



Monetary and Capital Markets Department
TECHNICAL ASSISTANCE HANDBOOK

Liquidity Forecasting— Part I: The Institutional Arrangements

Prepared by the Central Bank Operations Division (CO)

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THIS ONLINE HANDBOOK

This handbook aims to distill, document, and make widely available, the lessons learnt from MCM TA over a long period while also incorporating lessons learnt globally. It covers a wide range of central banking topics pertaining to governance and risk management, monetary policy, monetary and foreign exchange operations, and financial market development and infrastructures, while highlighting, where relevant, specific issues for low-income resource-rich countries. It is intended to document and promote good practices and support the consistency of advice over time. It is, however, stressed that one size solutions cannot fit all, and all advice therefore needs to be tailored to country-specific circumstances. The handbook comprises self-contained, issue-specific chapters with cross-references on overlapping issues where needed. It is targeted at those who provide TA (both IMF and non-IMF personnel), and practitioners in central banks and other relevant institutions.

THIS CHAPTER: LIQUIDITY FORECASTING—PART I: THE INSTITUTIONAL ARRANGEMENTS

Liquidity forecasting entails a process of estimating the near-term path of bank's reserves using a centralized framework. Short-term liquidity forecasts are used to calibrate the volume of central bank monetary operations to ensure that market conditions are aligned with the announced stance of monetary policy, whether expressed as an interest rate or as a quantity. Central to this exercise is the information sharing between the central bank and the counterparties having an account at the central bank, which transactions on those accounts influence reserves in the banking system. This chapter outlines the institutional arrangements between the central bank and its counterparties, the internal arrangements, the subsequent interactions with counterparties once forecasts are compiled; all making for an effective liquidity forecasting framework. This Part is to be read alongside [Part II- Liquidity Forecasting – The Statistical Component](#), which sets out the statistical methods to forecast liquidity factors and the demand for liquidity from which the central bank can determine the near-term path for reserves. Additional tools to support the operationalization of the liquidity forecasting framework within the central bank, such as a memorandum of understanding template, a liquidity forecasting and monitoring table, and a sample interbank survey, are included in this chapter of the TA Handbook.

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Glossary

| | |
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| AEs | Advanced Economies |
| ALFs | Autonomous Liquidity Factors |
| BOM | Bank of Mexico |
| CBDC | Central Bank Digital Currencies |
| CCC | Cash Coordination Committee |
| CCPs | Central counterparties |
| CG | Claims on Government |
| CIC | Currency in Circulation |
| ECB | European Central Bank |
| EMEs | Emerging Market Economies |
| ER | Excess Reserves |
| FX | Foreign Exchange |
| GD | Government Deposits |
| IMF | International Monetary Fund |
| LCR | Liquidity Coverage Ratio |
| LFT | Liquidity Forecasting and Monitoring Table |
| LFU | Liquidity Forecasting/Management Unit |
| LIDCs | Low-income and Developing Countries |
| LLM | Large Language Model |
| LT | Liquidity Table |
| MAE | Monetary and Exchange Affairs Department, IMF |
| MCM | Monetary and Capital Markets |
| MoF | Ministry of Finance |
| MOID | Monetary Operations and Instruments Database |
| MoU | Memorandum of Understanding |
| NBFIs | Nonbank Financial Institutions |
| NCG | Net Claims on Government |
| NCOC | Net Claims on Other Counterparties |
| NFA | Net Foreign Assets |
| OIN | Other Items Net |
| OMOs | Open Market Operations |
| RMP | Reserve Maintenance Period |
| RR | Required Reserves |
| SLA | Service Level Agreement |
| SOEs | State-owned Entities |

| | |
|-----|-------------------------|
| TA | Technical Assistance |
| TSA | Treasury Single Account |

Executive Summary

Liquidity forecasting involves estimating the near-term path of central bank reserves, crucial for effective monetary policy implementation. It ensures market conditions align with the central bank's policy stance, whether in terms of quantity or interest rate. Forecasting focuses on factors influencing liquidity demand and supply beyond the central bank's control,¹ including behaviors of key counterparties like banks, and the government, as well as the public demand for currency and international transactions.

Institutional arrangements for forecasting involve centralized data collection, coordination with external counterparties, and setting reporting standards, with the key components to discharge the function including:

- A dedicated unit to centralize the process, streamline interactions, and develop protocols for internal and external information sharing. The unit coordinates with various external counterparties, consolidates data, and ensures that information is processed efficiently for decision-making.
- Memorandums of understanding with non-monetary counterparties to define information sharing protocols and establish regular coordination committees. The committee, with agreed terms of reference related primarily to liquidity forecasting, ensures ongoing coordination and communication between the central bank and its non-monetary counterparties, which in most cases is the Treasury or Ministry of Finance (MoF).
- Regular surveys administered regularly to monetary counterparties (banks) and contact groups with market participants to gather information on their liquidity needs and understand behaviors and market expectations.

Publishing forecasts is encouraged to provide transparency and predictability. Central banks publish components of liquidity developments to varying degrees, with a few disseminating ex-ante liquidity forecasts and others publishing banks' balances before operations. The important objective for publishing forecasts is to reduce the liquidity premium for banks and encourage interbank market participation and to achieve the central bank's targeted open market operation (OMO) allotments.

The TA approach aims to establish a credible liquidity forecasting framework through a sequenced implementation of these components, enabling the central bank to incorporate and use liquidity forecasting effectively in its decision-making process. This structured approach ensures efficient and neutral operations, minimizing financial burdens and inefficiencies while stabilizing domestic liquidity conditions. The central bank should regularly review and update the liquidity forecasting framework based on feedback and changing market conditions to ensure its ongoing effectiveness.

¹ These are typically called the autonomous factors (ALFs), including currency in circulation (CIC), Net Claims on Government (NCG), Net Foreign Assets (NFA) and Other Items Net (OIN). Forecasting methodologies for these ALFs are discussed in TA Handbook Chapter on Liquidity Forecasting Part II – The Statistical Component.

Introduction

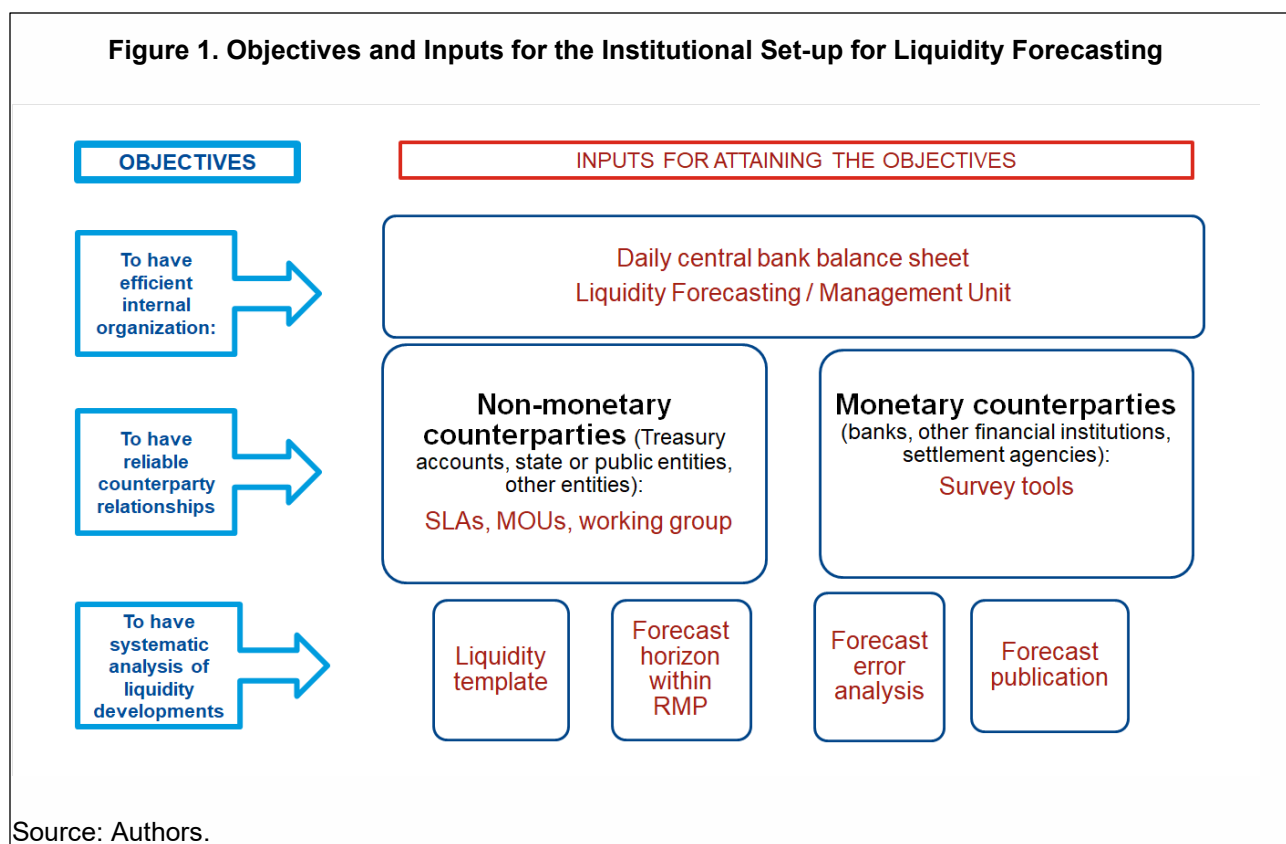
Liquidity forecasts matter when the central bank targets short-term interest rates. Short-term interest rates represent the price of borrowing an instrument issued by the central bank and kept by monetary policy counterparties (e.g., banks) and other institutional account holders (e.g., central clearing counterparties, Treasury, foreign central banks when applicable) on account at the central bank, which is called reserves. Since the price is a function of demand and supply, the central bank must forecast the demand for reserves to adjust supply, via monetary operations, injecting or draining reserves as necessary to steer the short-term rates towards the desired level. This is relevant both in a corridor system, in which the central bank aims at exactly satisfying the demand for reserves on average during a reserve maintenance period, and in a floor system, in which the central bank should saturate the demand at all times to pin short-term interest rates to the deposit facility rate. Forecasts also matter when reserve money is the operational target inasmuch, they help the central bank to calibrate monetary operations to achieve the reserve money growth target and better disentangle deviation from target as result of reserve demand from reserve supply shocks. Liquidity forecasts are also topical in exchange rate targeting frameworks. In these frameworks, central bank operations aim at steering short-term rates towards the reserves that will align the uncovered interest rate with the interest rate for the anchor currency.

Beside central bank open market and FX interventions, the stock of reserves is influenced by the transactions between monetary and non-monetary counterparties. The latter includes the public that demands banknotes for retail transactions (which are withdrawn from banks' account at the central bank). It also includes other institutions with an account at the central bank, chiefly the government that often (but not always) bank with the central bank. Collecting taxes, issuing debt, disbursing civil servant salaries, and official transactions influence monetary counterparties' reserves at the central bank and, thus, short-term rates. These items in the central bank balance sheet—over which the central bank has no control are called autonomous liquidity factors (ALFs).

The demand for reserves is underpinned by precautionary and regulatory factors. Free from any requirement to hold reserves at the central bank, monetary counterparties would, nevertheless, keep some balance at the central bank as a precaution against unexpected payments (the precautionary demand for reserves). That said, most central banks (but not all) set a target for reserve balances for monetary counterparties at the central bank, which is known as reserve requirement. The requirement is usually known in advance and does not need to be forecasted. The uncertain part of the demand resides, thus, in the demand for excess reserves (i.e., in excess of the reserve requirement). More recently, prudential regulation, such as the liquidity coverage ratio (LCR) could create a new and make it more difficult to estimate sources of demand for reserves, as excess reserves are usually considered a high-quality liquid asset eligible to fulfill those prudential requirements. Banks may in fact arbitrage between reserves and other eligible liquid assets as a function of the respective risk-adjusted return, transaction costs, risk-aversion, and liquidity risk profile.

Forecasting relies on a well-organized institutional set up that allows systematic data collection, data analysis and presentation for decision-making. In this set up, three goals exist: (i) to have effective internal coordination that consists of clearly delineated responsibilities for the core forecasting team and supporting teams; (ii) to establish reliable counterparty relationships for monetary and non-monetary counterparties; and (iii) to have a process for systematic analysis of liquidity developments.

Goals are interlinked, yet each one is only practically attainable when the correct inputs are combined for the central bank operations team to perform this function for the purpose of monetary policy implementation (Figure 1).



This institutional set up incorporates the central bank developing its own statistical models to forecast key components of the daily balance sheet and the behavior of its counterparties. These statistical tools are presented in Part II of the TA Handbook Chapter on Liquidity Forecasting.²

The exact balance between the institutional and statistical components of forecasting depends on local conditions and the cost versus benefit trade-off. For instance, in some countries, the government is not forecasting its cash flows. This limits the benefit of establishing a formal information sharing relationship between the central bank and the Ministry of Finance. Currency in circulation, another example, could be forecasted with high accuracy based on well-established model without surveying banks.

This chapter focuses on institutional arrangements for short-term, operational liquidity forecasts.

