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IMPACT OF RBI CENTRAL BANK DIGITAL CURRENCY (ERUPEE) ON PHYSICAL NOTES IN CIRCULATION IN INDIA

Sashikant Panda[1], Dr Ashutosh Priya[2]

[1]Research Scholar, Department of Economics, MJPR University Bareilly; UP, India
[2]Professor & HOD, Dept of Economics, MJPR University, Bareilly, UP, India

psashikant@gmail.com[1]
Ashutoshpriyamjpru@gmail.com[2]

Abstract

This paper examines how the Reserve Bank of India's Central Bank Digital Currency, the Digital Rupee (eRupee), is influencing physical currency in circulation (CIC). Using selected RBI/media-reported data points through May 2025, we contrast the scale of eRupee with CIC, outline mechanisms of substitution, and add international case studies (Bahamas, China, Sweden, Nigeria, Jamaica). We also construct illustrative scenarios (2026-2030) for CIC under different eRupee adoption paths. As of March-May 2025, reported eRupee retail value (~Rs 1,016.5 crore) is orders of magnitude smaller than CIC (~Rs 38.1 lakh crore), suggesting minimal stock displacement so far

This extended paper adds scenario simulations that show how alternative levels of CBDC adoption (0.5%, 2%, and 5% of M3) would impact currency, deposits, reserves, and RBI liquidity requirements in India.

This paper studies how the Reserve Bank of India's Central Bank Digital Currency (CBDC, "e-rupee") affects India's broad money aggregate M3. As of March 2025, e-rupee outstanding was ■ 1,016.5 crore (■0.0102 trillion), while M3 stood at approximately ■261–273 trillion — implying a share of only 0.0039% of M3. Thus, the macroeconomic impact is currently negligible.

