

Excess Reserve Management of Bangladesh Bank

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Abstract: Monetary accounts identity is taken into consideration to derive the excess reserves (ER) of deposit money banks (DMBs). DMBs Taka balance with Bangladesh Bank (BB) in reserve money (RM) minus cash reserve requirement (CRR) results ER in the central banks account. The shortfall of ER can also happen. ER is affected by autonomous and policy factors. Autonomous factor includes net foreign assets (NFA), net position of government and currency in circulation (CIC). The ER is managed through open market operations (OMOs), which is the policy factor. Without BBs intervention four days ER forecast is calculated in this paper to maintain the orderly situation in interest rate, exchange rate, inflation and output. Rise in call money appreciates the Taka against foreign currency and help to stiffen the inflation. Management of ER or Taka liquidity including sterilisation using BB Bill and reverse repo is crucial when NFA of RM increases. Using of principal asset mortgaging government securities to get liquidity through repo assured liquidity support facility (ALSF) is also important element for optimum ER management in Bangladesh. This paper addresses the issues relating to monetary and economic analysis, the two pillars of monetary policy for effective management of money multiplier (mm) and forecasting of ER. Quantity theory of money is analyzed to understand the money demand and supply relating to ER. The stability in mm is used as underlying factor to make relation among ER, interest rate, exchange rate, inflation and output.

Keywords: Central Bank, Monetary Policy, Forecasting and Simulation.

JEL classification: E58, E52 and E47

Introduction :

DMBs keep balance with BB for daily CRR maintaining purpose. The DMBs marginal ER balance with BB is optimum and reflects efficiency. Consequently, higher mm is desired. Although our economy is sixty percent monetised the share of time deposit in M2 is growing reflecting the interest rate sensitivity of the economy. The ER is generated through the public deposits in DMBs. The liabilities side of RM economic balance sheet contain the DMBs balance with BB. The RM is linked with the issue and banking department accounting balance sheet of BB for daily operation of ER. The liability side CIC of RM and broad money (M2) accounts reflects the cash money demand of public based on risk and return. The liability side of RM consists with CIC and DMBs Taka reserves. The forecast of autonomous factors CIC is stochastic. Accordingly, the NFA and credit to government (net) is forecasted. NFA, government credit (net), loan to banks and OMOs affect the bank Taka reserves. In ER management the CIC and DMBs Taka reserve account with BB balance each other. Daily changes of autonomous and policy factors influence the ER position.

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Economic and accounting balance sheets of BB are the basis of ER management in Bangladesh. Through ER short term interbank call money rate are maintained considering the optimum exchange rate, inflation and economic growth. The M2 growth is matched with money demand

consisting nominal GDP and income velocity of money. The money demand is stable and mainly reflects transaction motive following aggregate demand of the country. In M2 the share of currency is declining over time. While, the deposits share are growing in M2. Thus interest rate channel are receiving momentum in terms of monetization.

ER framework is quantified and analyzed in this paper. Due to sensitivity 2-year back data is used for exercise purpose to understand the ER management in Bangladesh, which is crucial to manage the RM and mm. The ER is impacted by autonomous and policy factors. Changes in NFA, government (net) position and CIC consists in the autonomous factor for daily ER management. OMOs and debt management tools are the elements of policy factor. These factors also impact the daily position of liquidity (ER) of DMBs. The autonomous factors forecasting are mainly adaptive and backward. The policy factors are applied prudently considering forward looking approach. The forecasting of ER for next four days (forecasted horizon) is presented without policy intervention. The amount of assured liquidity support facility (ALSF) under repo mortgaging the government securities provides shift in ER management in the changing paradigm. The ALSF for the next day impact the ER forecasting number. In this paper the ER is forecasted without ALSF or policy intervention. So the policy makers can intervene thoroughly to maintain ER for the next day.

Elaborately shortfall of ER of banks owing to currency growth directs to rise in inter- bank call money rate and general interest rate subject to ALSF. Rise in interest rate theoretically appreciate the Taka against foreign currency. Operationally, increase in overall net short position of banks following Basel II norms and higher opening of letter of credit for the future months may raise the exchange rate reducing international reserves. Consequently, lower amount of NFA in M2 and RM comparing net domestic asset (NDA) respectively impact the asset quality mix and ability of payment from credit rating perspective. Unplanned borrowings of the government from the DMBs reduce the credit expansion to the private sector affecting monetary aggregates identity.

Following the operational procedure of debt management DMBs submit their bids in the auction of government securities stating respective amount and rate. Auction committee determine the cut-off rate bearing in mind the movements of macroeconomic variables. Repo rate, reverse repo rate and sale/ buy of foreign exchange also settle on by the BB in terms of ER. Transaction of government treasury bills and bonds are held in the over the counter market (OTC) due to lack of secondary market. By buying and selling government securities, BB affects the aggregate level of balances available in the banking system. BB implements monetary policy primarily through RM as operating target by conducting OMOs. In OMO selling of BB bills mop up the liquidity from the banking system. In case of repo the liquidity increases and reverse repo mops up the liquidity. If BB wants to rouse the market it may follows an expansionary monetary policy considering budgetary and monetary requirements. The usual aims of OMOs are to maintain orderly situation in short term [interest](http://en.wikipedia.org/wiki/Interest_rate) [HYPERLINK "http://en.wikipedia.org/wiki/Interest_rate"](http://en.wikipedia.org/wiki/Interest_rate) [rate](http://en.wikipedia.org/wiki/Interest_rate) and the supply of RM, and thus

indirectly manage the total [money](http://en.wikipedia.org/wiki/Money_supply) [HYPERLINK "http://en.wikipedia.org/wiki/Money_supply"](http://en.wikipedia.org/wiki/Money_supply) [supply](http://en.wikipedia.org/wiki/Money_supply). BB bills more effectively mop-up the liquidity comparing government securities from the DMBs. Monetary variables such as [interest rates](#), [exchange rates](#) and inflation along with economic growth are impacted by OMOs.

