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TECHNICAL ASSISTANCE REPORT—ROYAL MONETARY AUTHORITY—STEPS TOWARDS A LIQUIDITY FORECASTING AND MANAGEMENT FRAMEWORK

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SOUTH ASIA REGIONAL TRAINING AND TECHNICAL ASSISTANCE CENTER (SARTTAC)

BHUTAN

**Royal Monetary Authority: Steps Towards
a Liquidity Forecasting and Management Framework**

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July 2017

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LIST OF ACRONYMS

APD	Asia and Pacific Department
BAS	Bhutanese Accounting Standards
BOB	Bank of Bhutan
BTN	Bhutanese ngultrum
CCC	Cash Coordination Committee
CIC	Currency in circulation
CPI	Consumer price index
CRR	Cash reserve ratio
DPA	Department of Public Accounts
DPNB	Druk PNB Bank
ER	Exchange rate
FX	Foreign exchange
GDP	Gross domestic product
ICD	Institute for Capacity Development
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
INR	Indian rupee
MCM	Monetary and Capital Markets Department
MDAs	Ministries, Departments, and Agencies
MOF	Ministry of Finance
MOU	Memorandum of Understanding
MT	Monetary targeting
NDA	Net domestic assets
NFA	Net foreign assets
OMOs	Open market operations
MLR	Minimum lending rate
RAMP	World Bank Reserve Asset Management Program
RBI	Reserve Bank of India
RM	Reserve money
RMA	Royal Monetary Authority of Bhutan
SAA	Strategic asset allocation
SARTTAC	South Asia Regional Training and Technical Assistance Center
SLA	Service Level Agreement
SLR	Statutory liquidity ratio
TA	Technical Assistance
TSA	Treasury Single Account

PREFACE

A mission from the South Asia Regional Training and Technical Assistance Center (SARTTAC) visited Thimphu (Bhutan), during the period June 2–9, 2017 to assist the Royal Monetary Authority of Bhutan (RMA) in identifying the drivers of systemic liquidity with a view, down the road, to support RMA's plan to establish a liquidity forecasting and management framework. The mission comprised Bernard J. Laurens (Consultant, mission chief), and Stéphane Couderc (Consultant).

The mission held discussions with RMA Governor Dasho Penjore, RMA Deputy Governor Tshogyel Yangchen, several RMA Directors, a number of RMA staff, as well as the Director from the Department of Public Accounts (DPA), and representative from several commercial banks operating in Bhutan.

The mission expresses its gratitude to Mr. Gopal Giri, Director, Research and Statistics Department and his staff for their kind hospitality and their effective support and cooperation during the stay of the mission in Thimphu.

This report is based on the Aide mémoire presented to RMA Management and staff at the end of the mission. It incorporates comments from the relevant departments at the IMF as well as from the authorities of Bhutan.

EXECUTIVE SUMMARY

Setting up a liquidity forecasting framework would go a long way in establishing a key building block allowing the RMA to fulfil its legal mandate to formulate and implement monetary policy in ways better aligned with current central bank practices. By allowing the RMA to broaden its monetary instruments toolkit, a liquidity forecasting framework would: (i) facilitate monetary policy signaling, (ii) support the develop of a nascent money market, most notably the Government securities market, and (iii) allow banks to enhance their treasury function, leading to reduced liquidity costs and settlement risks.

<u>**Drivers of Liquidity Conditions in Bhutan**</u>

Based on end-of-month data over the January 2015 – April 2017 period, an analysis of liquidity developments suggests the following preliminary conclusions;

- *The structural liquidity surplus, mainly due to foreign reserves accumulation, has been broadly stable* in the absence of RMA intervention (beyond the Cash Reserve Ratio-CRR and targeted sweeping to the RMA of Government accounts in banks).

- *Most autonomous factors present significant volatility*, which may complicate RMA task of monitoring and forecasting liquidity:
  - The increase in *currency in circulation* is not linear, suggesting strong seasonal and possibly conjunctural factors influencing the demand for banknotes.
  - The *consolidated account of the Government*, subject to daily sweeping is particularly volatile, and the Department of Public Accounts (DPA) has limited forward-looking information on its cash position and operations.
  - The *hydro projects related flows* are also subject to sterilization via sweeping to the RMA. However, they have a significant short-term impact on liquidity conditions until they are allocated to the project accounts swept to the RMA.

The volatility of autonomous factors and the fragmentation of the money market justify ambitious steps by the RMA towards setting up a liquidity management framework.

<u>**Constraints and Gaps from the Environment, and Related Recommendations**</u>

The mission identified several constraints and gaps that need to be addressed to support the effectiveness of a liquidity forecasting framework.

- *Because of a passive role as "banker of the Government", the RMA is in a weak position to fulfill its legal duties vis-à-vis the Government*. Most notably, while Government operations (reflected in the consolidated account at the RMA) are one of the main drivers of liquidity, and the RMA is periodically asked to cover overdrafts within

established legal limits, current operational arrangements do not allow the RMA to ascertain that the balance of the consolidated account truthfully reflects Government's operations. Furthermore, the placement in the banks of certain Government deposits not subject to sweeping lacks the transparency needed to ensure a level playing field.

- *The sweeping of Hydro Projects accounts, while sensible to sterilize related inflows in the economy presents several flaws.*
  - *The full conversion in ngultrum of the flows related to grants and loans as soon as they are made available to Bhutan should be reconsidered.* That would allow insulating RMA balance sheet (hence banking liquidity) from these flows which result nonetheless in drawing on RMA international reserves for up to 80 or 90 percent of the initial inflows (according to RMA estimates).
  - *The sweeping has been unable to prevent those inflows from resulting in high, unpredictable, and potentially disruptive volatility in liquidity conditions.* This is particularly the case when the flows are in transit ("float") before they are recorded in the Hydro Project accounts subject to sweeping.

The mission's recommendations presented in Table 1 aim at streamlining the processing of the Government's financial transactions and cash balances: (i) recorded in the consolidated account with RMA, involving the Bank of Bhutan (BOB) under an agent banking arrangement with the DPA; (ii) related to the Hydro projects; and (iii) maintained with banks (not swept to RMA).

<u>**Recommendations for Setting up a Liquidity Management Function**</u>

The mission recommends a number of concrete steps to gradually set up a liquidity forecasting and management framework:

- *Data management.* While a daily RMA balance sheet is available its exploitation for analytical purposes is difficult. A database allowing straightforward liquidity analysis (with daily time series) should be maintained on a daily basis.
- *Liquidity Team.* Liquidity is a key transversal topic that requires close interdepartmental cooperation. A Liquidity Team, functioning as "matrix" with experts from relevant RMA Departments (Research and Statistics, Banking, Regulation and Supervision, Payment Systems) should be set up.
- *Liquidity Committee.* The Liquidity Team should report weekly/biweekly on liquidity conditions (and possibly policy proposals) to a Liquidity Committee.

Before initiating efforts to forecast liquidity and operate a set of discretionary monetary policy instruments, RMA staff should gain an expertise in analyzing liquidity developments, both at aggregate and at individual bank level, through the regular analysis of the data (e.g., identifying seasonal patterns) and interactions with key stakeholders, e.g., the Treasury and bank treasurers (e.g., to estimate banks' "incompressible" needs for excess

reserves). Those interactions should aim at identifying and obtaining access to possible forward-looking sources of information on liquidity conditions, in the perspective of setting-up a liquidity forecasting framework.

Recommendations for Fostering the Development of the Money Market

A functional money market is necessary for an effective market-based implementation of monetary policy. The central bank should aim at addressing the aggregate liquidity situation, rather than individual banks' needs. The money market is also the first stage of the transmission of the monetary policy. Therefore, the mission considers it essential that the RMA, in parallel to internal endeavors to set up a liquidity management framework, actively promote the development of a functional money market:

- *Money market contact group.* The RMA could set up a *money market contact group* with the treasurers of the 5 banks as full members, and occasional presence of non-bank financial institutions, to discuss liquidity developments, the RMA's liquidity management, and initiatives to foster the development of the money market. In particular, it would be important for the RMA to regularly discuss with banks about any possible obstacles to the appropriate distribution of liquidity in the system.
- *A supportive regulatory environment for the money market.* The RMA should assess which changes to some of its prudential measures (e.g., the Statutory Liquidity Ratio-SLR) would be warranted to support money market development.
- *Oversight of the interbank market.* A closer oversight by the RMA on interbank transactions would not only support its understanding of the local money market, but also reassure banks that payment incidents are unlikely to occur without appropriate RMA response. In many emerging countries, money market development is supported by the central bank making an electronic trading platform, under its oversight, accessible to banks. The central bank may also eventually provide interest rate references (based on the compilation of transactions) to support activity.
- *Towards a repo market.* Information asymmetry and trust issues in the interbank market can eventually be addressed by a sound technical and legal framework for secured transactions, most notably a repurchase agreement. This long-term project would require a number of amendments to the legal and regulatory framework, and to the Government securities market (dematerialization, central depository). The RMA should play a leading role to push for those ambitious reforms.

Table 1. Key Recommendations

Recommendations	Timeline 1/
Institutional constraints and gaps	
Complete without delay the full implementation of the EPayment project.	

Recommendations	Timeline 1/
Sign a MOU with the Government and the BOB stipulating rights and obligations about the consolidated account of Government at RMA.	
Hydro inflows: 2 options are proposed.	
Amend the sweeping arrangement to include flows in transit (the "float") not yet recorded in Project Accounts subject to the sweeping arrangement	
Delay sale of INR to RMA to the time when the projects need ngultrum to pay for local expenses.	
Sweep to RMA all Government-related accounts, or establish a transparent mechanism for placing then with banks that ensures a level playing field (see below).	
Establish competitive mechanism for placing with commercial banks the cash balances of the Government not swept to the RMA (such as Bhutan Health Trust Fund and similar entities).	
Setting up a liquidity forecasting and management function at the RMA	
Complete the setting up of a database allowing straightforward liquidity analysis (with daily time series) to be thereafter updated daily with new RMA balance sheet data.	**Dec. 2017**
Set up an interdepartmental Liquidity Team, initially involved in the setting up of the database, then on the analysis of the drivers of liquidity.	**Dec. 2017**
Set up a Liquidity Committee, and start providing (weekly or biweekly) analysis on the drivers of liquidity during the previous period.	**Dec. 2017**
Initiate efforts to forecast liquidity.	**Dec. 2017**
Fostering money market development	
Set up procedures for an oversight of the interbank market.	**Sept. 2017**
Set up a money market contact group.	**Dec. 2017**
Complete an assessment of changes to the regulatory framework to support money market development.	**Dec. 2017**
Support the MOF in its efforts to modernize the Government securities market.	
Lead the effort to introduce a repo agreement in Bhutan.	

1/ Timeline **Under 1 year** **Between 1 and 2 years** **> 2 years**

SARTTAC stands ready to support the RMA in the implementation of the mission's recommendations. Table 2 suggests areas for TA during 2017.

Table 2. Suggested Follow Up Technical Assistance

Suggested Technical Assistance by SARTTAC during 2107	Timing
Objective: *Develop a forecasting model for currency in circulation* **Activity**: Once daily time series on currency in circulation are established, support the development of a forecasting model for currency in circulation.	2017-Q4
Objective: *Develop the analytical capacity of the Liquidity Team* **Activity:** Assist the Liquidity Team in developing the analysis of the drivers of liquidity, and the reporting format to the Liquidity Committee.	2017-Q3/4
Objective: *Take stock of progress made and advise on the next steps* **Activity:** Multitopic mission to assess progress made in the implementation of the action plan to set up the liquidity forecasting and management capacity, and advise on the next steps (liquidity forecasting and design of a toolkit for monetary policy operations). The mission could also cover issues related to the setting up of a Sovereign Wealth Fund.	2018-Q1

I. Introduction and Background

A. Overview of the Monetary Policy Landscape in Bhutan

1.   **Under the 2010 Act, the RMA is established "to carry out the functions of the Central Bank of Bhutan" (Chapter II, 3)**. The Act includes several provisions with regard to the objective and functions to the RMA which are relevant to the work of this mission, including: (i) the RMA primary objective "to formulate and implement monetary policy with a view to achieving and maintaining price stability" (Chapter II, 7); (ii) the RMA function to "act as banker, adviser and financial agent of the Royal Government" (Chapter II, 9); (iii) the RMA function to "issue currency" (Chapter II, 9); (iv) the RMA function to "be the owner, depository and manager of the official external assets of Bhutan" (Chapter VI, 108). Regarding the function of the RMA as banker of the Royal Government, the 2010 Act provides additional details: it makes the RMA "the depository of Royal Government funds" (Chapter VIII, 142), and it allows the Royal Government "to use the services of other financial institutions in case where the Authority [i.e.,, the RMA] has no branch office" (Chapter VIII,143b).