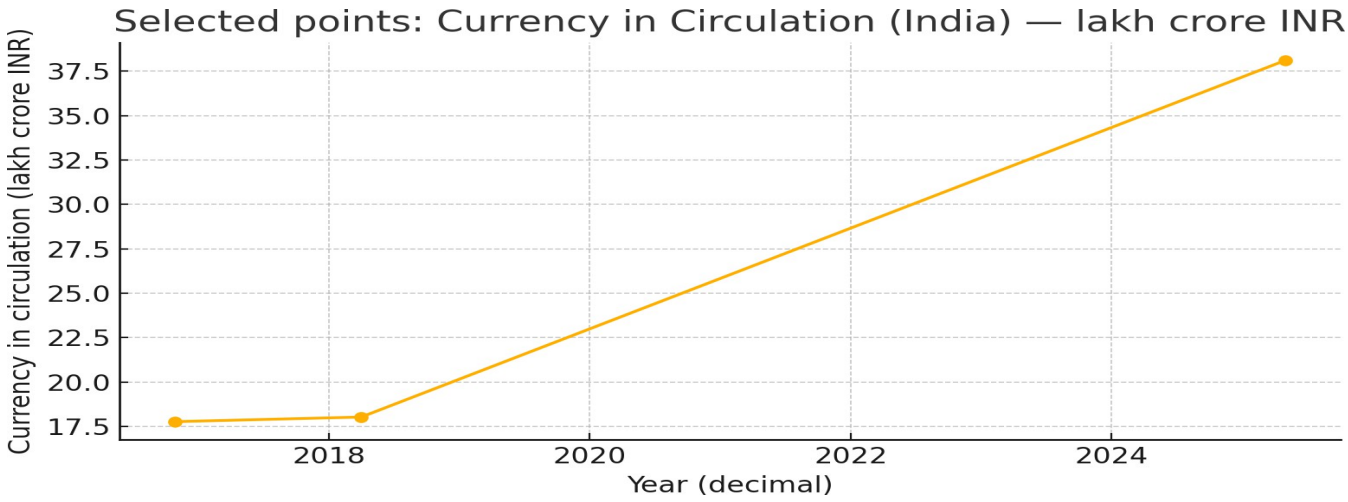

Figure 1. *Currency in Circulation (selected points, lakh crore INR).*

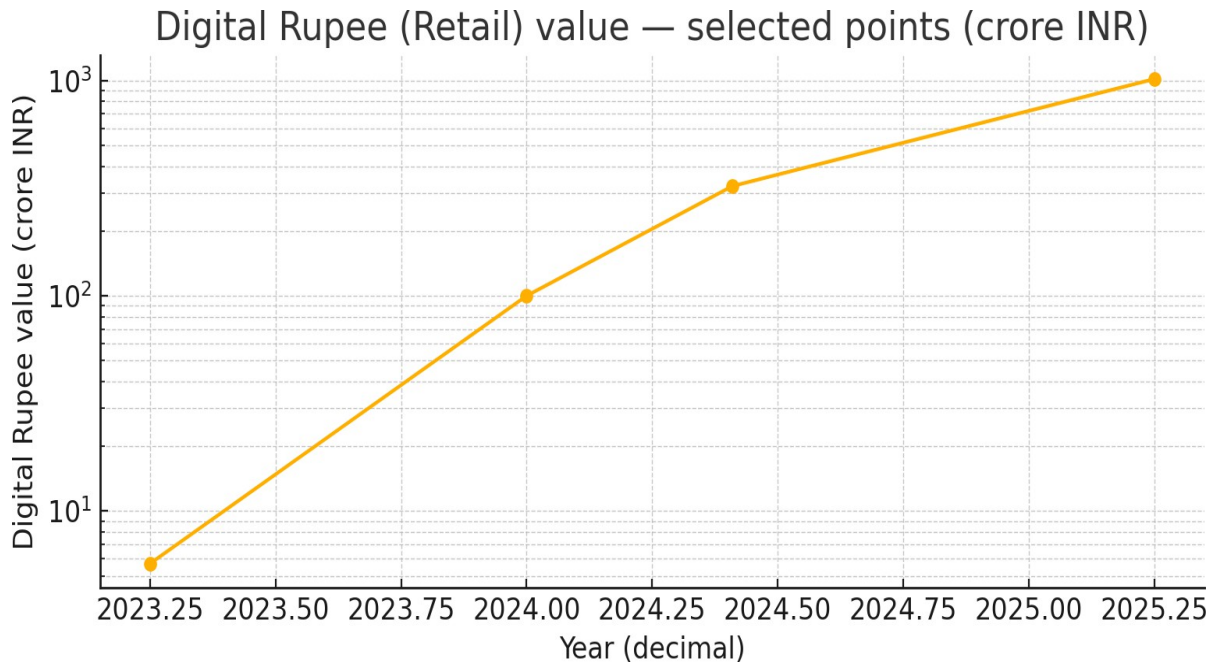

Figure 2. *Digital Rupee (retail) value (crore INR), log scale.*

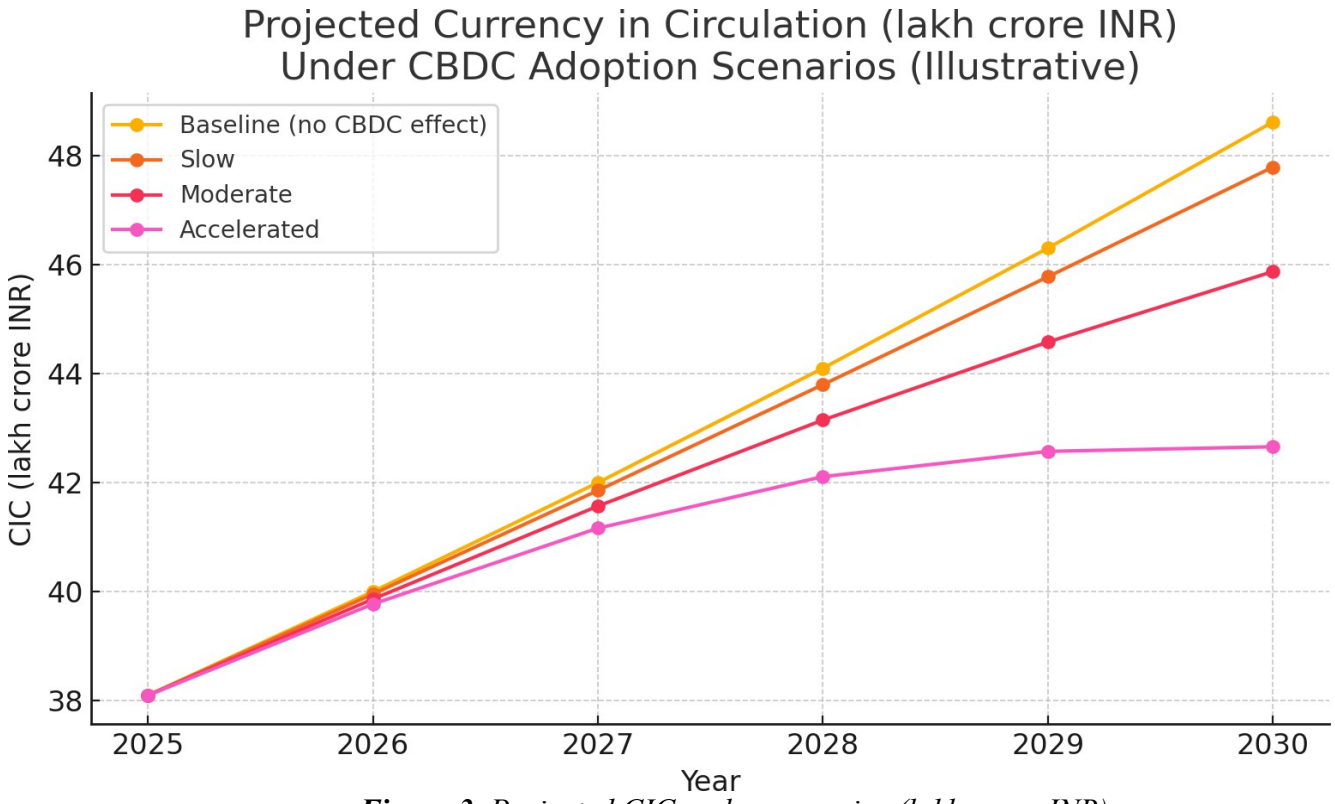

Figure 3. *Projected CIC under scenarios (lakh crore INR).*

1. Introduction and Motivation

Central banks worldwide are experimenting with retail CBDCs to improve payment efficiency, financial inclusion, and policy transmission. India's e-rupee pilot raises a key question: will CBDC materially change India's broad money (M3)?

2. Data Sources and Definitions

M3 includes currency with public, demand deposits, time deposits, and other deposits. The e-rupee is the RBI's digital liability, currently worth ■1,016.5 crore as of March 2025. M3 was approximately
■261.7 trillion in FY 2024–25.

