

Programmable Central Bank Digital Currency in India: A Theoretical Framework for Balancing Digital Governance, Financial Inclusion and Financial Autonomy

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Abstract

The emergence of Central Bank Digital Currency (CBDC) is changing the traditional understanding of money by introducing the possibility that digital currency can carry rules about how, where and when it can be used. India is particularly important in this discussion because the Reserve Bank of India (RBI) has been developing the e-Rupee while the country already has a highly developed digital payment ecosystem through platforms such as the Unified Payments Interface (UPI). The programmability of e₹ can be designed around parameters such as expiry date, geo-location, merchant category codes and merchant identity, with potential applications in Direct Benefit Transfer (DBT), interest-subsidy schemes, lending and defined employee allowances (RBI, 2025). While such features can improve the efficiency and targeting of welfare delivery, they also raise deeper questions about financial autonomy, privacy and inclusion. This paper develops a theoretical framework to examine this emerging policy dilemma. Using a descriptive-analytical and doctrinal research approach based entirely on secondary sources, including RBI publications, international institutional reports, academic literature and recent research on CBDC adoption, the study conceptualises programmable CBDC through three levels: closed-loop conditional CBDC, semi-programmable CBDC and open unconditional CBDC. The paper argues that programmability should not be viewed as inherently beneficial or harmful. Instead, its consequences depend upon the purpose, intensity, duration and institutional control of the conditions attached to digital money. The study develops six theoretical principles: purpose-bounded programmability, proportional programmability, reversible conditionality, privacy by design, financial autonomy and inclusion by design. The framework proposes that stronger programmability should be accompanied by stronger safeguards because restrictions on the use of money can increase administrative efficiency while simultaneously reducing individual discretion and increasing privacy risks. The paper concludes that India should preserve unconditional e₹ as the general-purpose form of digital money while using programmable CBDC selectively for clearly defined public purposes. The study contributes to the CBDC literature by shifting the debate from whether CBDC should be programmable to how much programmability is appropriate for different forms and purposes of digital money.

Keywords: Central Bank Digital Currency, e-Rupee, Programmable Money, Financial Inclusion, Financial Autonomy, Privacy, Digital Governance, India, CBDC Policy.

Introduction

The money, as a traditionally passive instrument, has been understood. There is no information on a ₹500 note as to either where and how it has been previously used or who should receive it next, on what it should reduce one's debt and whether it is valid or not. The user can usually determine what he

shall do with it and from where he shall do it, once he is legally in possession. This feature is strongly related with the ideas of fungibility, autonomy and freedom of use which historically have characterized money. Money isn't money it's money that has been digitised. While the monetary unit has remained largely free, bank deposits, debit cards, mobile wallets, digital payment systems have rendered transactions more convenient and quicker. With the advent of Central Bank Digital Currency (CBDC), however, the question of how it could be taken a step further arises. A central bank digital currency can be defined as a digital central bank currency, and it can include provisions on how the currency is used. The International Monetary Fund (IMF) cites two primary reasons for the advent of CBDC: the potential for generating a digital trail with information about transactions, users, and even potential behavioural patterns, while raising privacy issues that pose economic challenges. (Murphy et al., 2024) The RBI has made programmability as a design opportunity for the Digital Rupee (RBI, 2022).

The idea of programmable money is important because it alters the relationship of money to its users. Whereas simply moving money from one person to the other is what it is like with cash, with digital this may be influenced in a different way by a rule that may establish, say, when and where a transaction takes place, where and how this money may be used, and exactly which merchants can facilitate it and exactly what it could certainly be utilized for. The programmability of e₹ can be built into the feature as the expiry date, geo-location, merchant category codes and merchant VPA, RBI indicates possible applications that exist in Direct Benefit Transfer (DBT), interest subvention schemes, lending and defined employee allowances (RBI, 2025). It presents not only opportunities but also challenges to this development. Digital governance advocates can see programmability bringing a greater degree of targeting to government spending. At least, when financial resources are allocated for a given welfare function, the system can be designed so that the money is spent on that welfare function. This could help to limit certain ways people might use it, and to enhance administration. This same capability raises a fresh question: when the power to manage money outweighs the desire to attain a goal of the policy, what will occur? When a food subsidy is designed to buy food, the limitation may have something to do with the "reason for the subsidy. The difference arises if however regular household income is "programmed" to limit consumption, as in this case the money is your own economic resources. This establishes the main theoretical dilemma of this paper. The paper charts the discussion to focus on one key question, which isn't asked: should India's CBDC be programmable? Rather, the following questions hold more significance: How much programmability should be allowed? Why allow it? How long should it last? And who should authorise it? This is important because programmability is not a thing or property; it can be more or less. CBDC can be anywhere, from a fully decentralized form of digital currency to digital tokens with a lot of constraints. The RBI framework on CBDC does prescribe conditions to be applied to every transaction via e₹ but accepts various use cases of programmability (RBI, 2025). Meanwhile, the IMF highlights the need for policy considerations, information benefits, and privacy in the design of a CBDC (Murphy et al., 2024).