2.   **The monetary policy anchor in Bhutan is the exchange rate vis-à-vis the Indian rupee (INR).** The ngultrum has been pegged at par to the INR since the introduction of the ngultrum in 1974.[1] Given the close economic ties with India, the peg is considered to have served Bhutan well, and it is considered that it remains an appropriate nominal anchor, although recently the ngultrum has been moderately overvalued.

3.   **Looking ahead, monetary policy transmission would benefit from developing RMA's liquidity forecasting and management capacity**.[2] The RMA relies on direct instruments for managing liquidity and market conditions (Box 1). In the context of the 2016 Article IV Consultation, IMF staff indicated that adding further monetary tools could help improve monetary transmission. This would require: (i) developing the short-term Government securities market, with T-bills at market-determined rates providing a tool for liquidity management; (ii) improving RMA's ability to forecast liquidity in the financial sector and the Ministry of Finance's (MoF) ability to forecast Government cash flow; (iii) promoting further development of the interbank lending market as a tool of first resort for banks to meet their short-term financing needs; (iv) introducing a RMA short-term (overnight) standing facility at a penalty rate, to complement the interbank market, and help the banks meet their short-term liquidity needs; and (v) consider introducing a similar RMA standing deposit facility, to allow banks to deposit excess liquidity overnight, with penalty (low) rates setting the floor for interbank deposit rates.

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[1] Although the legal tender is the ngultrum, Indian rupee banknotes circulate freely in Bhutan.

[2] The authorities noted that the successful introduction of new monetary instruments requires the development of the interbank market, including short-term instruments to be used as collateral.

Box 1. Monetary Policy Tools of the RMA

The absence of a proper liquidity management framework has prevented the RMA from relying on market-based tool to manage overall liquidity conditions. While it has experimented several market-based instruments in the past, currently it relies exclusively on administrative tools: the cash reserve ratio (CRR), and a mechanism whereby Government accounts held in the banks are swept to the RMA at the end of the day. A Statutory Liquidity Ratio (SLR) plays a somewhat dual function.

Instruments (conventional and non-conventional)

- *Cash reserve ratio (CRR).* To manage structural liquidity in the banking system, the RMA relies on the CRR which require banks to maintain in a blocked account with the RMA a given ratio of their deposits with customers. In March 2015, the CRR was increased from 5 to 10 percent absorb more liquidity as the RMA faced a significant liquidity surplus.
- *RMA bills* (identical to T-bills with the sole exception of their use for sterilization). They have not been used since 2012.
- *Overdraft facility.* The RMA can provide liquidity through that facility but only in exceptional circumstances, when a bank does not have enough liquidity to meet its CRR, at a very penal rate (16 percent), and for only three days. After that, a bank unable to cover its account with the RMA (or still in violation of the CRR) is excluded from clearing and payment systems.
- *RSTLAW facility.* In March 2012, the RMA introduced a Short-Term Liquidity Adjustment Window (RSTLAW) for securitized RMA lending to banks at a newly-introduced policy rate which is linked to the RSTLAW facility. This facility is no longer in use.
- *Sweeping of Government accounts from the banks to the RMA.* The sweeping to the RMA at the end of the day of banks' account related to Government projects (in particular hydro-related project) acts as an automatic, and non-conventional sterilization instrument.
- *Statutory liquidity ratio (SLR).* Banks and nonbank financial institutions are required to maintain at all time a minimum liquidity in the form of "quick assets", in a ratio no less than 20 percent of total liabilities excluding capital and liabilities to the RMA for banks, and 10 percent of total liabilities excluding capital and labilities to the RMA for nonbank financial institutions.

Framework for monitoring banks' lending conditions

- *To guide banks' lending rates, since August 2016 the RMA relies on the Minimum Lending Rate (MLR).1/* The move was intended to introduce a forward-looking and interest rate policy mechanism expected to enhance transparency in the bank credit market, and encourage competition and professionalism among banks.
- *The RMA computes a single MLR by averaging the MLR of individual banks.* Three cost parameters are used: the marginal cost of funds, the negative carry charges on the CRR, and operating costs. The RMA reviews the MLR on a semi-annual basis, and it monitors its implementation based on the financial institutions' financial accounts.
- *On the single, common MLR, each financial institution is free to add its expected spread to arrive at the median final lending rate.* Financial institutions shall compute their product-specific final lending rates by adding the following components to the MLR: credit risk and tenor premium, and an item covering the bank's business strategy cost. Financial institutions cannot lend below the MLR expect for selected loans.

1/ The MLR replaced the base rate introduced in 2012 as a minimum rate at which banks could lend. Loans had to be priced from the base rate with the addition of bank determined borrower-specific charges to account for credit risk and term premium. The base rate of a bank considered its cost of funds, of complying with certain regulations (such as CRR or SLR), overhead costs, and profitability. There were exemptions to base rate for lending to priority sectors. Base rates were reviewed annually based on banks audited annual accounts. The RMA played an active role in base rate setting, including by imposing ad hoc adjustments to the base rates to engender a greater uniformity of lending rates across the financial system. A lack of uniformity in the application of the base rate methodology resulted in inefficiencies and poor transparency.

B. Scope of the Mission

4.   **With limited human resources but a strong commitment to monetary policy modernization, in the recent period the RMA has launched a number of reforms with the support of MCM**. RMA authorities are appreciative of the support they have received from the IMF. This support has helped shape the reform agenda, and allowed the RMA to move a faster pace. The broad range of issues that have been covered by MCM TA illustrates RMA's commitment to monetary policy modernizing (Appendix I).

5.   **The main task of the current SARTTAC mission was to help the RMA identify the drivers of systemic liquidity**. The scope for the mission, which was presented by the RMA on the first day of the mission, fits within the broader policy objective of the RMA to develop a liquidity forecasting and management framework. The mission's assessment and recommendations are expected to be reflected in a presentation to the RMA Board covering: (i) the relevance of a liquidity forecasting and management framework for Bhutan as this juncture (this work has already been done by RMA staff); (ii) identify the drivers of changes in the autonomous factors of bank liquidity, and on that basis the measures to be taken to allow the RMA to set up a robust and effective liquidity forecasting framework (scope of the mission's work); and (iii) draw some high-level implication for RMA reform agenda in the area of monetary and FX policy and operations, and related need to TA and training by SARTTAC. This will result in the adoption of a reform work agenda for the RMA that will be reflected in its Monetary Policy Statement expected to be released in July 2017.

C. Why a Liquidity Forecasting Framework Under a Peg Regime?[3]

6.   **A peg exchange rate regime does not eliminate the need for the central bank to pay careful attention to overall liquidity conditions in the economy**. Even in the context of limited autonomy in the monetary policy stance associated with a peg, the central bank should seek to ensure stable liquidity conditions for at least two reasons:

- **To effectively signal and implement monetary policy**. This is particularly true in a market-based financial system and operational framework for monetary policy. The central bank seeks to exploit its monopoly in the creation of base money to regulate overall liquidity conditions in the economy by influencing the underlying demand and supply conditions for central bank money.
- **To create supportive conditions for the development of financial markets**, starting with the money market which is under the central bank's oversight. This is critical to support the development of the nascent Government securities market, a first step in the development of the capital market.

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[3] Appendix II describes key features of a liquidity forecasting framework.

7.   **A liquidity forecasting and management framework has specific features under a peg regime**. In particular: (i) the FX component of the autonomous factors of banks' liquidity is difficult to forecast beyond t+2, due to the commitment to maintain the peg; (ii) as a corollary, the central bank will not be able to calibrate open market operations (OMOs) at variable rates, as is the case for central banks with flexible ER; (iii) if there is scope of arbitrage between the local currency and the currency to which the currency is pegged (i.e.,, through flows related to current account transactions) particular attention is needed to ensure that short-term domestic interest rates are aligned with those in the country to which the currency is pegged; and (iv) it is essential to ensure that any central bank refinancing to the local banks is not used to build positions against the domestic currency.

8.   **The development of a liquidity forecasting framework would go a long way in establishing a key building block upon which the RMA can fulfil its legal mandate to formulate and implement monetary policy in ways better aligned with current central banking practices.** Producing short-term liquidity forecasts would allow the RMA to rely on a broader set of monetary instruments. In turn, the RMA would be able to smooth changes in liquidity conditions, therefore creating stable liquidity conditions which allow market participants to clearly distinguish between changes in the monetary policy stance and temporary "noises". Distinctly signaling monetary policy changes reduces uncertainties that market participants might have about the central bank's policy intentions, thereby contributing to an efficient transmission of monetary policy.

9.   **In the same vein, stable liquidity conditions would support the development of Bhutan's nascent money market.** By moderating the volatility and uncertainty in overall liquidity conditions, commercial banks' liquidity management would be facilitated (i.e.,, costs for commercial banks would be reduced and settlement risks limited), in turn supporting the deepening of the interbank market. Stable liquidity conditions would also support the development of the Government securities markets, starting with the nascent treasury bills market, and down the road allowing the introduction of a Government bond market.

II. LIFTING INSTITUTIONAL CONSTRAINTS AND GAPS

A. Institutional Constraints and Gaps

10.   **The mission has identified several features of Government operations likely to complicate liquidity forecasting and management framework**:

- *Consolidated account of the Government at the RMA*. The RMA is by law the banker of the Government and the depositary of Government funds. At the end of the day, the cash balances of the central Government are held in the consolidated account of the Government at the RMA. The Bank of Bhutan (BOB) is responsible for performing the banking operations of the Government. At the beginning of the day, the RMA makes available to the BOB (i.e.,, on its current account with RMA) the

cash balance recorded in the consolidated account of the Government. Any cash balances left with the BOB at the end of the day (after having process all the banking operations of the Government) are swept back into the consolidated account upon notification of the be swept by BOB. Neither the RMA nor the Department of Public Accounts (DPA) at the MOF can track the flows and balances across the account of the Government during the day, or reconcile the cash position of the Government at the RMA. The RMA may be asked by the BOB to cover an overdraft at the end of the day, within the established legal limits.

- *Inflows related to grants and loans on account of the hydro projects with India*. Such flows transit mainly through Druk PNB Bank (DPNB), which sells the INR to the RMA upon reception. After having received the appropriate authorization from the Embassy of India in Bhutan and the MOF, DPNB transfers the funds to the relevant Project Account. These funds are routinely sterilized (through the sweeping of the accounts to the RMA at the end of the day) once they have been credited to Project Accounts, which can take several days. During that interval, the funds remain available to the banks. This has resulted in sizeable and volatile changes in liquidity conditions.

- *Accounts of the Government not swept to the RMA*. Currently the BOB is the only commercial bank allowed to undertake banking operations of the Government. In that context, the BOB can freely use Government cash balances currently not consolidated in the account of the Government held at the RMA and not swept at the RMA at the end of the day.[4] The absence of a level playing field among commercial banks in the allocation of these Government accounts appears to give the BOB a dominant position in the money market, as reflected by its structural long position.