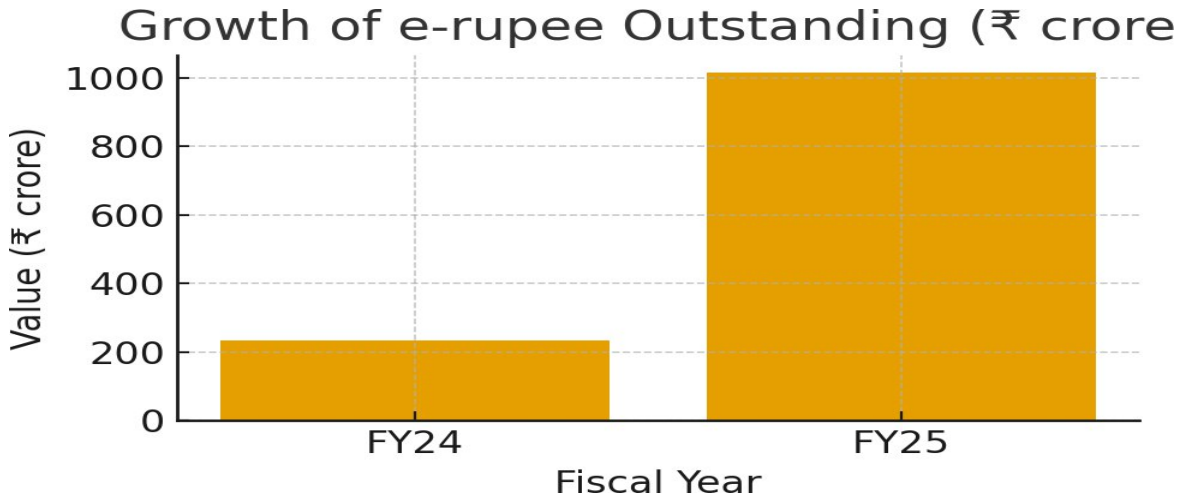

***Figure 4*:** Growth of e-rupee outstanding between FY24 and FY25.

3. Magnitude of e-rupee vs M3

The e-rupee accounts for only 0.0039% of India's M3. This is effectively negligible in terms of its current macroeconomic effect.

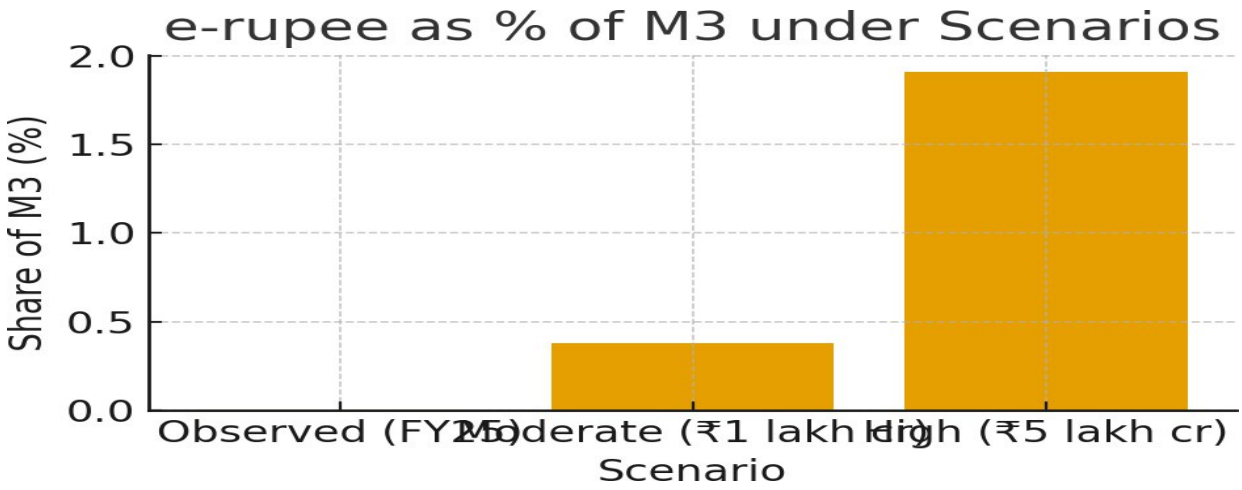

Figure 5: e-rupee share of M3 under alternative adoption scenarios.

4. Scenario Simulations and Liquidity Implications

The table below presents simulated outcomes for different CBDC adoption paths and substitution patterns. Each profile assumes different levels of substitution between physical currency and bank deposits.

