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BORROWING WITH CASH IN HAND:

The fiscal cost of treasury conservatism

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ABSTRACT

This paper develops and applies a simulation framework for evaluating treasury cash management efficiency in subnational governments. Using daily data from the Indian state of Meghalaya (2013-2021), we document systematic over-accumulation of cash buffers, minimal use of low-cost short-term liquidity facilities, and continued long-term borrowing despite idle balances. We formalize treasury management as an intertemporal optimization problem and simulate alternative liquidity strategies. Results indicate that modest buffer recalibration could have reduced state debt by ₹1,900 crore ($\approx 12\%$ of overall debt) and generated interest savings exceeding ₹133 crore. The findings highlight the fiscal costs of treasury conservatism and demonstrate the value of integrating liquidity and debt management.

Keywords: treasury cash management, public debt, sub-national finance, fiscal optimization, India

JEL classifications: E62, H63, H72, H74

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1. Introduction

Efficient treasury cash management is a critical but often overlooked dimension of public financial management (Wheeler (2004)). While governments typically focus on the size and allocation of public expenditure and debt issuance (see Reinhart and Rogoff (2009), Plekhanov and Singh (2005), Bird and Tarasov (2002), and Topalova and Nyberg (2010)), the timing and management of liquidity—the daily ebb and flow of cash receipts and payments—can have large fiscal implications.¹ Inadequate attention to cash management can lead to avoidable borrowing, increased interest costs, missed investment opportunities for surplus funds, and even liquidity crises that disrupt essential public service delivery.

This issue is particularly salient for sub-national governments in federal systems like India. State governments, which shoulder the bulk of public expenditure responsibilities in sectors such as health, education, and other public service delivery, have limited flexibility in raising revenue and are heavily dependent on transfers from the central government (see Lahiri (2000) and Smoke (2023)). Yet, the timing of these transfers are independent of expenditure commitments (Rao (2002); Reddy and Reddy (2018)). As a result, state treasuries are forced to maintain large precautionary cash balances or resort to ad hoc borrowing, both of which entail significant fiscal costs (see Pattanayak (2022) and Mu (2006)).²

Despite its fiscal relevance, treasury cash management has attracted relatively little academic attention, especially in the context of developing and emerging economies. Most existing studies focus on debt sustainability, intergovernmental transfers, or expenditure efficiency, while the daily mechanics of liquidity operations remain in the shadows. Moreover, there is limited empirical work that utilizes high-frequency treasury data to evaluate actual cash management performance or to simulate alternative strategies.

This paper seeks to fill that gap. Focusing on the northeastern Indian state of Meghalaya, we present a detailed analysis of sub-national treasury cash management using daily data over the period 2013–2021. Meghalaya provides an instructive case: it is fiscally constrained, reliant on central transfers, and exhibits typical timing mismatches between inflows and outflows. It also maintains relatively high average cash balances and borrows heavily from the market. Using this case, we ask three interrelated research questions:

1. How do state governments currently manage liquidity mismatches between inflows and outflows of cash?
2. What are the fiscal costs associated with current treasury practices, specifically the holding of excess cash or the premature resort to long-term borrowing?
3. Can active liquidity management reduce borrowing costs without compromising expenditure stability?

We place this study within a broader literature on public debt and fiscal discipline. Traditional work in public finance has emphasized the importance of fiscal rules, budget discipline, and debt ceilings (see Allen and Tommasi (2001)). More recent research has turned toward improving intra-year fiscal management, including expenditure smoothing, cash forecasting, and active debt portfolio management (for detail, refer to Cangiano et al. (2013), Gardner and Olden (2013), and Missale (2012)). However, most of these studies focus on national governments in OECD countries, where treasury systems are more sophisticated and borrowing access more predictable. The conditions facing Indian states are different: institutional constraints, lack of callable debt instruments, rigidities in borrowing approvals, and the asymmetry in central transfers all complicate liquidity decisions.

¹Cole (2009) demonstrates how government financial interventions are often driven by political motives rather than economic efficiency. This provides a useful parallel for understanding why a state might borrow long-term inefficiently.

² For an excellent overview, refer to Ter-Minassian (1997).

Within the Indian context, state cash management has received little systematic attention beyond descriptive treatment in Reserve Bank of India (RBI) reports. While the RBI offers short-term liquidity facilities such as Ways and Means Advances (WMA) and Special Drawing Facility (SDF), and automatically invests surplus funds in Intermediate Treasury Bills (ITBs), these mechanisms are often underutilized or misaligned with actual treasury needs. State governments, instead, tend to adopt a conservative strategy, holding excess cash buffers or resorting prematurely to long-term borrowing, often at higher interest costs. This strategy is not necessarily optimal, especially when more cost-effective liquidity management tools exist.

In this study, we examine the fiscal inefficiencies embedded in the treasury operations of the Indian state of Meghalaya using the daily ledger of cash balances, borrowings, and investments over the period FY2013–14 to FY2020–21. To quantify the losses, we first develop a stylized two-period model of treasury liquidity management under borrowing constraints, which captures the core trade-off between the opportunity cost of idle cash and the risk-adjusted cost of short-term borrowing. This model serves as the analytical foundation for a simulation framework that incorporates real-world institutional constraints, including RBI provided short-term liquidity facilities.

In the second part, using this framework, we simulate two counterfactual strategies: a conservative strategy that eliminates excess cash holdings by anchoring the opening buffer to the previous year's minimum balance, and an active strategy that pushes the historical minimum buffer downward to match the state's cumulative borrowing capacity under RBI liquidity windows. This simulation framework enables a direct comparison of fiscal outcomes—particularly the interest costs incurred—under prevailing treasury practices versus economically and institutionally feasible alternatives.

Our key findings are as follows. First, the state of Meghalaya has maintained average daily cash balances significantly higher than necessary, with limited use of short-term liquidity windows provided by the RBI. Second, the state has relied heavily on market borrowing, with long-term loans increasing substantially over the study period. Third, we estimate that adopting even a conservative optimization strategy (maintaining zero excess cash) would have saved the state approximately ₹133 crore over eight years. Under a more extreme strategy, where liquidity is pushed to its limits (but within the RBI's tolerance limits), the estimated fiscal savings rise to ₹253 crore. These are significant sums for a small state.

This paper makes four main contributions. First, we bring the treasury cash management problem into the academic conversation on sub-national fiscal policy, with a detailed case study based on high-frequency data, an approach rarely seen in an emerging countries context. Second, we propose and implement a simulation framework that can serve as a decision support tool for state treasury officials. Third, we offer a typology of liquidity management instruments available to Indian states and the associated costs and constraints, providing a roadmap for reform-minded policymakers. Finally, by quantifying the opportunity cost of cash mismanagement, we highlight a low-hanging fruit in fiscal consolidation that does not require politically difficult tax hikes or expenditure cuts.

While our empirical analysis focuses on a single state, the underlying framework is broadly generalizable. Numerous Indian states confront comparable challenges in managing intrayear cash flow mismatches, navigating unpredictable intergovernmental transfers, and operating under binding institutional constraints on short-term borrowing. These features are not unique to India; sub-national governments in other federal systems—particularly those with limited fiscal autonomy and exposure to volatile revenue streams—are likely to face similar liquidity management dilemmas (Boardway and Shah, 2007). The Indian case, however, is especially salient for public finance practitioners and researchers due to the sheer scale of its federal architecture, comprising 28 states and 8 union territories, whose aggregate borrowing behaviour has significant implications for national fiscal stability and macroeconomic risk.