11.   **The modernization of the operations of the Government currently under way at the RMA and DPA will greatly enhance the relationship between the treasury and the central bank, in line with current practices (Box 2), and ease some of the constraints**. The RMA, jointly with the DPA, has started the implementation of an EPayment system aimed at streamlining the banking operations of the Government. When the system is fully deployed (in about one year time), the DPA will deal directly with the RMA (instead of the BOB), which in turn will instruct the BOB to proceed with the execution of banking operations of the Government through its network of branches. The system will provide the DPA unambiguous control over all Government balances, backed by timely and detailed information on those balances via the EPayment system operated by the RMA. It will also

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[4] Currently, only the balances of the Government subsidiary accounts are included in the sweeping arrangement. The Letter of Credit and Project Letter of Credit accounts are not swept but they do not hold any cash; they only record the limit for withdrawal authorized by the DPA. The balances of the Government Current Deposits (CD) accounts, Trust Funds and Revolving Funds are not included in the sweeping arrangement. Information on these account is available in the Annual Financial Statements of the Government. As of June 2016, balances in those accounts amounted to about 2.7 billion ngultrums, of which 1.5 billion for the Bhutan Health Trust Fund.

provide the DPA and the RMA with timely information on the balance of the consolidated account of the Government during the day.

**Box 2. Government Cash Management:
Relationship between the Treasury and the Central Bank**

The relationship between the treasury and the central bank is at the heart of financial policies. One of the lessons from the financial crises of the 1980s and 1990s has been that debt management, and fiscal and monetary policy should be treated as separate arms of macroeconomic policy with specific objectives. There should be coherence in the overall policy mix, but the use of different instruments to meet different objectives facilitates greater transparency and predictability, enhancing the credibility and effectiveness of policy. Greater separation between monetary policy operations and Government debt and cash management has led to central bank independence with respect to monetary policy being a key feature of the modern framework. This greater policy separation has been paralleled over the last two decades by a progressive reform of the respective operational roles of the treasury and the central bank along the following lines:

- **The central bank focuses on monetary policy**. One result of the central bank's greater independence is that its objectives have narrowed, with emphasis on the control of inflation. It may still provide services to the Government, such as managing the Treasury Single Account (TSA), although transaction-banking services can be left to commercial banks. Where it is still a fiscal agent, the central bank's role is more clearly that of an agent, and not a driver of policy.

- **The treasury becomes a fully-fledged function**. It pools all Government liquidity, takes full responsibility for debt management, and manages cash actively. If executed well, it lowers average cash balances (thereby reducing costs) and it moderates money market volatility. Spending ministries, departments, and agencies (MDAs) may manage their own expenditures, but the treasury manages the Government's overall cash through the TSA. Importantly, the treasury provides the central bank with Government cash forecasts which the central bank utilizes for its liquidity forecasting exercise.

- **The banking sector provides banking services to the treasury, as required, on a transparently-costed basis**. This should be done through competitively tendered minimum standard service level agreements (SLAs). The role of the banks depends on the degree to which Government payment processing is centralized in the treasury, or dispersed to MDAs. In more decentralized payment systems, there is more room for commercial banks to provide specific services, such as the placement of short-term excess cash in a fixed-term investment.

Source: *Government Cash Management: Relationship between the Treasury and the Central Bank*, by Mario Pessoa and Mike Williams, IMF Fiscal Affairs Department (November 2010)

B. Recommendations

12.   **As a matter of priority, an MOU between all interested parties (Government, RMA, and BOB) should be signed stipulating their respective rights and obligations regarding the consolidated account of the Government.** Some of the key provisions to be included are as follows: (i) the current practice (as explained to the mission by BOB staff) of

a complete segregation at all time (including intraday) between BOB's financial transactions on account of the Government and BOB's own financial transactions; (ii) the role and workings of the Cash Coordination Committee (CCC) currently in place, including the nature of the Government cash flow forecast to be shared, to the satisfaction of the RMA for its liquidity forecasting framework; (iii) the processes that need to be in place to give the DPA unambiguous control over all Government balances, backed by detailed information on those balances to allow timely reconciliation of the balances recorded in the account.

13. **Several options are possible to deal with the potentially disruptive effects of the hydro flows on liquidity and ultimately the economy.**

- *Option 1: amend the sweeping arrangement*. The funds in transit to the relevant Project Account (pending the formal authorization of the Embassy of India and the MOF) could be recorded in a sub-account of the current of the bank at the RMA and swept to the RMA at the end of the day.

- *Option 2: sell INR to the RMA only when there is a need for payments in local currency.* A study by RMA staff shows that up to 80 or 90 percent of the expenses related to the Hydro projects end up being settled in INR. The current practice leads to an increase of the international reserves of the RMA which will only be temporary, and no contingent liability on those reserves is formally recorded in the balance sheet of the RMA. Keeping the funds in INR would avoid the need to rely on the sweeping arrangement for these funds and reduce volatility in liquidity conditions (Appendix IV).[5]

14. **Regarding the handling of balances of the Government not swept to the RMA, the mission offers the following options:** (i) include those accounts in the perimeter of the sweeping arrangement; or (ii) establish a transparent mechanism for placing these deposits with commercial banks (Box 3). Given the significant cash balances of some public entities (such as the Bhutan Health Trust Fund), a competitive mechanism for placing these funds with the banks would be particularly appropriate in order the support a level playing field.

15. **Finally, the mission encourages the authorities to complete promptly the full implementation of the EPayment system**. By making the RMA the main (or even only) intermediary between the DPA and the BOB, it will allow the RMA to fulfil better its legal

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[5] The mission was made aware of a project being developed by the government to the effect of setting up a Sovereign Wealth Fund that could play in role in the recording and channeling of the loan and grant components of the hydro flows (in addition to the flows related to the sale of electricity to Indian, and possibly a fraction of the RMA profit remitted to the government). Under such a scenario, the loan and grant component of the hydro projects would first be channeled to an account managed by the RMA (logged in the Sovereign Wealth Fund, and not in the balance sheet of the RMA). Disbursements would occur as and when the Hydro Projects need liquidity. As regards domestic liquidity conditions, such a framework would achieve a similar result to what is propose by the mission. The RMA indicated that SARTTAC TA support may be requested once a draft of the Royal Charter related to the Sovereign Wealth Fund is available.

mandate vis-à-vis the Government (see Paragraph 1), and provide the Government with the tools to monitor more effectively its cash position.

Box 3. Guidelines for Placing Government Deposits with Commercial Banks Tools

If the Government chooses to place deposits with commercial banks it must decide how to distribute its balances among the banks. The allocation system should be transparent and one which ensures a level playing field for all banks. Best practice suggests that the Government should avoid procedures that imply favoring some institutions over others or that provide opportunities for corruption. One effective way to eliminate these problems is for the Government to auction its deposit balances.

Whichever method is used, the allocation of deposits requires coordination with the central bank so that the actions of the Government are not at cross purposes with the monetary policy stance of the central bank, namely, that the Government is not auctioning deposits (injecting liquidity) while the central bank is trying to tighten monetary policy.

Government deposits should not be used to support weak banks which face solvency or liquidity difficulties. Any such support should be made transparent and appropriately budgeted. Hidden subsidies and implicit bailouts may create fiscal exposure, and could create a situation of moral hazard which would further undermine the banking system.

Government deposits should not be placed exclusively in state-owned banks. Such a practice can result in operational inefficiencies and segmentation which can inhibit the development of the money market.

III. TOWARDS A LIQUIDITY MANAGEMENT FRAMEWORK

A. Drivers of Liquidity Conditions in Bhutan

Definition of the Autonomous Factors

16.   **The analysis of liquidity conditions in any banking system should be based on the analysis of the autonomous liquidity factors.** Autonomous factors are defined as the items on the central bank's balance sheet, both on its asset and on liability sides, that are not controlled by the central bank in its monetary policy role: those items are therefore considered as "autonomous" from conventional monetary policy actions.

17.   **Aggregate liquidity conditions are solely determined by autonomous factors on the central bank's balance sheet because the central bank is the unique creator of liquidity in the system; liquidity then circulates across economic actors**. Therefore, the only economic transactions that may affect *aggregate* liquidity conditions are those which affect the central bank's balance sheet; transactions between economic actors (banks and

other financial corporations, non-financial corporations, households, the State) cannot affect aggregate liquidity, but only the *distribution* of liquidity across those actors.

18. **The determination of autonomous factors on the central bank's balance sheet is normally uncontroversial, with the same categories of autonomous factors existing across all central banks**. The four usual autonomous factors exist on the RMA's balance sheet as on most central banks' balance sheets:

- *Net foreign assets (NFA)* may be, to some extent, controlled by the central bank, but not in its monetary policy role. Therefore, the NFA are an autonomous factor. For the RMA, they should be calculated as the difference between, on the one hand, foreign assets (foreign currency cash in hand, balance with banks, term deposits, and investment securities, as well as non-monetary gold and silver, and accrued interest on foreign investment), and, on the other hand, foreign liabilities (foreign currency due to the IMF and other international institutions, to the Government, accrued interest, overdraft accounts, and the Government of India. In Bhutan, NFA are a *liquidity-providing* autonomous factor (i.e., an asset, in net terms): gross assets (BTN 67.4 billion)[6] greatly exceed liabilities (BTN 9.1 billion), resulting in a net (liquidity-providing) autonomous factor asset of **BTN 58.3 billion**.
- *Currency in circulation (CIC)* is always a *liquidity-absorbing* autonomous factor (i.e., a liability on the central bank's balance sheet). Indeed, banknotes are issued by the RMA to banks against a deduction on their current accounts. A banknote is considered to be "in circulation" once it is transferred from the central bank to the bank, i.e., when it exits the central bank's vaults. In Bhutan, currency in circulation, as of end April 2017, amounted to **BTN 10.4 billion**.
- *Government accounts* are an autonomous factor because they are determined by the Government's choices regarding its cash management, rather than by monetary policy. In Bhutan, Government accounts should be calculated as the difference between, on the one hand, advances to the Government, and, on the other hand, the accounts of the Government swept to the RMA at the end of the day[7] (Government consolidated account, Ministry of Finance refundable deposit account, and RGOB

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[6] In this section, all mentioned static levels from the RMA's balance sheet are as of end April 2017.

[7] In Bhutan, while Government accounts are recorded in the balance sheet of the RMA, at the beginning of the day their balance is credited to the current account of the Bank of Bhutan (BOB). During the day, the BOB handles government transactions through its branches, as instructed by the DPA. At the end of the day, the balance is swept back to the RMA. This mechanism does not change the approach regarding the calculation of this autonomous factor. Because of the sweeping, the liquidity impact of those Government accounts is the same as if they were kept permanently with the RMA.