Research methodology

Monetary and economic analysis from different perspective has been considered for day to day ER management. Macroeconomic theory related to quantity theory of money and judgmental factors with seasonality are the underlying factors for managing ER of Bangladesh. Banking and economic data is used to describe the ER. Stability in mm $(1+c/d)/(c/d+r/d)$ is assumed managing ER through BBs OMOs and debt management tools and direct instruments for achieving optimum inflation and GDP growth.

Organization of the paper

Literature review is given in section-I. Monetary and economic analysis of ER is described in section-II. Section-III deals with the forecasting of ER in brief. Conclusion is represented in section-IV.

Literature review :

Literature review is done to understand the interactions of M2, RM, BOP and money demand functions of Bangladesh in the cross country perspective. One of the Bank of England's two core purposes is monetary stability. Monetary stability means stable prices with low inflation and confidence in the currency. Stable prices are defined by the monetary authorities' inflation target, which the Bank seeks to meet through the decisions taken by the Monetary Policy Committee. Canadian monetary policy is concerned with how much money circulates in the economy and what that money is worth. By keeping inflation low, stable and predictable, the Bank contributes to solid economic performance and rising living standards for Canadians. In the United States, the Federal Reserve is in charge of monetary policy. Monetary policy is one of the ways that the U.S. government attempts to control the economy. If the money supply grows too fast, the rate of inflation will increase; if the growth of the money supply is slowed too much, then economic growth may also slow. In general, the U.S. sets inflation targets that are meant to maintain a steady inflation of 2 percent to 3 percent.

The Fed also makes outright purchases and sales of securities through the System Open Market Account (SOMA) with its manager over the Trading Desk at the New York Reserve Bank. The trade of securities in the SOMA changes the balance of bank reserves, which also affects short term interest rates. The SOMA manager is responsible for trades that result in a short term interest rate near the target rate set by the Federal Open Market Committee (FOMC), or create money by the outright purchase of securities. Very rarely will it permanently destroy money by the outright sale of securities. These trades are made with a group of about 19 banks or bond dealers who are called [primary dealers](#) (PD). Money is created or destroyed by changing the reserve account at a bank. The Fed has conducted OMOs in this manner since the 1920s, through the Open Market Desk at the [Federal Reserve Bank of New York](#), under the direction of the Federal Open Market Committee.

The Eurosystem's regular OMOs consist of one-week euro liquidity-providing operations (main refinancing operations or MROs) as well as three-month euro liquidity-providing operations (longer-term refinancing operations or LTROs). MROs serve to steer short-term interest rates, to manage the liquidity situation, and to signal the stance of monetary policy in the euro area, while LTROs aim to provide additional, longer-term refinancing to the financial sector. Currently, the regular operations are complemented by euro liquidity-providing operations with a maturity of (around) one, six, twelve and thirty-six months as well as US-dollar liquidity-providing operations. In addition, the Euro system has launched two Covered Bond Purchase Programmes (CBPP, which ended in June 2010 and CBPP2, which started in November 2011) in order to purchase euro-denominated covered bonds and, since 10 May 2010, it has conducted interventions in debt markets under the Securities Markets Programme (SMP). The liquidity provided through the SMP is currently absorbed by weekly collections of fixed-term deposits.

Nasiruddin (2012) investigates the existence of a long run money demand function for Bangladesh during the period 1975-1997 using the co-integration and error correction modelling approach. It also examines the parameter stability of the money demand function. The empirical results suggest that there exists a unique long-run relationship between real broad money balance, real GDP, and the real exchange rate. The short- term dynamic behaviour of money demand has been investigated by estimating an error correction model in which the error correction term has been found to be correctly signed and statistically significant. Real GDP and the real exchange rate have emerged as important determinants of the demand for money in Bangladesh.

Islam (2000) provides new evidence on the money demand function for Bangladesh using co-integration techniques and a longer quarterly time series data than previously used. Co-integration results indicate that a single co-integrating vector describes the long-run equilibrium money demand relationship in Bangladesh for both the narrow and broad money categories. It is also found that the money demand function is stable and is highly dominated by the transaction motive for holding money. The effects of alternative opportunity cost variables on money demand were not found to be significant. The short- run money demand function was found to be stable and the speed of adjustment to the long-run equilibrium was found to be reasonable for both money categories.

Mahboob and Anisul (2012) empirically tested the money supply function for Bangladesh using annual time series data. Authors observed that high-powered money played a very significant role in the money supply process of Bangladesh, particularly with respect to the narrow money supply M1, thus providing some support for the monetarist model. However, beyond the monetarist view, additional variables in the light of the Keynesian and structuralist analysis, such as bank rate, external resources, and financial liberalization need to be taken into account in understanding the money supply process of the country. Other aforesaid variables were also found to exert some influence on the broad money supply in Bangladesh. However, given the poor performance of the narrow money model and the existence of multicollinearity issue in both models, the estimated results, even for the broad money model, needed to be interpreted with caution.

India's OMOs are much influenced by the fact that it is a developing country and the capital flows are much different than other developed countries. Thus Reserve Bank of India (RBI), being the Central Bank of the country, has to make policies and use instruments accordingly. Prior to the 1991 financial reforms, RBI's major source of funding and control over credit and interest rates was the CRR ([Cash reserve ratio](http://en.wikipedia.org/wiki/Cash_reserve_ratio)) And the SLR ([Statutory Liquidity Ratio](http://en.wikipedia.org/wiki/Statutory_Liquidity_Ratio)). But post the reforms, the use of CRR as an effective tool was de-emphasized and the use of Open market operations. OMO is more effective in adjusting [market liquidity](http://en.wikipedia.org/wiki/Statutory_Liquidity_Ratio).

The two traditional type of OMOs used by RBI:

- Outright purchase (PEMO): Is outright buying or selling of government securities. (Permanent).
- [Repurchase agreement](http://en.wikipedia.org/wiki/Repurchase_agreement) (REPO): Is short term, and are subject to repurchase.