India offers a significant backdrop to explore this issue. The country has been on a transformative trajectory for digital payments with such innovations as UPI and efforts to boost financial inclusion, while trying to advance and accelerate the process. The only thing that brings in e-Rupee is now a new digital ecosystem for the citizens where already they have other types of digital money and payment instruments. This brings up the next question: why would users switch from already existing, digital payment processes to a programmable CBDC? There is recent Indian proof that technological possibilities are not sufficient to explain adoption. Vijayalakshmi and Pallavi (2026) revealed that digital financial literacy had a statistically significant influence on adoption of e-Rupee and perceived convenience and beliefs about e-Rupee's role had a significant effect on e-Rupee acceptability to move towards it. This discovery is important on a theoretical level since programmability presents another dimensional challenge to digital money. Technologically advanced, but confusing for everyday users, may engender digital exclusion of its own. The paper thus theorises three conflicting goals: Digital governance efficiency, financial inclusion, financial autonomy and privacy. The study suggests that these goals cannot be achieved at the same time by having a fully programmable system. Rather, the right balance is determined based on how the programmability will be used and how much it will be used.

Literature Review

• CBDC and the Transformation of Money

The CBDC literature initially focused on the reasons why central banks might issue digital currencies. Payment efficiency, financial inclusion, resilience of payment systems, payment innovation

and preservation of central bank money in a digital economy are among these. According to the Concept Note issued by Minister of State for Finance, Trends of Possible Motives for the Issuance of CBDC (RBI, 2022), the possible motivation for issuance of CBDC include the following: RBI also acknowledges the privacy, financial stability, and monetary policy, and technology considerations for CBDC. Similarly, development of CBDCs must take account of considerations related to adoption, measures to guard against cybercrime and cybersecurity, positioning of payment systems, monetary operations, and privacy protection and use of CBDC data (IMF, 2024). This literature outlines the non-payment aspects of CBDC and leaves no doubt that it is a payment tool more than anything else. It can impact on the macro dimensions of the monetary and financial system. In the early literature though, however, the question whether or not there should be CBDC took a back seat. The argument that is coming into the limelight is growing round and round the possibilities of what CBDC could do. (Auer et al., 2020; IMF, 2024)

- **Programmability and Conditional Money**

The CBDC literature initially focused on the reasons why central banks might issue digital currencies. Payment efficiency, financial inclusion, resilience of payment systems, payment innovation and preservation of central bank money in a digital economy are among these. According to the Concept Note issued by Minister of State for Finance, Trends of Possible Motives for the Issuance of CBDC (RBI, 2022), the possible motivation for issuance of CBDC include the following: RBI also acknowledges the privacy, financial stability, and monetary policy, and technology considerations for CBDC. Similarly, development of CBDCs must take account of considerations related to adoption, measures to guard against cybercrime and cybersecurity, positioning of payment systems, monetary operations, and privacy protection and use of CBDC data (IMF, 2024). This literature outlines the non-payment aspects of CBDC and leaves no doubt that it is a payment tool more than anything else. It can impact on the macro dimensions of the monetary and financial system. In the early literature though, however, the question whether or not there should be CBDC took a back seat. The argument that is coming into the limelight is growing round and round the possibilities of what CBDC could do. (Auer et al., 2020; IMF, 2024)