deposit account)[8]. It is a *liquidity-absorbing* autonomous factor, providing that the sweeping accounts of the Government (BTN 2.8bn) exceed the RMA's advances to the Government (zero). As of end April 2017, the Government accounts are therefore a (liquidity-absorbing) autonomous factor liability of **BTN 2.8 billion**.
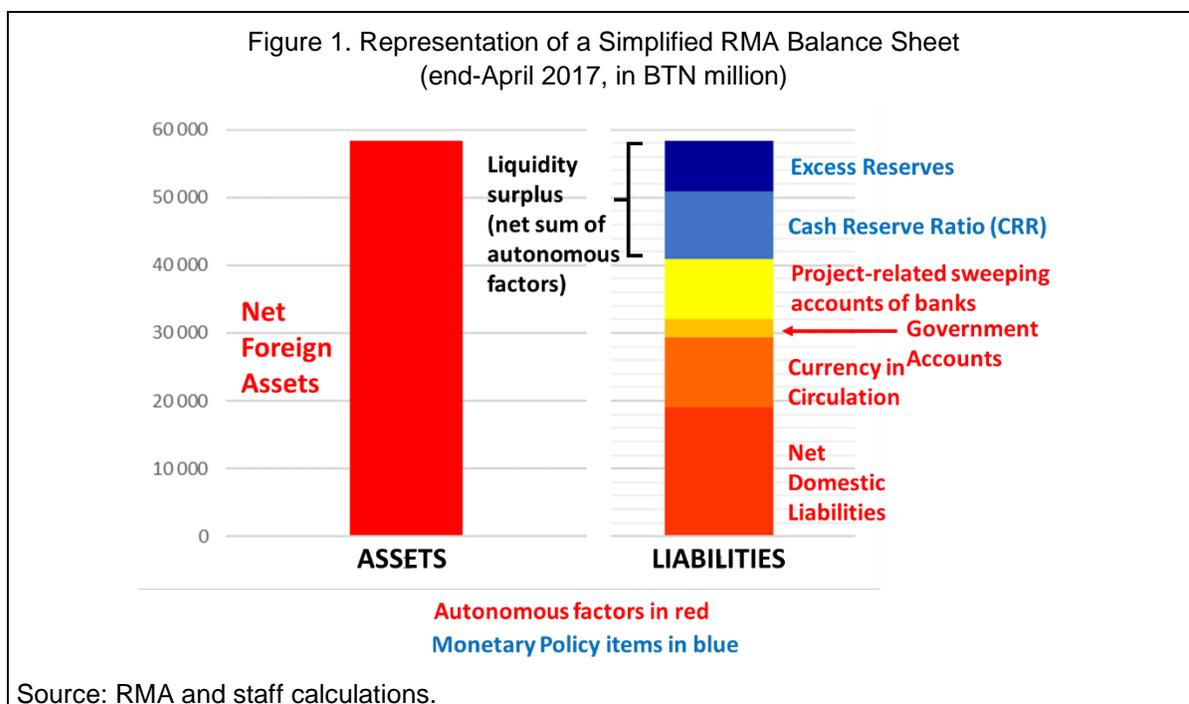
- *Net domestic assets (NDA)* are defined as the difference between all residual, non-monetary policy-related, domestic currency-denominated, assets and liabilities on the central bank's balance sheet. In Bhutan, net domestic assets are calculated as the difference between, on the one hand, non-monetary policy financial domestic assets (domestic currency cash in hand, balances with banks, investment securities, other financial assets, accrued interest, profit and loss account, retained loss, unrealized loss on securities) and non-financial assets (gross fixed assets, inventories, equity contribution), and, on the other hand, capital and reserves, and non-monetary policy domestic liabilities (restricted accounts of financial institutions, accumulated depreciation, other provisions, other liabilities, prior period adjustment). The largest by far of all those items is the RMA's capital and reserves (BTN 17.8bn), greatly exceeding domestic financial assets (BTN 0.1bn) and non-financial assets (BTN 0.6bn), so that in term terms, net domestic assets are negative: this is a *liquidity-absorbing* autonomous factor liability of **BTN 19.0 billion**.

19. **The status as autonomous factor (or not) of the sweeping to the RMA of banks' accounts related to public projects (in particular hydro projects) is ambiguous**:

- On the one hand, the RMA's decision to impose the sweeping of those accounts at the RMA was intended to sterilize the injection of Indian rupee funds into Bhutanese banks (i.e., it might be considered a monetary policy decision). From this perspective, those project-related sweeping accounts are not strictly speaking an autonomous factor, but a non-conventional monetary policy tool.
- On the other hand, the RMA's monetary policy does not determine the amounts and fluctuations on those project-related sweeping accounts of banks. From this perspective, those project-related sweeping accounts should be considered as an autonomous factor, i.e., a *liquidity-absorbing* autonomous factor liability of an amount of **BTN 8.8 billion**.

20. **The Excel file provided by the mission shows the calculation of all autonomous factors, based on the detailed RMA monthly balance sheet**. The liquidity factor capturing the sweeping to the RMA of banks' accounts related to public projects has been identified as a specific fifth autonomous factor.

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[8] By convention, the RMA's foreign currency liabilities to the Government are not included in the calculation of the Government accounts autonomous factor, because they are already included in the NFA autonomous factor.

Figure 1. Representation of a Simplified RMA Balance Sheet
(end-April 2017, in BTN million)

Source: RMA and staff calculations.

Liquidity Table and Liquidity Surplus/Deficit

21.   **The liquidity surplus or deficit is determined by the net sum of all autonomous factors.** It amounts to the net aggregate liquidity that has been either injected or absorbed by the central bank, as the sole creator of central bank money: if autonomous factors assets exceed autonomous factors liabilities, the system is in *liquidity surplus;* if autonomous factors liabilities exceed autonomous factors assets, the system is in *liquidity deficit.*

22.   **Bhutan presents a structural liquidity surplus due to the accumulation of foreign reserves in excess of the sum of all liquidity-absorbing autonomous factors**. RMA foreign reserves (a liquidity-providing autonomous factor) structurally exceeds the sum of liquidity-providing autonomous factors, essentially RMA's capital and reserves, the currency in circulation, the Government accounts, and the project-related sweeping accounts of banks.

23.   **The aggregate liquidity situation is best represented by the *Liquidity Table* (Table 3), which separates the items on the central bank's balance sheet between the autonomous factors and the monetary policy-related factors**. By definition, the autonomous factors are beyond the scope of monetary policy and are therefore exogenous to the central bank as the monetary policy decision-maker (even if the central bank may have a degree of control or influence on autonomous factors through its other functions, e.g., as foreign reserve manager). The role of monetary policy is to manage the liquidity surplus or deficit, resulting from the autonomous factors, so that the central bank's monetary policy mandate is met. The liquidity table clearly differentiates autonomous factors from monetary policy-related items on the central bank's balance sheet.

Table 3. Recommended Liquidity Table for the RMA 1/ 2/
(in BTN million)

AUTONOMOUS FACTORS						
	Apr-17	**Mar-17**	**Dec-16**	**Jun-16**	**Dec-15**	**Dec-14**
Net foreign assets	**58,322**	**63,109**	**64,596**	**59,197**	**56,972**	**60,392**
Foreign assets	67,467	76,346	77,933	79,432	69,232	75,950
Foreign liabilities	-9,145	-13,237	-13,338	-20,236	-12,260	-15,557
Net domestic assets	**-18,978**	**-19,808**	**-21,003**	**-21,629**	**-20,495**	**-18,365**
Domestic financial assets	119	108	105	89	89	64
Non-financial assets	636	635	622	556	642	703
Capital and reserves	-17,823	-18,496	-19,821	-20,370	-19,337	-17,267
Other domestic liabilities	-1,910	-2,055	-1,909	-1,905	-1,888	-1,866
Currency in circulation	**-10,363**	**-10,043**	**-10,440**	**-9,671**	**-9,407**	**-8,315**
Government accounts	**-2,780**	**-310**	**-608**	**-1,036**	**-3,735**	**-2,291**
Project-related sweeping accounts of banks	**-8,864**	**-12,554**	**-10,336**	**-8,940**	**-7,625**	**-5,108**
Total net autonomous factors	**17,337**	**20,395**	**22,208**	**17,921**	**15,711**	**26,313**
(if positive : liquidity surplus; if negative : liquidity deficit)						
MONETARY POLICY / LIQUIDITY MANAGEMENT						
Cash reserve ratio (CRR)	9,853	9,545	9,505	8,246	7,923	3,768
Liquidity position after CRR	**7,484**	**10,850**	**12,703**	**9,676**	**7,788**	**22,545**
Liquidity-providing operations	0	0	0	0	0	0
Liquidity-absorbing operations (RMA bills)	0	0	0	0	0	0
Total liquidity management operations	**0**	**0**	**0**	**0**	**0**	**0**
Liquidity position after CRR and operations	**7,484**	**10,850**	**12,703**	**9,676**	**7,788**	**22,545**
Excess reserves (current accounts)	**7,484**	**10,826**	**12,703**	**9,886**	**7,788**	**22,545**
Estimated incompressible excess reserves	*4,000*	*4,000*	*4,000*	*4,000*	*4,000*	*4,000*
Excess reserves beyond incompressible	**3,484**	**6,826**	**8,703**	**5,886**	**3,788**	**18,545**

Source: RMA and staff calculations.
1/ The Excel file provided by the mission establishes this Liquidity Table based on a simplified balance sheet of the RMA, which is itself based on the daily, granular, balance sheet.
2/ By convention, liquidity-providing autonomous factors are indicated with a positive sign, and liquidity-absorbing autonomous factors are indicated with a negative sign. The net sum of autonomous factors amounts to a liquidity surplus (if positive), or to a liquidity deficit (if negative).

24.   **Currently, the only active conventional monetary policy instrument utilized by the RMA is the CRR**. Since the last modification in its level (in March 2015), liquidity sterilized with the CRR has increased gradually together with the banks' deposits, accounting for a greater share of total bank reserves (Figure 2). Beyond the CRR, the RMA has tools to manage liquidity more actively, but they have not been used for long (Box 1). Whether these limited instruments to manage liquidity activity are appropriate to the RMA's needs, and how to develop the RMA's toolbox, are beyond the scope of this mission. At this juncture, the priority for the RMA is to better understand and analyze the dynamics of liquidity. At a later stage, it will be essential for the RMA to review and develop its liquidity management toolbox.

Liquidity Surplus	Total Bank Reserves

Source: RMA and staff calculations.
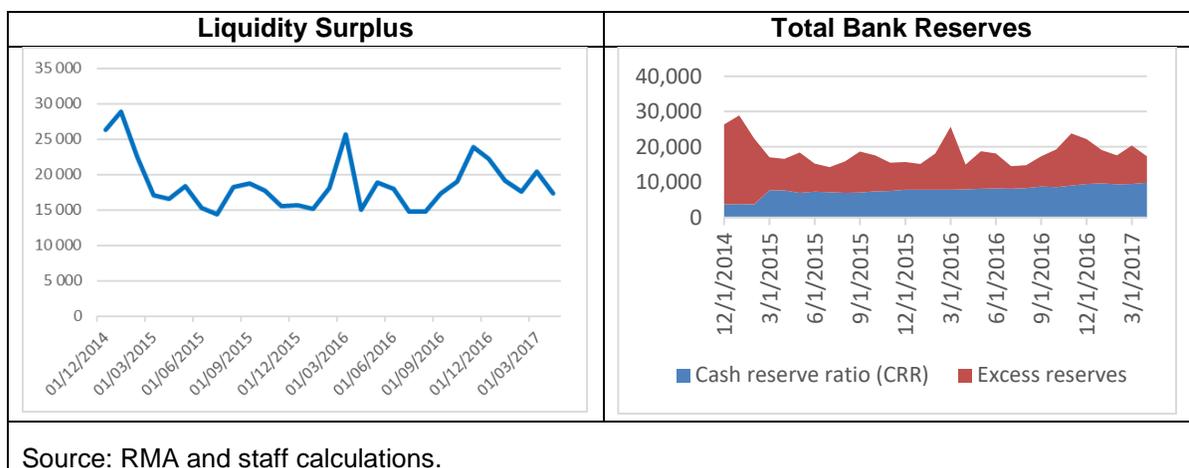
## B. Analysis of Liquidity Developments

25.   **The analysis of liquidity conditions is the first step of any liquidity management by a central bank.** Before the RMA envisions to forecast changes in autonomous factors, and consequently the liquidity surplus or deficit, it should first set up a systematic (ex-post) monitoring of autonomous factors and liquidity developments. Once it has gained sufficient knowledge about the drivers of liquidity, the RMA will be able to table steps towards a systematic forecasting of liquidity.

26.   **The model designed by the mission for liquidity monitoring is based on the monitoring of each autonomous factor.** For the exercise conducted during the mission, monthly data from the RMA's balance sheet (simplified and then converted into a Liquidity Table) was used, for the period December 2014 April 2017 (see "Liquidity Report" in Figure 3 and Figure 4 for a representation of the autonomous factors' contributions to monthly changes in liquidity).

