Economics Bulletin

Volume 45, Issue 2

Could migrant families encourage the adoption of CBDCs in developing countries?

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Abstract

We examine the potential of upcoming Central Bank Digital Currencies (CBDCs) to be used as a means of transferring remittances. In a simple theoretical model, CBDCs compete with traditional channels provided by specialized intermediaries and with digital transfer options already offered by fintech companies. Their success depends on factors such as anonymity, potential conversion into cash, and the network effects generated by CBDC transactions among recipients' families.

Citation: Dominique Torre and Qing Xu, (2025) "Could migrant families encourage the adoption of CBDCs in developing countries?", *Economics Bulletin*, Volume 45, Issue 2, pages 842-853
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Submitted: September 13, 2024. **Published:** June 30, 2025.

1 Introduction

While recent literature has discussed CBDC implementation projects (Agur et al., 2022; Williamson, 2022; Rojas-Breu, 2022; Bhaskar et al., 2022; Kumhof and Noone, 2021), and Minesso et al. (2022) studied it in an international context, the impact of CBDCs on remittance transfers remains unexplored. This paper fills this gap by examining the potential role of CBDCs in cross-border remittances.

Remittances are monetary transfers from emigrants to their relatives, families, or friends in their home countries. In 2019, they became the largest source of capital inflows to developing economies, overtaking foreign direct investment, private capital flows, and aid (Batiz-Lazo and González-Correa, 2022). According to the World Bank, they have increased by 1.6% from USD 843 billion in 2022 to USD 857 billion in 2023 and are projected to grow by another 3% in 2024. In many countries, the ratio of received remittances to GDP exceeds 20%, helping to reduce poverty and to fuel economic growth.

Remittances can be transfered in cash by specialized companies, or digitally by telephone operators (especially in Africa) or fintech companies (in Latin America and Asia). Central Bank Digital Currencies (CBDCs) could candidate as another solution when they will be available and transferable (BIS, 2021; Bilotta and Botti, 2021; Batiz-Lazo and González-Correa, 2022; Padhi, 2022) since they will "enabl[e] faster, cheaper, more transparent and more inclusive payments for wholesale and retail alike" (BIS, 2021, p. 8).

Each method has advantages and weaknesses. Cash transfers are costly but do not require any conversion when cash payments are needed in the recipient country. Telephone operators and fintechs are less expensive, more secure, and offer access to online services, but recipients need to convert digital funds into cash in case of need. The use of CBDCs should be secure and free of transaction costs. However, CBDC anonymity and the conditions of their conversion into cash will be determined by Central Banks and governments in the recipients' countries. Our simple model tests their potential use for remittances and examines their capacity to compete with other channels. Sections 2 and 3 outline our model and results. Section 4 concludes.

2 The model

Two theoretical settings are used to explore CBDC adoption in a national context. Search theoretic models[1] offer rich microeconomic foundations, with potential applications for cross-border payments (Chiu and Keister, 2022). More presentations use DSGE models: Assenmacher et al. (2023), Xin and Jiang (2023), and Magin et al. (2023) examine the consequences for monetary policy and financial stability of introducing CBDCs. Minesso et al. (2022) extend the framework proposed by Eichenbaum et al. (2021) and study, in an open economy, the international transmission of shocks and the impact of monetary policy when CBDC is used as a substitute for cash deposits. They refer in some cases to Agur et al. (2022), who elaborate on the trade-off between security and anonymity when considering an alternative between CBDC and another means of payment.

Like Agur et al. (2022), we consider anonymity and security as two important properties for migrants' means of transfer. However, the context we analyze requires new considerations. Our agents are a population of families, not individuals: each 'family' includes a migrant and a domestic component (labeled recipient) remaining in the home country. Fintechs are already established and offering transfer services before the potential introduction of CBDCs. We assume that there are no particular constraints on migrants in the country they work in terms of possession and use of CBDCs.[2] Transaction and conversion costs play a role as well. Finally, the spatial distribution of recipients in the home countries matters. This assumption reflects the tendency of immigrants to choose destinations based on their regions or sub-regions of origin, creating clusters of migrant families.[3]

There are n heterogeneous families, and 3 means of transfer: traditional cash services, fintech digital transfers, and CBDC transfers. Families have all the same

[1] see the special issue of the Journal of Economic Dynamics and Control, Vol. 142(C), 2022

[2] As pointed out by Auer and Böhme (2020) and Minesso et al. (2022), Central banks could in some cases limit the use of their digital issues or reserve them for residents. In other cases, more relevant to the context studied in this paper, central banks could, on the contrary, favor the use of their CBDCs for international payments, and thus encourage non-residents to hold them.