(%)	Profile	CBDC Amount	Currency Reduced	Deposits Reduced	Reserve Change	Bring Liquidity
	Conservative (80% currency, 20% deposits)	130,867	104,694	26,173	1,178	26,17
	Balanced (50% currency, 50% deposits)	130,867	65,434	65,434	2,945	65,43
	Deposit-heavy (20% currency, 80% deposits)	130,867	26,173	104,694	4,711	104,6
	Conservative (80% currency, 20% deposits)	523,469	418,775	104,694	4,711	104,6
	Balanced (50% currency, 50% deposits)	523,469	261,735	261,735	11,778	261,7
	Deposit-heavy (20% currency, 80% deposits)	523,469	104,694	418,775	18,845	418,7
	Conservative (80% currency, 20% deposits)	1,308,673	1,046,939	261,735	11,778	261,7
	Balanced (50% currency, 50% deposits)	1,308,673	654,337	654,337	29,445	654,3
	Deposit-heavy (20% currency, 80% deposits)	1,308,673	261,735	1,046,939	47,112	1,046,9

5. Mechanisms and Policy Implications

CBDC could affect M3 through three main channels: substitution for currency, substitution away from deposits, and reserve/liquidity effects. RBI design choices such as wallet limits and
non-interest-bearing CBDC mitigate risks of disintermediation.

6. Quantitative Scenarios

If e-rupee adoption reached ■1 lakh crore, it would represent 0.38% of M3. At ■5 lakh crore, it would be 1.91%. Only beyond such levels would CBDC materially affect M3 composition or liquidity management.

7. Policy Recommendations

1. Ensure transparent reporting of CBDC within monetary aggregates.
2. Maintain safeguards against deposit flight.
3. Prepare RBI liquidity operations to manage M3 effects.
4. Conduct further research on behavioral adoption and policy transmission.

8. Conclusion

India's e-rupee has grown rapidly in percentage terms but remains negligible relative to M3. Policymakers should prioritize gradualism, statistical clarity, and readiness for future liquidity management as adoption grows.

9. Discussion and Policy Takeaways

Even at 5% CBDC adoption, deposit reductions remain within a manageable range relative to the total M3, though liquidity support requirements could reach several lakh crore rupees. The RBI would need to provide equivalent liquidity injections to prevent credit contraction.

Conclusion

India's e-rupee currently has minimal impact on M3. Scenario analysis confirms that the macro effects become meaningful only once CBDC adoption exceeds 2–5% of M3. Policymakers should plan liquidity buffers and refine statistical treatment to ensure smooth transition as adoption scales up.

References

1. RBI Annual Report (2025) – data on e-rupee outstanding ■1,016.5 crore.
2. Money control (2025) – e-rupee value growth 334%.
3. MOSPI (2024) – M3 compilation methodology.
4. Datafile (2025) – M3 dataset for FY2024–25.
5. Reuters (2024) – CBDC pilot usage and expansion details.

International Case Studies (Lessons for India)

1. Bahamas - Sand Dollar: Launched in 2020, with adoption under 1% of CIC; shows mandates alone don't ensure uptake.
2. China - e-CNY: Enabled cross-border use with Hong Kong; demonstrates the role of large-scale merchant integration.
3. Sweden - e-krona: Pilot in a low-cash economy; mainly a resilience measure.
4. Nigeria - eNaira: Adoption under 0.5% of population in year one; limited value perception.
5. Jamaica - JAM-DEX: Modest uptake; underscores need for incentives and interoperability.

Scenario Analysis Summary (2026-2030)

Illustrative projections using baseline CIC growth of 5% per annum and a substitution elasticity of 0.6:

Slow adoption: minimal impact on CIC.-
Moderate adoption: slight slowing of CIC growth.-
Accelerated adoption (~8% transaction share by 2030): noticeable slowdown, but CIC still rises in level terms (approx. Rs 48-50 lakh crore by 2030).

Policy Recommendations

1. Publish regular CBDC statistics and CIC breakdowns.
2. Encourage merchant acceptance via UPI QR integration.
3. Preserve low-value privacy and enable offline use.
4. Offer incentives for merchants and users.
5. Avoid premature reduction of note supply until clear substitution trends emerge.

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