The rest of the paper is structured as follows. Section 2 sets the context and documents the current practices of state treasury operations in India. Section 3 documents the specific case of Meghalaya's cash management practices using daily data. Section 4 introduces a stylized theoretical model, while Section 5 documents the simulation methodology. Section 6 presents the results of the counterfactual analysis. Section 7 discusses broader implications and policy recommendations.

2. Setting the context

For any financially active entity—whether a private corporation, a non-profit institution, or a sovereign government—efficient management of cash and liquidity is a fundamental requirement. A treasury management system ensures that inflows and outflows of funds are aligned, liquidity is available when needed, and surplus funds are either invested productively or used to retire debt.³

In the case of public institutions, this function carries even greater weight. Unlike corporations that manage shareholder funds, governments manage public resources and are responsible for delivering essential services. Therefore, any inefficiency in treasury operations has immediate implications for public service delivery, fiscal stability, and overall economic credibility. Moreover, the scale of operations is often enormous. Governments routinely manage cash flows running into thousands of crores, and even small deviations in liquidity strategy can generate significant costs or savings (see [Liu and Waibel \(2008\)](#)).

The challenge of treasury management is even more complex and consequential at the subnational level. In federal systems like India, state governments are responsible for nearly 60% of total public expenditure but possess limited control over revenue generation. Their fiscal space is constrained by centrally determined tax-sharing formulas, conditional grants, and rigid borrowing frameworks. As a result, state treasuries often navigate significant timing mismatches between receipts and expenditures. For example, while salaries, pensions, and interest payments are disbursed in the first week of the month, major revenue sources like GST compensation or central grants arrive with lags or at irregular intervals. This structural misalignment forces states to either borrow at short notice or maintain large idle balances, both of which impose fiscal costs.⁴

To help state, the RBI, acting as the banker and debt manager for most states under Section 21A of the RBI Act, has developed a structured framework to help states manage such liquidity mismatches. Broadly, the tools available can be categorized based on whether the state faces a *shortfall* or a *surplus* of liquidity.

³ Failure to do so can result in missed obligations, inefficient borrowing, or foregone investment income.

2.1 Managing liquidity shortfalls

RBI has devised various means to help the states tide over temporary mismatches in the cash flows of their receipt and payments. The most popular of which is the “Ways and Means Advances (WMA).” WMA is defined as ‘advances repayable in each case not later than three months from the date of the making of the advance.’

There are two types of WMA:

Normal WMA: Also known as *Clean WMA*, it was instituted in 1937. The Normal WMA limit vary from state to state on the basis of total expenditure (revenue plus capital expenditure) to account for their fiscal size. For most states, the WMA limit is a fixed percentage of their expenditure adjusted for lottery expenditure. Currently, the fixed percentage is 2.03% for all states except for the Himalayan states (Himachal Pradesh, Uttarakhand and Jammu & Kashmir) and the North Eastern states (Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland and Tripura), for which it is 2.78%. [Reserve Bank of India \(2021\)](#) documents the evolution of WMA since its inception.

Also, note that states can borrow only up to 3 months at the repo rate⁵ from RBI under Normal WMA. However, if they decide to borrow beyond three months, they have to pay an additional percentage as a penal rate.

Special WMA: Introduced in 1953, it is a secured advance provided against the collateral of government of India (GoI) securities. Also known as *Special Drawing Facility (SDF)*,⁶ it can also be availed against the incremental investment in the *Consolidated Sinking Fund (CSF)*⁷ or the *Guaranteed Redemption Fund (GRF)*⁸ subject to a maximum limit of Normal WMA. A uniform hair cut margin of 5% is applied on the market value of securities for determining the operating limit of SDF. Since this qualifies under collateralized lending, the interest charged on SDF is usually a percentage point lower than that on Normal WMA. Therefore, most states avail SDF before utilising Normal WMA.

Additionally, for exceptional situation, an **Overdraft (OD)** facility is provided by the RBI whenever financial accommodation to a state exceeds its Normal WMA and SDF limits. However, to discourage states from using the OD facility, RBI attaches a penal interest rate. If availed up to 100% of WMA limit, RBI charges additional 2% penalty above the repo rate, while if it exceeds 100% of Normal WMA limit, it attracts a penalty of repo rate plus 5%.

Also, there are term limits. A state or union territory (UT) can be in OD continuously for a maximum of 14 working days and can remain in OD for a maximum of 36 working days in a quarter. If the OD exceeds 100% of the Normal WMA limit for five consecutive working days for the first time in a financial year, RBI advises the state to bring down the OD level within the 100% of Normal WMA limit. If, however, such irregularity occurs again in the financial year, the RBI stops all payments related with the concerned state or UT.

⁴ Refer to [Ahmad and Brosio \(2015\)](#) for an overview of multilevel finances.

⁵ The repo rate (repurchase rate) is the policy interest rate at which the RBI lends short-term funds to commercial banks against collateral, typically government securities, with an agreement to repurchase them at a future date.

⁶ Note that RBI has changed the nomenclature of Special WMA to Special Drawing Facility (SDF) since June 23, 2014, by amending its agreement with respective state governments.

⁷ 5% of total annual liability of a state.

⁸ 5% of current outstanding guarantees.

In addition to short-term liquidity facilities from the RBI, states finance their fiscal deficits primarily through market borrowings in the form of State Development Loans (SDLs). SDLs are non-callable dated securities issued by state governments, typically with maturities of 10 years and above, and carry interest rates that reflect prevailing market conditions and the relative credit risk of the issuing state. While SDLs are intended to finance structural deficits and long-term expenditures, they are frequently used to cover short-term liquidity gaps due to rigidities in cash flow planning. This disconnect, where states accumulate idle cash balances while continuing to service long-term debt, exacerbates the fiscal cost of treasury mismanagement. Table 1 summarizes the full spectrum of financing instruments available to state treasuries, including all RBI-administered liquidity windows (SDF, WMA, OD) and SDLs.

Table 1 Cost of various liquidity facility (and borrowing)

	Base condition	Interest rate	Additional limits
SDF	If availed against net annual incremental investment in CSF and GRF	Repo - 2%	A uniform hair cut margin of 5% is applied on the market value of the securities for determining the operating limit of SDF on a daily basis.
	If availed against investment in Gsec/ATBs	Repo -1%	
WMA	If outstanding up to 3 months from the date of making the advance	Repo	
	If outstanding beyond three months from the date of making the advance	Repo +1%	
OD	If availed up to 100 per cent of WMA limit	Repo +2%	A state/ UT can be in OD continuously for 14 working days and can remain in OD for a maximum of 36 working days in a quarter. Serious penalty involved after 5 consecutive working days.
	If exceeds 100 per cent of WMA limit	Repo +5%	
SDL	50-100 bps above Gol dated securities		

2.2 Liquidity surplus

For states having surplus liquidity, they can hold the excess money as deposits with the RBI or can invest in various GoI securities or funds available to the states. Here we document a comprehensive list of securities available for the state governments to invest.

Cash balances with the RBI: State governments are required to maintain a minimum cash balance with the RBI, which varies from state to state depending on the size of states' budget and economic activity. States can decide to maintain just the minimum balance or can hold additional balances with the RBI. RBI does not offer any interest on the cash deposited with the RBI.