An increasing number of central banks are complementing such short-term operational forecast, the purpose of which is to inform the calibration of regular monetary operations, with a longer-term structural forecast to inform the decision on whether to deploy structural monetary policy instruments or alter their configuration for balance sheet management purposes. While the institutional arrangements for the two

² <https://www.imf.org/-/media/Files/Publications/Miscellaneous/English/2022/mcm-technical-assistance-handbook/liquidity-forecasting-part-ii.ashx>.

forecasts are similar, the chapter will briefly mention the main differences while also considering that processes and arrangements for the longer-term forecast are less standardized than for the short-term operational forecast.

The chapter discuss how to arrange external and internal relationships to facilitate the aggregation, presentation, and integration of valuable information on liquidity forecasting for monetary policy decisions. The chapter first presents the coordination arrangements for different central bank counterparties; based on their role and the influence of their activities on liquidity developments. Different approaches would be applicable depending on the counterparty; so, the chapter discusses some practical methods to systematize these relationships. The subsequent sections discuss important aspects for the central bank's internal organization for it to be able to routinely perform the functions for liquidity forecasting and its integration in the monetary policy decision-making apparatus.

Arrangements with Non-monetary Counterparties

Guidance: the central bank should establish ongoing relationships with its major counterparties for timely information sharing to institute an effective liquidity forecasting framework.

Establishing the overall relationship between the treasury (non-monetary counterparties) and the central bank at a high level will set the tone for the working relationships that will form at the technical level. In some cases, the high-level relationship is specified in legislation, or at the other end of the spectrum, there may simply be an exchange of letters. Nevertheless, for the central bank seeking to effectively develop its liquidity forecasting framework – and where the Treasury account is in the central bank -- the operational interactions with the Treasury should be underpinned by some form of protocol. This relationship can be established through a service level agreement (SLA),³ a memorandum of understanding (MoU) and working groups.

A. The Government

In most countries, the government controls the movement of funds from its accounts and coordinates with the central bank to varying degrees to avoid disrupting bank liquidity. One major decision of the government is where it places its accounts.⁴ Where the Treasury Single Account (TSA) is held at the central bank, it can provide several advantages. First, it simplifies government cashflow management operations and allows for effective cash monitoring and management. Second, it enables a

³ A service level agreement (SLA) is a contract that sets out the standards for services supplied, including banking and settlement services, the management of accounts by the Treasury, other operational agency roles. SLAs are rarely public documents as they contain sensitive information, and confidentiality may be important to prevent fraud. See “The Service Level Agreement Between the Treasury/Ministry of Finance and the Central Bank,” PEMPAL, 2017.

⁴ The requirements and benefits of a modern government cash management are well-documented, and it is desirable that the government operates a comprehensive treasury single account (TSA) that is well-integrated with an efficient electronic payment system, as even where commercial bank balances are used to support the distribution of payments, any excess balances should be swept back to the TSA overnight. See Government Cash Management: Relationship between the Treasury and the Central Bank, IMF 2012.

practical separation of fiscal operations from monetary operations, e.g., for removing considerations about the equitable distribution of government deposits across banks, and whether these deposits should be subject to (or not subject to) reserve requirements; and removes additional layers of uncertainty from the liquidity forecasting process. Third, it avoids any credit risk for the government and any perceived implicit guarantee of funding for the banks that hold government accounts.

The central bank's role as banker of the government defined in the law, allows the central bank and the government to set out agreements for services provided. The detailed obligations of the account holder (the government) and the central bank (which may also provide other agency functions beyond being banker to the government) can be articulated in an SLA which could include setting out the contours for the operation of the TSA. For other functions, such as to support the central bank's liquidity forecasting function, an MoU⁵ can be sufficient in establishing the obligations of this relationship.⁶

The MOU should be established with sufficient detail to define who does what in streamlining the exchange of information and encourage the account holder (the government) to operate in a predictable way. It may include the following provisions:

- Explanation of the purpose and intended broad parameters for the usage of the account.
- MoF reporting obligations to the central bank concerning:
 - Short-term (e.g., over a week and over a month-horizon) and medium-term (e.g., beyond a month) cash flow forecasts on an aggregated basis and possibly broken down by major components or revenue, expenditure, and debt issuances.
 - The frequency and the timeline with which such forecasts should be provided to the central bank.
 - Material changes to the forecasts previously provided, and obligations to notify (in advance with a predefined notice period) about large, unexpected payments or receipts not included in the original forecast. The notification threshold is normally set based on the liquidity impact relative to the size of the market.⁷
 - Possible deadlines with which all payments should be instructed or completed.
- The arrangements to convert FX amounts in local currency and vice versa.

⁵ A sample MOU is provided in Appendix I.

⁶ In principle, a central bank may have several MOUs with different public agencies. For example, the Central Bank of Chile has several MOUs with other public institutions, such as Internal Revenue Service, Treasury, Financial Intelligence Unit, Superintendence of Pensions. See IMF Country Report No. 22/113. Likewise, the Bank of Canada has developed a number of instruments governing the relationship with the government. See IMF Country Report No. 22/318. The Central Bank of Uruguay has an MoU specifically on banking services to the government for the cost of operations. See IMF Country Report No.22/234.

⁷ It is notable that this obligation for notification is written in the central bank law for the Banco de México (BOM), which requires that the BOM must receive the instructions for debits for credits at least one business day before the effective transaction date.

- The participation of Ministry of Finance representatives in any central bank cash coordination committee (see discussions below).
- The broad cash management policy of the MoF, the use of its cash surplus, the services the central bank can provide to the MoF for cash management and any lower/upper (soft) limit to its cash balances for the purposes of liquidity management.
- Cash advance operational arrangements where the central bank law allows, including the request and decision-making processes.
- The information feedback from the central bank to the MoF.

The MoU can serve the central bank well to improve its liquidity forecasting capabilities and to avoid excessive and unanticipated swings in liquidity. While a maximum cash balance threshold is unlikely, the MoU may be provided with lower remuneration rates on larger cash balances, exceeding a necessary working balance, with a view to encouraging market placements via short-term fixed-term deposits with commercial banks, or for better remuneration on fixed-term deposits with the central bank in a structured and predictable manner.

The MoU should also make provisions for a joint forum between the central bank and the MoF on cash management and forecasting issues – the role for a cash coordination committee (CCC). The establishment of a CCC is a practical mechanism to facilitate discussions on government cashflow forecasts and the overall projected market liquidity, which is central to setting financial policies. The participation of both the central bank and the Treasury ensures that liquidity forecasts incorporate the latest available information and allows the Treasury representative to relay feedback on variances and update information on the forecasted aggregated liquidity conditions. The assessments of the CCC identify inconsistencies between the projected liquidity and the forecasts—conducting error analysis—and the implications thereof for liquidity conditions and for government debt management operations (Figure 2).

The CCC's standing and work should be detailed in a Terms of Reference (ToR), and key performance indicators set out to ensure that it continues to function for the purpose intended. In addition to serving as the forum for discussing liquidity developments, in some countries where the government conducts active cash management,⁸ an effective and functioning CCC is critical. As the government's cash management becomes more sophisticated, e.g., doing short-term placements of excess balances in the banking system, it interacts more with monetary policy operations, and therefore need to be well coordinated. The question, therefore, is whether the Treasury is sufficiently incentivized to prepare accurate cash flow forecasts in a timely manner to reduce uncertainty for the central bank's liquidity forecast (see Box 1). The CCC should therefore comprise representatives at several levels, including managers exercising decision-making authority over government cash balances, as well as with technical staff working with the actual data.

⁸ Active cash management has the purposes of minimizing of the cost of government borrowing and maximizing the opportunity cost of resources, to yield overall net positive income to the budget. Active cash management includes the use of short-term financial instruments both on the liability and asset sides, ensuring the availability of cash and avoiding unnecessary idle cash balances, "Government Cash Management: Relationship between the Treasury and the Central Bank," page 6.

Box 1. Central Bank and Treasury Relationships to Reduce Uncertainty in Liquidity Forecasting

The coherence of monetary policy with government financing policies, including fiscal policies, underpins successful macroeconomic management. Pessoa and Williams, 2012.

Institutional arrangements for government accounts impact liquidity forecasting and management. Advanced treasury and debt management functions reduce erratic liquidity changes and variability. This allows the government to maintain optimal cash buffers and acquire new debt only when necessary. Consequently, the central bank can make smaller, incremental liquidity adjustments, reducing uncertainty in liquidity forecasting. This balance ensures efficient and neutral operations, minimizing financial burdens and inefficiencies while stabilizing domestic liquidity conditions.

Some specific institutional arrangements can help reduce uncertainty: (i) allowing the central bank the leverage to place excess balances with banks; (ii) setting early cut-off times for government transactions, which allows the central bank sufficient time to respond to unforeseen changes; and (iii) remunerating government balances—either the full balances, or some portion thereof—at market rates. The success of these arrangements is founded on the principle that there should be practical balance between efficiency and neutrality to ensure that the incentives encourage better cash management and liquidity management. In this sense, efficiency ensures that the government is able to conduct its operations in a way that does not create unnecessary financial burden or contributes to inefficiencies for liquidity management, and neutrality seeks to redistribute the cost-saving from having parsimonious monetary operations to the payment of interest (e.g., the policy rate) on government deposits; leaving the central bank's financial position 'neutral.' To practically apply the principles, establishing the country context, the size and sophistication of the financial markets are just as important as having reliable government cash forecasts. Moreover, the policy adopted for the treatment of government balances should not be subject to frequent changes in its implementation. Frequent changes would undermine the central bank's operating framework and create more volatility in interest rates that could in-turn adversely impact government domestic debt operations.

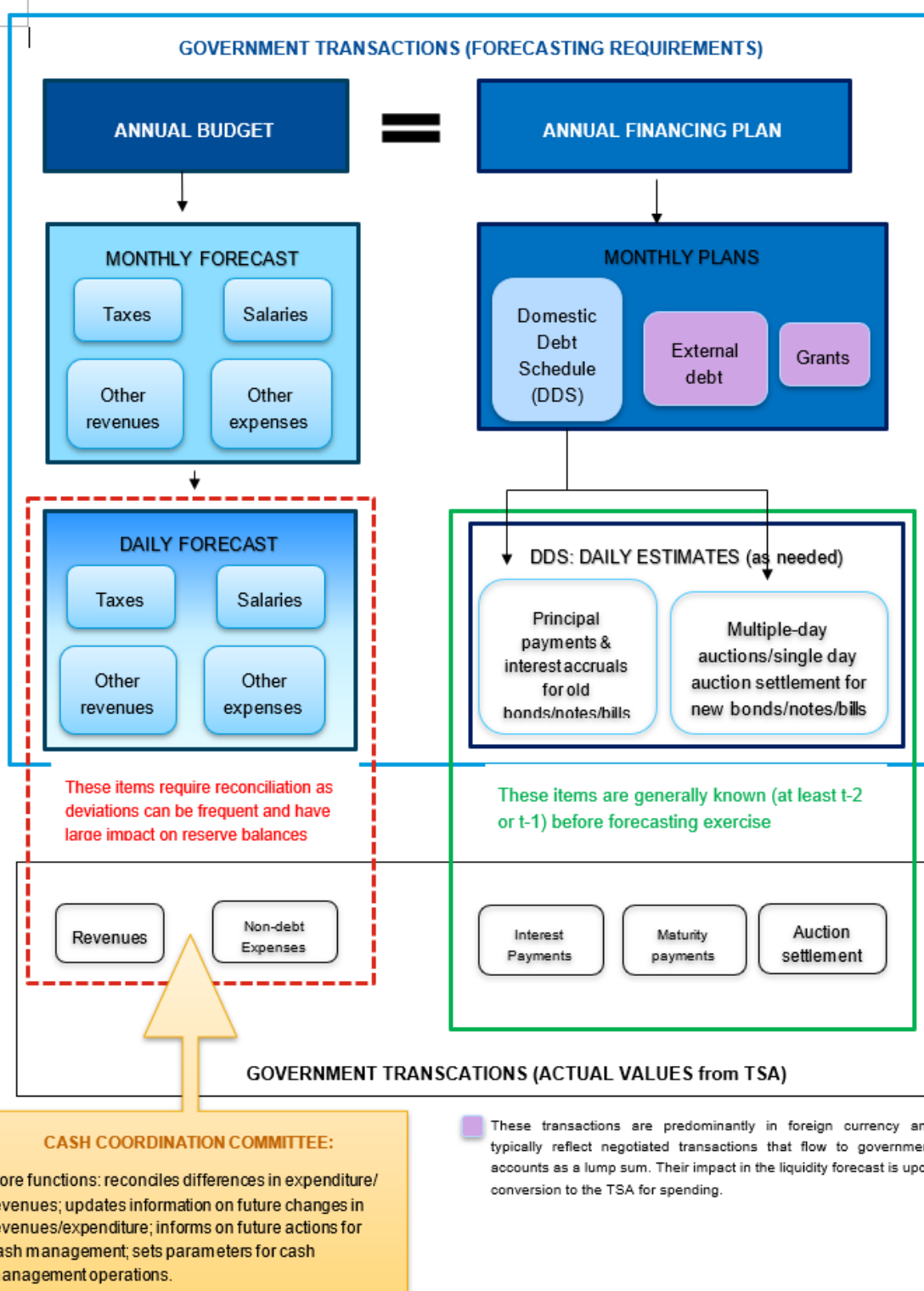
One key question is whether deposits should be remunerated on commercial terms or be based on the central bank's operational rate.¹ The options for remuneration that may be considered are: (i) paying the policy rate as long as the government keeps balances at the level that results in an agreed neutral liquidity position or whatever balances are held (Central Bank of Iceland, January 2022); (ii) paying the policy rate on a fraction of government balances that keeps liquidity neutral, and amounts above that level earns zero; (iii) paying interest on the excess using commercial terms, as fixed term deposits that pay interest rates that are more aligned with market rates; or (iv) paying the policy rate minus a spread to have these non-monetary deposits remaining low and stable (ECB, April 2024).² In theory, these options could be examined. But in practice, they require strong commitment, excellent forecasting, and analytical skills.