- **CBDC, Data and Privacy**

One of the key issues that come with CBDC is privacy. CBDC has the potential to generate a digital record of transactions, user activities and behavior (Murphy et al., 2024), the IMF highlights. In contrast to actual cash, digital transactions can provide information that can be stored, processed and analysed. This information can be very valuable to the economy. While aggregated transaction data could be used to inform economic activity, other transaction information could be helpful for regulatory and compliance applications (Murphy et al., 2024). But anything that can be good can be bad, and that is the case here too. Improved CBDC design can also enhance trust in central bank money, notes the IMF, which lists risks as data leakage, data abuse, and cyberexposed threats. Thus, privacy is only a technical problem. It is associated with levels of independence and confidence. Moreover, BIS research from a randomised survey experiment conducted in Korea concludes that privacy protection is key in the design of a CBDC, and that these characteristics influence willingness to use the CBDC. Further, BIS research on a randomised survey experiment (RSX) in Korea shows that the privacy preserving features of a CBDC are critical elements in its design and that the willingness to use it is heavily reliant on these features (Choi et al., 2023). This resonates with the theoretical position that privacy is part of the adoption process of CBDCs, and should not be seen as a compliance measure.

- **Privacy-Enhancing Technologies**

The literature explores how technology might contribute to the resolution of the tension between the function of CBDC(s) and privacy. Arora et al. (2025) explore various privacy-enhancing technologies (PET) for CBDC and note that relevant technologies can ensure data protection while it is stored, transmitted, and processed. The authors also point out the issues of implementability: increased system complexity and system performance cost. The significance of this literature is that it indicates that privacy and programmability don't necessarily need to be mutually exclusive. In some cases, a CBDC system could also determine if a transaction complies with a specific condition and only provide irrelevant details to certain other users that perform mathematical operations requiring that information. The theoretical implication is that the privacy problem is a design problem, part of this puzzle. (Arora et al., 2025)

- **Financial Inclusion and CBDC Adoption**

CBDC policy also has a pivotal aspect of financial inclusion. Financial inclusion and the possible role of a CBDC to inclusion will certainly rely on the availability of a digital wallet for financial users, but

importantly also on understanding and usage. The current e₹ framework of RBI also involves exploration of offline functionality to facilitate transaction in the offline areas where internet connectivity is limited or absent (RBI, 2025). This is further exemplified by the recent Indian evidence, which shows that the user's capability is important. Vijayalakshmi, P. and Pallavi (2026), interviewed 751 people and revealed that there was a significant impact of digital financial literacy on e-Rupee adoption. Existing preferences for UPI and cash are also significant in explaining payment behaviour, their findings revealed. This poses an important theoretical question; indeed, financial inclusion does not simply occur when technology is accessible. Technically a CBDC may be available, but for a practical reason, it is not easily adopted. This might be even more challenging with programmability as they would have to learn not just how to make a digital transaction, but understand the conditions associated with specific funds as well. (RBI, 2025; Vijayalakshmi & Pallavi, 2026)

Research Gap

There is ample discussion in the literature on the adoption of CBDC, privacy, financial inclusion and programmability. This approach separates, though, the study of these themes. Most of the literature on programmability is through the lens of available possibilities and certain use cases. Much of the literature on privacy is about data governance and monitoring. Key interests in financial inclusion literature include adoption and access and digital literacy. The advantages and disadvantages of CBDC design are discussed in the policy pieces. The comparatively less developed part of this knowledge gap can be summarized as the lack of one theoretical framework that can explain simultaneously the impact of the intensity of the programmability on governance efficiency, financial inclusion and individual financial autonomy. To fill this gap this paper proposes a Tiered Programmability Autonomy Framework. The framework argues that there is no-one-to-one mapping between the impact of programmability and policies. Rather they differ in terms of what it is the money is being used for, how strict the rules are, for how long the rules are in place, how much information is needed, if the user is able to understand the system and who is responsible for altering the rules.

Research Methodology

The study follows a descriptive analytical and doctrinal research methodology based entirely on secondary sources. The principal sources include RBI publications and CBDC documents, IMF reports and FinTech Notes, Bank for International Settlements publications, Bank of Canada research, peer-reviewed journal articles, academic working papers, research on CBDC adoption and privacy, and relevant legal and policy literature. The study does not collect primary survey data. Instead, existing empirical findings are used to support the conceptual arguments. The methodology is therefore appropriate for the paper because its principal objective is theory development rather than statistical hypothesis testing. The paper uses existing evidence to develop theoretical propositions concerning the relationship between programmability and financial autonomy.