Intermediate Treasury Bills (ITBs): Instead of increasing their cash balances with the RBI, state government can choose to invest the surplus in Intermediate Treasury Bills (ITBs). The 14-Day Intermediate Treasury Bills was introduced in 1997 in place of 91- Day tap Treasury Bills to enable state governments, foreign central banks and special bodies to invest their temporary cash surpluses.⁹ Interest rate on ITBs are currently fixed at 2% points below the reverse repo rate and surplus cash balance of state governments (above the minimum requirement) is automatically invested in ITBs.¹⁰

Auctioned Treasury Bills (ATBs): ATBs offer short-term investment opportunities, generally up to one year. They are thus useful in managing short-term liquidity. At present, the GoI issues four types of treasury bills, namely, 14-day, 91-day, 182-day and 364-day. The interest rate offered by these securities are determined through auctions.

Dated GoI securities: Dated G-Secs are securities which carry a fixed or floating coupon (interest rate) which is paid on the face value, on half-yearly basis. Generally, the tenor of dated securities ranges from 5 years to 40 years and the yields are market determined.

Additionally, the RBI manages two reserve funds on behalf of state governments for meeting their contingent liabilities: (1) the Consolidated Sinking Fund (CSF); and (2) the Guarantee Redemption Fund (GRF). States can voluntarily choose to participate and invest in these funds.

Consolidated Sinking Fund (CSF): It is an amortisation fund created to meet repayment obligations of the state government. There is no ceiling on the amount of contributions to the fund. However, withdrawal from the fund is permissible only for repayment of outstanding liabilities which includes internal debt and Public Account liabilities of the Government. The withdrawal limit is set at the interest income accrued and accumulated in the fund up to the end of previous financial year.¹¹ Also, there is a lock-in period of 5 years and only the net incremental annual investment of states (i.e., the outstanding balance over and above the level in the corresponding period of the previous year) is eligible for availing SDF. CSF invests in dated GoI securities.

⁹ Reserve Bank Introduces 14-Day T-Bills, Business Standard, April 01, 1997.

¹⁰ As per Reserve Bank of India (2021), investment by states in ITBs are very volatile and unpredictable, thereby imparting volatility to the cash balance of the GoI that in turn affect the liquidity management of the RBI. This is the major reason why RBI does not offer a higher return on liquid money.

¹¹ Also, the amount withdrawn shall not exceed the amount of redemption due for that year in respect of open market borrowings.

Guaranteed Redemption Fund (GRF): GRF is constituted by the state governments for meeting their obligations arising out of guarantees issued on behalf of state level bodies. The accretions to the fund can only be utilised towards payment of guarantees issued by the state government (and invoked by the beneficiary) in respect of bonds issued or other borrowings by their state level undertakings or other local bodies. Withdrawals are allowed from the fund up to the redemption of the guarantees invoked. Also, state governments have the option to withdraw excess fund over 5% of outstanding guarantees of the previous year. Similar to CSF, the net incremental annual investment of states in GRF is eligible for availing SDF and the fund earns interest by investing in GoI dated securities.

Table 2 summarizes the full spectrum of investment instruments available to state treasuries, including both RBI-administered and GoI dated securities.

Table 2 Interest earned on extra cash

	Interest
1. Cash 0%	0%
2. 14-Days Intermediate Treasury Bills (ITBs)	Reverse Repo - 2%
3. Auctioned Treasury Bills (ATBs)	Repo - (0-1)%
4. GoI dated securities	Treasury Yield GoI
5. Consolidated Sinking Fund (CSF)	10-yr treasury yield GoI (proxy)
6. Guaranteed Redemption Fund (GRF)	10-yr treasury yield GoI (proxy)

Overall, this dual structure (comparing Table 1 and 2), where borrowing costs are higher than the earnings on idle cash, creates a fundamental trade-off: states must choose between the risk of *running out of cash* and the *cost of holding too much*. In principle, this framework supports efficient treasury operations. In practice, however, most states err on the side of caution.¹³

These gaps manifest in three interlocking problems. First, states hold excessive cash buffers that earn minimal returns, even as they borrow at higher rates. Second, debt issuance is often disconnected from actual liquidity needs. Third, there is no formal mechanism to assess the cost-effectiveness of various treasury strategies. These challenges are especially acute in fiscally constrained and smaller states.

¹³ Despite this maturing framework, several additional challenges persist. Philosophically, treasury functions continue to be treated as operational back offices rather than strategic fiscal actors. In many states, treasuries prioritize payment clearance over cash optimization. Instrumentally, many treasuries underutilize low-cost facilities like SDF or WMA due to limited understanding or fear of violating overdraft norms. Instead, they resort prematurely to long-term market borrowings often at higher interest rates. Operationally, treasuries lack the technological systems and analytical staff needed for daily cash flow forecasting, scenario simulation, or real-time adjustment.

3. The case of Meghalaya

The state of Meghalaya provides a particularly clear illustration of the treasury cash management inefficiencies discussed in the previous sections. Using daily data on cash balances, investments, and borrowings from April 2013 to March 2021, we document how the state has managed short-term liquidity, the extent to which it has relied on available institutional facilities, and the fiscal costs associated with these choices.

We begin by constructing a comprehensive measure of the state's liquid position, defined as the sum of cash balances with the RBI and short-term investments in ITBs and ATBs, net of outstanding borrowings under the SDF, WMA, and OD. Table 3 reports the average and minimum daily liquid balances for each financial year, alongside the corresponding average SDF and WMA limits. Two features of the table stand out. First, Meghalaya consistently maintained average liquid balances far in excess of its short-term liquidity limits, often exceeding ₹500 crore and peaking above ₹1,300 crore in some years. Second, even the minimum daily liquid balances (barring a few isolated days in FY2013–14 and FY2020–21) remained well above the thresholds required to avoid overdraft or penalty rates under the RBI framework. These patterns indicate systematic over-buffering rather than precautionary responses to exceptional shocks.

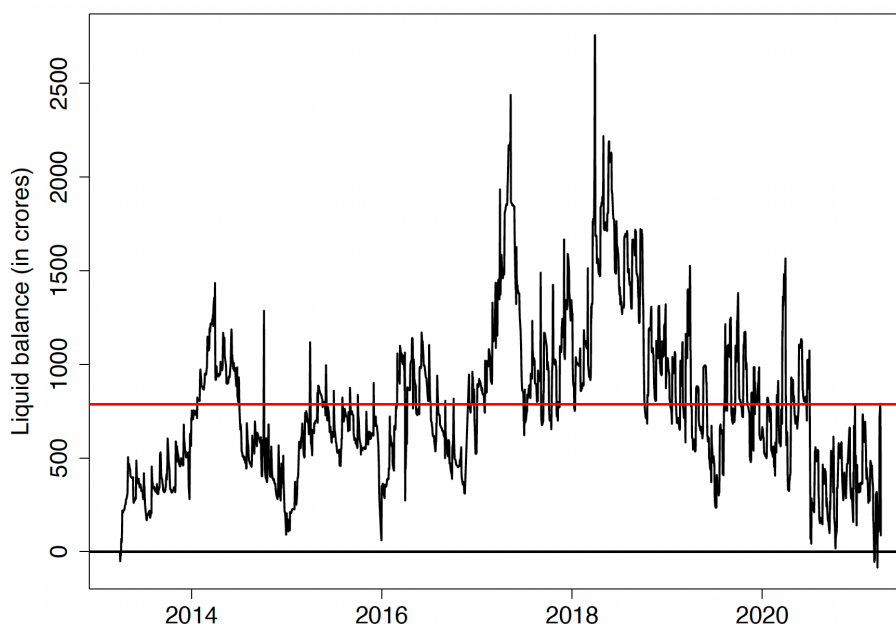
Table 3 Average daily liquid balance

FY	Avg. liquid balance	Min. liquid balance	Avg. SDF Limit	Avg. WMA Limit
2013-14	507	-51	49.36	71.35
2014-15	600	91	55.42	90
2015-16	653	61	60.24	103.45
2016-17	808	310	78.11	175
2017-18	1183	622	70.02	175
2018-19	1302	583	62.05	175
2019-20	741	234	119.69	175
2020-21	452	-85	164.63	277.14

Amounts are in crores. Financial Year in India is from April to March next year.