[3] Sociologists point out that migrants from certain cities or regions often share similar geographical origins due to strong and weak ties that influence their migration. In some cases, this results in a "high level of endogamy between migrants and families" (Chort et al., 2012) or "networks of businesses owned by migrants from the same origin" (Garip and Asad, 2015). Several examples of such clusters have been observed in Africa (Failler and Binet, 2010; Liu, 2013), Latin America (Mines, 1981; Garip and Asad, 2016), and Asia (Shah and Menon, 1999; Piotrowski, 2006).

gross multiplicative utility function xy where x figures the consumption of the migrant and y the consumption of the recipient, both expressed in monetary term.[4] Families are identified by two indexes, i and j. Family $\{ij\}$ $(i, j = 1, 2, \ldots, n)$ is characterized by

- a parameter θ_i, uniformly distributed on the segment $[0, 1]$. The closer θ_i is to 0, the more the family values the anonymity of the transfer and the less it considers security important,
- a parameter α_j, uniformly distributed on the segment $[0, \bar{\alpha}]$, which captures the advantages provided for family by online services offered by fintechs.

The distributions of θ_i and α_j are independent.

The unit prejudices for security are respectively s_c and s_f for cash and for fintechs, and 0 for CBDC, with $s_c > s_f > 0$. The unit prejudice for anonymity are 0 for cash, a_f and λ, with $(\min\{a_f, \lambda\} > 0)$ respectively for fintechs and CBDC. λ could be considered as a control variable of the recipient country. The condition $a_f > s_f$ will be admitted (all things equal, the risk of holding fintech digital balances is low and could even be neglected).

Transfers costs are t_c and $t_f, (t_f < t_c)$ for cash transfers and fintech transfers, and 0 for CBDC. Unit conversion costs are 0 for cash, γ_f and γ_d for fintech and CBDC transfers, with $\min\{\gamma_f, \gamma_d\} > 0$.

Finally, 2 additional parameters relate only on CBDC transfers. The parameter $\mu, (0 \leq \mu < 1)$, captures the general acceptance of CBDC in the migrants' country of origin, excluding the migrants' families. Like λ, μ can be controlled to some extent by monetary and political authorities of the recipients country. This parameter vanishes when there is no tendency, except for migrants families, to use CBDC in payments, then to accept payments in CBDC. The parameter β captures the "level of clusterisation" of recipients previously defined.

Net utility of family $\{ij\}$ then writes as following, when it uses respectively cash transfers (1), fintech services (2), or CBDC transfers (3):

[4]The use of a Mas-Collel quasi linear utility function of the form $u(x, y) = \alpha x + \beta \ln(1 + y)$ does not change for the most the results. The unit of expression of values is indifferently the monetary unit of the sender or the receiver country.

$$u_{ij} = x(\bar{x} - x)(1 - t_c) - s_c\theta_i \tag{1}$$

$$v_{ij} = x(\bar{x} - x)(1 - t_f - \gamma_f) - s_f\theta_i - a_f(1 - \theta_i) + \alpha_j \tag{2}$$

$$w_{ij} = x(\bar{x} - x)[(\mu + \beta\frac{n^e}{n}) + (1 - \gamma_d)(1 - \mu - \beta\frac{n^e}{n})] - \lambda(1 - \theta_i) \tag{3}$$

where $\bar{x}$ figures the initial endowment of the migrant. n^e in the utility function 3 figures for each recipient family, the expected number of other recipient families accepting transfers in CBDC around her.

3 Results

We first characterize the distribution of families among the 3 means of transfer according the values of i and j, considering that in the short term, the expected value n^e is not perfect.

Proposition 1 *At the short term equilibrium, agents are distributed among the three possibilities to transfer remittances. Agents with a relative preference for anonymity over security and little interest in online services choose cash, those with a relative preference for security choose CBDC and the remainder use fintech services.*

Proof: First order conditions applied to expression (3) gives $x = \frac{\bar{x}}{2}$, then $w_{ij} = \frac{\bar{x}^2}{4}[(\mu + \beta\frac{n^*}{n}) + (1 - \gamma_d)(1 - \mu - \beta_d\frac{n^*}{n})] - \lambda(1 - \theta_i)$. Comparison with u_{ij} provides the frontier equation $\theta_i^* = \frac{\frac{\bar{x}^2}{4}(-t_c - M\gamma_d + \gamma_d) + \lambda}{\lambda + s_c}$, where $M = \mu + \beta\frac{n^e}{n}$. Comparison with v_{ij} provides the frontier $\alpha_j = (\lambda + s_f - a_f)\theta_i + \frac{\bar{x}^2}{4}(M\gamma_d - \gamma_d + t_f + \gamma_f) + a_f - \lambda$. Families ij such that $\alpha_j \geq -(s_c - s_f + a_f)\theta_i - \frac{x^2}{4}(t_f - t_c + \gamma_f) + a_f$ are such that $v_{ij} \geq u_{ij}$. Once the conditions for qualification are satisfied for each frontier, families distribute as in figure 1 on the rectangle determined by the values of θ_i and α_j □

Figure 1 illustrates the short term distribution of families.