27.   **Since the first quarter 2015, the liquidity surplus in Bhutan has been broadly stable though with some volatility, fluctuating around BTN 15-20 billion**. This broad stability has been the result of several offsetting factors:

•   The upward (though irregular) trend for *NFA* (a liquidity-providing autonomous factor) has been partly compensated by an upward trend in *hydro project-related sweeping accounts* of banks (a liquidity-absorbing autonomous factor). The fact that those offsetting autonomous factors tend to rise in parallel is to be expected: Indian rupee inflows for hydro projects are systematically converted into domestic currency, thereby leading to an increase in the RMA's NFA (though mostly temporarily as about 80 percent will be converted back into INR to finance imports for the hydro projects).

Figure 3. Proposed Liquidity Report for Monitoring Liquidity Developments

Source: RMA and staff calculations.
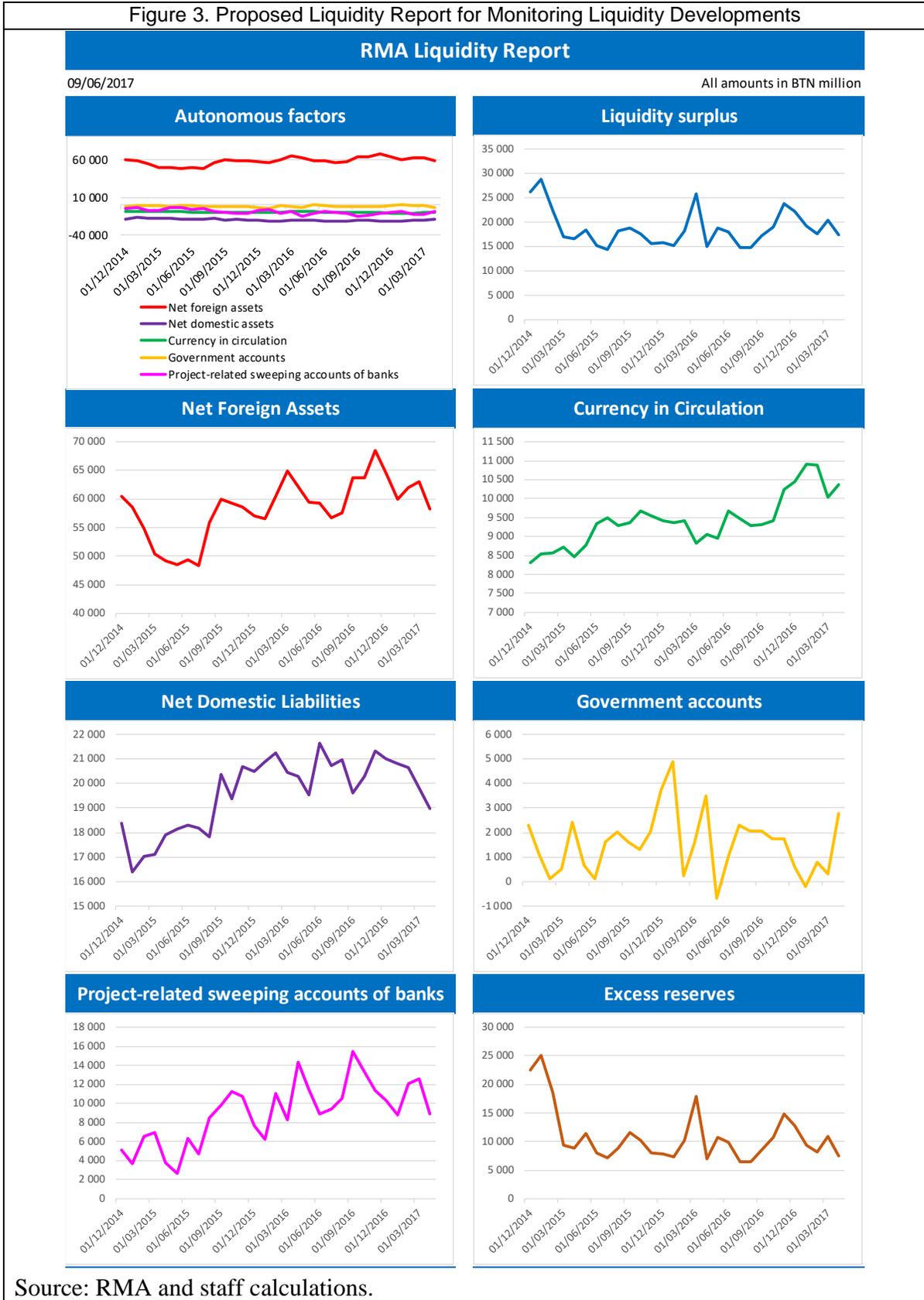
- Two other liquidity-absorbing autonomous factors, the ***currency in circulation*** and the ***net domestic liabilities*** (dominated by the RMA's capital and risen) have shown an upward trend, but a very gradual one, thereby not significantly offsetting the effect of the upward trend in net foreign assets.
- ***Government accounts*** (another liquidity-absorbing autonomous factor) have been very volatile, without clear trend.

Figure 4. Autonomous Factors' Contributions to Monthly Changes in Liquidity

Source: RMA and staff calculations. This chart shows autonomous factors' contributions to monthly changes in liquidity. More relevant (but not displayed here because of a lack of date) is the autonomous factors' contributions to daily changes in liquidity.
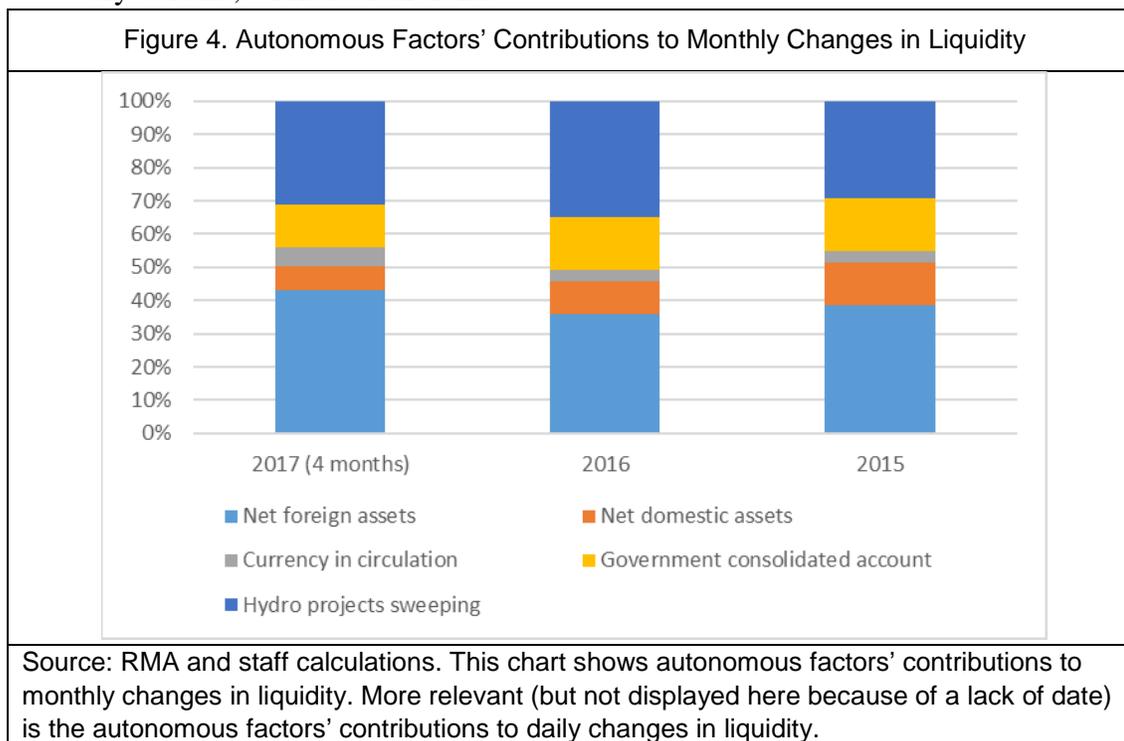
28.   **Hydro projects (part of sweeping accounts of banks) account for a disproportionate share in aggregate liquidity volatility.** Related flows are fraught with uncertainty, as the RMA has poor visibility on the timing and size of those flows, which are controlled by other stakeholders (i.e.,, the Indian authorities, the project managers, and to a lesser extent the two banks involved in those flows, BOB and Druk PNB). The period between the moment when those inflows reach those banks' balance sheets and their actual transfer to the project managers may change depending on the projects and decisions by the Indian authorities (it may vary from one day to a couple of weeks). Given the significant size of hydro project flows, this uncertainty has a significant effect on daily liquidity conditions.
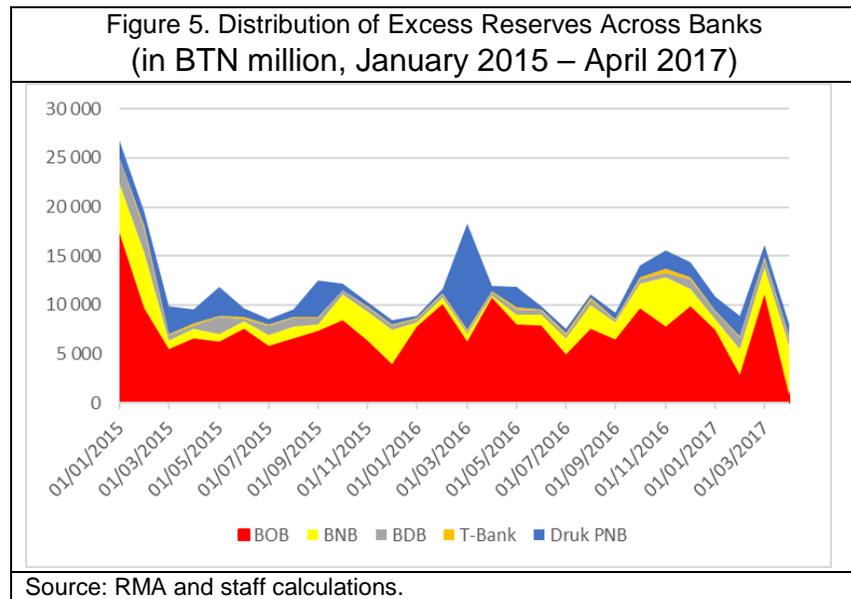
Micro-level Liquidity Analysis

29.   **In addition to the aggregate liquidity analysis (based on the monitoring and forecasting of autonomous factors) the RMA should initiate a micro-level liquidity analysis.** While the central bank's primary responsibility is to manage aggregate liquidity conditions, it also has an interest and responsibility in the adequate circulation of liquidity

across banks, both from monetary policy and financial stability perspectives. Therefore, it is essential that the RMA starts monitoring liquidity also at individual bank level.

30.   **As part of its regular liquidity report, the RMA should systematically monitor and analyze banks' current accounts (i.e., the distribution of excess reserves across banks)**. The RMA should conduct regular discussions with the five banks' treasurers, to assess the banks' liquidity situations, identify possible liquidity risks and obstacles to the adequate circulation of liquidity in the banking system.

31.   **Bank of Bhutan's hegemonic liquidity position and its implications for the four other Bhutanese banks deserve careful monitoring, and possibly some balancing actions (Figure 5).** On the observed period (January 2015 – April 2017), BOB held on average about two thirds of total excess reserves (banks' current accounts). Interviews of BOB and three other banks by the mission confirm BOB's crucial role, and predominant position, in the circulation of liquidity in the banking system. Such hegemony, particularly in the absence of

Figure 5. Distribution of Excess Reserves Across Banks (in BTN million, January 2015 – April 2017)

Source: RMA and staff calculations.

effective liquidity-providing instruments at the RMA (no marginal lending facility), may be problematic for the development of a sound competition in the banking sector in Bhutan. BOB's hegemonic liquidity situation is largely due to the role it plays in the management of the Government finances. Most notably, the BOB controls the liquidity of Government entities whose accounts are not part of the sweeping arrangement with the RMA. At the end of June 2016, the funds amounted to about BTN 2.7 billion (see footnote 4), accounting for about 40 percent of its structural excess reserves. The RMA should promote measures aimed at restoring a balanced distribution of liquidity across banks, and a more level playing field, e.g., through a competitive allocation among banks of public funds not swept to the RMA.