Figure 1 complements this evidence by plotting the daily evolution of liquid balances over the full sample period. The figure shows that elevated cash holdings were not confined to specific months or episodic events but persisted throughout the year, including periods of relatively stable cash flows. The red line, denoting the sample average, reinforces the extent to which high liquidity levels became the norm rather than the exception. Interpreted in light of the institutional framework described in Section 2, this behavior suggests that treasury operations were guided by conservative rules of thumb rather than by active calibration of buffers to underlying volatility. As in the corporate finance literature on precautionary cash holdings, such behavior reflects risk aversion, but in the public sector context it carries direct fiscal costs through forgone interest savings and unnecessary borrowing (see [Bates et al. \(2009\)](#), [Almeida et al. \(2004\)](#), and [Han and Qiu \(2007\)](#)).

Figure 1 Daily liquidity balance: April 2013 to March 2021



Note: The black line represents the daily liquid balance while the red line represents the average liquid balance for the sample period (April 2013 to March 2021).

This is also supported by the fact that Meghalaya made almost no use of the short-term liquidity instruments explicitly designed to manage temporary mismatches in cash flows. Over the entire eight-year period, the WMA was accessed only once. SDF was used for eight days and the OD facility was never invoked. This near-complete avoidance of short-term borrowing is striking given that these facilities are lower-cost, institutionally sanctioned, and specifically intended to smooth daily liquidity volatility.

At the same time, Meghalaya relied heavily on long-term market borrowing through SDLs. Table 4 shows that outstanding market borrowings increased steadily from ₹340 crore in FY2013–14 to ₹1,777 crore by FY2020–21. These borrowings carried interest rates ranging from 6.75% to 9.27%, reflecting prevailing market conditions. Appendix A documents that much of this borrowing occurred in periods when policy rates were declining, further widening the wedge between the cost of debt and the return on idle cash balances invested in ITBs and ATBs. Combined with the daily cash flow patterns observed in Figure 1, this suggests that a significant portion of long-term borrowing was effectively used to finance liquidity buffers rather than capital expenditure or structural deficits.

Table 4 Amount of money raised by issuing long term loans

Year	Amount (in ₹ crore)	Amount Interest Cost (in %)
2013-14	340	9.27
2014-15	545	8.37
2015-16	680	8.22
2016-17	1001	7.60
2017-18	1115.5	7.72
2018-19	1122	8.39
2019-20	1344	7.19
2020-21	1777	6.75

1 US \$ = 91₹. 1 crore = 107

Taken together, the evidence from Meghalaya highlights a fundamental disconnect between liquidity management and debt management in practice. While the institutional architecture for managing short-term liquidity in India is well-developed, operational decisions appear to be driven by extreme conservatism rather than cost minimization. The result is a treasury that simultaneously holds large idle balances, underutilizes short-term liquidity facilities, and accumulates long-term debt at non-trivial interest costs. This case motivates the analytical framework developed in the next section, where we formalize the trade-off between precautionary liquidity and borrowing costs and evaluate the fiscal gains from alternative treasury strategies.

4. A stylized model of treasury liquidity management

To formalize the trade-offs faced by state governments in managing their treasury cash balances, we develop a two-period model grounded in the literature on liquidity management under financial constraints (e.g., [Almeida et al. \(2004\)](#); [Holmström and Tirole \(2000\)](#)). The model captures the core intertemporal optimization problem of a sub-national government that faces rigid expenditure needs, stochastic revenue inflows, and limited access to institutional borrowing facilities.¹⁴

4.1 Basic setup

Consider a state government that must finance a known expenditure obligation $E > 0$ in period 2. In period 1, it receives deterministic revenue R_1 , from which it can allocate an amount $C \in [0, R_1]$ to a precautionary cash buffer. The cash buffer earns a safe return $r \geq 0$ over the period and is available to supplement revenues in period 2. The decision to hold C involves an opportunity cost, as these funds could otherwise be used to reduce borrowing or support public spending in the present.

In period 2, the state receives stochastic revenue R_2 , which follows a normal distribution:

$$R_2 \sim N(\mu, \sigma^2),$$

where, μ denotes the expected inflow from own taxes, shared revenues, and grants, and σ^2 captures the volatility of these inflows, reflecting seasonality and unpredictability.

The total resources available to the treasury in period 2 are $R_2 + C(1 + r)$. If this amount is less than the expenditure requirement E , the state must finance the shortfall by borrowing from the RBI under a structured liquidity facility. This borrowing carries interest and may be subject to quantitative limits.

Let $S = \max\{0, E - R_2 - C(1 + r)\}$ denote the shortfall to be financed in period 2. In the baseline version of the model, this entire amount is borrowed at interest rate $R (> r)$, and the government chooses C to minimize the expected total cost:

$$\min_{C \in [0, R_1]} -rC + \mathbb{E}_{R_2} [R \cdot S]$$

¹⁴ For seminal work in this area, refer to [Baumol \(1952\)](#) and [Miller and Orr \(1968\)](#). To get an overview of the determinants and implications of corporate cash holdings, refer to [Opler et al. \(1999\)](#).

This objective function combines the ex ante opportunity cost of holding cash with the expected ex post cost of borrowing.

Define $Z = \frac{E - C(1+r) - \mu}{\sigma}$. Then, using known results for the expectation of the positive part of a normally distributed variable, the expected borrowing can be expressed in closed form as

$$\mathbb{E}[S] = (\theta - \mu)\Phi\left(\frac{\theta - \mu}{\sigma}\right) + \sigma\phi\left(\frac{\theta - \mu}{\sigma}\right)$$

where, $\theta = E - C(1 + r)$, and $\Phi(\cdot)$ and $\phi(\cdot)$ are the cumulative distribution function (CDF) and probability density function (PDF) of the standard normal distribution, respectively.

Substituting this into the cost function yields:

$$\mathcal{L}(C) = -rC + R \left[(E - C(1 + r) - \mu)\Phi\left(\frac{E - C(1 + r) - \mu}{\sigma}\right) + \sigma\phi\left(\frac{E - C(1 + r) - \mu}{\sigma}\right) \right].$$

To obtain the optimal buffer C^* , we take the derivative of $L(C)$ with respect to C and set it to zero:

$$\frac{d\mathcal{L}}{dC} = -r + R(1 + r) \left[-\Phi(z) + \frac{z}{\sigma}\phi(z) \right] = 0.$$

This yields an implicit equation in z^* , which can be solved numerically. The optimal cash

$$C^* = \frac{E - \mu + z^*\sigma}{1 + r}.$$

This expression formalizes the key trade-offs in cash buffer design. The optimal buffer increases with expenditure needs E , revenue uncertainty σ , the cost of borrowing R , and decreases with the return on cash r and expected revenue μ .

4.2 Extension: Tiered RBI liquidity instruments

We now extend the model to reflect the institutional liquidity arrangements available to Indian states through the RBI. These include the SDF, the WMA, and the OD facility. Each instrument offers short-term liquidity at increasing interest rates and is subject to quantitative ceilings.

