require a minimum mark-up (around 16%) interest rate in the loan market before lending to the marginal borrower due to the oligopoly power banks possess in that market.

One of the policy implications of this loan market feature is the ineffectiveness of indirect monetary policy over the flat range of the liquidity preference curve. This means that reserve shocks like change in the reserve level by open market operations can only have desirable effects on the loan rate when that rate is very high (upper 16%). Unfortunately, the downward sloping portion is globally associated with very high interest rates with their adverse consequences on economy.

This result is to take with some caution, because the liquidity preference curve indicates also that banks some time decide to hold excess liquidity above the minimum loan rate. This highlights the existence of other factors like limited opportunities for lending, asymmetric information, risk aversion, etc. The plentiful supply of deposits by commercial banks in Rwanda during the period under review, coupled by the limited ability to expand their loan portfolios and underdeveloped financial market has pushed banks to expend their investment in money market on which they are net lenders. This limits the impact of change in short term interest rates on deposits and lending rates.

It can be recommended that ongoing efforts to develop the Rwandan financial market (including payment systems) be accelerated for an efficient allocation of financial resources. In this regards, the entrance to the market by international banks is to encourage as it will stimulate competition, introduce innovation and break the oligopoly situation in the financial industry. There is also a need to diversify the range of collaterals accepted for the mobilization of loans on the capital market. The structure of the economy needs to be modernized in line with a modernized financial market. In fact, the credit culture is not widespread over the country, and most of economic activities don't use it to supplement investor's own capital.

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