Addressing possible non-linearities is also important. First, a financial system that already operates with excess reserves would reduce the demand for government deposits and the opportunity cost therefore is reduced. Second, the impact on profit distribution or loss recovery at the end of the financial period should be examined. The final cost of paying interest on government deposits could reduce the transfer to the MoF or could induce losses; requiring MoF recovery. Moreover, paying the policy rate on government deposits could also have implications for paying interest on other monetary liabilities, e.g., reserve requirements that contributes directly to the effectiveness of the liquidity management framework.

¹The central bank's operational rate refers to the interest rate for its dominant monetary operation, which may be a sterilization rate or refinancing rate, depending on the structural liquidity position of the financial system.

² The European Central Bank Governing Council has set a remuneration rate for non-monetary deposits that reflects the thinking that these deposits should not contribute to persistently or structurally disturb the transmission or implementation of monetary policy. https://www.ecb.europa.eu/press/pr/date/2024/html/ecb.pr240417_annex%7E813a29fb7d.en.pdf

Sources: Government Cash Management: Relationship between the Treasury and the Central Bank, Liquidity Forecasting, Monetary and Exchange Affairs Department (MAE) Operational Paper; Location of Government Deposits: Implications for Monetary Operations, MAE Operational Paper, and Authors.

Figure 2. Forecasting Government Transactions and Coordination Arrangement

Source: Authors

B. Other Non-monetary Counterparties

Guidance: Identify large nonmonetary counterparties, other than the Treasury, banking with the central bank and establish systems for routine information collection and facilitate information flow with the treasury manager to account for their impact on liquidity developments

In some cases, movements on the accounts of nonmonetary counterparties could impact the balances on the account of monetary counterparties. Generally, three broad types of ‘other entities’ can be identified as follows:

- **Quasi-government entities:** Examples include, state-owned entities, (SOEs), including development banks, deposit insurance fund, commodity exporters or utility companies.
- **Other official entities:** Central banks sometimes allow multilateral organizations to hold operating accounts with the central bank account to facilitate in-country loans, which when disbursed, impacts domestic liquidity conditions.
- **Non-bank financial institutions (NBFIs):** Examples of non-bank entities that have accounts at the central bank include securities dealers, central counterparties (CCPs) and non-bank deposit taking and lending institutions (e.g., co-operative banks).

The arrangements with nonmonetary counterparties vary according to the type of counterparty and the balances they hold with the central bank. Non-bank deposit taking and lending institutions are often assimilated to banks in terms of liquidity management arrangements with a view to ensuring a level playing field across institutions with similar business models and functions. For quasi government entities, an MoU may be contemplated if the respective holdings may be material. For example, in resource-rich countries where the central bank is the sole agency that can facilitate transactions involving the natural resource domestically, the impact on liquidity may be sizeable and a supporting MoU can regularize the information flow and foster predictability for liquidity forecasting. Arrangements with international donors and multilateral development banks vary from case to case. To the extent that the balances of these institutions and the variability thereof may be material and impact in a meaningful way liquidity conditions, arrangements to facilitate the predictability of large flows are appropriate and should be pursued.

Generally, the type of arrangement necessary for the purpose of liquidity forecasting is a function of several factors:

- **The materiality of the balances held.** When the potential balance is not material, the case to establish complex arrangements may be weaker.
- **The desirability of encouraging central bank holdings vs market placements.** It may not be considered, for instance, desirable to encourage market placements from CCPs as this may increase financial stability risks, interconnectedness, and cash availability when CCPs may need it the most.
- **The extent non-monetary counterparties transactions can be assimilated to banks.** It is often the case that some nonmonetary counterparties fulfill functions similar to banks with which they directly compete, even though they may be subject to a simplified regulatory and supervisory

framework on account of lower risk exposure. In such a case their cash balances may be forecast via modalities similar to the banks' forecast.

Arrangements with Monetary Counterparties

A. Demand for Currency via Intermediaries

Guidance: Currency in circulation (CIC) is best analyzed using statistical models which would more efficiently capture the trends and seasonality in the stock of currency.⁹ With the introduction of central bank digital currencies (CBDC), central banks need to do separate statistical forecasts for physical notes and CBDC.

The circulation cycle through issuance and redemptions for physical bank notes typically show distinct monthly and intra-monthly patterns that facilitate predictability. So, the central bank may see clear patterns of rising currency stock (at issuance) and strong decline during the redemption cycle in response to the usual monthly business cycle. With physical notes, CIC undergoes two netting processes before banks interact with the central bank:

- The first netting occurs at businesses (e.g., retail shops) that use some of their cash to replenish stock while retaining a portion for their float. As a result, only a limited amount of the received cash is deposited in the bank.
- The second netting takes place between business and their bank, where cash flows in and out throughout the day, managed by the bank's vault. Consequently, the bank will only withdraw or return the net amount of cash to the central bank.

With the introduction of CBDC, another complication is added to liquidity forecasting.¹⁰ Depending on the substitutability of CBDC for physical cash, bank deposits and reserves, liquidity forecasting can become more challenging. Scholars on the CBDCs suggest that the risks to monetary operations (including liquidity forecasting) are inherent in the CBDC design, with interest-bearing retail CBDCs believed to have the greatest impact on the central bank's ability to forecast reserves (Lukonga, 2023). Therefore, based on the CBDC design, additional attention to the behavior of this ALF and developing tools that measure the impact on bank reserves is imperative. Armas and Singh 2022 suggest that CBDC should be considered an additional ALF to be forecasted.

Moreover, since CBDC demand is likely to be more volatile than physical notes, it is argued that it is important for central banks to accurately forecast how CBDC will impact the level of reserves. Central banks should continue to hone and update the tools used to forecast CIC and estimate the displacement of other means of payment or store of value instruments by CBDC. At this stage however, although digitalization in cash payments have taken place in many countries, CIC continues to show trend growth while cash in use of payments decline, suggesting that a precautionary motive for holding physical notes remains dominant in many countries. The central bank's investment requires on-

⁹ See Liquidity Forecasting Part II—The Statistical Component, IMF TA Handbook.

¹⁰ [Implications of Central Bank Digital Currency for Monetary Operations](#), IMF FINTECH NOTE, October 2024.

going upgrading and testing of its tools for forecasting CIC and having systems to identify changes in the behavioral patterns in the advent and increased penetration of CBDCs.¹¹

B. Bank Demand for Reserves

Guidance: To ensure that the central bank can produce accurate liquidity forecasts and conduct operations parsimoniously, it is important to disentangle the motives for holding reserves for mandatory requirements and reserve holdings influenced by other factors.

Banks generally are motivated to hold reserves for different reasons, with three overlapping concepts used to describe their reserve holdings:¹²

- **Mandatory reserves requirement**—the amount required to be held through regulation; and excess reserves that are held in excess of the reserve requirement.
- **Excess reserves**—which can be held voluntarily if they have a precautionary motive or involuntarily if the central bank does not offer placement opportunities. In normal circumstances, voluntarily held reserves will closely equate with excess reserves, while within regimes with ample reserves, banks may hold reserves in excess of their voluntary demand.

Greater precision in forecasting banks' reserve demand, and determining the excess reserves, may be more relevant for an interest rate operating target. In this framework the operational goal is for the central bank to optimize monetary operations by setting reserves at a level that is consistent with anchoring money market rates to the policy rate. In the same vein, having excess reserves at its optimal level can support effective liquidity redistribution and interest rate transmission in the interbank market (assuming limited frictions from credit or counterparty risk) as banks would have an incentive to price reserves relative to the marginal interest rate on the central bank's facilities. If short-term rates are not the operational target, the forecast of the demand for reserves may be less critical for monetary policy implementation. However, banks' shifting to higher reserves from 'their normal levels' could reveal possible risks for financial stability that may be of interest for the central bank as it assesses the reserve money path using a quantitative monetary target.

Mandatory Reserve Demand

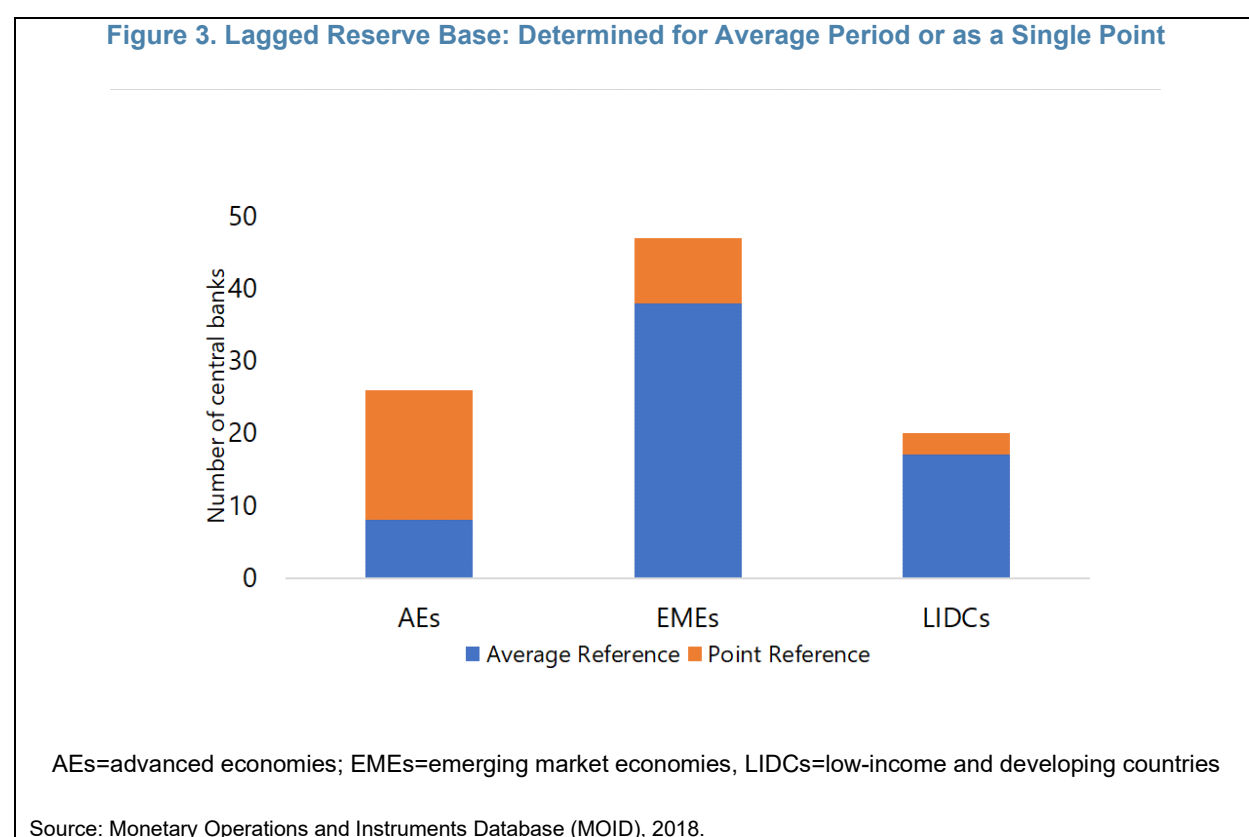
Guidance: The regulatory reserves (for the reserve requirement) should be determined using a lagged base that is defined on a preestablished prudential reporting frequency, and the amount for fulfillment is determined at the beginning of the reserve maintenance period.

¹¹ While the share of cash in transactions fell from 26 percent in 2019 to 16 percent in 2023, globally the trend for CIC as a share of GDP increased from 6.5 percent in 2019 to 8.6 percent in 2023, globally. Data sources: Worldpay. The Global Payments Report 2024. Worldpay, 2024. <https://worldpay.globalpaymentsreport.com/en>. "Currency in Circulation (CURRCIR)." FRED, Federal Reserve Bank of St. Louis, 2024, <https://fred.stlouisfed.org/series/CURRCIR>. "World Economic Outlook Database." International Monetary Fund, 2023, <https://www.imf.org/en/Publications/WEO/weo-database/2023>. "World Bank Open Data." The World Bank, 2023, <https://data.worldbank.org/>.

¹² See Reserve Requirements, IMF TA Handbook.