But even after sidelining CRR as an instrument, there was still less liquidity and skewedness in the market. And thus on the recommendations of the Narshiman Committee Report(1998), The RBI brought together a [Liquidity Adjustment Facility](http://en.wikipedia.org/w/index.php?title=Liquidity_Adjustment_Facility&action=edit&redlink=1) (LAF). It commenced in June, 2000 and it was set up to oversee liquidity on a daily basis and monitor market interest rates. For the LAF, two rates are set by the RBI: Repo rate and reverse repo rate. Repo rate is applicable while selling securities to RBI (Thus daily injection of cash flow (liquidity)), while reverse repo rate is applicable when banks buy back those securities (Absorption of liquidity). Also, these interest rates that are fixed by the RBI also help in determining other market interest rates.

The money supply and mm related issues of developed and developing countries have been widely worked out. Johannes and Rasche (1979), Bomhoff (1997), Park (1980), Arby (2000), Ford and Morris (1996), Baghestani and Moot (1997) have pursued studies on money supply and mm of different countries. They highlighted the degree of controllability over money supply by the monetary authority, stability and predictability of money supply, determinants of money supply and policy implications for governing monetary policy.

Monetary and economic analysis of ER :

In quantity theory of money the left hand side of the equation is money supply and the right hand side consists with real GDP plus inflation and percentage change in income velocity of money ($M2 = \text{real GDP} + \text{inflation rate} + \text{percentage change in velocity}$). Taylor rule exhibits the level of actual and potential inflation and output with respect to interest rate. In this paper I have used BB model of judgmental and seasonal factors along with macroeconomic theory to make relationship with ER and related variables. ER management through short term interest rate will optimize the actual and potential inflation and output gap considering the monetization of the economy. Excess money supply comparing money demand will create inflation deviating from equilibrium. Undesired money supply clearly impacts the core inflation. While the head line inflation may impacted by other factors such as demand and cost push along with ER. Thus inflation is monetary phenomenon. Consequently, economic goals of a country from

macroeconomic point of view have three principal goals. 1) High level and rapid growth of output 2) high level of employment with low involuntary unemployment and 3) price level stability. To achieve these goals all of the countries in the world adopt two policies such as fiscal policy and monetary policy. Monetary policy refers to systematic actions taken by a central bank affecting money supply, interest rates and exchange rate, in order to influence inflation. Price stability is the primal goal of monetary policy to achieve high output growth and low unemployment. To achieve price stability interest rate stability, stability of financial markets and stability in foreign exchange markets are essential. The fiscal policy along with ER of monetary policy addresses the budgetary and real sector for betterment of the economy with lower poverty and income inequalities.

For managing ER OMOs are conducted by BB by using repo, reverse repo, BB bill and selling and purchase of foreign exchange in order to adjust the Taka liquidity conditions in the market. Government debt management tools are related to selling and buying of Treasury bills and bonds of different maturities, which also impact ER. OMOs are measures used by the BB to manage money supply with stability in mm ($M2/RM$). The primary tool for implementing monetary policy, OMOs facilitate changes in short-term interest rates and money supply depending on the prevailing economic scenario. In case of liquidity shortfall in the economy the BB uses repo and hence infuses money into the system. Otherwise, it use reverse repo in case of excess liquidity in the system. In monetary and credit programming in Bangladesh

reserve money is used as operating target. Broad money is intermediate target and inflation and GDP growth are ultimate goal. Stability in mm $(1+c/d)/(c/d+r/d)$ is assumed in monetary programming. Currency deposit ratio (c/d) and reserve deposit ratio (r/d) determines the magnitude of mm. Deposit growth depends on currency demand and financial engineering. The monetization rate in Bangladesh is sixty percent of GDP in relation to interest rate sensitivity and its pass-through in the economy. Currency is a random factor. Excessive government borrowing from BB may enhance the RM creating volatility in mm. Money multiplier can enter solving $(1+c)/(c+r)$. Programmed currency and deposit amount for end June 2013 for instance is Tk. 67576.50 crore and Tk.535129.60 crore. Reserve amount Tk.44852.90 crore contains cash in tills and balances with BB. To arrive mm 5.36 for end June 2013 the calculated c/d is 0.12628 and r/d is 0.08382.

BB through mm stability monitors the RM to keep it in target. Stability in mm contributes to create orderly situation in inflation, GDP growth, interest and exchange rate. Currency outside banks and reserves are the two components of reserve money from liability side. Currency and reserve numbers are arrived from the Issue Department and Banking Department balance sheet of Bangladesh Bank (BB). Increase in currency outside banks and reserves (DMBs balance with BB) will reduce the mm. Decrease in banks deposit (demand and time) also decrease the mm. Increase in currency outside banks increase the high powered money with inflationary impact. While increase in DMBs reserve with BB assuming constant deposit growth will reduce the mm without creating inflation that much. Stable and upward mm through BB operations will smooth monetary data generating process (DGP) with white noise econometric regression inference and less losing degrees of freedom.

A central feature of monetary policy strategies in all countries is the use of a nominal anchor as an intermediate target to achieve an ultimate goal such as price stability. There are three basic types of monetary policy strategy a) exchange rate targeting b) monetary targeting and c) inflation targeting. BB uses RM as operational target to achieve a growth path for broad money (intermediate target) consistent with the targeted rate of GDP growth and inflation. In this regard monetary policy instruments are used prudently. The direct instruments are variations in reserve ratios, i.e., CRR and SLR. At present, CRR for all banks and SLR for conventional banks are 6.5 percent and 13.0 percent of their total demand and time liabilities respectively. However, for the Islamic banking the SLR is 5.50 percent. Bank rate is another direct instrument, which is at present 5 percent. Change in policy rates, i.e., repo and reverse repo rates are the indirect instruments (OMOs). Presently, the repo and reverse repo rates are 6.75 percent and 4.75 percent. From bill perspective central banks own instrument for OMOs are 30-day and 91-day BB Bills. Presently, 91-day BB Bill is no longer in active. FX intervention, i.e., buying/selling of foreign currency by the BB is another indirect instrument for ER management. BB uses weighted average of maximum and minimum exchange rate of banks for its own buying and selling rates. So, the BBs exchange rate is market driven. The mid-rate of BB is hovering around Tk. 77.40 against 1USD for a long time. ER is impacted by direct instruments (CRR, SLR and Bank rate) and indirect instruments (OMOs). Considering the macro and micro economic variables the BB authority fixes these rates and manages the ER scrupulously. Key monetary development with economic outlook is the basis of rational expectation for ER management by the BB authority.