Estimation of Incompressible Reserves

32.   **Estimating individual banks' incompressible reserves is important to the assessment of the liquidity conditions.** In a banking system with a liquid interbank market (no segmentation) and well-developed central bank liquidity-providing operations (such as a

marginal lending facility), the liquidity situation can be purely based on autonomous factors forecasts: the net sum of the forecasts determines, on the forecast horizon, whether the system is in a liquidity surplus or deficit, and the central bank can calibrate its operations accordingly (by injecting or absorbing liquidity for an amount equal to the "neutral benchmark allotment" resulting from autonomous factors forecasts). The situation faced by the RMA is different: (1) due to the peg regime, the RMA cannot forecast accurately changes in NFA beyond the horizon of T+2 (settlement date of FX transactions); (2) the Bhutanese interbank market is shallow and fragmented; (3) for the moment, the RMA does not have effective liquidity-providing operations to address possible idiosyncratic or systemic negative shocks on liquidity. Consequently, in order to estimate liquidity conditions, the RMA should not only monitor (and eventually forecast) autonomous factors, but also estimate individual banks' incompressible reserves (i.e., the minimum amounts they need to have on their current accounts at the RMA to operate normally).

33. **Incompressible excess reserves can be estimated by a direct dialogue with individual banks and by an empirical study on their current account data**:

- *Banks generally target a minimum level of their current accounts at the central bank, below which they would be uncomfortable to go*. For instance, in its meeting with the mission, BOB indicated that it is normally unwilling to have a current account at the RMA below BTN 2 billion (about 5 percent of its total assets). Whenever BOB faces liquidity needs pushing its current account below that limit, it restricts its operations (e.g.,, lending to other banks) to restore the current account at the desired level. Consequently, this level of BTN 2 billion could be defined as BOB's "incompressible reserves" level. The RMA could investigate other banks' incompressible reserves levels through surveys or direct meetings.
- *Incompressible reserves can also be estimated through an empirical study on individual banks' current accounts.* For instance, the level of incompressible reserves for each bank could be defined as the level above which 95 or 90 percent of the bank's current account is observed, over the sufficiently long period (2–3 years). Another approach consists in applying a percentage of total assets to estimate incompressible reserves. For instance, BOB's incompressible reserves amounting to 5 percent of its total assets, the same ratio could be tentatively applied to all other banks. However, a caveat is that this ratio (typically ranging from 1 to 5 percent) may vary across banks, e.g.,, depending on their business model (banks with significant activity with large corporations usually need larger incompressible reserves, in order to face possible significant outflows for those corporations).

C. RMA's Internal Organization for Liquidity Management

34. **The RMA should considerably reinforce its data management, the first necessary ingredient to any liquidity management.** The RMA already prepares, on a daily

basis, a detailed, well-defined, balance sheet. Therefore, the RMA already has the most crucial data to monitor liquidity (as liquidity in the system can only change through operations affecting the central bank's balance sheet). However, for the moment, the RMA balance sheet data can only be downloaded in Excel one day at a time[9], which significantly complicates the data processing for a thorough analysis. Furthermore, the number of lines in the RMA balance sheet may vary over time, which complicates the automatic processing of the data[10].

35.   **For the RMA's liquidity management purposes, it is essential to allow the automatic extraction and compilation of daily data from the RMA's balance sheet into an Excel file, according to a determined template**. The Excel file provided by the mission could serve as a model. In particular, this Excel file should comprise time series with daily data for all items of the RMA's Liquidity Table (NFA, currency in circulation, hydro projects-related to weeping accounts of banks…), allowing a more thorough analysis of their developments that the preliminary one prepared by the mission.

36.   **The RMA should reinforce its human resources' capacity with automatized data processing.** A sound liquidity management requires a daily monitoring, compilation and processing of data, which should preferably be automatized (including the preparation of automatized reports on liquidity developments and operations). As complement to the competent economists working for the Research and Statistics Department, it could be useful to create a new position of Research Analyst, with skills more focused on IT (database management, Excel, VBA…) than on macroeconomics[11].

37.   **The RMA should create an inter-departmental Liquidity Team, responsible for the regular monitoring, analysis, and (eventually) forecasting, of liquidity**. Liquidity is a transversal topic for a central bank, involving a number of different, but complementary, perspectives: monetary policy implementation and transmission, financial stability, payment systems, management of banknotes. The recommended approach for a central bank to address the transversal nature of liquidity consists in setting up an inter-departmental Liquidity Team. This allows, for instance, the appropriate monitoring and forecasting of

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[9] Sometimes the data download can fail for technical issues, or be very time-consuming.

[10] Because of this difficulty, the Excel file designed by the mission, based on monthly data for the period December 2014 – April 2017, had to be prepared largely on a manual basis. For the necessary move to daily data analysis, an automatic process would be much preferred.

[11] This model prevails in a number of leading central banks. For instance, each division involved in the implementation of monetary policy at the European Central Bank (ECB) typically comprises about 15 experts (with profiles focused on finance and/or economics), and 5 research analysts and trainees (with profiles focused on IT). On top of the daily IT support provided from these internal resources within each division, the ECB's IT department provides support e.g. for project management and the development of new applications.

autonomous factors (for instance the department in charge of foreign exchange operations normally has the best perspective on changes in net foreign assets). Table 4 presents a tentative composition of the proposed RMA Liquidity Team, as well as the role of each participant.

Table 4. Composition of the Proposed RMA Liquidity Team	
Members	**Role**
Manager: Director of Research and Statistics Department	Definition of tasks, verification of deliverables, interaction with the RMA management
Secretary: Economist of Research and Statistics Department	Coordination, (joint) preparation of analyses, forecasting, and policy proposals; interaction with the Treasury regarding Government accounts and cash flow forecasts
Research Analyst of Research and Statistics Department (position to be created)	Compilation of daily time series, preparation of weekly liquidity report, automatization of data processing
Expert of Banking Department	(Joint) preparation of analyses, forecasting, and policy proposals; analysis of banks' current accounts
Expert of Foreign Exchange and Reserve Management Department	Analysis and forecasting of net foreign assets
Expert of Payment Systems Department	Analysis of information from transactions in payment systems
Expert of Issuance Department	Analysis of developments in currency in circulation

Source: Staff elaborations

38.   **The RMA should form a Liquidity Committee responsible for overseeing all liquidity-related issues and for preparing the related policy recommendations.** Until 2012, the RMA had a Market Operations Committee, which became inactive as the RMA stopped issuing bills to absorb excess liquidity. The mission recommends that the RMA should have a Liquidity Committee on a permanent basis, independently on whether it conducts active liquidity management operations or not. The Liquidity Team should present its observations (and possible policy recommendations) on liquidity conditions, on a weekly or biweekly basis, to the Liquidity Committee. The Liquidity Committee would have a leading role in the gradual development of a modern liquidity management framework, including the monitoring and forecasting of liquidity conditions, and an appropriate "toolbox" of liquidity management operations.

39.   **The Liquidity Committee could also be responsible for operationalizing the RMA's lender-of-last-resort function (development of a framework for Emergency Liquidity Assistance, ELA).** Best practices suggest establishing a clear separation between the activities related to ELA and those related to regular monetary operations. At this juncture in Bhutan, the Liquidity Committee could also be responsible for operationalizing RMA's ELA function to avoid the creation of multiple committees. However, whenever the Liquidity Committee has to deal with such issues, it should include a representatives from the RMA departments responsible for financial stability, banking supervision and legal affairs.

D. Towards Liquidity forecasting

40. **The development of an appropriate liquidity forecasting will first require the RMA to better monitor and understand developments in the key autonomous factors, in particular by a dialogue with key stakeholders.** For each of the five key autonomous factors determining liquidity conditions in Bhutan, the RMA should identify available data and relevant stakeholders, before starting to forecast each autonomous factor. Table 5 provides an overview of key stakeholders, as well as preliminary indications on the relevant forecasting method, for each autonomous factor.

Table 5. Key Stakeholders and Forecasting Methods for the Main Autonomous Factors		
Autonomous factor	**Stakeholders and available data**	**Forecasting method**
Net foreign assets	Foreign Exchange and Reserve Management Department; data on FX transactions (will have a liquidity impact on T+2)	The peg (RMA commitment) makes forecasting difficult; however seasonal patterns could be identified (adjusted ARIMA model)
Net domestic assets	Accounting Department should have the best perspective on the RMA's capital and reserves, non-financial assets (incl. depreciation), and provisions	Naïve prediction (level at t+1 = level at t), with occasional adjustments based on forward-looking information provided by Accounting Department
Currency in circulation	Data from the RMA's balance sheet; currently no analysis by the Research and Statistics or Issuance Departments	Seasonal patterns in currency in circulation are typical; forecasting by an adjusted ARIMA model 1/, with dummy variables for Bhutanese public holidays
Government accounts	Data from sweeping accounts of the banks (Government bank accounts not subject to sweeping do not have any liquidity impact); Treasury (Department of Public Account) 2/	The Treasury should be able to share forecasts (currently missing) on its operations and cash position
Project-related sweeping accounts of banks	Data from sweeping accounts of the banks, but no information from the Indian authorities and from the project managers	Contacts should be established with the Indian authorities responsible for cash disbursements and with project managers
1/ The adjusted Auto-Regressive Integrated Moving Average (ARIMA) model is presented in Appendix III. 2/ The mission met the manager of the Treasury's Department of Public Account (DPA). The DPA currently lacks both a clear view on the daily operations by its agent, the Bank of Bhutan (BOB) and a prospective view on future cash operations. This problem will be partly addressed by the planned implementation of e-payment systems.		

Source: Staff elaborations

IV. TOWARDS A FUNCTIONING MONEY MARKET

A. Assessment of the Current Situation

41.   **Currently the Bhutanese interbank market is shallow and highly fragmented, due to a number of fundamental obstacles**:

- *The RMA does not have any regular liquidity-providing operations (in particular no marginal lending facility).* [12] The impossibility for a bank to resort to a central bank liquidity-providing facility (as a "safety net") in case of liquidity need incites banks to keep conservatively their liquidity, rather than engage into interbank lending.

- *The structural hegemonic liquidity position of the State-owned BOB is a major distortion and hindrance to a well-functioning interbank market*. It may be seen as problematic that other banks *need* the liquidity support of their main rival, the BOB, to finance their projects, while the BOB's liquidity advantage mainly results from its role as agent of the Treasury. The BOB argues that perceived credit risks on other banks limits its interbank lending, but it cannot be ruled out that BOB's restrictive interbank lending could rather be due to its desire to slow down competition.

- *The rare interbank transactions seem rather due to prudential considerations than to regular interbank lending.* The SLR imposes that "quick assets" (cash, balances with the RMA, T-bills/bonds, demand deposits with commercial banks, fixed deposits with maturity less than 90 days) account for more than 20 percent of total liabilities minus capital funds. [13] The inclusion of demand deposits with commercial banks in the SLR numerator incites banks to engage into such transactions (in a bilateral or circular manner) for the sole purpose of complying with the SLR requirement, rather than as a result a real liquidity need.

- *There is currently no legal and technical framework for a secured interbank market.* The rare interbank transactions currently take the form of (unsecured) deposits. Bhutan lacks a legal framework for secured transactions such as repurchase agreement (repo) transactions. Beyond the absence of legal texts, a major obstacle to

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[12] Except for the overdraft facility, which can be activated for only three days, and at very penal conditions (16 percent), for a bank in violation of the Cash Reserve Ratio (CRR).

[13] 20 percent for banks, 10 percent for non-bank financial institutions.

repos in Bhutan is the absence of a credible vehicle for such operations, as there is currently no secondary market for T-bills[14].