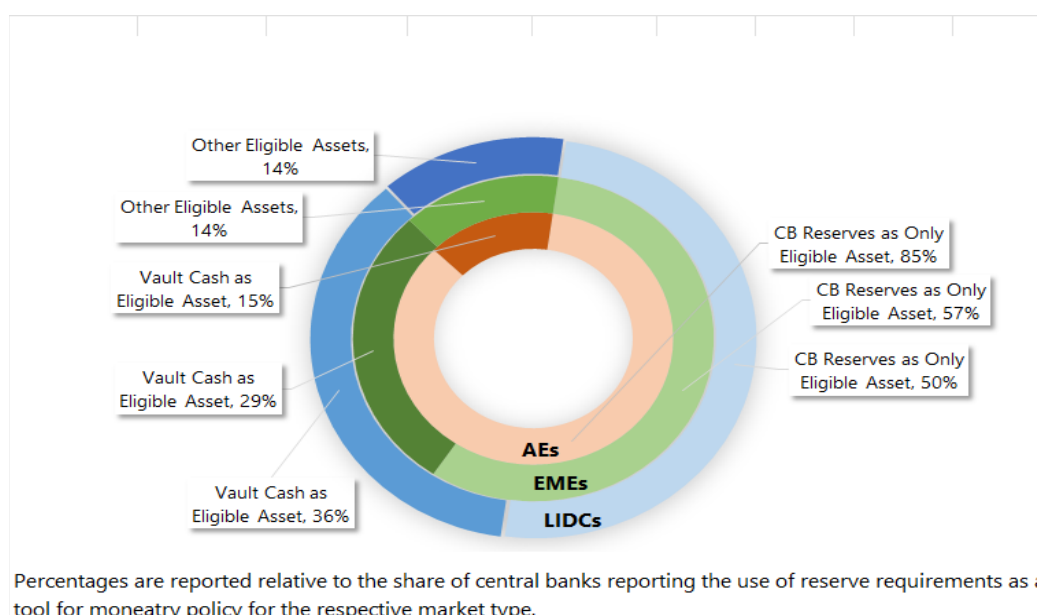
The possibility of applying minimum reserve requirements on credit institutions is typically provided within the central bank law. The operational requirements are instead typically laid down in a central bank's regulation. Operational parameters include the reserve base, the reserve ratio, the eligible assets to fulfill minimum reserve requirement, and the reserve calculation period (see TA Handbook on reserve requirement).¹³

Reserve requirement creates a known demand for reserves from banks. To precisely calculate this demand, the central bank would typically introduce a lag between the reference date/period for the calculation of the mandatory reserves and the start of the reserve maintenance period. Reserve requirement is typically calculated on the basis of banks average liabilities over a period preceding the start of the reserve maintenance period, or at a given reference date preceding the start of the reserve maintenance period (Figure 3). This allows banks and the central bank to know with certainty the reserve requirement at the start of the reserve maintenance period.



In computing the reserve demand associated with the mandatory(regulatory) reserves, the TA provider needs to sometimes adjust for the other eligible assets—i.e., not central bank reserves—that are used for fulfillment of these reserves. Some central banks allow vault cash and other non-reserve assets for the reserve requirement fulfillment (Figure 4). The guidance is that eligible assets should comprise only reserve balances held at the central bank and in the same currency as the reserve base (MCM, TA Handbook, p. 18).

¹³ See “Reserve Requirements”, Technical Assistance Handbook on the reporting on the reserve base.

Figure 4. Reserve Demand Based on Fulfillment of Mandatory Reserves Requirement

AEs=advanced economies; EMEs=emerging market economies, LIDCs=low-income and developing countries

Source: MOID, 2018.

Excess Reserves Demand

Guidance: Excess reserve demand and developments could be examined through regular survey of monetary policy counterparties which could be complemented with other metrics, including the intraday liquidity turnover and usage, and end of day closing balances.

Surveys provide some advantages to support near-term assessments: (i) they can be administered at specific periods; (ii) they can be web-based and administered online allowing for easy updates as new developments in reserve demand emerge; and (iii) they offer versatility in collecting quantitative and qualitative information on liquidity and credit risk perceptions and interbank market frictions, and help with understanding the motivations for changes in demand for excess reserves.

Regular interbank surveys could be useful to gather and analyze developments and trends in banks' demand for precautionary excess reserves. Understanding the reserve requirement fulfillment patterns within the reserve maintenance period is useful information on demand for excess reserves.¹⁴ In addition, more recently liquidity regulation like the Basel III liquidity coverage ratio (LCR) adds an extra component to the demand for excess reserves.¹⁵ The LCR mandates banks to hold a minimum amount of

¹⁴ Where averaging is a new feature, assuming a liner pattern of fulfillment may be made at the outset. But as financial institutions adapt their risk preferences by using reserve averaging or not, the pattern of fulfillment may change the demand patterns for excess reserves.

¹⁵ Two regulations in the US financial system often cited as driving factors of banks' demand for reserves are the liquidity coverage ratio(LCR) and resolution plans. In meeting the LCR, banks may decide to use reserves to cover a

highly liquid assets against runnable liabilities over a 30-day period. Eligible assets include excess reserves and high-quality, liquid marketable assets. Although the ratio may also be fulfilled with higher yielding marketable assets, there are several reasons why banks may prefer using, at least in part precautionary reserves, including:

- Reserves may be accessed without incurring any transaction costs.
- Reserves have lower market risk than other marketable assets and their use does not create potential risks or realized losses.
- The holding of reserves at the central bank usually does not consume allocation within the sovereign credit risk limit.
- Reserves, by definition the most liquid asset, provides the ability and speed to access liquidity at short notice. The market infrastructure and depth for converting other marketable assets into reserves vary across countries, which makes asset to asset conversion sometimes difficult or contributory to disorderly market conditions.

When such liquidity ratio applies, the propensity for using central bank reserves to fulfill it is therefore a function of several factors. These factors include:

- The yield differential between marketable assets and excess reserves.¹⁶
- The liquidity of marketable assets in normal circumstances and in disorderly market conditions.
- The liquidity risk of individual banks, as the greater the risk, the more volatile the funding, and greater prospect of using reserves to satisfy LCR level 1 highly liquid assets.
- Risk aversion.

The impact of these factors on reserve demand would be difficult to quantify, so central banks may run surveys that include questions on this topic. Smaller central banks may poll the entire banking population whereas larger banks may use a representative sample of banks, requiring banks to disclose information on minimum or desired reserve levels, banks' reaction to address deviations from these desired levels, risks from funding changes, and how it may (re)allocate across asset classes.

The central bank should balance the need for sufficient information for meaningful monetary policy implementation against the burden to the bank to complete and submit the survey. For banks, the motivation to complete the survey should emanate from the expectation that the data reciprocated by the central bank will broaden their knowledge of liquidity developments and improve individual liquidity risk management. Central banks are therefore encouraged to publish its liquidity forecasts (see section on Internal Organization) and the supplementary data (from the aggregated

larger percentage of the required high-quality liquid assets since its calculation reflects the immediate short-term funding risk. Additionally, part of the resolution for banks is ensuring that they have enough short-term liquidity to cover demands from stakeholders and counterparties.

¹⁶ The interest rate on excess reserves (IOER) has often exceeded the yield on short-term Treasury Bills since 2013.

interbank surveys) to monetary counterparties. The specific considerations for administering bank surveys for this purpose are provided in Box 2, and a sample central bank survey on liquidity developments is provided in Appendix II.

Box 2. Key Considerations for Surveys used in Knowledge Building on Banks' Reserve Demand

Ensure clarity in the objective for the survey, as the information should provide the central bank with the opportunity to periodically assess underlying trends in the demand for ER in the context of standard or extraordinary events. The survey should be clearly linked to the purpose for enhancing the central bank's knowledge of its counterparties in the financial sector, covering: (i) perspectives on banks' demand for ER based on their business model and risk preferences; (ii) approximations of the level of desired reserve balances; and (iii) factors that may contribute to banks' changing their interactions (e.g., credit limits, risk profiles) with other financial market players.

Scope for information collection should be clearly defined. The survey focused on money market reflect the fact of banks' interactions with other banks and financial institutions defined at a single point in time or over time. Banks will have different metrics for price-setting, counterparty relationships, and to establish the desired reserve position, given internal risk mitigation and risk tolerance. Against this background, information may be largely qualitative, with specific information requested on: (i) factors that would cause the desired level of reserves to change; (ii) number of counterparties; (iii) the size of counterparty limits; (iv) factors that may cause counterparty limits to increase or decrease; and (v) whether the bank participates in secured and unsecured markets. Information obtained from other sources within the central bank (e.g., financial returns, settlement turnover, balances on reserve accounts) can also serve as useful sources and should be exploited to complement the survey information.

Frequency. Check-ins done at the start of the reserve maintenance period may be adequate to meet the purpose, reflecting that liquidity developments between each monetary operation can be assessed by the use of standing facilities. The central bank would have the opportunity to regularly validate responses from previous surveys with its forecast for aggregate demand for reserves.

Wide coverage (as reasonably possible). The response rate may likely vary depending on the size and structure of the financial system. Ideally, the central bank's target is to cover all banks, but realistically it might cover banks that makeup up to 90 percent of assets. The aim is to get to a representative level that covers a substantial part of the financial system assets and comprising a cross-section of domestic and foreign banks that serve as counterparties for the central bank.

Publication and disclosure. The highest level of confidentiality should be accorded to the information received. Nevertheless, publishing aggregate information can help banks' liquidity planning, improve their knowledge and understanding of reserve developments, and make bidding in monetary operations more data driven. Other non-monetary counterparties can find this information useful also, especially where there may be large corporates transacting in the wholesale money market.

Source: Authors.

Internal Organization

Who Does What?

Guidance: The liquidity forecasting and management unit (LFU) should be set-up as a standalone unit with a clear mandate as well as accountability for information gathering, oversight, and analysis.

Liquidity forecasting and management should be assigned to a dedicated unit with a clear, standalone, focused liquidity management mandate. The size of the unit will largely depend on the complexity of the financial system, and the reliability of the inputs received from different sources. This unit would facilitate the centralization of all activities related to this central bank function. Its main activities will entail:

- Gathering inputs from, internal sources—such as the research department, FX operations department, and payment systems department, and banking operations departments; as well as from sources external to the central bank, such as the MoF and banks.
- Establishing daily/weekly/monthly processes as necessary to produce liquidity forecasts, through aggregating forecast inputs from different sources to present recent developments and forecast of reserves and its determinants to the Liquidity Management Committee.¹⁷
- Regularly reviewing realized ALFs vs forecast with an assessment of the impact of any forecast error on market conditions.
- Steering processes for setting up the CCC and streamlining the review of MoU(s) with nonmonetary counterparts and survey tools used for estimating and knowledge-building on monetary counterparties' reserve demand.
- Maintaining the databases and technical applications of core components used in the forecasts and the liquidity forecasting template. Databases are used to record historical information that are needed for analytical purposes. Technical applications are necessary to aggregate data, perform quality checks, and generate the agreed output for different internal and external stakeholders.
- Assessing optimal statistical approaches for forecasting the ALFs; regularly reviewing the methodology for forecasts; and coordinating the maintenance of the different quantitative algorithms and liquidity metrics used for liquidity forecasts and analysis.
- Reviewing forecast errors to produce regular reports on ALFs forecast errors.
- Developing the publication standards for liquidity forecasts and monetary operations to regularize the published information of relevant information, including aggregate survey results, for monetary policy counterparties mainly, and to the wider public.

¹⁷ The Liquidity Management Committee (or Operations Committee in some central banks) is a committee internal to the central bank, comprising cross-sectional representation of staff from across the central bank, including from monetary and economic research, bank supervision, payments oversight and the banking departments. The Liquidity Management Committee should meet routinely to primary review liquidity developments, assess the alignment of the central bank's operations with the operating target and the monetary stance, approve monetary operations, and discuss any developments that impact bank reserve demand and the central bank's monetary policy operational framework. The Committee meets as frequent as the central bank conducts its operations. The committee receives delegated authority from the central bank governor and would therefore need to report routinely into policy meetings.

- Publishing the liquidity forecasts, the outturn for ALFs and monetary operations in line with the central bank's policy. Central banks publish components of ALFs and liquidity conditions with varying details, with most in the sample publishing a daily forecast and liquidity position (Table 1).

| Table 1. Examples of Publications for Autonomous Liquidity Factors and Banks' Reserves | | | |
|---|----------------------------|---------------------------------------|--|
| | Forecast horizon(s) | Forecast publication frequency | What is/was published |
| Albania | 7-days | Daily | Forecasts for ALF, banks' reserve requirements target and accumulated position for the reserve maintenance period, banks' non-tradeable excess reserves |
| Australia | 1 year | Daily (2020) | System cash position for the current day (i.e. the expected net flows between the central bank and the private sector). |
| Canada | 1 year | Daily (2020) | General guidance on the level of payment system settlement balances, the daily target for the next day, and the current day's actual settlement balances. |
| Czech Republic | | Daily | Autonomous liquidity factors forecast, banks' reserve requirements and excess reserves, forecast error. |
| Euro system | 10–49 working days | Daily | Banks' reserve requirement target and accumulated reserve position, excess reserves position, and autonomous liquidity factors forecasts. |
| Hong Kong SAR | 3 days | Daily | |
| Indonesia | 1 year | Daily | Total liquidity position, maturing OMOs, and banks' excess reserves projected |
| Japan | Daily and monthly | Daily and monthly | |
| Kazakhstan | | Daily | Banks' excess balances with the central bank. |
| Malaysia | 1 month | Daily | Liquidity forecast position, including ALFs, announced on the automated system for conducting monetary operations 45 mins before the operation is conducted. |
| Mexico | Up to 1 year | Daily | |
| New Zealand | 1 year | Daily | |
| North Macedonia | 30-49 days | Daily | Aggregate autonomous liquidity factors, banks' reserve requirements target and accumulated actual balance for the reserve maintenance period |
| Russia | | Weekly (2020) | |
| Serbia | | Daily | Banking sector liquidity and forecast of autonomous factors |

Table 1. Examples of Publications for Autonomous Liquidity Factors and Banks' Reserves (concluded)

| | | | |
|--|----------|--------|--|
| | | | |
| Sweden | 6 months | Weekly | |
| Uganda | | Daily | Forecast of aggregate liquidity position for banks' excess reserves |
| Ukraine | | Daily | Aggregate autonomous liquidity factors, open market operations position, banks' opening reserve position |
| Data is shown as of 2022, except where a date is indicated in brackets. | | | |
| Sources: Bank of International Settlements Markets Committee Monetary Policy Operations Compendium and authors' collation from central banks' websites | | | |

The skills required within the unit will range from advanced econometrics to good data management and administrative skills. The task requires a high standard of integrity, given that the calibration and conduct of the monetary operations is dependent upon its output. Advanced econometric skills are essential to ensure that models are developed and frequently recalibrated to produce accurate forecasts of the ALFs.