Conceptualising Programmable CBDC

Programmability should be distinguished from digitisation. A digital rupee that simply allows users to make electronic payments is not necessarily programmable. Programmability begins when rules are attached to money or to the transaction process. The RBI identifies several possible programming parameters for e₹, including expiry date, geographical location, merchant category codes and merchant VPA (RBI, 2025). Based on this understanding, this study proposes three levels. (RBI, 2025)

- **Tier I: Closed-Loop Conditional CBDC**

Tier 1 is the highest level of restriction. The money is allocated for a specific and definite use and only on specific conditions. Examples: 1) Transfers of money and goods to, from or within the government or institutions for specific purposes such as food subsidies, agricultural input subsidies, purpose specific government or institutional transfers for employees and their allowances, and scholarships. Tier I is defined as having high conditionality, which is the theoretical characteristic. The purpose and conditions of use are provided by the state or sponsoring institution. This can enhance government performance and cut down individual discretion.

- **Tier II: Semi-Programmable CBDC**

Tier II is an intermediate stage. While e₹ has the same basic nature, specific balances or dealings might have specific conditions. Examples – time limited vouchers, specific employer benefits, auto-enrolments, user set restrictions on spending and chosen financial products. Therefore, theoretical control is Tier I (intermediate) and Tier III (moderate).

- **Tier III: Open and Unconditional CBDC**

Tier III is considered as general purpose digital money. It can be held, transferred, spent and saved without any purpose restriction. The key feature is functional and independent. Conceptually this is the most similar to physical cash.

Theoretical Framework

The main argument of the paper is that social and economic impacts of programmable CBDC are related more to the level of programmability than to the programmability. The system is based on six theoretical principles. (RBI, 2025; IMF, 2024)

- **Principle I: Purpose-Bounded Programmability**

The first principle states that the stronger the restriction placed on CBDC, the clearer and more specific the public purpose supporting that restriction should be. The logic is straightforward. If the government provides a food subsidy, restricting the money to food purchases can be connected directly to the purpose of the transfer. However, if the same restriction is applied to a person's salary, the connection becomes much weaker. Therefore, the legitimacy of programmability should depend partly upon the relationship between purpose and restriction. This establishes a theoretical relationship in which a clearly defined public purpose provides stronger justification for imposing conditionality, whereas a weak, vague, or unrelated purpose provides comparatively weaker justification for imposing such conditions. The principle prevents the technological ability to programme money from becoming a sufficient justification for doing so.

- **Principle II: Proportional Programmability**

The second principle is based on proportionality. The degree of programmability should be proportionate to the policy objective being pursued. Not every problem requires maximum technological control. A welfare scheme may require a merchant restriction but not geographical tracking. Similarly, a temporary benefit may require an expiry date but not continuous monitoring of the user's other financial activities. Therefore, policymakers should ask: What is the minimum level of programmability necessary to achieve the intended objective? This establishes a minimum necessary programmability principle, in which greater levels of restriction require stronger justification and correspondingly stronger safeguards to ensure that programmability remains proportionate and appropriately limited.

- **Principle III: Reversible Conditionality**

The third principal concerns time. A condition that is appropriate today may not be appropriate tomorrow. Therefore: Programmable restrictions should normally have a clearly defined duration and should not become permanent without renewed justification. This leads to the concept of reversible conditionality. For example, if a subsidy is designed for a six-month agricultural season, the restriction should be linked to that period rather than permanently attached to the beneficiary. The purpose of this principle is to prevent temporary policy conditions from becoming permanent characteristics of money.

- **Principle IV: Privacy-by-Design**

The fourth principal concerns data. The IMF explains that CBDC can generate digital trails containing transaction and behavioural information and that the use of such data creates a trade-off between economic value and privacy protection (Murphy et al., 2024). Therefore: A programmable CBDC should collect only the information necessary to enforce the relevant condition. This means that verification and surveillance should not be treated as the same thing. If the system only needs to determine whether a beneficiary is purchasing an eligible product, it should not automatically require access to the person's complete financial history. Privacy-enhancing technologies may help address this problem, although their implementation remains technically challenging (Arora et al., 2025).