42.   **A functional money market is necessary for an effective market-based implementation of monetary policy**. The development of an effective money market is important from at least three perspectives:

- *Monetary policy implementation (liquidity management).* The central bank should normally aim at addressing the aggregate liquidity situation, rather than individual banks' circumstances. Therefore, as long as there is no effective redistribution of liquidity in the banking system, the RMA will need to consider individual banks' situations, e.g., through accounting for sufficient incompressible reserves for each bank.

- *Monetary policy transmission*. The money market is also the first stage of the transmission of the monetary policy. Any central bank should closely monitor the transmission of its monetary policy decisions (e.g., the level of key policy interest rates) on the bank's funding rates, starting on short maturities (money market).

- *Financial stability*. The absence of a functioning interbank market exacerbates liquidity risks, e.g., in case of idiosyncratic shock. Under the current framework, a bank facing a liquidity need uncovered from its regular sources (essentially deposits and shareholders), and deprived of sufficient access to the interbank market, would need access to the RMA's overdraft facility, and may effectively be forced to close down after three days (the temporal limit for the usage of the overdraft facility). The absence of an interbank market (coming on top of no effective RMA liquidity-providing facility) deprives the Bhutanese banking system from a major shield against liquidity shocks.

B. Recommendations

43.   **This justifies that the RMA, in parallel to efforts to set up a liquidity management framework, should actively promote the gradual development of a functional money market**. The mission recommends the following actions to that effect:

- *The RMA could set up a Money Market Contact Group, as a forum to discuss with banks about liquidity issues and the money market*. The contact group could meet on a quarterly basis, and on an ad hoc basis (e.g., in case of significant monetary policy initiative of the RMA, or in case of a liquidity shock). The Research and Statistics Department and the Banking Department of the RMA would be jointly responsible for managing the contact group, in particular for preparing the agenda: regular topics for discussion could be liquidity developments, the RMA's liquidity management,

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[14] T-bonds and T-bills, due to their liquidity and low credit risk, are normally the first candidate vehicle for a repo market. There is currently no T-bond in Bhutan (even if the Treasury discussed vague plans for a T-bond issuance with the mission), and T-bills are not dematerialized (paper transactions), making the development of a secondary market difficult.

and initiatives to foster the development of the money market. The treasurers of the 5 banks would be full members of the contact group, while non-bank financial institutions would be occasionally present. Each bank should be encouraged to freely present its view on obstacles to the appropriate circulation of liquidity in the system.

- ***The RMA should exert a closer oversight on the interbank market.*** A closer oversight by the RMA on interbank transactions would not only support its understanding of the local money market, but it may also reassure banks that payment incidents are unlikely to occur without appropriate RMA response. In many emerging countries, money market development is supported by the central bank making an electronic trading platform, under its oversight, accessible to banks. The central bank may also eventually provide interest rate references (based on the compilation of transactions) to encourage money market activity.

- ***The RMA should reflect about a more supportive regulatory environment for the money market.*** While the mission abstains from making specific recommendations on supervisory issues, the RMA may consider investigating changes to some of its prudential measures (e.g., the SLR), which might, in their current form, hinder rather than facilitate the emergence of a functional money market.

- ***The RMA should take first steps towards the development of a legal framework and appropriate payment systems environment for a repo market***. Information asymmetry and trust issues in the interbank market can eventually be addressed by a sound technical and legal framework for secured transactions, with repurchase agreement being recognized as the most effective model. This long-term project would require many substantial changes, in the legal and regulatory framework, and in the T-bill/T-bond design (dematerialization, central depository). The central bank should play a leading role to push for those ambitious changes.

APPENDIX I. RECENT MCM TECHNICAL ASSISTANCE TO THE RMA ON CENTRAL BANKING ISSUES

Financial Sector Deepening, Regulation and Supervision, and Monetary Operations

1.   **The August 2013 MCM TA mission reviewed arrangements in place regarding financial sector deepening, regulation and supervision, and monetary operations**. Its conclusions informed discussions during Bhutan's Article IV Consultation. Key recommendations were as follows: (i) Bhutan needs a comprehensive strategy for deepening and broadening the financial sector; (ii) a comprehensive Financial Sector Development Strategy (FSDS) is needed to improve the ability of the financial system to contribute to long-term economic growth. Most of the recommendations in the area of monetary policy implementation are pending (Table 6). It is expected that the work of the current mission will help the RMA engage the program of reforms needed for their implementation.

Appendix 1. Table 1. Recommendations of MCM August 2013 TA Mission and Action Taken

Recommendations	Action Taken
Government Securities Market	
1. Start systematic work toward establishing an issuance calendar for T-bills and commit to float meaningful amounts on a regular basis. 2. Publish the first issuance calendar for the next six months.	1, 2. Started in 2016.
3. Reduce gradually use of Government's overdraft facility in a commercial bank and agree on more restrictive use of the overdraft facility at the RMA.	3. Pending.
4. Agree on a MOU specifying how RMA could be reimbursed for the cost of monetary policy that cannot be absorbed on its own balance sheet.	4. Pending.
5. Utilize regular meetings of the Treasury Bill Management Committee to share information and coordinate public debt management and liquidity management.	5. Pending.
6. Prepare a plan for establishing an automated depository for registering treasury bills at the central bank (RMA), and implement the depository at the RMA.	6. Pending.
7. Initiate systematic work on strengthening the market infrastructure for securities trading. Introduce a Code of Conduct.	7. Pending.
Monetary Operations	
8. Reactivate the liquidity monitoring framework by in particular ensuring that the Government cash flow projections can serve as direct input to the liquidity framework, and present the first liquidity monitoring table to management.	8. Under way.
9. Redesign the CRR by merging the CRR account and the current account into one account and allow for averaging over the maintenance period.	9. Pending.
10. Limit use of sweeping arrangement to eligible accounts, selected in cooperation with commercial banks, and refrain from using it to manage normal liquidity flows.	10. <u>Under consideration</u>.
11. Use Treasury bills on a regular basis with maturities and amounts determined by expected liquidity flows to stabilize as much as possible bank reserves.	11. Pending.
12. Introduce a short-term standing lending facility (one week) and redesign the RSTLAW as a LOLR facility to assist banks with longer-term liquidity problems.	12. Pending.
Monetary Transmission	
13. Start working toward establishing a liquidity management framework in which monetary instruments are available to ensure that market interest rates are close to the policy rate. Publish a plan for the new liquidity management framework.	13. Under way.

Appendix 1. Table 1. Recommendations of MCM August 2013 TA Mission and Action Taken	
14. Start work to analyze and identify the various components of banks' demand for reserves in order to determine the level of "true" excess reserves.	14. Under way.

FX Regulatory Framework

2.   **The MCM TA mission that visited Bhutan in November 2015 followed up on the recommendations of a previous TA in April 2014 aimed at guiding the RMA in the review of Bhutan's FX system and regulations**. The mission took stock of developments since the previous TA mission, and it provided guidance on revising and consolidating the FX regulations to facilitate compliance with Bhutan's obligations under Article VIII of the Fund's the Articles of Agreement. The discussions took place against the background of the authorities' plan to update the existing FX legal framework in light of recent developments and to revise the FX regulations and other relevant guidelines with a view to eliminate any anomalies, lacunae, and inconsistent provisions as well as to consolidate the dispersed regulations, rules, and policies in effect.

3.   **The mission provided the authorities a set of broad recommendations** for restructuring and revising the regulations; a roadmap for removal of the exchange restrictions under the IMF's Articles of Agreement; and an annotated copy of the Foreign Exchange Regulations, 2013 with specific drafted recommendations for revision.

International Reserves Management

4.   **Following the March 2016 MCM TA mission, the RMA has started to review its strategic asset allocation (SAA).** In particular, the RMA has: (i) reduced its FX risk, by increasing the share of Indian rupee (INR) from 20 percent to 30 percent of its foreign reserves; (ii) added new counterparties to reduce the credit risk, including by joining the World Bank Reserve Asset Management Program (RAMP) for investments in U.S. treasuries; and (iii) developed appropriate backstops with the Reserve Bank of India (RBI) against liquidity risk in INR.

5.   **The May 2017 MCM TA mission reviewed the strategic currency composition for the RMA foreign reserves and recommended further increasing the share of INR in foreign reserves**. The composition of foreign reserve currencies does not reflect the structure of the RMA balance sheet, leading to significant FX risk for the RMA. In particular, the share of INR remains too low to preserve the RMA against significant FX losses, similar to those the central bank faced a few years ago. Liquidity and interest rate risks are well controlled, but the credit risk should be further reduced by increasing investment in securities of well rated issuers to replace a heavy reliance on deposits with commercial banks.

Central Bank Accounting

6.   **The RMA is upgrading its accounting framework, with the support of MCM TA.**
The Bhutanese law requires financial institutions to adopt the Bhutanese Accounting
Standards (BAS), a 2010 version of International Financial Reporting Standards (IFRS)
translated into Bhutanese. The RMA's Act requires that it "adopt an internationally
recognized accounting framework" as the basis for its financial reporting and, as such, the
RMA has chosen to adopt BAS to provide consistency with Bhutanese law. Thus, the RMA
is required to be fully compliant with BAS for its June 2019 reporting year-end.

7.   **In April 2016, a MCM TA mission developed a detailed project plan for the
RMA's transition to BAS**. The objective is to assist the RMA in transitioning to BAS in a
smooth and sustainable manner. To do so, a series of TA missions will provide the RMA
with the needed technical accounting and systems expertise to make the transition and
provide the RMA with the necessary skills to maintain their accounts in compliance with
BAS going forward. Working closely with staff, an April 2017 MCM TA mission began the
to develop the policy positions for the RMA and identify the necessary systems requirements.
As well, in May 2017, a FIRST project was approved to fund the full 2 ½ year program to
support the RMA's transition.

APPENDIX II. KEY FEATURES OF A LIQUIDITY FORECASTING FRAMEWORK

Objectives of Liquidity Forecasting

1.   **The main purpose of producing short-term liquidity forecasts is to create an information set which puts the central bank into a position to smooth changes in liquidity conditions**. The purpose of smoothing fluctuations in liquidity demand and supply is to create stable liquidity conditions and steer the central bank's operating target. These are preconditions to effectively conduct monetary policy, since they help market participants to distinguish between changes in the monetary policy stance and temporary "noises." Clear signaling reduces uncertainties that market participants might have about the central bank's policy intentions, thereby contributing to an efficient transmission of monetary policy. Stable liquidity conditions facilitate also banks' liquidity management: by moderating the volatility and uncertainty, liquidity management costs are reduced and settlement risks limited.

2.   **Liquidity forecasting is the process of centralizing all relevant information that determine the future stance of liquidity without central bank activities**. Upon these projections, central banks decide on how much liquidity they should add or withdraw from the system. Liquidity forecasting is, therefore, a process that precedes the implementation of liquidity management. It is important to note that central banks will want to conduct liquidity forecasts no matter whether their operating target is an interest rate or a quantity (monetary base or bank reserves) target. The liquidity forecasting process is the same in both cases, but the use of the information, i.e.,, how a central bank utilizes its policy instruments, differs.

Liquidity Forecasting and Monetary Policy Instruments

3.   **Central banks that conduct monetary policy through direct monetary policy instruments have no immediate need for liquidity forecasts**. Without market forces at play, a central bank exerts direct control over the liquidity situation by controlling interest rates, directing credit, or setting bank-to-bank credit ceilings. When moving from direct to market-based indirect monetary policy instruments, it is crucial to develop a thorough liquidity forecasting framework, including its institutional and organizational setup.

4.   **Certain indirect monetary policy instruments can contribute to reducing fluctuations in liquidity conditions**. Reserve requirements with averaging provisions and standing facilities can limit interest rate volatility. Reserve averaging acts as a buffer to changing liquidity conditions by allowing banks to over- and under fulfill reserve requirements during the maintenance period. The interest rate elasticity of demand for reserves tends to by higher in systems with reserve averaging, thereby reducing the degree of fluctuations in money market rates from liquidity supply shocks.