The LFU usually sits within the monetary operations unit, as the business need for the forecast is to calibrate monetary operations and implement them on the predefined schedule or as needed. Moreover, the monetary operations unit will have direct and on-going dialogue with monetary (and often non-monetary) counterparties and could gain valuable qualitative information that can be used to refine the liquidity forecast. It is, thus, locally responsible for the institutional arrangements. However, the research area could be invited to produce statistical forecasts for the unit if it hosts staff with the necessary quantitative skills.

What are the Main Deliverables?

Guidance: The LFU should extract the liquidity table (LT) and develop the liquidity forecasting and monitoring table (LFT), which becomes main information source on short-term liquidity developments and for deciding monetary operations.

The liquidity table represents a transposition from the central bank balance sheet. The liquidity table allows the central bank to identify trends in the main ALFs and directs the monetary operations for the current reserve maintenance period. The liquidity table provides an assessment of the liquidity imbalance as a result of the difference between reserve demand and supply from the beginning of the reserve maintenance period. It aggregates the balance sheet into different ALFs; it projects the ALFs until the end of the reserve maintenance period and the maturity of the next regular monetary operations; and it projects supply deriving from outstanding monetary operations. The calibration of the operation is a function of the accumulated liquidity imbalances of the reserve demand deriving from projected ALFs and the outstanding supply.

The liquidity table requires a mapping of the central bank’s balance sheet into distinct ALFs impacting reserves. This may be a one-off exercise with the mapping updated periodically to ensure that all relevant variables are incorporated in the liquidity table. The mapping from the balance sheet to the liquidity table is shown in Figure 5.

Figure 5. Moving from the Analytical Central Bank Balance Sheet to the Liquidity Table

| Analytical Central Bank Balance Sheet | | | | Liquidity Table | | |
|---------------------------------------|------------------------------------|------|------------------------------------|------------------------------------|-----------------------------------|-------|
| Assets | | | Liabilities | Autonomous Liquidity Factor (ALFs) | | |
| A1 | Foreign Exchange | L1 | Foreign Exchange | CIC | Currency in Circulation | L2 |
| A2 | Credit to the Government | L2 | Currency in Circulation | NFA | Net Foreign Assets | A1-L1 |
| A3 | Claim on Other Counterparties | L3 | Government Deposits | NCG | Net Claim on the Government | A2-L3 |
| A4 | Monetary Operations and Facilities | L4 | Deposits of Other Counterparties | NCOG | Net Claim on Other Counterparties | A3-L4 |
| A5 | Net Other Asset | L5 | Monetary Operations and Facilities | OIN | Net Other Items | A5-L7 |
| | | L6 | Banks' Current Account | Net Monetary Operations (OMOs) | | |
| | | L6.1 | - of which Reserve Requirement | Banks' Current Account (R) | | |
| | | L6.2 | - of which Excess Reserve | RR | - of which Reserve Requirement | L6 |
| | | L7 | Capital and Reserves | ER | - of which Excess Reserve | L6.1 |
| | | | | | | L6.2 |

Source: Authors

Preparing the liquidity table by forecasting items that have an impact on excess reserves is the common approach used, as the focus for the central bank’s operations is on adjusting the excess reserves by corresponding changes in monetary operations. The net monetary operations in Figure 5 and ΔOMOs in Equation 1 represents the change in the stock of OMOs to either increase or reduce reserves. The LFU would assess the net reserve position of the banking system, and what is consequential for achieving the operational target, completing the exercise with less labor-intensive resources than compiling the entire balance sheet on the stock balances. Yet, it is important that within the activity there is a process for daily reconciliation of these forecasts with the central bank balance sheet.¹⁸ Excess reserves are typically expected to be close to zero, after the central bank’s operation. Equation 1 illustrates the liquidity forecasting calculation based on balance sheet items shown in Figure 5.

¹⁸ Some central banks forecast all components of the central bank balance sheet to prepare the LT, an approach that ensures the completeness of coverage and consistency with the accounting balance sheet. The LT then filters transactions to remove accounting and valuation changes from the items that impact the transactional reserve position, allowing direct focus on ALFs relevant for attaining the operating target. This process, therefore, requires more resources than the approach presented in the main text.

$$\Delta \text{ Excess Reserves (SR)} = \text{ALFs } (\Delta \text{NFA} + \Delta \text{NCG} + \Delta \text{NCOC} - \Delta \text{CIC} + \Delta \text{OIN}) - \text{demand for reserves } (\Delta \text{RR}) + \text{CB operations } (\Delta \text{OMOs}) \quad (1)$$

The liquidity table allows the central bank to present information on liquidity developments (what has happened and what is forecasted) in a way that facilitates the calibration of the central bank's operations. Extending the liquidity table to develop a liquidity forecasting table (LFT) that incorporates actual values (at time *t*) and forecasted values up to the end of the reserve maintenance period allows the central bank to observe trends and monitor liquidity developments for the reserve maintenance period—in the short-term (Figure 4). The level of detail in the LFT may vary depending on the institutional and financial sector context, the RR framework, and the specification of the operating target (a quantity or a price), and the design of the operational framework.

The LFT should ideally be at a daily interval with a horizon of at least one reserve maintenance period (Figure 6). The opening reserves position (closing from the previous day), changes in disaggregated ALFs (NFA, CIC, NCG and OIN), known central bank operations (maturing and planned) and the demand for reserves (assuming an interest rate operating target), should be included in the forecast. Spanning a full maintenance period with a daily average of reserve compliance against the requirement will highlight the degree to which pressure may emerge on interest rates towards the end of the maintenance period and where the daily average compliance is substantially below or above the required level. Compliance through a given period can also be compared against the observed fulfillment pattern, again to highlight potential liquidity pressures that may need to be addressed through fine-tuning liquidity operations.

Disaggregated file data should feed into the main items on the LFT with a structure that captures outcomes and facilitates the analysis of forecast errors. There should be separate worksheets containing the data at a sufficiently disaggregated level, for generating forecasts for all ALFs and other items that link to the main LFT—to avoid the need for manual reentry of items. As an example, the file on NGP should contain a schedule of government securities maturing and expected issuances (an element that should be relatively certain), and the forecasts of the key revenue and expenditure lines. In addition, the structure of the LFT and associated files should allow for the collection of outcomes in each item—again sufficiently disaggregated—to facilitate rigorous assessment of the forecast errors.

**Figure 6. Liquidity Forecasting and Monitoring Table (Sample)
Assuming 14-day Reserve Maintenance Period**

| Liquidity Forecasting Table for 14-day Reserve Maintenance Period (RMP) | | | | | |
|---|------------|------------|-----------|----------|-------|
| | Day t | Day t+1 | Day.... | Day t+14 | Total |
| A. Opening Reserve Balances (Closing Previous Day) | 23 | 17 | 21 | | |
| <i>1. Autonomous Factor Supply: Inflow (-), Outflow (+)</i> <i>= a+b+c+d+e</i> | <i>-15</i> | <i>10</i> | | | |
| a. Change in Net Foreign Assets (net FX operations) | -15 | 10 | | | |
| b. Change in Currency in Circulation | 2 | -5 | | | |
| c. Change in Net Government Position | -2 | 1 | | | |
| d. Change in Other Entities | 0 | -5 | | | |
| e. Change in Other Items Net | 0 | 9 | | | |
| <i>2. Central Bank Operations – maturing and planned</i> <i>=f+g+h+i+j</i> | <i>-21</i> | <i>-23</i> | | | |
| f. Maturing: Repos (-), reverse repo (+) | -18 | -5 | | | |
| g. Maturing: Standing Facilities: lending (-), deposit (+) | -1 | -18 | | | |
| h. Secondary market purchases (-), sales (+) | 0 | 0 | | | |
| i. Reserve requirement changes | -2 | 0 | | | |
| j. Other transactions | 0 | 0 | | | |
| B. Forecasted Reserves Pre-Central Bank Operations = A+1+2 | -13 | 4 | | | |
| C. Forecasted Demand | 17 | 21 | | | |
| D. Forecasted Excess Supply (+) / demand (-) = B-C | -30 | -17 | | | |
| E. Central Bank Operations – Calibration = k+l+m | 30 | 17 | | | |
| k. Repos [liquidity providing operations] (+), Reverse repos (-) [liquidity draining operations] | 30 | 17 | | | |
| l. Secondary market purchases (+), sales (-) | 0 | 0 | | | |
| m. Other | 0 | 0 | | | |
| F. Forecasted Reserves Post-Central Bank Operations = B+E | 17 | 21 | | | |
| Required Reserves | 18 | 18 | | | |
| Reserves Compliance Actual (daily average to date) | 20 | 16 | | | |
| Reserves Compliance Forecast (based on fulfillment pattern) | 19 | 19 | | | |

Source: Authors.

Ideally liquidity forecasts are produced daily. Even when the central bank conducts its main OMO less frequently, say weekly, daily forecasts allow for closer monitoring of banking system liquidity as the central bank may need to use fine-tuning operations if the daily monitoring indicates a significant

forecasting error or warns of an extraordinary liquidity shock (Cabrero, Camba-Mendez, Hirsh, and Nieto (2002)).

Liquidity forecasts should comprise at least one reserve maintenance period recognizing that forecast quality declines at longer horizons. In the absence of reserve requirements, the horizon should extend to at least the horizon of main OMO (e.g., seven days if the central bank has a weekly seven-day OMO).

Guidance: The residual balance sheet category other items net (OIN) should have no liquidity impact or, if they do, should be forecasted as a separate ALF.

Other Items Net (OIN) are ALFs are not always factors that totally impact liquidity, therefore where the full central bank balance sheet is forecasted, some exceptions may be needed. These items include the central bank's capital, reserves, and the revaluation accounts, fluctuations in which, generally do not impact banking system liquidity. However, there can be cases where such items do impact reserves, for example when central bank dividends are paid into a government account held with a commercial bank and so all transactions in this category need to be considered for impact and materiality on reserves.

Other smaller items of the central bank balance sheet that do not have a significant impact on bank reserves, can be summed up and modeled on an aggregated basis. Only large items should be disaggregated and separately forecasted one of which may be the *reserve float*. A reserve float arises if the payer's and payee's accounts with the central bank are not credited and debited on the same day, a problem arising from inefficiencies in the payment system (Veale and Price, 1994). The best approach to forecast the reserve float is to extrapolate historical data and assess the float's specific economic and noneconomic determinants, such as tax and payroll dates as well as specific factors contributing to transportation delays. ("Reports - Reserve Bank of India") ("Reports—Reserve Bank of India")

Guidance: Leveraging the technical skills from doing short-term forecasts, central banks can prepare longer term forecasts to inform the decision on the deployment of structural liquidity management instruments.

Increasingly, short-term operational forecasts are complemented by a longer-term forecast.

Despite diminished accuracy, longer-term projections are however useful for multiple purposes: (i) they may anticipate large balance sheet swings that may require policy reaction; (ii) they may inform the deployment of structural liquidity operations on a timely, and proactive basis; (iii) they may be a component of a broader balance sheet stress testing to project how central bank capital may evolve and whether assets generate sufficient income to cover monetary policy implementation costs and operating expenses.¹⁹

For identifying structural liquidity operations, the arrangements for the longer-term forecast are substantially similar, with some noteworthy differences:

¹⁹ This aspect is not covered in the scope of liquidity forecasting, but the analytical framework and discussion is available in [CCBS publication, forthcoming].

- *Longer-term forecasts are less standardized than short-term operational forecasts.* There are varying degrees of differences among central banks—in terms of the horizon, the frequency, and granularity of forecasts. However, when conducted regularly, the frequency is seldom greater than quarterly because of the close association with projections for other macroeconomic variables. Some central banks that conduct them yearly, use the information to make decisions on the size of the portfolio of assets to hold, and the reserve requirement ratio needed to manage the structural liquidity position.
- *The granularity is also less.* These would typically be for a monthly data frequency. In addition, statistical models need to be recalibrated to capture the influences of other macro variables that impact reserves, some of which are available only for monthly or lower frequency.
- *Forecasts are presented within a range rather than a point estimate.* The range can be generated based on different assumptions on key variables or based on different macro scenarios. For the purposes it fulfills a range of possible outcomes can be more informative than a point estimate.