- **Principle V: Financial Autonomy**

Financial autonomy refers to the user's ability to decide how to use legally held money. Traditional cash provides a strong degree of autonomy because the holder generally determines its use. Programmable money can reduce this discretion. Therefore: As programmability increases, the potential for restrictions on financial autonomy also increases. This does not mean that all conditional money violates autonomy. The issue is one of degree and purpose. A food subsidy is different from a salary. A scholarship is different from personal savings. A government benefit is different from privately earned income. This distinction forms the theoretical foundation of the proposed framework.

- **Principle VI: Inclusion by Design**

The sixth is: Financial inclusiveness of the CBDC can only be seen when users can access, understand and effectively use the system. This is especially relevant in the context of India's e₹ landscape, since it is related to digital literacy. Mukti Vijayalakshmi and Pallavi (2026) found that the digital financial literacy had a significant effect on the adoption of digital rupee among their sample of 751 respondents. A programmable money system, therefore, should be based on the user expertise, and not just the technical potentials, of ordinary individuals. A technologically sophisticated system that suffers from poor, if any, usability is nonetheless socially unacceptable if it is not easy to understand, if only a small number of transactions are successful, if it is not easy to identify who the merchants are, if merchants can choose new expiration terms without the consumer's knowledge, if complaints are not listened to, etc.

The Programmability–Governance–Autonomy Model

The six principles that were identified in this study can be combined into one theoretical relationship that explains the multi-dimensional impacts of the programmability of CBDC. The more the digital money can be programmed, the more administrative control can be gained over what it can do - which could help increase the efficiency of governance by providing more targeted, transparent and purpose specific administration of public funds. But, the more programmable it is, the less control may users have on what their money is spent on, which could mean a loss of financial autonomy. Higher levels of programmability can also lead to increased access to the availability of transaction level information in order to check the compliance to pre-defined conditions, which raises data availability and thus also potential risks in relation to privacy. Higher digital and financial competence could also be needed for the operation of the CBDC system due to its growing programmability. When the conditions cannot be understood, or obeyed, by the users the system may produce new forms of digital exclusion. The central theory or intention raised is therefore that programmability may bring about advantages and disadvantages at any given time, it may boost the preliminary governance capacity although reducing the financial autonomy, building more privacy considerations and raising more issues regarding inclusion. Thus, the promise of programmability is neither a blessing nor a bane, but a mixed blessing, dependent upon a variety of factors, including its intensity, its purpose, its duration, the information needs, and protections that are in place at the institutional level. (Murphy et al., 2024; Arora et al., 2025)

Applying the Theoretical Framework to India

- **Tier I: Welfare and Subsidy Applications**

Tier I provide the strongest case for programmability. The RBI already identifies DBT and other targeted schemes among the potential use cases for programmable e₹ (RBI, 2025). The theoretical justification is that welfare funds have a clearly defined public purpose. For example: Food-related benefit → food-related restriction. The condition and purpose therefore correspond. However, even Tier I should not be unrestricted from a governance perspective. The recipient should know why the restriction exists, how long it will remain, where the money can be used, what happens if a transaction fails, and how an incorrect restriction can be challenged. (RBI, 2025)

- **Tier II: Semi-Programmable Retail Money**

Tier II is a more challenging theoretical issue. The funds start to gain features of general-purpose retail money, but have some programmability. Therefore, protection is of greater significance. There should be difference between programmability selected by the user and programmed by the authorities. If a user makes a spending limit by his free will, he is being autonomous. If an authority gives the user a limit on how much could be spent on the user's regular money, then it has control over them. Theoretically different, but these two forms may rely on the same technology.

- **Tier III: General-Purpose e₹**

Tier III should, above all, maintain the basic attributes of ordinary money, fungibility, broad transferability, non-expirability, general purpose and absence of purpose restrictions, a measure that safeguards individual rights. It is a step that enables individuals to have fundamental control over the use of their digital money in how, when and where it is used as opposed to highly conditional forms of CBDC. It is especially crucial for such qualities to remain public confidence in central bank money. Part of this trust is the Privacy aspect, as worries over undue data gathering, observing or remuneration control can detract from their consent to embrace and utilize CBDC. It is crucial to balance the risks to user privacy with the benefits that transaction data may offer in the design of an upcoming CBDC (IMF, 2024; Murphy

et al., 2024). Thus, the general purpose and unconditionality of e₹ should be the basic norm and any programmable restriction should be used sparingly and only when extremely well motivated by a legitimate policy goal. (RBI, 2025; Murphy et al., 2024)