Let the shortfall $S = \max\{0, E - R_2 - C(1 + r)\}$ be financed sequentially as:

$$\begin{aligned} B_s &= \min\{S, \bar{B}_s\}, \\ B_w &= \min\{S - B_s, \bar{B}_w\}, \\ B_o &= \min\{S - B_s - B_w, \bar{B}_o\}, \end{aligned}$$

with interest rates:

$$R_s = R - \delta, \quad R_w = R, \quad R_o = R + \gamma.$$

The borrowing caps \bar{B}_s , \bar{B}_w and \bar{B}_o are specified by RBI guidelines and vary across states and time.

If the shortfall S exceeds the total facility limit $\bar{B}_s + \bar{B}_w + \bar{B}_o$, the state incurs a fixed penalty $\Phi(S) = \kappa \cdot 1\{S > \bar{B}_s + \bar{B}_w + \bar{B}_o\}$, representing institutional sanctions or fiscal disruption.

In this case, the revised optimization problem is:

$$\min_{C \in [0, R_1]} -rC + \mathbb{E}_{R_2} [R_s B_s + R_w B_w + R_o B_o + \phi(S)].$$

This formulation introduces nonlinearities in the cost function due to the kinks at borrowing limits and the stepped cost structure. The marginal cost of cash now depends not only on the interest differential ($R - r$), but also on the location of C in relation to the likelihood of entering more expensive borrowing windows or hitting facility ceilings.

4.3 From analytical insight to empirical estimation

The stylized model developed above provides a tractable framework to understand the fundamental trade-offs in treasury liquidity management. Under the assumption that period-2 revenue inflows (R_2) follow a normal distribution, the model yields a closed-form expression for the optimal cash buffer (C^*), which balances the opportunity cost of idle cash against the expected cost of institutional borrowing. This derivation facilitates intuitive comparative statics and helps to identify how optimal buffer sizes respond to changes in revenue volatility, borrowing rates, and institutional penalties.

However, the analytical solution relies critically on distributional assumptions, most notably, that revenue inflows are independently and normally distributed. This assumption does not hold in the context of actual state-level treasury operations in India. In practice, daily revenue inflows are characterized by temporal bunching, administrative lags, and sharp discontinuities associated with policy-determined fund releases such as tax devolution, centrally sponsored scheme grants, and non-tax revenues. The empirical distribution of daily inflows is typically non-Gaussian, displaying excess kurtosis, skewness, and thick tails. These features render the conditional expectations in the model analytically intractable and undermine the applicability of the closed-form solution.

Moreover, the borrowing instruments made available to states by the RBI—namely, the SDF, WMA and OD—operate under a tiered structure with limits, escalating interest rates, and hard constraints on usage. These instruments introduce significant non-linearities and institutional rules that are difficult to represent in a closed-form analytical framework.

Given these considerations, we adopt a simulation-based approach in the next section. Using actual daily revenue and expenditure data for the state of Meghalaya, we replicate the logic of the theoretical model while allowing for realistic, data-driven inflow distributions and the operational borrowing framework defined by the RBI. This approach enables us to assess the fiscal implications of alternative buffer policies under empirically observed revenue volatility, institutional borrowing limits, and state-specific expenditure obligations.

5. Simulation method

We build on a simple but powerful idea: that treasury cash management can be framed as an intertemporal optimization problem subject to institutional and regulatory constraints. States must choose how much cash to hold on any given day, how much to borrow or repay and how to allocate surpluses across available investment instruments. The goal is to ensure uninterrupted expenditure operations while minimizing the net fiscal cost of idle balances and borrowing.

In this section, we formalize this problem and describe the simulation-based approach used to evaluate treasury performance. We integrate daily-level cash balance data with borrowing costs, investment returns, and regulatory limits to simulate alternative liquidity management strategies and their fiscal consequences. The simulation reproduces the actual evolution of the treasury balance sheet and allows us to ask: *what would have been the cost saving had the state adopted a different treasury policy?*

5.1 Simulation methodology

We develop a high-frequency simulation model using daily treasury data from the state of Meghalaya over the fiscal years 2013–14 to 2020–21. The model takes as inputs:

1. Daily net flows, defined as revenue inflows minus expenditure outflows, $(R_t - E_t)$;
2. Daily opening cash balances;
3. Historical time series of interest rates on short-term borrowing and investment instruments; and
4. Regulatory limits on liquidity access through the RBI's SDF, WMA, and OD facilities.

The simulation engine reconstructs the daily evolution of the treasury's balance sheet under alternative liquidity management strategies. Below, we describe the first of two counterfactual strategies analyzed in the model.

Method I: Conservative strategy (Zero lower bound rule)

Under this strategy, the state begins the fiscal year by reducing its debt stock by an amount equal to the minimum daily cash balance observed in the preceding year, provided that this minimum was positive. If the previous year's minimum balance was negative, indicating reliance on SDF, WMA or OD, the strategy recommends no adjustment. This rule is motivated by the idea that the minimum observed balance in the prior year reflects the state's explicit overestimation of its precautionary liquidity need.

Formally, the initial cash buffer in year T is adjusted as:

$$C_t^{(T)} = C_t - \min_{t \in \text{FY}(T-1)} C_t$$

where $C_t^{(T)}$ denotes the adjusted cash balance in fiscal year T , and the minimum is taken over all days in the preceding year.

This approach reflects the idea that excess balances carried over from the previous year are, in effect, precautionary savings that were not utilized. By re-optimizing the current year's buffer relative to this historical floor, the state can lower the opportunity cost of idle cash without compromising liquidity assurance.

Method II: Active management strategy (Within liquidity limits)

This strategy models an actively managed treasury that optimally utilizes the full spectrum of liquidity instruments available from the RBI, including the SDF, WMA, and OD.

The initial cash buffer for fiscal year T is adjusted based on both the minimum balance held in the previous year and the cumulative liquidity support accessed through these instruments.

Formally:

$$C_t^{(T)} = C_t - \min_{t \in \text{FY}(T-1)} C_t - (\text{SDF} + \text{WMA} + \text{OD})_{\text{FY}(T-1)}.$$

This approach assumes that the state actively manages liquidity by drawing upon short-term borrowing facilities when required, and reallocates surplus funds to reduce outstanding debt wherever feasible. Unlike the conservative strategy, Method II explicitly treats the use of SDF, WMA and OD not as a failure or contingency, but as a legitimate component of an optimized borrowing plan, subject to institutional constraints.

Evaluation criteria

For each of the two counterfactual strategies described above, we simulate the daily evolution of the treasury's cash position over the period FY2013–14 to FY2020–21. The following performance metrics are recorded:

1. The number of days on which the simulated cash balance falls below zero;
2. The number of days the state enters the SDF, WMA, and OD windows, while remaining within the RBI's regulatory limits for duration and volume;
3. The net fiscal gain or loss under each strategy, relative to the actual treasury behavior observed in the data.

This enables an evaluation of whether the fiscal savings from more active cash management are achieved at the cost of increased liquidity risk or exposure to regulatory penalties.

The simulation yields two key quantitative outcomes. First, it estimates the additional interest cost incurred under the observed conservative strategy due to unnecessary borrowing, i.e., borrowing undertaken while surplus cash was available. Second, it computes the opportunity cost of idle balances, defined as the foregone return from either investing surplus funds in short-term instruments or avoiding costlier borrowing by drawing down excess balances.