In Bangladesh most of the banks already fulfils their statutory liquidity requirement (SLR) using government securities in the category of held for trade (HFT) and held to maturity (HTM). Now the surplus holdings of government securities by the banks need effective secondary market. Banks are collateralizing government securities taking loan from BB in the form of repo using the derivatives concept of underlying assets. Banks are also maintaining

overall short position in the foreign exchange market. This is the new area of monetary policy of Bangladesh impacting monetary programming and banks finance to government sector to boost real sector savings and investment. It may be noted that OMOs of Bangladesh is discretionary considering liquidity of the economy.

Metwally (1997) from the banks perspective defines liquidity refers to the ability of the bank to meet up deposit withdrawals, maturing loan request and liabilities without setback. Literature survey on conventional liquidity suggests liquidity in financial markets has multiple connotations. Liquidity signifies the aptitude of a financial firm to keep up all the time a balance between the financial inflow and outflow over time mentioned by Vento & Ganga (2009). Likewise in the preceding decade worldwide growth rates of 10 percent to 15 percent per annum has been experienced by Islamic banking. In addition with their presence in over 51 countries shows increasing pace of Islamic banking system moving into conventional financial system elaborated by Sole (2007). In Bangladesh about 20 percent of total liquidity is belongs to Islamic banking. Ghannadian and Goswami (2004) experienced the performance of an Islamic banks and how Islamic banking scheme can offer liquidity and support in the process of money

As of end June, 2013						
Balances with Bangladesh Bank	Unencumbered approved securities	Cash in tills+ balances with Sonali Bank	Total Liquid Assets	Required Liquidity (SLR)	Required Liquidity (SLR)	Total Liquid Assets
5	6	4	2	3	8	7=(4+5+6)
						Private Banks (Other than Islamic) 79515.66

creation from side to side contribution transactions accounts and found that in all developing economies investing funds on basis of profits and losses is an attractive choice for the banks. Muhammad et al (2011) in case of Pakistan pointed out additional efforts are required by Islamic banks for scaling liquidity management due to their unique characteristics and conformity with Shariah principles. In Bangladesh excess reserves substantial amount is belongs to Islamic banks (**Column-11 of Table-2**). Bangladesh government issues bond as guarantee against the pool of funds formed by the Islamic banks and individuals in order to develop money market in Islamic banking sector. Virtually government does not borrow money from this sector. The return of the bonds depends on profit or loss in line with the Islamic Shariah savings rate and related factors reflected in the balance sheet of the Islamic bank. 3-month and 6-month Bangladesh Government Islamic Investment Bond (BGIIB) are in operation now to mop-up the liquidity). Deposit of money in the 3-month and 6-month BGIIB mop-up the liquidity from the market. Maturing of BGIIB increases the liquidity in the economy. Effective investment of ER of Islamic banks based on profit share ratio (PSR) will optimize the overall liquidity with higher mm in Bangladesh.

It may be noted that there is difference between DMBs total liquidity and ER. Total liquid assets of DMBs equal Balances with BB + Cash in tills + Balances with Sonali Bank (SB) + Unencumbered approved securities (**Table-1 and Chart-1**). Development of secondary market will enhance the DMBs liquidity utilizing unencumbered approved securities, which is 71.77 percent of total liquid asset (**Chart-1**).

Table-1: Liquidity position of the scheduled banks

Bank Group	As of end June 2014						
State owned Banks	53467.32	26433.53	2047.11	10725.47	64464.88	77237.46	20831.50
		47538.27	5799.02	21642.32	63856.29	91297.63	37265.18

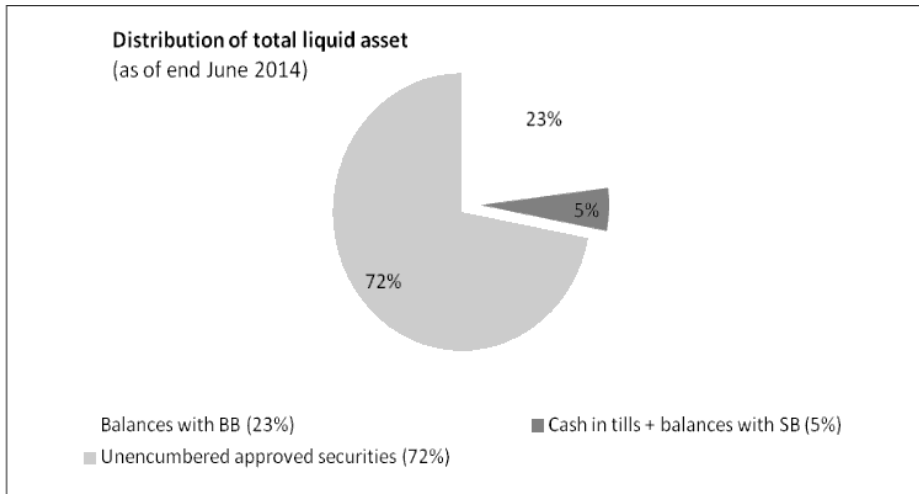
Private Banks (Islamic)	21836.40	11297.16	1737.15	10872.46	12416.64	25026.25	6579.81
Foreign Banks	14274.48	6396.07	553.22	4287.61	11314.17	16155.00	4836.15
Specialised Banks*	5077.47	3065.74	411.65	2536.49	2011.61	4959.75	1765.58
Total	174171.33	94730.77	10548.15 (+4.91)	50064.35 (+23.32)	154063.59 (+71.77)	214676.09	71278.22

Source : Department of Offsite Supervision. Note :- Figures in brackets indicate sectoral share in the total liquid assets.

* SLR does not apply to Specialised banks (except BASIC Bank) as exempted by the Government .

@ According to the circular No-MFD-02, 2013 with effect from February 01, 2014 SLR has been calculated separately as 13% (excluded CRR)

Chart-1



Liquidity management (LM) is the process of deciding the appropriate level of operating target, as part of overall strategy of monetary management. Operating targets are often reset and varied according to market movements, especially when such movements are dominated by market frictions and expectations and not by economic fundamental alone. The important aim of liquidity management is to maintain stable call money rate (**Chart-2**) and helping to derive effective deposit and lending rate through yield curve (**Chart-3**). The yield curve is upward sloping because the longer maturity is bearing higher interest rate and the yield curve is showing positive expectation about the future.