Financial Inclusion Implications

CBDC can potentially contribute to financial inclusion through easier access to digital payments and offline functionality. RBI states that the offline e₹ feature is intended to support transactions in areas with limited or no internet connectivity and to replicate some advantages of physical cash (RBI, 2025). However, inclusion cannot be understood only in terms of infrastructure. Vijayalakshmi and Pallavi (2026) demonstrate that digital financial literacy is significantly associated with e-Rupee adoption in their survey of 751 respondents. This suggests that the success of programmable CBDC depends partly on human capability. Therefore, the more complex the programmable system becomes, the greater the need for user-oriented design. Simple language, regional language interfaces, offline functionality, assisted transactions and accessible grievance mechanisms can therefore be understood as theoretical components of inclusion rather than merely technical additions. (RBI, 2025; Vijayalakshmi & Pallavi, 2026)

Discussion

The theoretical framework developed in this study suggests that the future of India's CBDC should not be understood as a movement toward increasingly programmable money. Instead, it should be understood as a movement toward selectively programmable money. This distinction is important. Maximum programmability may maximise administrative control, but it does not necessarily maximise social welfare. Similarly, zero programmability may protect autonomy but reduce some of the potential benefits of CBDC for targeted public programmes. The optimal position therefore lies between these extremes. The theoretical model can be represented as, low programmability is associated with higher financial autonomy and greater fungibility because users retain substantial discretion over how their digital money is held, transferred and spent, although the capacity for targeted governance is comparatively limited. Moderate programmability creates a balance between user autonomy and administrative control, enabling governments or institutions to achieve specific policy objectives while increasing the need for transparency, accountability and clearly defined conditions. In contrast, high programmability can provide greater governance capability by allowing more precise control over the use of digital money. However, this increased control may reduce individual financial autonomy and create greater privacy and financial inclusion risks, particularly when restrictions are complex, extensive or difficult for users to understand. The implication is that programmability should be matched with governance safeguards. This is consistent with the IMF's broader position that CBDC design involves trade-offs between data use, privacy, adoption, monetary operations and institutional arrangements (IMF, 2024). (IMF, 2024)

Policy Implications

The theoretical framework developed in this study generates several important policy implications for India's CBDC ecosystem. First, unconditional general-purpose e₹ should be preserved as the autonomy-preserving form of digital money, remaining broadly fungible and free from unnecessary purpose-based restrictions. Second, strong programmability should be used primarily for clearly defined and legitimate public purposes, particularly welfare transfers, subsidies and other targeted government programmes where the connection between the purpose of the transfer and the imposed conditions is clearly established. Third, policymakers should apply the minimum necessary restriction, since the technological ability to impose a condition should not, by itself, constitute sufficient justification for imposing that condition. Fourth, time limits and sunset mechanisms should be incorporated into programmable CBDC arrangements, ensuring that temporary policy objectives do not result in permanent restrictions on the use of digital money. Fifth, privacy by design should be strengthened by limiting data collection, processing and access to what is necessary for the intended purpose, consistent with the emphasis placed by the IMF and Bank of Canada literature on institutional and technological safeguards for CBDC privacy (Murphy et al., 2024; Arora et al., 2025). Sixth, programmable CBDC should be designed for users with varying levels of digital and financial literacy, as Indian evidence indicates that digital financial literacy significantly influences e₹ adoption (Vijayalakshmi & Pallavi, 2026). Finally, effective grievance and redress mechanisms should be established so that users can identify, question and challenge incorrectly programmed or improperly applied restrictions. Collectively, these implications suggest that India's CBDC policy should pursue

selective and proportionate programmability rather than maximum programmability, ensuring that improvements in governance efficiency do not come at the cost of financial autonomy, privacy and inclusion. (RBI, 2025; Murphy et al., 2024; Vijayalakshmi & Pallavi, 2026)