Together, these outcomes provide an empirical measure of the fiscal inefficiency embedded in current treasury management practices. In addition, by tracking the frequency of borrowing window usage and the extent of compliance with institutional rules, the framework allows us to evaluate the potential risk exposure associated with more aggressive liquidity strategies— specifically, whether fiscal savings are achieved at the cost of increased vulnerability to short-term cash flow shocks or regulatory breaches.

5.2 Calibration and assumptions

Additionally, the simulation model relies on the following key assumptions and calibration choices:

- At the beginning of each fiscal year, the state is assumed to be able to reduce its opening treasury balance costlessly, i.e., without incurring penalties or administrative friction;¹⁵
- The opportunity cost of holding excess daily cash balances is set at 2% per annum. This figure reflects the historical spread between the average interest cost on SDLs and the returns earned on ITBs and ATBs, where surplus cash is typically invested;¹⁶
- Access to liquidity support from the RBI is constrained by historical limits on the SDF, WMA, and OD, specific to the state of Meghalaya;
- Simulations are conducted separately for each fiscal year in the dataset, allowing borrowing limits, interest rates, and cash flow patterns to vary annually in accordance with actual historical data;
- The simulated path of daily treasury balances is required to match the actual observed path, except for differences arising from the counterfactual adjustment made at the start of the fiscal year under each simulated strategy.

6. Results

Before turning to the counterfactual simulations, Table 5 provides an important benchmark for interpreting our results. The table documents the revealed liquidity strategy actually followed by the state over eight fiscal years. Two features stand out. First, despite facing occasional negative minimum balances in FY2013–14 and FY2020–21, Meghalaya made only extremely limited use of RBI liquidity facilities: SDF was accessed on a handful of days, WMA almost never, and overdraft facilities not at all. Second, this near-zero reliance on short-term liquidity support coexisted with persistently high average liquid balances. Together, these patterns indicate that the treasury operated with a large self-imposed precautionary buffer and treated RBI facilities as instruments of last resort rather than as part of routine liquidity management.

Table 5 Number of times the state treasury has availed liquidity facility

FY	Min. liquid balance	SDF	WMA	Regular OD	Extreme OD	Average balance
2013-14	-51	5	1	0	0	507
2014-15	91	0	0	0	0	600
2015-16	61	0	0	0	0	653
2016-17	310	0	0	0	0	808
2017-18	622	0	0	0	0	1183
2018-19	583	0	0	0	0	1302
2019-20	234	0	0	0	0	741
2020-21	-85	3	0	0	0	452

¹⁵While state development loans (SDLs) are non-callable in practice, this adjustment can be operationalized in one of two ways:

1 By undertaking additional expenditure early in the year equivalent to the excess balance, regardless of incoming revenues; or

2 By reducing fresh borrowing at the start of the fiscal year by the same amount.

¹⁶This estimate is based on observed differences between SDL yields and ITB/ATB returns during the simulation period.

This benchmark is critical for interpreting the simulations that follow. The counterfactual strategies explored in Sections 6.1 and 6.2 do not assume an unrealistically aggressive or institutionally unconstrained treasury; instead, they relax precisely the conservative behavior revealed in Table 5. Simulation I asks what fiscal savings would have been realized if the state had merely reduced excess buffers while broadly preserving its aversion to frequent facility usage. Simulation II, in contrast, examines the upper bound on potential gains if the state had treated SDF and WMA as intended—low-cost, short-term instruments to smooth cash flow volatility within regulatory limits. Read in this light, Table 5 clarifies that the fiscal gains we estimate arise not from risky financial engineering, but from correcting a systematic underutilization of existing institutional liquidity support alongside sustained overaccumulation of idle cash.

6.1 Simulation I: Conservative buffer rationalization

In the first counterfactual simulation, we estimate the fiscal savings from a simple rule-based adjustment: at the beginning of each financial year, the treasury retires an amount of longterm debt equivalent to the minimum liquid balance observed in the previous fiscal year. The rationale is that this minimum historical balance represents a revealed preference for a conservative liquidity floor, and that maintaining this additional cash above zero is economically inefficient.

The results of this simulation are presented in Table 6. We find that:

Table 6 Number of times the state treasury will have to avail liquidity facility

FY	Amount retired	SDF	WMA	Regular OD	Extreme OD	Average balance
2013-14	0	5	1	0	0	507
2014-15	0	0	0	0	0	600
2015-16	91	2	0	0	0	653
2016-17	61	0	0	0	0	808
2017-18	310	0	0	0	0	1183
2018-19	622	1	0	0	0	1302
2019-20	583	76	37	8	0	741
2020-21	234	47	11	0	0	452

All amounts are in ₹crore. 1 crore = 10^7 .

1. Debt retired under this strategy ranges from ₹60 crore to ₹622 crore in different years, reflecting the wide variation in idle balances.
2. The cumulative amount of debt that could have been precluded through this buffer rationalization across the eight-year period is approximately ₹1,900 crore.
3. Applying a conservative interest cost of 7% per annum (reflecting prevailing SDL yields), the total interest saving is estimated at ₹133 crore per annum (0.07×1900).

Importantly, this strategy does not increase exposure to overdraft or regulatory risk. The number of days requiring recourse to SDF or WMA rises modestly in some years (e.g., 76 SDF days and 37 WMA days in 2019), but OD usage remains negligible. Thus, the fiscal gains come without compromising liquidity resilience or violating institutional constraints.

This strategy demonstrates that even modest adjustments in cash buffer targets, grounded in historical experience, can generate substantial fiscal dividends. It requires no major behavioral change, only a disciplined commitment to adjusting liquidity holdings at the start of the fiscal year.

6.2 Simulation II: Aggressive optimization targetting regulatory limits

The second simulation explores the theoretical upper bound on fiscal savings achievable under an active treasury management regime that fully exploits the liquidity headroom provided by RBI. Specifically, we target the minimum liquid cash balance as the maximum permissible borrowing under SDF, WMA, and regular OD limits using last years daily cash balance data. Under this approach, the treasury is allowed to draw down its liquid balances as needed and substitute short-term liquidity support from RBI in place of precautionary cash holdings.

The simulated results are presented in Table 7. In this extreme scenario, the amount of debt that could have been retired is substantially higher than in Simulation I, ranging from ₹52.79 crore in 2013 to over ₹1,000 crore in 2018. Additionally, relative to Simulation I, the scale of potential interest savings is considerably larger (250+ crores).

Table 7 Number of times the state treasury will have to avail liquidity facility

FY	Amount retired	SDF	WMA	Regular OD	Extreme OD
2013-14	58	6	5	0	0
2014-15	98	1	0	0	0
2015-16	91	8	4	3	0
2016-17	281	0	0	0	0
2017-18	718	20	4	0	0
2018-19	1005	70	57	35	1
2019-20	960	230	206	119	44
2020-21	620	174	139	41	0

However, these fiscal gains come with significant operational and institutional costs. Unlike Simulation I, which requires minimal behavior change, this aggressive strategy results in frequent and sustained reliance on short-term liquidity instruments. For example, in FY2019–20, the treasury would have been in SDF for 230 days, WMA for 206 days, and OD for 119 days, including 44 days in “extreme overdraft” (i.e., above 100% of WMA limit). These are technically outside the RBI’s regulatory limits. And even though additional long term debt can be raised to bring it within the regulatory limit, such frequent exposure may be politically undesirable, operationally taxing, and difficult to manage in real-time without enhanced cash forecasting capabilities.

Moreover, this approach risks reputational consequences, such as increased scrutiny from central oversight bodies or credit rating agencies that may misinterpret routine overdraft usage as a sign of fiscal distress. It also places a high premium on the treasury’s ability to anticipate intra-month variations in flows, manage administrative frictions across spending departments, and respond to liquidity shocks in real time.