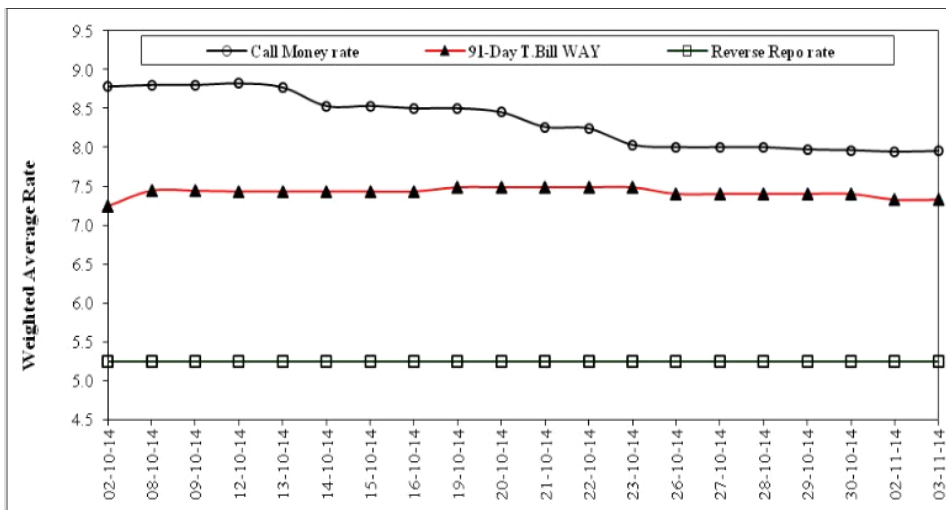
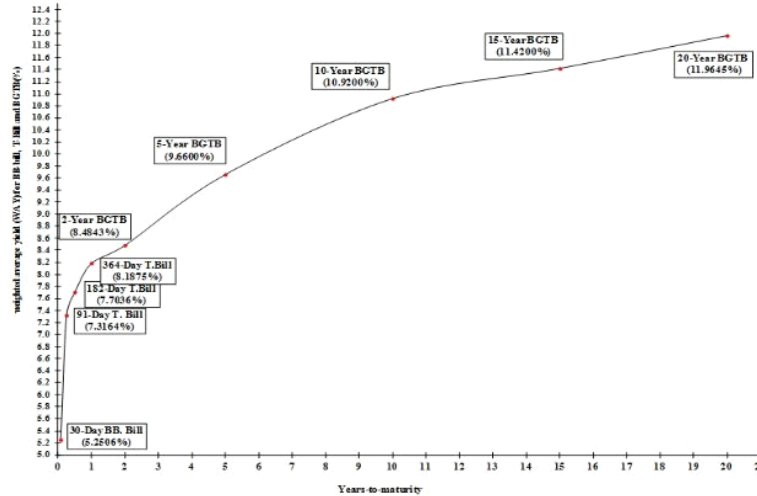


Chart-2

Chart-3

Yield curve of BB-bill, treasury bills and bonds
(as of Nov 24, 2014)



Our area of concentration is management of ER (**Column-10 of Table-2**) of DMBs. This is liquidity (ER) management. ER arrives DMB's local currency balance with BB (**column-6 of daily movement of reserve money Table-2**) minus CRR (**column-9 of daily movement of reserve money Table-2**).

Table-2: Daily Movement of Reserve Money and Excess/Shortfall of Reserves

As on October 20, 2014												
(in million taka)												
Date	Bank Notes	Govt. Notes and Coins	Currency in Circulation	DMBs Deposits with		Reserve Money (RM)		Required Cash for all Banks	Excess /Shortfall of Reserve	Excess /Shortfall of Islamic Banks	Net Effect of Policy Actions	Changes in Local Currency Deposits
1	2	3	4=2+3	F.C. Clearing Account	Local Currency Account 1/	Excl. F.C. Clearing Account	Incl. F.C. Clearing Account	9	10=6-9	11	12	13
17-09-14	898023	7909	905932	84450	474758	1380690	1465139	441365	33393	23423	687	-
18-09-14	899360	7909	907269	84638	484132	1391401	1476038	440945	43187	25638	-930	9374
21-09-14	900714	7909	908623	85094	476380	1385003	1470097	440934	35446	22838	-6441	-7752
22-09-14	902408	7909	910317	83419	477109	1387425	1470844	440934	36175	22473	-2819	729
23-09-14	905444	7909	913353	83700	465404	1378757	1462457	440934	24470	17921	-8650	-11704
24-09-14	910209	7909	918118	81844	458749	1376867	1458711	440934	17815	18167	165	-6655
25-09-14	918334	7909	926243	80129	458650	1384893	1465022	440934	17717	17520	7672	-98
28-09-14	930846	7909	938755	80243	461224	1399979	1480221	440934	20290	13378	15287	2573
29-09-14	948171	7909	956080	77263	445848	1401928	1479191	440934	4914	11330	666	-15376
30-09-14	962827	7909	970736	80919	465822	1436558	1517478	440934	24888	15294	32056	19974
01-10-14	986971	7909	994880	81073	463010	1457890	1538964	445661	17349	6555	25109	-2812
02-10-14	1013318	7909	1021227	80241	465355	1486583	1566824	445655	19700	7517	12445	2345
08-10-14	1022974	7909	1030883	80887	456821	1487704	1568591	445855	10966	4558	-4076	-8534
09-10-14	1018199	7909	1026108	83557	454531	1480639	1564196	445855	8676	3860	-7811	-2290
12-10-14	1007972	7909	1015881	84294	459099	1474980	1559274	446245	12854	10202	-5101	4568
13-10-14	998194	7909	1006103	84566	455376	1461479	1546046	445845	9531	9263	-13480	-3723
14-10-14	985254	7909	993163	81331	467170	1460333	1541664	445845	21325	10899	706	11794
15-10-14	974974	7909	982883	84525	466111	1448994	1533519	445844	20267	10601	-10829	-1058
16-10-14	966699	7909	974608	76095	465498	1440105	1516200	445844	19654	12484	-4347	-614
19-10-14	958160	7909	966069	77058	466559	1432628	1509687	445751	20808	16634	-5241	1062
20-10-14	950225	7909	958134	78774	421362	1379496	1458270	445751	-24389		-50198	-45197
21-10-14	942814	7909	950723	78271	437016	1387740	1466011	445751	-8735		4500	15654
22-10-14	936271	7909	944180	78289	442540	1386720	1465010	445751	-3211		0	5524
23-10-14	931165	7909	939074	77697	449565	1388639	1466336	445751	3813		3000	7024