What are the Uses for the Deliverables of the LFU?

Guidance: Liquidity forecasting used for the calibration of monetary operations ensures that liquidity conditions are consistently in line with the central bank’s monetary policy stance.

This is a technical decision that is made by the liquidity forecasting and monitoring unit for implementing the announced stance of the monetary policy committee or the executive board of a central bank. The LFU prepares the forecasts and submits proposals on the deployment of monetary instruments available from the central bank’s toolkit to adjust the liquidity position. This analysis is best prepared and presented immediately before the scheduled operation.

The LFU can use the liquidity forecasts to calibrate the monetary operations that comprise:

- Maturing monetary operations.
- Forecasted liquidity change, which is the expected change of liquidity from the LFT.
- Difference between actual and targeted levels of bank reserves. The actual level of bank reserves may differ from the targeted level if the central bank supplied or absorbed less (or more) during the last monetary operation than necessary, due to unexpected changes in market liquidity. The targeted level represents the minimum balance that banks need to maintain for daily operations in the case of no averaging reserve requirement, or the required reserves for the remaining maintenance period in the case of an averaging reserve requirement. Under these circumstances, banks may hold either an excess or insufficient volume of reserves at the central bank. The central bank should adjust liquidity supply or absorption by this amount to ensure that banks have sufficient reserves to meet their demand.

Thus, the calibrated volume of the monetary instrument can be represented as:

$$\text{OPER}_{t+1}^{\text{EST}} = \text{OPER}_t^M - \Delta \text{LF}_{t+1} + (\text{ER}^{\text{tar}} - \text{ER}_t) \quad (2)$$

where,

| | |
|--------------------|--|
| $OPER_t^M$ | is maturing monetary operations |
| ΔLF_{t+1} | is forecast of liquidity change |
| ER_t | is the actual banks' reserves |
| ER^{tar} | is the central bank's target of banks reserves |
| $OPER_{t+1}^{EST}$ | is calibrated monetary operations volume |

In case of averaging reserve requirement maintenance

$$ER^{tar} = \frac{(RR_m \times \text{Days of maintenance period} - \text{average } BR_m \times \text{Days passed})}{\text{Days remained}} \quad (3)$$

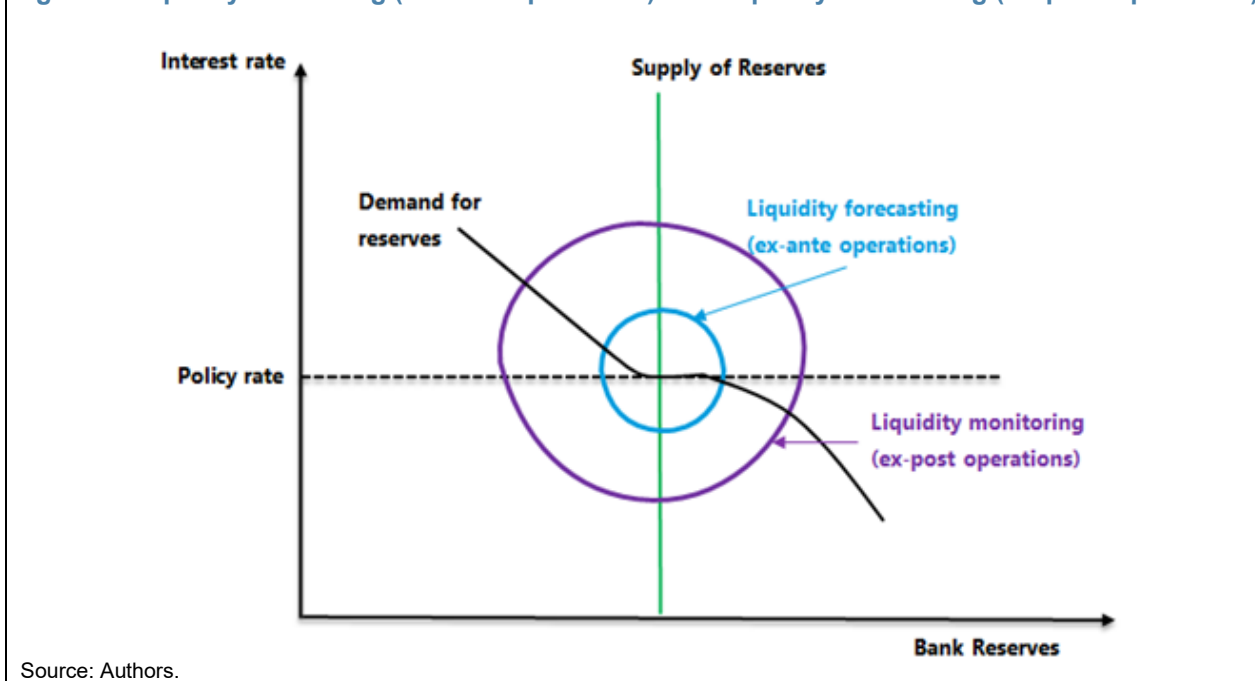
where,

RR_m is required reserves for current maintenance period

average BR_m is the average actual reserves during current maintenance period

In using the liquidity forecasts to set monetary operations, the central bank can reduce the volatility of interbank interest rates. The central bank can adjust liquidity supply or absorption based on either a change in ALFs that have already occurred, through monitoring liquidity changes (ex-post operations or backward-looking assessment for liquidity monitoring), or on the forecasted change in ALFs (ex-ante operations or forward-looking liquidity management). The combination of these activities helps to minimize interbank interest rate volatility around the policy rate, in this case in the smaller perimeter reflecting liquidity forecasting and active liquidity management versus the larger perimeter of liquidity monitoring before operations are calibrated (Figure 7).

Figure 7. Liquidity Monitoring (Ex-ante Operations) and Liquidity Forecasting (Ex-post Operations)



Past TA Advice: Stock and Gaps

An assessment of these institutional components for developing liquidity forecasting frameworks in IMF TA advice was conducted to evaluate the coverage of the components. The observations were generally encouraging, with most advice covering different components to varying degrees. Not all TA reports covered all components, and rightfully so, as the extent of coverage would depend on the stage of development of the central bank in discharging this particular function. This assessment is used to help streamline the scope and imperatives for TA delivery on this topic.

The assessment is based on analyzing over 24,000 sentences on the topic that were extracted from 56 TA reports using a large language model (LLM) (Panel a, Figure 8). The LLM was trained using status quo sentences for the different components (Panel b, Figure 8), with reports containing on average 413 sentences on the components. From this classifier, the assessment also revealed well-defined topic clusters,²⁰ while for other clusters, such as for the forecast error analysis, there is limited coverage and variability (see Panel c, Figure 8).

In summary, the assessment revealed that some components—such as arrangements with counterparties—received greater attention in TA advice (Panel D, Figure 8). Nevertheless, within this component there was a wide thematic array of sentences as reflected in the variability of this cluster. Similarly, on the liquidity template and forecast horizon, the sentence cluster showed greater variability. On other components such as routine forecast evaluation and the publication, recommendations are more infrequent. Table 2 provides a summary of gaps in TA advice on institutionalizing liquidity forecasting and liquidity management, and the solutions proposed in this Handbook Chapter.

Table 2. Typical Gaps in Recommendations and Operational Solutions

| Typical Recommendation | Gap | TA Solution |
|---|---|--|
| 1. Have a MoU with Government/Treasury | No concrete proposal on the MoU and how it should be drafted. | MoU template provided in Appendix I |
| 2. Have a Treasury Cash Coordination Committee | No concentrate recommendation on committee governance and structure | CCC Term of Reference, including governance and membership guidance provided in Appendix I. |
| 3. Routinely assess forecast performance and evaluate forecast errors | Limited forecast quality assessments performed | Prepare error analysis and publish errors ex-post. IMF statistical toolkit can enhance routine for forecast evaluations. |
| 4. Publish liquidity forecasts when central bank has robust and credible framework for preparing forecasts consistently | Few central banks publish liquidity forecasts, and substantial differences in liquidity forecast publication exist. | CBs encouraged to prepare forecasts for shorter horizons that should reflect lower forecast errors and build credibility in process using IMF tools and streamline forecast publication with the IMF Central Bank Transparency Code (CBT) in Pillar IV—Outcome; 4.1.3. ²¹ |

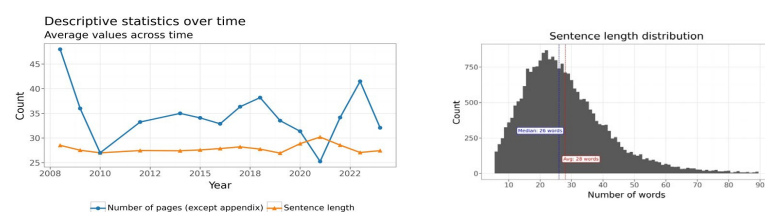
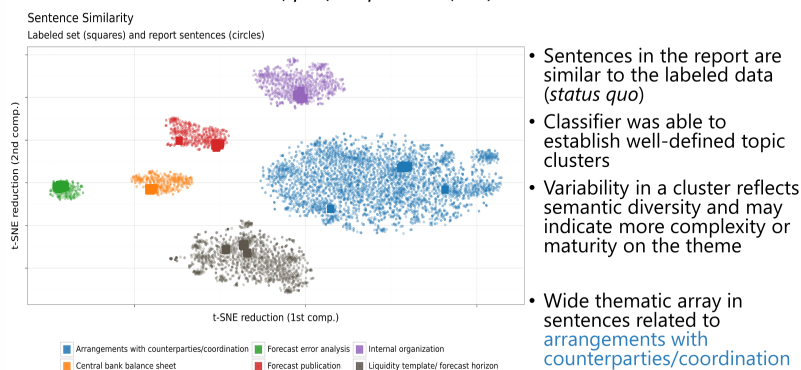
Source: IMF TA Reports, Authors.

²⁰ A cluster refers to a group of data points that are similar to each other based on certain characteristics [Clustering in Machine Learning - Javatpoint](#); in this case context and content. Clustering is used to analyze the sentences from TA reports, which reflect different sentence structures and sequence. The wider the cluster the more dissimilar are the sentences, while the tighter the cluster, the more similar are the sentences.

²¹ <https://www.imf.org/external/datamapper/CBT/>.

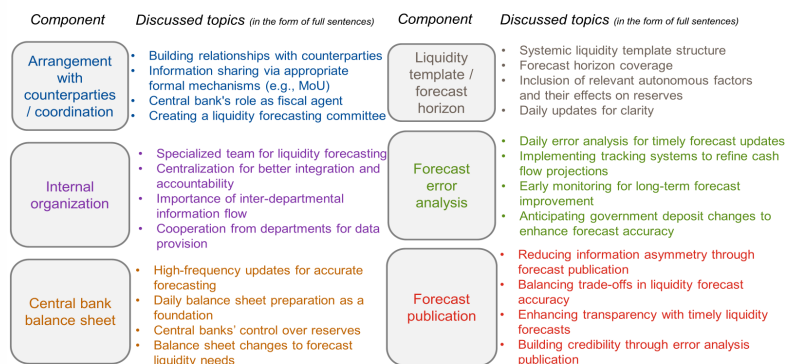
Figure 8. Assessment of TA Advice on the Institutional Framework for Central Bank Liquidity Forecasting**Panel a: Descriptive statistics of the TA reports**

- 23,960 sentences extracted from 58 documents
- On average, each report contains 413 sentences
- The average sentence length is 28 words, and there is a substantial dispersion

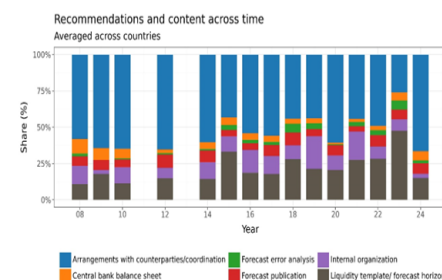
**Panel c: Sentence similarity**
Labeled set (squares) and report sentences (circles)

The similarity assessment is based on a seminal paper on this topic. Van der Maaten, L., & Hinton, G. (2008). Visualizing Data using t-SNE. *Journal of Machine Learning Research*, 9(11):2579-2605."

Source: Authors.

Panel b: Status-quo of knowledge for liquidity forecasting
Each component contains 30 representative sentences**Panel d: IMF Technical Assistance Coverage**

- Across the approximately 24,000 sentences extracted from 58 documents, TA scope shows good representation of the components of the liquidity forecasting institutional set-up.
- Emphasis has been reflected on arrangements with counterparties, with progress on error analysis and forecast publication.



Technical Assistance Approach

Guidance: Develop a sequenced approach to allow the central bank to fully incorporate and to use liquidity forecasting in the decision-making process for its operations, and to systematically monitor liquidity developments and conditions.

TA will involve several steps to provide the authorities with a liquidity forecasting framework that is efficient and is fully integrated in monetary operations decision-making. The points of emphasis in the context of TA will depend on the country capacity, including data availability, staff skills, and the institutional arrangements for the central bank's operational framework. While liquidity forecasting (and monitoring) is useful for the implementation of monetary operations irrespective of the operational framework, it is even more relevant when the central bank uses an interest rate operating target and where it conducts auctions as a routine part of its monetary operations.