5.   **Standing facilities (credit and deposit facilities) set an upper and lower boundary for interbank money market rates with the same maturity**. A narrow corridor between the credit and deposit facility rate limits market volatility fluctuations, but has several disadvantages; (i) liquidity is injected or absorbed at the initiative of banks rather than the central bank; (ii) interbank activity is discouraged, with negative consequences for market deepening; and (iii) the central bank's ability to extract information on liquidity conditions and banks' expectations from the money market is reduced. Most interest rate targeting central banks therefore conduct their main operations through a policy instrument which is at their initiative, and aim at an interest rate corridor that is wide enough to encourage interbank transactions. Liquidity forecasting then serves to consolidate information on the expected liquidity conditions and to avoid unwarranted excessive volatility.

Liquidity Forecasting and the Payment System

6.   **Another factor relevant to the central bank's liquidity forecasting and liquidity management process is the payment system, the features of which affect the demand and the effective supply of bank reserves**. If the payment system is undeveloped and inefficient, the banking system typically holds large, often highly volatile amounts of excess reserves. Moreover, in some cases an inefficient payment system goes along with large and unstable reserve floats. Both deficiencies complicate liquidity forecasting, can weaken the central bank's control on the liquidity supply, and hence hamper monetary management. The quality of liquidity forecasts will increase with the efficiency of the payment system.

Determinants of Liquidity

7.   **The liquidity forecasting exercise involves an analysis of the projected changes in the main items of the central bank's balance sheet**. The main components of banks' demand for liquidity and the autonomous supply of liquidity (i.e.,, all supply factors that are in the short-run beyond the control of the central bank) can be derived from the central bank balance sheet. Based on the projected gap between the liquidity demand and autonomous supply the central bank can decide on the appropriate level of liquidity to be added to or withdrawn from the market. The autonomous factors of liquidity supply comprise: (i) net foreign assets, (ii) net position of the Government with the central bank, (iii) currency in circulation, and (iv) other items net. Liquidity demand consists of demand for required and excess reserves. To forecast the demand and autonomous supply of liquidity, one has to identify their determinants and decide on the appropriate forecasting techniques. The predictability of these items depends on the institutional and regulatory environment.

8.   **Very often the net position of the Government with the central bank accounts for the most significant changes in the autonomous liquidity supply**. To ensure a high degree of overall forecast accuracy, it is therefore crucial that the Government cooperates closely with the central bank in providing on a timely basis all information available on

Government transactions that affect the liquidity supply (i.e.,, cash flow projections on revenues, expenditures and funding instruments). In countries with heavily managed exchange rates and large and volatile capital flows, significant changes in liquidity supply can also result from changes in net foreign assets. In the very short run however, variations in net foreign assets are normally known with certainty, since settlements of foreign exchange typically lag transactions by two days. Currency projections can under certain circumstances also underlie large uncertainties—for example, after a period of high inflation.

Liquidity Forecasting Framework

9.   **A clear and efficient organization of the liquidity forecasting process is essential to produce accurate and timely projections**. Liquidity forecasts should be arranged as a rolling process under which every new piece of information is promptly incorporated. A useful way to organize the process is to assign the forecasting responsibility to a dedicated unit in the monetary operations department to ensure a close link between liquidity forecasting and liquidity management. The unit should be responsible for: (i) communicating with the different information sources and ensuring the timely receipt of the data, (ii) supervising the consistency of the forecasted components, (iii) producing an overall liquidity projection which is regularly (daily) updated, and (iv) assessing forecasting errors.

10.   **Liquidity forecasting horizons and forecasting intervals differ with institutional setups.** In systems with reserve requirements, the forecasting horizon should comprise at least the current maintenance period; in systems without reserve requirements the horizon should comprise at least the time period between two discretionary monetary interventions. Optimally, liquidity forecasts should be at daily intervals. If data is not available at this frequency, the central bank might initially start producing forecasts at weekly intervals.

Conceptual Background

11.   **The demand and supply of liquidity can be derived from the balance sheet of the central bank.** Simplifying a typical balance sheet, by netting the external position of the central bank and the position against the Government, and summarizing all other assets and liabilities (other items net/net domestic assets) results in the following:

Stylized Balance Sheet of the Central Bank

Assets	**Liabilities**
• Net foreign assets • Net lending to banks/OMOs 1/ • Other items net/Net domestic assets	• Currency in circulation • Bank reserves (required and excess) • Net position of the Government 2/
1/ In countries where there is a structural excess liquidity, the net "policy" position with banks can be on the liability side, for instance when the central bank absorbs liquidity by issuing its own securities. 2/ In countries where the central bank is allowed to provide direct credit to the Government, the net position of the Government may appear on the assets side.	

12.   **The demand for bank reserves can be divided into the demand for required reserves and excess reserves**:

Demand for bank reserves = Required reserves + excess reserves

13.   **The demand for bank reserves is primarily determined by the institutional relationship between the central bank and the banking system, the degree of interbank money market development, the variability and timeliness of payments, and the banking system's expectations about the central bank's liquidity management.** Important components of the institutional relationship are the characteristics of reserve requirements, the design and efficiency of the payment system, and access to central bank credit (see Section III.A). It is important to note that identifying determinants for short-run fluctuations in liquidity demand is the main purpose of the day-to-day liquidity forecasting exercise. Institutional factors are more relevant for the long-run level of liquidity demand. They must, particularly, be taken into account in case of structural changes.

14.   **The liability side comprises the two uses of base money—currency and 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 as:

Supply of bank reserves =
- Net foreign assets
- \+ net position of the Government ⎫ Autonomous liquidity
- \+ other items net ⎬ position
- – currency in circulation ⎭
- \+ lending to banks/OMOs ⎬ Policy position

15.   **The first four items contain all factors that are beyond the control of the central bank in the very short run or—more generally—not related to monetary policy actions.** These items are, therefore, called the "autonomous liquidity position."[1] In contrast, the central bank's "policy position" which comprises central bank direct lending to banks and net lending through open market operations (OMOs) is under the immediate control of the central bank. The supply of bank reserves is defined as the sum of the autonomous liquidity position and the policy position. To steer the supply of liquidity according to its objectives, the central bank needs adequate information on the autonomous factors of liquidity supply.

16.   **By comparing the forecasted demand and the projected autonomous factors of the supply of bank reserves, the central bank receives an estimate of the excess supply**

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[1] NFA are categorized as an autonomous item regardless of the exchange rate regime. This assumes that under flexible exchange rates the central bank does not intervene in the very short run and NFA are, therefore, constant. On the other hand, under fixed exchange rates NFA changes are outside the control of the central bank as it is committed to intervene to hold the exchange rate stable.

of (or excess demand for) liquidity that results if the central bank does not intervene. Based on this estimate, the central bank decides how to adjust its net policy position to achieve the desired liquidity conditions. The net policy position accounts for policy operations that have been carried out in the past and come into effect later like the redemption of repo or reverse repo agreements, maturing refinance credit and the like.

17. **In general, the way in which a central bank adjusts its policy position to disequilibria depends on the underlying operating target, which can be a quantity target (reserve money or bank reserves) or an interest rate target**. In addition, the time horizon of the operating target needs to be considered. A central bank can, for example, target the overnight rate or reserve money on a daily basis or aim at a certain weekly or monthly path and allow for daily deviations from the target path.

- *If the central bank targets the overnight interest rate*, it nevertheless still uses the projected daily excess supply or demand reserves to define the amount it has to withdraw or inject daily into the market. The relationship is less strict if the central bank steers the overnight interest rate within a corridor or has reserve requirements with averaging provisions in place. Then, the central bank only has to react to cumulated disequilibria over the entire maintenance period, since the system of reserve requirements works as a stabilizer. In contrast, if the central bank operates without reserve requirements, or without reserve averaging, it may then need to manage liquidity conditions more on a day-to-day basis.

- *In the case of quantitative (reserve money or bank reserves) operating targets*, the central bank in principle adjusts the supply of bank reserves so that it confirms with the target level. For all remaining excess demand or supply, the central bank would allow the interbank money market rate to adjust. However, if the demand for bank reserves is interest inelastic, as might be the case at the end of the reserve period, the central bank would have to accommodate the demand to avoid disturbances within the financial system even if this leads to short-term deviations from the quantitative operating target.

APPENDIX III. MODELING CURRENCY IN CIRCULATION - STRUCTURAL TIME SERIES APPROACH

1.   **The augmented ARIMA model for the purpose of banknote modeling has the following structure**:

$$\Delta CIC_t = a + \sum_{1}^{5} b_i * Day_i + \sum_{1}^{52} c_i * Week_i + \sum_{1}^{4} d_i * WeekPosition_i + \sum_{1}^{12} e_i * Month_i + f$$
$$* Public\ Holiday + \sum_{1}^{n} g_i * Public\ Holiday_{-i} + \sum_{1}^{n} h_i$$
$$* Public\ Holiday_{+i} \qquad + i * One\ Off\ Factor$$
$$+ \sum_{1}^{n} j_i * AR_i + \sum_{1}^{n} k_i * MA_i + \varepsilon_t$$

Where:

Day_i is the dummy variable that takes the value of 1 on day i of the week and 0 otherwise.

$Week_i$ is the dummy variable that takes the value of 1 during week i of the year and 0 otherwise.

$WeekPosition$ is the dummy variable that takes the value of 1 during the first week of a given month and 0 otherwise.

$Month_i$ is the dummy variable that takes the value of 1 during month i of the year and 0 otherwise.

$Public\ Holiday$ is the dummy variable that takes the value of 1 when a day is a public holiday and 0 otherwise.

$Public\ Holiday_{-i}$ is the dummy variable that takes the value of 1 i day(s) before the public holiday and 0 otherwise.

$Public\ Holiday_{+i}$ is the dummy variable that takes the value of 1 i day(s) after the public holiday and 0 otherwise.

$One\ Off\ Factor$ is the dummy variable that takes the value of 1 when the one-off factor occurred and 0 otherwise.

AR_i are autoregressive terms.

MA_i are moving average terms.

ε_i are residuals.

2.   **To be noted, the position of a public holiday within a week is not neutral and should also be tested**. For instance, if a public holiday occurs just before or after a weekend, it should have a stronger effect on CIC than a public holiday occurring in the middle of a

week. Before starting the estimation process, the usual stationary test (such as the Durbin-Watson test) should be implemented regarding the explained variable (ΔCIC_t). As for explanatory dummy variables, it is advisable to test a very large scope and to progressively discard non-significant variables. Should residual autocorrelation issues occur, AR and MA should be tested and introduced.

3. **Once the specification is established, the forecasting power of the model should be tested using an "out-of-the-sample" testing procedure** (straightforward to compute in the available Eviews Software). For a given set of historical data (for example, from January 1, 2006, to August 31, 2015), the idea is to run, in a first step, the regression on a subsample (for example, from January 1, 2006, to July 30, 2015) and to implement the forecast on the other part of the sample (from August 1, 2015, to August 31, 2015). Forecasts are then compared to historical data. Eventually, the model specification and forecasting performances should be reassessed regularly (such as every three months).

APPENDIX IV. SIMULATED EFFECTS OF PROPOSED OPTION 2 FOR HYDRO PROJECT FLOWS

1.   **This Appendix presents an estimate of the effects of Option 2 for hydro project flows (sell INR to the RMA only when there is a need for payments in local currency) on liquidity conditions**. The implementation of Option 2 would: (i) considerably reduce the amount of sweeping accounts of banks to the RMA, and (ii) reduce by the same amount the RMA's foreign reserves (in gross and net terms). Volatility in liquidity conditions would decrease, as well as the optical volatility in the RMA's foreign reserves.

Figure 1: Simulated Effects of Option 2 on Sweeping of Hydro-Project
(in million ngultrum)

Source: RMA and staff estimates.

Figure 2: Simulated Effects of Option 2 on Foreign Assets
(gross and net, in million ngultrum)

Source: RMA and staff estimates.