1/ Figures of forecasted reserves are without intervention; 2/ Calculated @ 6.5% of total demand and time liabilities adjusted with investment in islami securities for the islami banks, w.e.f 04/06/2014; 3/ Includes excess reserves of the branches/windows of the conventional banks based on islami sharia.

Literature survey found that in Bangladesh the money demand function is stable and is highly dominated by the transaction motive for holding money. However, in this paper emphasis has been given in the supply side of money assuming stability in money demand following quantity theory of money. Central banks prudential policy impact the supply side, while mainly income and interest rate influence the demand for money. The objective of this paper is better monitoring of ER ensuring desired inflation and economic growth (**Chart-4 and 5**) through

higher mm (M2/RM). The M2 and CPI are following optimum trend with some time lag. In FY12, FY13 and FY14 the decrease in M2 leading to decline in CPI (**Chart-4**). From FY 04 except FY 09 the GDP growth is over 6 percent (**Chart-5**). With effective monetary and economic policy this growth can be over 7 percent (potential level) taking into account national budget number of FY 2014-15.

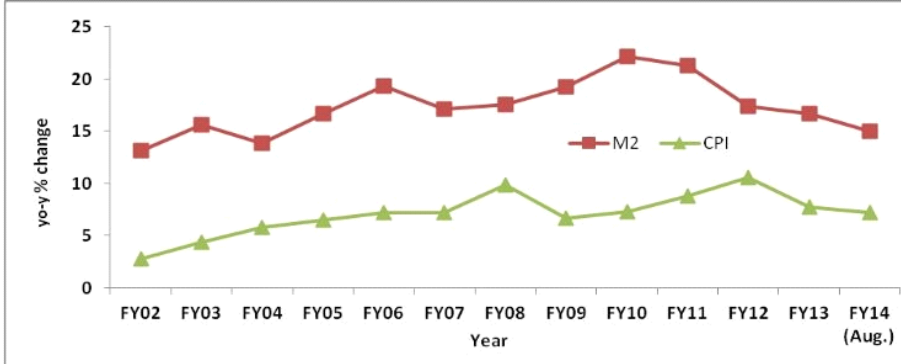
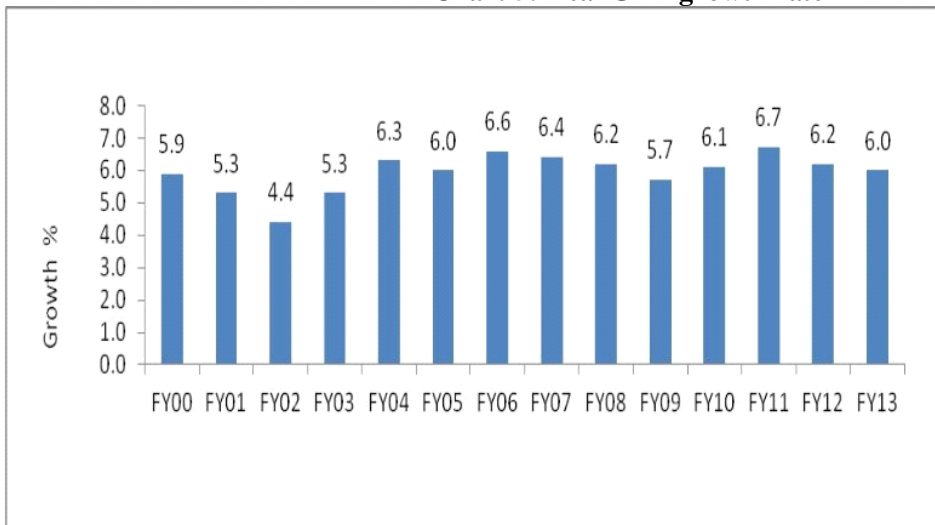


Chart 4: 12-month

Average growth rate of CPI and

M2

Chart 5: Real GDP growth rate



Success of credit to the government sectors are supported by proper securitization of treasury bills and bonds and effective secondary market. RM (Table-3) is the economic balance sheet of BB. NFA of RM arises from balance of payment (BOP). Substantial amount of foreign exchange reserves based on import is the cushion from the external sector perspective. Current and blocked nature debt including government bills and bonds outstanding minus deposit comprises government (net) account of RM. Refinance, OMO instruments and budgetary tools impact the credit of DMBs.

Table-3: Stylized balance sheet of BB

Assets	Liabilities
• Net foreign assets	• Currency in circulation
• Net position of the government	• DMBs reserve with BB
• Credit to DMBs/OMOs	

The ultimate benefit of ER management or monetary policy relies on economic development of the country. Ahmed and Mortaza (2005) estimated threshold level suggests 6-percent inflation as the threshold model level (i.e., structural break point) of inflation above which inflation adversely affects economic growth. The empirical evidence demonstrates that there exists a statistically significant long-run negative relationship between inflation and economic growth for Bangladesh pointed out by Ahmed and Mortaza (2005). Study observes gross investment over 30 percent of GDP will lower the poverty level in the country below 31.50 percent of 2010 (World Bank statistics). According to World Bank statistics the gross investment of Bangladesh is 27 percent in 2012. Higher growth and proper fiscal policy including progressive tax policy can reduce the income inequalities measured by Lawrence curve. GINI index of Bangladesh was at 32.12 in 2010, according to the World Bank. In recent time the GINI index is close to 24 percent. The Global Economy.com mentioned that Bangladesh unemployment rate is around 4.5 percent in 2012. (http://www.theglobaleconomy.com/Bangladesh/unemployment_rate/). Bangladesh unemployment data has underemployment and disguised unemployment issue. Considering this factor may raise the unemployment in the double digits. In consequence ER management is crucial to maintain the monetary and economic rates of the country. ER management is correlated with forecasting, which is elaborated next.