Some key issues that are addressed in the context of TA include:

1. *Identifying a dedicated team of experts to build out data requirements and to outline methods for coordination and reporting through an institutionalized framework.*
 - TA could detail the institutional arrangements for the internal organization that will centralize the responsibilities to define and maintain the liquidity forecasting methodologies, the regular collection and processing of data and information, the regular production of report and forecast, and the assessment of the quality of the forecast in a dedicated, adequately staffed unit.
 - TA may need to assess and recommend changes as necessary on central bank capacity (types of skills), resourcing (number of staff) and the organizational structure (location of forecasting unit and reporting lines).
 - The central bank may also use TA to help establish internal reporting protocols, including the discussions on liquidity analysis and developments, and report distribution to staff with an adequate level of seniority so that this information feeds directly into monetary operational decisions for the central bank to achieve its operational target.
2. *Identifying the key drivers of liquidity and ensuring that the LFU's activities are streamlined to systematically gather data and information from internal and external sources and counterparties.*
 - TA will need to assess the institutional context (i.e., location of the government account, role of SOEs or NBFIs) and financial sector development to ensure an understanding of the drivers of banking system liquidity. Where the arrangements with counterparties are not in place, TA could assist with the establishment of some of these arrangements (MOU, surveys, econometric models, etc.). In general, the more relevant is a driver, and the greater is its uncertainty and volatility, the more effort should be made to adequately forecast it.
 - TA could help authorities identify the key elements of the MOU that would facilitate practical cooperation with the MOF that supports the liquidity forecasting function of the central bank. In

instances where with coordination with the MoF may be constrained by political economy issues, establishing an effective relationship through an MoU may be challenging. TA could bridge the gap by setting minimum information exchange requirements and establishing communication channels *ex novo*. Including MoF representatives in relevant discussions could help identify possible pathways for a working relationship among technicians.

- In setting out the MoU TA could assist with outlining specific data provision requirements (in terms of frequency, break down, timeliness, channels of transmission) with the main nonmonetary counterparties. The MoU shall also provide scope for regular clarification when uncertainty arises and the overall cash management strategy.
 - TA could help systematize the central bank's conduct of an interbank survey that covers liquidity demand and near-term developments. Ideally, TAs on the topic should include an interbank survey which forms part of the assessment on liquidity distribution. Setting out a plan for the central bank to conduct such surveys on a regular frequency, post mission, is encouraged.
3. *Ensuring that the data from the central bank's statement of condition listing of account balances are mapped to present the information in an analytical balance sheet format that is available at least at a daily frequency.*
- TA needs to review the available data (of the ALFs)—quality and frequency—and may identify data gaps to be addressed. Providing advice on the structure of the database needed to support the liquidity forecasting process is advisable for setting foundations for future conducting statistical exercises.
 - TA could help central bank staff to convert the daily statement of condition (the accounting balance sheet) to an analytical balance sheet (where this does not exist) to identify the key components for the liquidity table and liquidity forecasting template.
 - TA should also assess and advise on the technical applications needed to store data, perform edit/quality checks on consistency and plausibility, generate statistical forecasts, and prepare assessments of realized figures versus forecasts to evaluate forecast errors. It is also important that the technical infrastructure is flexible enough to facilitate ad hoc analysis of liquidity developments, and ALF patterns, example for longer-term forecast periods.
4. *Customizing the standard liquidity table to allow the central bank to readily identify the developments in reserves that directly influence its operating target and calibrate OMOs.*
- TA needs to ensure that the liquidity table is consistent with the institutional and financial set-up; the monetary policy framework (i.e., a quantity or interest rate operational target) and the operational framework (i.e., frequency of main operation, design of reserve requirement).
 - Where the central bank may derive an optimal bank reserve demand level to maintain its operating target, the template should reflect this target and make the adjustments for the calibration of OMOs. In addition, the liquidity table may need to be adjusted to reflect banks'

preferred fulfillment patterns, as the central bank may need to calibrate its operations depending on the pattern of fulfillment characteristic of the banking system.²²

- TA should ensure that the frequency for compilation and disseminating information on liquidity forecasts align with decision-making structures to ensure timely policy actions and outline the appropriate timelines for and horizon of the forecasts.
 - At the initial stages (where the central bank is at the starting point of the developing the liquidity forecasting framework), TA support to the central bank in developing the routines for liquidity monitoring and calibrating the monetary operations for active liquidity management may be needed. This can be conducted concurrently with the work of the LFU to refine the forecasts for ALF progresses.
5. *Central banks should be encouraged to routinely evaluate forecast performance, to set out clear protocols for transparency about the liquidity framework, and to explain how liquidity forecasting, as a tool, works within the context of the monetary framework.*
- TA could help to set up process for routine error analysis of liquidity forecasts and emphasize the need for constant improvement to address any deterioration in forecast quality. Evaluation reports should identify the main sources of forecast errors, link such errors to market impact, when applicable, and provide an historical perspective on how errors changed over time, so that material deviations can be addressed to minimize their impact on the central bank attaining it operational target.
 - TA should provide guidance on developing publication guidelines in line with the IMF CBT at a minimum. Based on the error performance, TA should consider which aspects of the liquidity forecasts should be shared. With central banks more focused on using transparency as a tool to establish its track record and to give account for its mandate(s) the publication of monetary operations should be regularized and distributed within a specified timeline based on the decision-making calendar and when the monetary operations are conducted. The medium for sharing this information can vary, as more central banks use electronic platforms to conduct operations the information dissemination would be targeted to its main counterparties.²³
 - In instances where the forecasts are not published, TA could provide an assessment on the desirability of such publication, its potential benefits, and prerequisites.

²² See Reserve Requirements, MCM TA Handbook, page 24.

²³ The target audience for the publication of liquidity forecasts is typically the monetary operations counterparties. However, the central bank could also publish the forecasts and historical data on liquidity developments on its website for use by other stakeholders, including researchers.

Appendix I. Template for the Memorandum of Understanding (MoU) between the Central Bank and the Ministry of Finance¹

| Section Name | Description of Section | Suggested Guidance |
|--------------------|---|--|
| A. Purpose | This section outlines the objectives and scope of the MoU. | <ul style="list-style-type: none"> i. This MoU sets out the terms for cooperation between the [Central Bank name] and the [Ministry of Finance name], hereafter, the Treasury] in sharing information and data, and joint procedures to support the implementation of monetary policy by the [Central Bank name]. ii. By signing this memorandum, the parties agree to cooperate on information sharing and recognize the responsibilities set forth in this document and all related appendices. iii. Whereas the [Central Bank name] is designated by [insert name of Law, and relevant section] to act as banker for the Treasury, the Treasury is responsible for providing forecasts of the daily, weekly, monthly, and quarterly information on [net changes in the Treasury account balance/projected end of day Treasury account balances] as a result of state budget revenues and expenditures, debt management inflows and outflows, and other non-recurrent inflows and outflows to allow the central bank to determine the impact of Treasury operations on domestic currency reserves. |
| B. Preamble | This section sets up the legal context for the respective agencies to operate and agree to the MOU. | |

¹ Important Notice: This template provides general guidance on the compilation of an MOU specifically for the central bank in discharging its responsibility for liquidity forecasting of banking system reserves associated with its responsibilities for monetary policy. The MOU aims to facilitate orderly and systematic coordination between the ministry of finance and the central bank, based on the central bank's responsibility for monetary policy; and its duties as the government's banker, fiscal agent, and adviser. This MOU template does not contain exhaustive provisions or accountability requirements to fully protect the parties involved. Users must adapt the suggested guidance under reliable legal advice to ensure comprehensive protection for all signing parties. The International Monetary Fund shall not be held liable for any losses, damages, or claims arising from the use of this MOU template. Users are responsible for ensuring that the final MOU adopted is legally sound and adequately protects the interests of all parties involved.

| Section Name | Description of Section | Suggested Guidance |
|---------------------------------------|---|---|
| C. Rights and Responsibilities | This section details the specific responsibilities of each party regarding information sharing. | <ul style="list-style-type: none"> iv. The Treasury is responsible for providing the central bank with information on the government cash flow from its main operating account(s) that will impact reserves at least over a monthly horizon. The specific information is detailed in an Annex that is discussed and agreed by both parties. v. Where the Treasury becomes aware of material changes in its estimated revenues and expenditures previously provided, the information should be provided immediately to the central bank as part of any daily submissions, such that its assessment of liquidity developments can be as accurate and as comprehensive as possible. vi. Weekly updates to forecasts provided at the start of each month can be submitted to reflect the latest forecasts for the government cash flows. |
| | A Technical Annex (sample provided) may be added to itemize the specific data needed. This Annex can be updated annually, with revised or new data requests, new delivery timelines and persons who should handle the data and its transmission; without the need for the parties to sign a new the MOU annually. | <ul style="list-style-type: none"> vii. The central bank is responsible for providing the Treasury with information on liquidity, aggregate banking sector data at the beginning of each month. <ul style="list-style-type: none"> • Updates in short-term liquidity forecasts are to be provided to the Treasury each week. • Forecasts on liquidity developments for the upcoming quarter, and potential impacts for debt issuances, and risks to placements are shared at the start of each quarter, and to satisfy ad hoc requests. |
| D. Data Transmission | Specifies the method and format for exchanging information. | viii. Information is exchanged electronically, with details such as the format (e.g., CSV files sent by email) to be set forth in a technical annex. |
| E. Cash Coordination Committee | Specifies the formalization of the committee, outlining its purpose, scope, and composition. | ix. The primary objective of a cash management committee is to ensure efficient management of government cash flows, optimize liquidity, and minimize borrowing costs. |

| Section Name | Description of Section | Suggested Guidance |
|--|--|---|
| | | <ul style="list-style-type: none"> x. The committee's core roles include: (1) oversees the forecasts of government cash flows that are relevant for general cash management and for the central bank's liquidity forecasts, and (2) reconciles short-term forecasts for the main budget items for revenues and expenditures. xi. As an extension, the CCC may be tasked with implementing cash management strategies on behalf of government. xii. The possible requirements and authority of the CCC should be detailed in a Terms of Reference for the CCC, see sample TOR as an appendix of this MOU template. |
| F. Data Revisions | Procedures for handling major data revisions. | <ul style="list-style-type: none"> xiii. In the event of a significant revision between regular data transmissions, the party that produced the data will send revised data to the other party as soon as possible, with significant movements flagged. |
| G. Procedure in the Event of a Disaster | Steps to follow in case of a disaster affecting data reporting. | <ul style="list-style-type: none"> xiv. In exceptional circumstances, the parties may agree to a temporary reduction in reporting and data deadlines and may use an alternative electronic platform. Contact details for disaster recovery are listed in the technical annex. xv. The central bank is prohibited from publishing data (in terms of forecast) or realized data received from the Treasury, or any of its departments, from which data originates. The central bank can however publish aggregated liquidity forecasts and data on its liquidity management activities, or as derived from its balance sheet which could include aggregate government liabilities and assets. The reverse is equally true, as any information (forecast or realized) on monetary policy operations and implementation to be published is the sole responsibility of the central bank. |
| H. Confidentiality | Rules for maintaining the confidentiality of shared information, are applicable, as the parties will follow non-disclosure rules and use non-public information only internally. | <ul style="list-style-type: none"> xvi. All non-public and unpublished data must be accorded the highest level of confidentiality by the receiving party. |
| I. Amendment Procedure | Processes for making amendments to the MoU. | <ul style="list-style-type: none"> xvii. There are two procedures: a general amendment procedure requiring mutual consent of the parties or their alternates, and a simplified amendment procedure for specific paragraphs, which can be amended by mutual consent of local |

| Section Name | Description of Section | Suggested Guidance | |
|---|--|--------------------|--|
| J. Periodic Review and Revisions | Guidelines for reviewing and revising the MoU periodically. | xviii. | management. Lists of authorized signatories for each amendment procedure are maintained and exchanged. The parties will review the MoU every five years and conduct general amendments, as necessary. |
| | Conditions under which the MoU can be terminated. | xix. | Either party may terminate the MoU with six months' notice. The MoU enters into force one month after the day of its signature. |
| K. Termination | Section for the signatures of the parties involved and should be agreed at the highest level for the respective parties. | xx. | Insert the date and the names of the representatives from the respective institutions to sign the MOU. |
| L. Signatures | | | |

Appendix II. Technical Annex: Itemized Listing of Information for Sharing Under MoU, and Timelines for Delivery

This schedule provides examples of the information that should be identified and tabulated for ease of reference in the MOU. The specific timelines for delivery depend on the start of the reserve maintenance period, the length of the maintenance period (which may overlap two calendar months), the time in the maintenance period for the central bank's operations, and the tenor for the central bank's operation. Where there are multiple operations in the reserve maintenance period, the central bank may need more frequent updates of the information.