Conclusion

The development of India's e-Rupee represents a significant stage in the evolution of digital money. The central issue is no longer simply whether money can be transferred digitally. Increasingly, the question is whether money can be designed to carry conditions governing its use. The RBI has already recognised that e₹ can be programmed according to parameters such as expiry date, geographical location, merchant category and merchant identity, with potential applications in DBT, lending, interest-subvention schemes and defined allowances (RBI, 2025). This capability creates substantial opportunities for digital governance. Government programmes may become more targeted, automated and transparent. At the same time, however, programmability changes the relationship between individuals and money. A programmable rupee is potentially different from an ordinary rupee because its value may be accompanied by conditions. The theoretical contribution of this study is therefore to argue that the appropriate question is not whether CBDC should be programmable, but how much programmability should be applied to different categories of digital money. The study proposes three levels of CBDC: closed-loop conditional money, semi-programmable money and open unconditional money. These levels demonstrate that the consequences of programmability depend upon its intensity. (RBI, 2025; IMF, 2024).

References

1. Adrian, T., & Mancini-Griffoli, T. (2019). The rise of digital money. IMF FinTech Notes, 2019/001.
2. Arora, R., Du, H., Kazmi, R. A., & Le, D.-P. (2025). Privacy-enhancing technologies for CBDC solutions. Bank of Canada Staff Discussion Paper, 2025-1. <https://doi.org/10.34989/sdp-2025-1>.
3. Auer, R., Cornelli, G., & Frost, J. (2022). Rise of the central bank digital currencies: Drivers, approaches and technologies. BIS Working Papers, No. 880.
4. Auer, R., Cornelli, G., & Frost, J. (2023). The technology of retail central bank digital currency. BIS Quarterly Review.
5. Bank for International Settlements. (2023). Project Rosalind: Building a practical model for central bank digital currency. BIS Innovation Hub.
6. Bindseil, U. (2020). Tiered CBDC and the financial system. ECB Working Paper Series, No. 2351.
7. BIS, CPMI, IMF, & World Bank. (2021). Central bank digital currencies for cross-border payments. Bank for International Settlements.
8. Brunnermeier, M. K., & Niepelt, D. (2019). On the equivalence of private and public money. *Journal of Monetary Economics*, 106, 27–41.
9. Choi, S., Kim, B., Kim, Y.-S., & Kwon, O. (2023). Central bank digital currency and privacy: A randomized survey experiment. BIS Working Papers, No. 1147.
10. Fernández-Villaverde, J., Sanches, D., Schilling, L., & Uhlig, H. (2021). Central bank digital currency: Central banking for all? *Review of Economic Dynamics*, 41, 225–248.
11. International Monetary Fund. (2024). Central Bank Digital Currency: Progress and Further Considerations. IMF Policy Paper No. 2024/052. <https://doi.org/10.5089/9798400293252.007>.
12. Kiff, J., Alwazir, J., Davidovic, S., Farias, A., Khan, A., Khiaonarong, T., Malaika, M., Monroe, H., Sugimoto, N., Tourpe, H., & Zhou, P. (2020). A Survey of Research on Retail Central Bank Digital Currency. IMF Working Paper.
13. Kshetri, N., & Loukoianova, E. (2022). Data privacy considerations for central bank digital currencies in Asia-Pacific countries. *Computer*, 55(3), 95–100.
14. Meaning, J., Dyson, B., Barker, J., & Clayton, E. (2018). Broadening narrow money: Monetary policy with a central bank digital currency. Bank of England Staff Working Paper, No. 724.

15. Murphy, K. P., Sun, T., Zhou, Y. S., Tsuda, N., Zhang, N., Budau, V., Solomon, F., Kao, K., Vucinic, M., & Miggiani, K. (2024). Central bank digital currency data use and privacy protection. IMF FinTech Notes, 2024/004. <https://doi.org/10.5089/9798400286971.063>.
16. Reserve Bank of India. (2022). Concept Note on Central Bank Digital Currency. Reserve Bank of India.
17. Reserve Bank of India. (2025). Digital Rupee (e₹): Frequently Asked Questions. Reserve Bank of India.
18. Vijayalakshmi, S., & Pallavi, N. (2026). Does information nudge make the e-Rupee more adoptable? Examining the adoption and willingness to shift to digital currency in India. Journal of Risk and Financial Management, 19(4), 235. <https://doi.org/10.3390/jrfm19040235>.
19. World Bank. (2022). The Global Findex Database 2021: Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19. World Bank.