Forecasting of ER in brief:

Liquidity forecasting (LF) is the process of centralizing all relevant information that determines the future stance of liquidity without central bank intervention. Liquidity forecasts enable the central bank to decide on how much liquidity to provide to or withdraw from the market on a day to day basis with the objective of smoothing undesirable fluctuations of rates.

Relationship between LF and LM

Liquidity forecasting provide all relevant information to the liquidity management committee that determine the future stance of liquidity without central bank activities, but does not try to provide guidance on how to find the optimal stock of liquidity or what instruments to use to achieve this. Liquidity forecasting is the discretionary of BB authority. The monetary

instruments are the elements of liquidity management rather than the forecasting process. This is how we can determine the relationship between LF and LM.

Steps of liquidity forecasting

The preparation of liquidity forecasts can be divided into two steps. The first step is to identify the factors that determine the components of the demand and the autonomous supply of liquidity. The second step is to decide upon the appropriate forecasting techniques and apply these to project the demand and supply components.

Demand for bank reserves

Bank reserves are held, in principle, for two purposes, which include fulfilling reserve requirements (CRR) and meeting settlement obligation. The demand for bank reserves can be split into demand for required reserves and demand for excess reserves.

Supply of Bank Reserve

The liability side of the balance sheet of the central bank comprises the two uses of base money a) currency and b) bank reserves, which are mirrored by the four sources of base money creation on the asset side. The supply of bank reserves can thus be derived solving net foreign assets + net position of the government + lending to banks and OMOs - currency in circulation.

Liquidity forecasting framework

A useful way to organize the liquidity forecasting process is to assign the forecasting responsibility to a specific division within the central bank's monetary operations department to ensure a close link between ER forecasting and ER management. The assignment of such a ER forecasting division should comprise communicating with the different information sources and ensuring the timely receipt of the data and supervising the consistency of the forecasted components producing an overall ER projection, which is regularly (daily) updated assessing forecasting errors.

Practice of liquidity forecasting

Central banks should follow a preset timetable to produce ER forecast. The timetable should set forth certain items such as a) when to contact the different data providers to gather new information b) when to produce or revise the overall liquidity forecast and c) when to transmit the final projections to the central bank's management.

Forecasting techniques

The approaches I have used to forecast the different components of ER supply and demand are time series data (deterministic and stochastic model), judgmental estimation, adjusting for seasonal and calendar effects. ARIMA and VAR model may also produce forecasted results. In ARIMA selection of order and seasonality is important. In VAR lag and other related variable selection is critical for forecasting. Econometric exercise suggests Bangladesh monetary data has structural issue in different decades. Setting dummies may fabricate the forecasting impacting the real outcome. Taking of unnecessary lag may also lose the degrees of freedom of the observations. Improper seasonal weight may not smooth the forecasting. Moreover, the monetary data is in identity (accounting) form, which has multicollinearity. Consequently, as the Bangladesh monetary data is not classical for simplicity moving average method with short memory (5 days) provides usual forecasting.

Judgmental estimation

Prerequisites for applying time series models as forecasting methods are the availability of historical data and the stability of the relations being modeled. In countries with a bend data base or in times of economic transition, introduction of new policy measures or restructuring of these conditions are not fulfilled. In this situation, forecasts will have to rely mainly on judgmental factors in many cases. The ER of October 20, 2014 is forecasted adding October 19, 2014 (stock of ER) plus sum of policy and autonomous factors data (**Table-4**), which is Tk.-24389 million. Accordingly, the forecasted ER for October 21, 22 and 23 of 2014 are Tk.-8735, Tk.-3211 and Tk.3813 million. These ER are without BBs intervention providing room for intervention prudently. The RM is forecasted for October 20, 21, 22 and 23 of 2014 summing currency in circulation, CRR balance and ER (+/-) position (**Table-2**). The autonomous and policy factors variables increase (+) and decrease (-) sign impacting liquidity (ER) are presented in **Table-4**. The (+) sign stands for increase in DMBs liquidity (ER) and (-) sign stands for decrease in DMBs liquidity (ER).

Adjusting for seasonal and calendar effects

In case of very short-run forecasting horizons (daily, weekly or monthly), not only the trend, cycle and the irregular component need to be captured, but also recurring patterns, seasonal and calendar effects, have to be modeled. Liquidity needs for instance are greatly influenced by certain payment dates (e.g., salaries, pensions, and taxes). Demand for currency typically increases before holidays or the weekend.

Liquidity forecasting of BB

Monetary policy department (MPD) of BB has been forecasting the liquidity of the banking system on daily basis since November 2002. The main task of the liquidity forecasting process can be divided into three parts. 1) Collecting the actual data of the autonomous factor (NFA, government (net) and currency) and forecasting them on the basis of historical data considering judgment, seasonal and calendar affects. 2) Expressing the policy action data both in actual and projecting period and 3) providing the actual and forecasting position of ER, total bank reserves and reserve money. The actual data of autonomous factor data are collected from the respective department of BB (**Table-4**).