Data format and delivery: All data should be sent as Excel files via email addressed to: []

(list names of persons within whom the information should be shared):.

| <u>Central Bank Staff</u> | |
|---------------------------|-------|
| Names | Email |
| | |

| <u>Ministry of Finance Staff</u> | |
|----------------------------------|-------|
| Names | Email |
| | |

| Information Description (Examples) | Timeline for Delivery (Examples) |
|---|--|
| Information from Treasury to Central Bank: | |
| Revenues for the consolidated budget for accounts at the central banks: forecast for each day during the month. | 2 days before the end of the month |
| Expenditure payments from the consolidated budget account at the central bank: itemized based on recurrent expenses, debt maturity, interest payments, etc.: for each day during the month. | 2 days before the end of the month |
| Revenues broken by categories of tax and non-tax items to the consolidated accounts at the central banks: daily actual flows for each day in the reporting period. | weekly by the 2 nd business day of the following week for the preceding week. |
| Information from central bank to Treasury: | |
| Forecast of banking sector liquidity for one month ahead. | weekly by the 2 nd business day of the first week of the month. |

Appendix III. Terms of Reference for the Cash Coordination Committee (CCC) for the Ministry of Finance for [Country] and the Central Bank of [Country]¹

The Cash Coordination Committee (CCC) is an Inter-Agency Committee on the programming of government revenues and expenditures in [country name]. The CCC includes representatives from the [Insert list of government departments with responsibility for handling government accounts, managers for revenue and expenditure areas, and debt management office] and the [insert relevant dept for liquidity forecasting] of the [Central Bank name].

This committee play a crucial role in coordinating the financial operations between the Treasury and the Central Bank.

This Terms of Reference (TOR) sets out, in detail, the modalities for the operations of the CCC.

Purpose and Scope

- **Objective:** The primary objective of a cash management committee is to ensure efficient management of government cash flows, optimize liquidity, and minimize borrowing costs.
- **Scope:** The committee oversees the coordination of cash flow management, liquidity forecasting, and the implementation of cash management strategies.
- **Relationships with other Policy committees:** (if any)

Composition

- **Ex-officio members:** Typically includes senior officials from the Ministry of Finance, the Treasury, and the Central Bank. Members may also include representatives from other relevant departments such as budget, debt management, and financial planning.
- **Roles:** Each member has specific roles and responsibilities, such as providing data, analyzing cash flow trends, and making policy recommendations.
- **Special invitees:** can be asked to participate in meetings of the CCC to discuss specific aspects that are relevant for the work of the Committee.

Meetings

- **Frequency:** Regular meetings are held, often monthly or quarterly, to review cash flow forecasts, discuss liquidity needs, and plan for upcoming financial requirements.
- **Agenda:** Meetings typically include discussions on cash flow projections, review of past performance, and planning for future cash needs.
- **Secretariat services:** Can be central bank staff designated by their function for liquidity forecasting and monetary operations implementation.

¹ Whereas this document sets out typical functions of the Cash Coordination Committee (CCC), the signing parties to the MOU will need to customize these requirements based on the specific country context and the roles and authority defined for the CCC.

Responsibilities

- **Treasury:** Responsible for providing detailed cash flow forecasts, managing government bank accounts, and ensuring timely settlement of government transactions.
- **Central Bank:** by virtue of its role as banker to government can use information from the Treasury Single Account (TSA) to develop forecasts and conduct forecast evaluations to advise the work of the Committee. It also, updates on monetary policy operations, provides comprehensive liquidity forecasts that may impact government cash management activities, including for domestic debt operations.

Reporting

- **Reports:** Regular reports are prepared on cash flow status, liquidity positions, and financial forecasts. These reports are shared with the committee members, who may share them with designated senior management for their respective agencies.
- **Transparency:** Ensures that cash management operations and decisions therefrom are made in a transparent manner of the basis for sound decision-making.
- **Circulation of CCC minutes:** shall not be circulated outside of the ex-officio members of the CCC.
- **Disclosure of the CCC:** no external publications are allowed from the discussions of the CCC.

Review and Improvements

- **Periodic Review:** The committee's performance and effectiveness are reviewed periodically. This includes assessing the accuracy of cash flow forecasts.
- **Continuous Improvement:** Recommendations for improvements are made based on the review findings, or changes in operational arrangements that can enhance the overall cash management process.

Confidentiality

- **Data Security:** Ensures that sensitive financial information is kept confidential and is only shared with authorized personnel for the respective agencies.
- **Non-Disclosure:** Members are required to adhere to non-disclosure agreements to protect the integrity of the information. These non-disclosure agreements are signed upon the appointment of each committee member.

Amendments

- **Flexibility:** The guidelines and procedures of the committee can be amended as needed to adapt to changing financial conditions and requirements.
- **Approval:** Amendments are typically approved by senior management for the respective agencies or through a formal approval process involving all committee members.

Appendix IV. Central Bank Survey on Liquidity Developments in the Interbank Market (Sample)

This survey is conducted to gather qualitative information on liquidity use and credit terms and conditions in domestic currency in the interbank market and wholesale funding market. The survey serves as part of the central bank's data gathering for understanding the main drivers of the trends in the distribution of central bank reserves over a reserve maintenance period, or any specified period that is defined by the central bank. The information collected is valuable for monetary policy purposes.

The survey questions are grouped into three sections covering:

1. **Institutional reserve balances and liquidity management in domestic currency**—examines key aspects of institutional reserve and liquidity management, including reserve balances, use of central bank operations, high-quality liquid asset holdings.
2. **The use of unsecured and secured transactions in the domestic money market**—examines typical size and frequency of deposits, borrowings, and lending activities with various counterparties across wholesale markets, as well as the variability of interest rates for both secured and unsecured transactions. It also explores the use of different financial instruments in institutional liquidity management.
3. **Counterparty arrangements and risk management practices**—examines various aspects on existing counterparty arrangements in the interbank market, and risk management practices in using the domestic interbank market, including lending, and borrowing limits, and haircut on collateral.

SECTION I: INSTITUTION'S RESERVE BALANCES AND LIQUIDITY MANAGEMENT

Reserve Balances

1. What was the average reserve balance on your current account or settlement account at the central bank for the last reserve maintenance period?
2. What was the average reserve balance on your current account or settlement account at the central bank for the last reserve maintenance period?
3. What was your minimum reserve requirement for the last reserve maintenance period?
4. If your actual average reserve balance exceeded the minimum reserve requirement, what are the main reasons? What is the average reserve balance you plan to, or forecast to retain for the next reserve maintenance period?
5. Does this planned average reserve balance exceed the minimum reserve requirement for the current period?
6. If yes, what are the main reasons?

Use of Central Bank Instruments in Institutional Liquidity Management

7. Does your institution regularly use central bank instruments for managing your reserve position?
8. If not, what other liquidity instruments are used?

7. Does your institution participate regularly in the central bank's reserve sterilization operations?
8. If not, what are the main reasons?
9. Does your institution participate regularly in the central bank's reserve providing operations?
10. If not, what are the main reasons?
11. What information on the central bank's standing facilities influences your decisions to hold or lend excess reserves?
12. How many times did your institution use the central bank's standing deposit facility during the last reserve maintenance period?
13. How many times did your institution use the central bank's standing refinancing facility during the last reserve maintenance period?
14. Indicate the average value of funds placed on the standing deposit facility during the last reserve maintenance period.
15. Indicate the average value of refinancing loans from the standing lending facility during the last reserve maintenance period.

SECTION II: FUNDING COSTS AND LIQUIDITY INSTRUMENTS

16. What are the main sources of funding for your institution in national currency?
17. Do you use the interbank market for managing your reserve position or treasury activities?
18. In what type of assets are excess reserves or short-term liquidity buffers typically held?

High-quality Liquid Asset Holdings

19. Indicate the average amount of cash held on current accounts for the last reserve maintenance period.
20. Indicate the average balance of central bank sterilization instruments held for the last reserve maintenance period.
21. Indicate the average balance of government securities held for the last reserve maintenance period.
22. Indicate the average balance of other liquid assets held for the last reserve maintenance period.
23. What is the value of total assets held by the institution as of the end date of the last reserve maintenance period?

Interest Rates and Funding Costs

24. Which interest rate in the domestic financial market best tracks your funding costs?
25. Relative to the risk-free reference interest rate, what was the variability of your average borrowing rate for unsecured money market transactions conducted during the last reserve maintenance period?
26. Relative to the risk-free reference interest rate, what was the variability of your average lending rate for unsecured money market transactions conducted during the last reserve maintenance period?
27. Relative to the risk-free reference interest rate, what is the variability of your average borrowing rate for secured money market transactions conducted during the last reserve maintenance period?

Interbank Market Activities

- 28. What type of transaction is used for most transactions in the interbank market?
- 29. Indicate the frequency and average maturity of your borrowing reserves in the interbank market.
- 30. Indicate the frequency and average maturity of your lending reserves in the interbank market.
- 31. Indicate the frequency and average maturity of your borrowings from other financial corporations.
- 32. Indicate the frequency and average maturity of your borrowings from non-financial corporations.

Deposits and Borrowings

- 33. Indicate the average value of deposits from interbank counterparties.
- 34. Indicate the average value of deposits made with interbank counterparties.
- 35. Indicate the average value of deposits with other financial institutions.
- 36. Indicate the average value of deposits from other financial institutions.
- 37. Indicate the average value of deposits from non-financial corporates.

Unsecured Transactions in the Domestic Money Market

- 38. What is the share of unsecured money market transactions relative to your balance sheet size?
- 39. Indicate the average value of unsecured borrowing using commercial paper.
- 40. Indicate the average value of unsecured borrowing using certificates of deposit.
- 41. Indicate the average value of unsecured lending using commercial paper.
- 42. Indicate the average value of unsecured lending using certificates of deposit.
- 43. Indicate the number of transactions done for unsecured borrowing with interbank counterparties during the last reserve maintenance period.
- 44. Indicate the number of transactions done for unsecured lending with interbank counterparties during the last reserve maintenance period.

Secured Transactions in the Domestic Money Market

- 45. Indicate the average value of secured borrowing using bilateral repos in the interbank market during the last reserve maintenance period.
- 46. Indicate the average value of secured borrowing using bilateral repos with other financial institutions during the last reserve maintenance period.
- 47. Indicate the average value of secured borrowing using bilateral repos with non-financial corporates during the last reserve maintenance period.
- 48. Indicate the average value of secured borrowing using collateralized loans in the interbank market during the last reserve maintenance period.
- 49. Indicate the average value of secured borrowing using collateralized loans with other financial institutions during the last reserve maintenance period.
- 50. Indicate the average value of secured lending using repos with interbank market counterparties.
- 51. Indicate the average value of secured lending using bilateral repos with other financial institutions (NOT BANKS).
- 52. Indicate the average value of secured lending using collateralized loans with interbank market counterparties.

- 53. Indicate the average value of secured lending using collateralized loans with other financial institutions.
- 54. Indicate the average value of secured borrowing using currency swaps with interbank counterparties.
- 55. Indicate the average value of secured lending using currency swaps with interbank counterparties.
- 56. Indicate the average value of secured borrowings using currency swaps with other financial institutions.
- 57. Indicate the average value of secured lending using currency swaps with other financial institutions.

SECTION III: COUNTERPARTY ARRANGEMENTS AND RISK MANAGEMENT PRACTICES

- 58. Indicate the number of counterparties your institution has in the domestic interbank market.
- 59. Within the last year, how has the number of counterparties in the domestic interbank market changed?

Lending and Borrowing Limits

- 60. Indicate your largest lending limit in domestic currency with interbank counterparties.
- 61. Indicate your largest borrowing limit in domestic currency with interbank counterparties.
- 62. Indicate your smallest lending limit in domestic currency with interbank counterparties.
- 63. Indicate your smallest borrowing limit in domestic currency with interbank counterparties.
- 64. Within the last year, how has your largest lending limit in domestic currency with interbank counterparties changed?
- 65. Within the last year, how has your largest borrowing limit in domestic currency with interbank counterparties changed?
- 66. Within the last year, how has your smallest lending limit in domestic currency with interbank counterparties changed?
- 67. Within the last year, how has your smallest borrowing limit in domestic currency with interbank counterparties changed?

Bid-Ask Spreads

- 68. What is the average range for the bid-ask spread for unsecured money market transactions conducted within the domestic financial system this year?
- 69. What is the average range for the bid-ask spread for secured money market transactions conducted in the domestic financial system this year?
- 70. Within the last year, how have bid-ask spreads on unsecured transactions conducted in the domestic financial system changed?
- 71. Within the last year, how have bid-ask spreads on secured transactions conducted within the domestic financial system changed?

Types of Security for Secured Transactions

- 72. What type(s) of security is typically used for most secured transactions with interbank counterparties?

73. What type(s) of security is typically used for most secured transactions with other financial institutions?
74. What type(s) of security is typically used for most secured transactions with non-financial corporate institutions?

Haircuts on Collateral

75. For secured transactions conducted in the domestic financial market using government bonds or central bank instruments, indicate the range for typical haircuts applicable to acceptable collateral.
76. For secured transactions conducted in the domestic financial market using corporate bonds (issued by financial and non-financial corporates), indicate the range for typical haircuts applicable to acceptable collateral.
77. Within the last year, how have applicable haircuts on secured transactions conducted in the domestic financial market changed?
78. If the institution does not engage in secured lending, what are the main impediments to collateralized transactions - loans or repos?
79. What are the factors (e.g., Creditworthiness of the counterparty, market conditions, duration of the loan) used to determine the rate for unsecured loans in the interbank market? (Rate each factor from 1 to 5, where 1 = Not Important and 5 = Very Important)

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