Therefore, while Simulation II provides a useful benchmark of the maximum fiscal space that can be unlocked through dynamic cash optimization, it is best understood as a theoretical upper bound rather than a practical policy prescription. The key insight is not that the treasury should operate at the limits of permissible liquidity risk, but that the current practice of maintaining unnecessarily high buffers and underutilizing low-cost borrowing is suboptimal and fiscally costly.

In this context, the optimal treasury strategy lies between the two simulated extremes. A more moderate approach—where the state targets a dynamic buffer calibrated to anticipated cash volatility and selectively uses RBI liquidity facilities in periods of tightness—would balance fiscal prudence with operational feasibility. This middle path does not require real-time optimization or systematic overdraft usage but instead entails setting a buffer based on formalized forecast error bands and periodically recalibrating it based on experience.

7. Conclusion

This paper identifies a significant and largely avoidable source of fiscal inefficiency in subnational public finance. Using high-frequency treasury data from Meghalaya, we show that the state consistently maintained large precautionary cash buffers while simultaneously issuing long-term debt at significant interest rates. Although such behavior reflects a preference for liquidity safety, it generates excess borrowing and avoidable interest costs. Our simulation-based estimates indicate that relatively modest improvements in cash buffer calibration could have yielded fiscal savings of up to ₹133 crore per year, without increasing exposure to liquidity risk or violating institutional borrowing constraints.

A central implication of these findings is the need to broaden how fiscal prudence is understood and evaluated. In practice, assessments of fiscal discipline, both in India and in many developing economies, focus primarily on annual deficit targets, debt ceilings, and compliance with fiscal rules. Far less attention is paid to the intra-year management of cash flows, despite its direct implications for borrowing needs and interest costs. Our results show that conservative liquidity practices can themselves be fiscally costly. In environments where public investment and service delivery are constrained by limited fiscal space, efficiency gains from improved treasury operations can therefore serve as an important complement to traditional revenue mobilization or expenditure rationalization efforts.

The analysis also highlights the importance of integrating cash management and debt management functions within subnational finance departments. In many states, long-term borrowing decisions are determined by annual borrowing limits and capital expenditure plans, while day-to-day liquidity management is treated as a separate operational task. This institutional separation weakens feedback between actual cash positions and borrowing decisions, leading states to issue debt even when substantial idle balances are available. Closer integration, consistent with international best practices in public debt and cash management, would allow borrowing decisions to respond to real-time liquidity conditions and reduce precautionary over-borrowing ([Gardner and Olden \(2013\)](#)).¹⁷

A related implication concerns the use of central bank–provided liquidity facilities. The near absence of SDF and WMA usage in Meghalaya suggests that these instruments are perceived as indicators of fiscal stress rather than as routine tools for managing short-term volatility. This perception runs counter to their intended role. When used within prescribed limits, such facilities can reduce the need for large idle balances and lower overall financing costs. Normalizing their use as part of standard treasury operations would align practice more closely with modern PFM frameworks that emphasize active cash forecasting and liquidity smoothing.

Finally, the scope for reform depends critically on incentives. Existing frameworks for evaluating subnational fiscal performance, whether through Finance Commission assessments, central government oversight, or credit ratings, rarely incorporate metrics related to liquidity efficiency. Incorporating indicators such as idle cash balances relative to borrowing, interest savings from active cash management, or effective use of short-term liquidity instruments could help institutionalize better practices. This would complement ongoing reforms related to Treasury Single Accounts, medium-term fiscal frameworks, and budget execution monitoring.

In conclusion, while India's federal fiscal reforms have made substantial progress in areas such as tax devolution, grant design, and aggregate fiscal discipline, treasury cash management has remained largely administrative and compliance-oriented. This paper argues for a shift toward viewing treasury operations as a strategic component of fiscal management, with direct implications for efficiency and resilience. The evidence from Meghalaya demonstrates both the costs of existing practices and the feasibility of reform within current institutional arrangements, offering lessons for other Indian states and for subnational governments in developing economies more broadly.

¹⁷For a detailed exposition, refer to Appendix B.

A. Historical borrowings and policy rates

Table A.1 shows the average level of policy rates (repo and reverse repo) together with the weighted average interest rate for the centre and the Meghalaya state government dated securities.

Table A.1 Various interest rates

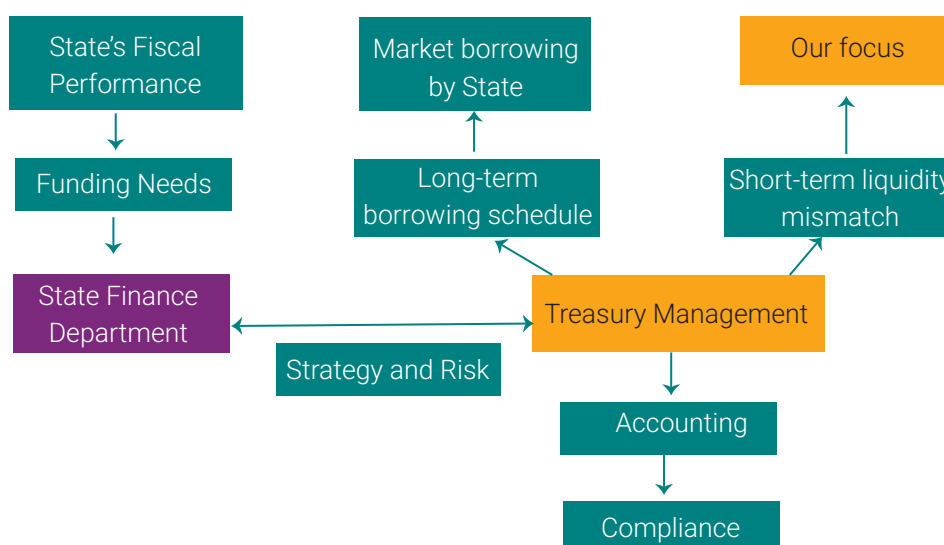
FY	Policy rates		Weighted average interest rate	
	Repo	Reverse Repo	Centre	State
2013-14	7.55	6.55	8.45	9.18
2014-15	7.93	6.93	8.51	8.58
2015-16	7.04	6.04	7.89	8.28
2016-17	6.38	5.87	7.16	7.48
2017-18	6.08	5.83	6.97	7.67
2018-19	6.34	6.09	7.78	8.32
2019-20	5.43	5.17	6.85	7.24
2020-21	4.05	3.41	5.80	6.55

B. A unified framework

This appendix outlines a conceptual framework that integrates treasury cash management with broader debt management objectives at the sub-national level. While traditional fiscal literature often treats liquidity and debt as distinct domains, in practice they are deeply interlinked. States face continuous trade-offs between holding idle cash to manage liquidity risk and incurring market borrowings that add to long-term debt and interest obligations. A unified analytical treatment is therefore essential for designing efficient treasury policy.

Figure B.1 summarizes the finance function of the state governments. We use the 'finance function' here as a reference to the set of activities that relates to satisfying state's funding needs.

Figure B.1 A framework of finance activities: For states in India



B.1 Dual objectives of the treasury

The treasury must satisfy two simultaneous requirements: (1) *Liquidity Management*: Ensure that daily payment obligations are met without interruption, while minimizing the opportunity cost of idle balances. (2) *Debt Management*: Minimize the long-term cost of financing, subject to rollover risks and constraints on market access.