Forecasting framework in BB :

Forecasting horizon: 4 working days (ahead of time). Forecasting interval: 1 day Reserves (CRR) maintenance period: 15 days with averaging

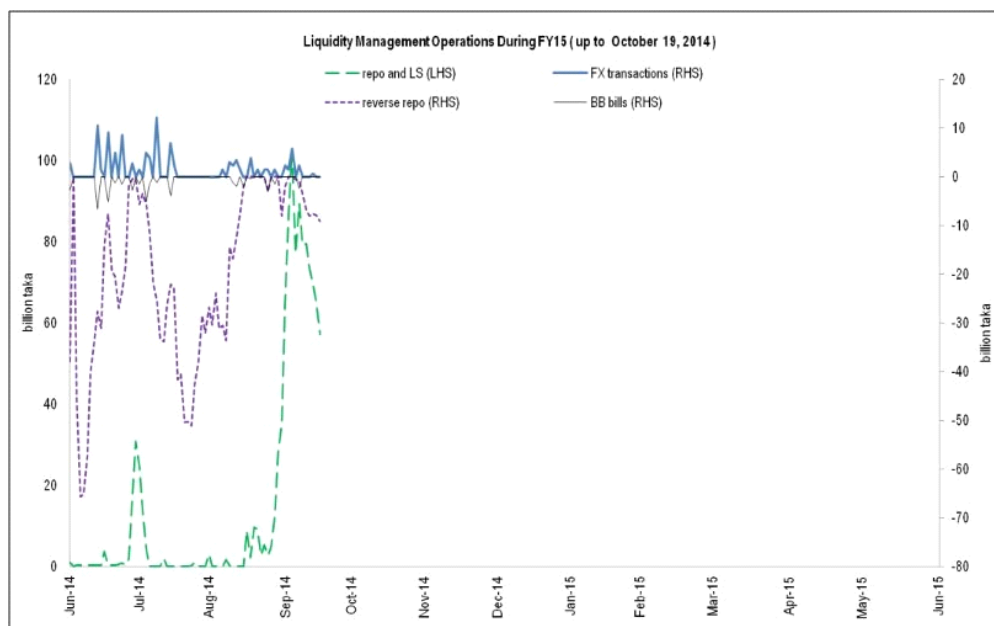
Finally, we can say in liquidity forecasting there are two factors. 1) Autonomous factor (random factor) and 2) policy factor (deterministic factor). Autonomous factor of liquidity forecasting includes 1) change in NFA 2) change in Government net position and 3) Change in CIC. The NFA numbers for next (forecasted) four days are collected from the Foreign Exchange and Reserve Management Department (FRTMD). The payments and receipts of foreign exchange actual numbers are reported in the NFA forecasted row (**Table-4**; February 20-23,2014). Foreign exchange purchase from DMBs increases the Taka liquidity in the money market. In such scenario BB may apply sterilization policy issuing BB Bill or reverse repo. Government payments higher than receipts increase the liquidity in the market. For instance payment of Tk.18 billion to the Ministry of Agriculture can increase the liquidity of the same amount if there is no receipts (deposit) from government tax account. From BBs Accounts and Budgeting Department we get the government payments schedule for the forecasted period. Government roads/bridges construction bills payments and monthly salary can increases the liquidity.

Utilizing core banking software of the BBs Motijheel Office (local branch) and other 8 branches (except Mymensingh branch) we get government the payment numbers. The government receipt number depends on seasonal tax depositing factors for illustration. We also apply moving average of last five days actual receipts number for the forecasted period. CIC number depends on public currency holding choices depending on interest rate and investment opportunities. We get the actual number of CIC from branch offices (operational offices). Calendar effect impacts the CIC numbers. At the beginning of the month the CIC number increases due to workers salary payments. Usually the currency position rise in the first 15 days of a month. In the last 15 days of the month the trend of currency declines. Judgmental factor and last 5-day moving average is used for forecasting the CIC. Considering these autonomous development the government debt management and OMOs are conducted for maintaining effective ER (**Table-4**). Maturing of government treasury bills, bonds, BB Bill, repo and reverse repo are also treated as autonomous factors.

Policy factor for liquidity forecasting includes repo, reverse repo, foreign exchange sale or purchase, BB Bill and loans at bank rate. These are broadly the OMOs tools of BB. Debt management tools of policy factors such as auction of Bangladesh government Treasury Bills and BGT Bonds are also impact the liquidity of Banks. Repo, foreign exchange purchase and loans increase the DMBs liquidity. Reverse repo, BB Bill and foreign exchange sale mop-up the Taka liquidity from the banking system. The OMOs and government treasury bills and bonds issue and maturity number are reported in the forecasted period. The ER numbers at the bottom of the **Table-4** are derived from DMBs Taka Balances with BB - CRR. These numbers are Tk.-24389 million, Tk.-8735 million, Tk.-3211 and Tk.3813 million for February 20-23, 2014 time period. These forecasted

ER are also included in column 10 of **Table-2**. The ER and RM forecasting for next four days (February 20-23, 2014) are without policy intervention treatment (**Table-4 and Table-2**). It means that the BB authority balance these short term ER applying OMOS. In case of negative ER of Tk. 24389 the BB authority may apply repo to inject liquidity in the market to lower the call money rate and impact the RM. Thus OMOs and debt management authority balances the ER of DMBs scrupulously (**Chart-6**).

1. Autonomous impact on excess reserves (flow)	82941	-104132	-66318	-93262	-74220	-70662	-43323	-63061	-56160	-	46104	28042	15654	5524	7024
Changes in NFA (excl. intervention) (+/-) 1/	1641	1	239	793		53	199	11	101	35	80	85	62	73	
Changes in net position of government															
Receipts (-)	-9009	-8837	-12047	-25974	-8487	-22035	-4386	-16729	-8090	-6941	-	-6859	-7354	-6881	
Payments (+)	10958	18229	34761	2628	4292	10903	11743	9002	5043	5527	23788	20773	10518	6273	5727



Section-IV

Conclusion

Development of secondary market will enhance the liquidity of DMBs utilizing unencumbered approved securities. Financing facility with the ER of Islamic banks complying profit share ratio (PSR) will reduce the RM improving mm and financial deepening in the economy. Maintenance of effective ER will balance the call money, yield curve, deposit and lending rates of DMBs. These rates will stabilize the exchange rate maintaining optimum inflation and GDP growth. Higher and stable economic growth will help to generate classical data and to forecast NFA, government credit (net), loans amount to DMBs and currency in circulation. Considering this the OMOs will be more rational impacting ER and addressing quantity of money and mm. Moreover, without remittance the balance of payment current account is deficit implying actual output is lower than potential. Proper monetary analysis related to ER and economic analysis will address the two pillars of monetary policy. Consequently, meticulous ER management with desired call money rate and other rates impacting inflation and output the economy will be lifted.

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