These objectives often operate in tension. Aggressively minimizing cash balances may reduce fiscal drag in the short run, but increases the risk of accessing expensive borrowing instruments during liquidity shortfalls. Conversely, holding large cash buffers reduces risk but at the cost of additional interest burden due to parallel borrowing.

B.2 Liquidity-debt trade-offs

Let C_t denote the cash buffer at time t , and D_t the outstanding stock of market debt. The total fiscal cost at time t can be written as:

$$\text{Fiscal Cost}_t = r_d \cdot D_t - r_c \cdot C_t,$$

where r_d is the average cost of market borrowing and r_c is the return on surplus cash (typically below r_d). In a myopic setting, minimizing C_t appears optimal. However, the risk of large outflow ($S_t = \max\{0, E_t - R_t - C_t\}$) can lead to overdraft or emergency borrowing, which may carry penalty rates or reputational costs.

B.3 Intertemporal problem

The treasury's intertemporal optimization problem is:

$$\min_{\{C_t, D_t\}_{t=1}^T} \mathbb{E} \left[\sum_{t=1}^T \delta^t (r_d \cdot D_t - r_c \cdot C_t + \kappa \cdot \mathbf{1}\{S_t > \bar{B}_t\}) \right],$$

subject to the liquidity identity

$$C_{t+1} = C_t + R_t + r_c \cdot \max\{0, C_t\} - E_t + B_t - \text{Cost}_t,$$

and the debt accumulation identity

$$D_{t+1} = D_t + \text{Net Borrowing}_t,$$

with borrowing limits \bar{B}_t defined by institutional constraints (e.g., SDF, WMA, and OD). The penalty term κ captures the cost of regulatory breach or payment failure.

This formulation reveals two key policy implications. First, the optimal liquidity management requires explicit integration with debt planning, rather than ex post reconciliation. Second, investment of surplus balances should be benchmarked against marginal borrowing costs to evaluate net fiscal cost.

The simulation framework in the main paper approximates this unified problem by evaluating how alternative buffer strategies impact both cash utilization and borrowing volumes, holding expenditure constant. A full stochastic dynamic programming solution is left for future work.

References

- Ahmad, E., Brosio, G. (Eds.), 2015. Handbook of Multilevel Finance. Edward Elgar Publishing.
- Allen, R., Tommasi, D., 2001. Managing Public Expenditure: A Reference Book for Transition Countries. OECD Publishing. URL: https://www.oecd.org/content/dam/oecd/en/publications/reports/2001/03/managing-public-expenditure_g1gh1491/9789264192607-en.pdf.
- Almeida, H., Campello, M., Weisbach, M.S., 2004. The cash flow sensitivity of cash. *Journal of Finance* 59, 1777–1804.
- Bates, T.W., Kahle, K.M., Stulz, R.M., 2009. Why do U.S. firms hold so much more cash than they used to? *The Journal of Finance* 64, 1985–2021.
- Baumol, W.J., 1952. The transactions demand for cash: an inventory theoretic approach. *The Quarterly Journal of Economics* 66, 545–556.
- Bird, R.M., Tarasov, A., 2002. Intergovernmental fiscal transfers: International lessons for developing countries. *World Development* 30, 899–912. URL: https://www.researchgate.net/publication/222575334_Intergovernmental_Fiscal_Transfers_International_Lessons_for_Developing_Countries.
- Boardway, R., Shah, A. (Eds.), 2007. Intergovernmental Fiscal Transfers: Principles and Practice. World Bank. URL: <https://openknowledge.worldbank.org/server/api/core/bitstreams/36b06999-a22b-5b48-9f60-44366799361f/content>.
- Cangiano, M., Curristine, T., Lazare, M. (Eds.), 2013. Public Financial Management and Its Emerging Architecture. International Monetary Fund. URL: <https://www.elibrary.imf.org/display/book/9781475531091/9781475531091.xml>.
- Cole, S., 2009. Fixing market failures or fixing elections? Agricultural credit in India. *American Economic Journal: Applied Economics* 1, 219–50.
- Gardner, J., Olden, B., 2013. Cash management and debt management: Two sides of the same coin?, in: Cangiano, M., Curristine, T., Lazare, M. (Eds.), Public Financial Management and Its Emerging Architecture. International Monetary Fund, pp. 283–310. URL: <https://www.elibrary.imf.org/downloadpdf/display/book/9781475531091/ch009.pdf>.
- Han, S., Qiu, J., 2007. Corporate precautionary cash holdings. *Journal of Corporate Finance* 13, 43–57.
- Holmström, B., Tirole, J., 2000. Liquidity and risk management. *Journal of Money, Credit and Banking* 32, 295–319.
- Lahiri, A.K., 2000. Sub-national public finance in India. *Economic and Political Weekly* 35, 1539–1549.
- Liu, L., Waibel, M., 2008. Subnational Insolvency: Cross-Country Experiences and Lessons. Policy Research Working Paper 4496. World Bank.
- Miller, M.H., Orr, D., 1968. The demand for money by firms: Extensions of analytic results. *The Journal of Finance* 23, 735–759.
- Missale, A., 2012. Sovereign debt management and fiscal vulnerabilities. BIS Papers .
- Mu, Y., 2006. Government Cash Management: Good Practice & Capacity- Building Framework. Financial Sector Discussion Series, Technical Paper. World Bank. URL: <https://documents1.worldbank.org/curator/en/918791468179361162/pdf/443440REPLACEMENT00Management0id918008.pdf>.
- Opler, T., Pinkowitz, L., Stulz, R., Williamson, R., 1999. The determinants and implications of corporate cash holdings. *Journal of Financial Economics* 52, 3–46.
- Pattanayak, S., 2022. How to Build Cash Management Capacity in Fragile States and Low- Income Developing Countries. IMF How To Notes 2022, 1. URL: <http://dx.doi.org/10.5089/9781557754431.061>, doi:10.5089/9781557754431.061.

- Plekhanov, A., Singh, R.J., 2005. How should subnational government borrowing be regulated? Some cross-country empirical evidence. *IMF Staff Papers* 52, 426–452. URL: <https://link.springer.com/article/10.2307/30035920>.
- Rao, M.G., 2002. State finances in India: Issues and challenges. *Economic and Political Weekly* 37, 3261–3271.
- Reddy, Y.V., Reddy, G., 2018. *Indian fiscal federalism*. Oxford University Press.
- Reinhart, C.M., Rogoff, K.S., 2009. The aftermath of financial crises. *American Economic Review* 99, 466–72.
- Reserve Bank of India, 2021. Report of the Advisory Committee on Ways and Means Advances to State Governments. Technical Report. RBI. URL: <https://rbidocs.rbi.org.in/rdocs//PublicationReport/Pdfs/WMA3663DFD8A6EA4A42956DA5D02D1E848E.PDF>.
- Smoke, P., 2023. Fiscal Decentralization and Subnational Government Investment in Developing Countries: The Case for Increasing Subnational Borrowing and Commercial Debt. Working Paper 23-22. International Center for Public Policy, Georgia State University. URL: <https://icepp.gsu.edu/files/2023/12/paper2322.pdf>.
- Ter-Minassian, T. (Ed.), 1997. *Fiscal Federalism in Theory and Practice*. International Monetary Fund. URL: <https://www.elibrary.imf.org/display/book/9781557756633/9781557756633.xml>.
- Topalova, P., Nyberg, D., 2010. What level of public debt could India target? Technical Report. International Monetary Fund.
- Wheeler, G., 2004. *Sound practice in government debt management*. World Bank Publications.

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