Expectations n^e change over time. Suppose that they are extrapolative, *e.g.* that expected number of CBDC users for next period is given by current observed number. At perfect expectations equilibrium expectations are confirmed by the

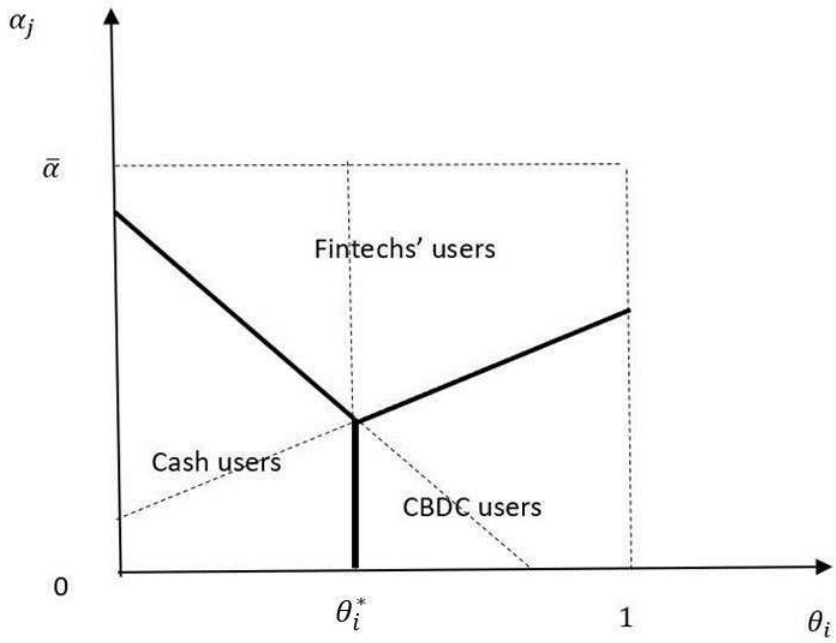

Figure 1: Distribution of families among the three means of transfer

distribution of migrants and families among the three means of transferring remittances. This equilibrium is stationary but not always stable. Stable stationary equilibria are studied in Lemma 1 according values of parameters (including possible controls of government and monetary authorities over λ and μ.We test both the interest of migrants in using this CBDC to transfer remittances and the capacity of the recipient country's monetary authority to develop local use or to make this CBDC convertible into the local currency or able to circulate in parallel with it.

Lemma 1 *There is always at least one stationary equilibrium, which is stable with extrapolative expectations. The nature and number of stable equilibria depend on the parameters relating to the characteristics of the CBDC. Still depending parameters, CBDC could be used or not at stable equilibrium(a).*

Proof: We introduce the following notations: $A = (\lambda + s_f - a_f)$, $B = \gamma_d \frac{\bar{x}^2}{4}\mu$, $C = \gamma_d \frac{\bar{x}^2}{4}\frac{\beta}{n}$, $D = \frac{\bar{x}^2}{4}(-\gamma_d + t_f + \gamma_f)$, $E = a_f - \lambda$, $F = \frac{\bar{x}^2(-t_c - \mu\gamma_d + \gamma_d) + \lambda}{4(\lambda + s_c)}$, $G = \frac{\bar{x}^2}{4(\lambda+s_c)}\frac{\beta\gamma_d}{n}$, write $H = B + D + E$, and note that H does not depend on α_j and θ_i. Given figure 2, at stationary equilibrium, the effective number of migrants and families using CBDC to send remittances can be written as $n^* = \min(\max[0, n\int_{\theta_i=\max(0,\theta_i^*)}^{1} A\theta_i + Cn^* + H], n)$, with $\theta_i^* = F - Gn^*$. Given that C and G are positive, there are 5 possible configurations depending on μ and λ. They are represented in Figure 2. Only in cases 2, 3, 4 and 5, CBDC could be adopted at stationary equilibrium, with 2 stable equilibria in case 2 and 4. In case 2, the adoption is conditioned to initial 'optimist' expectations on its future adoption □

Lemma 1 attests to the conditional adoption of CBDCs as a means of transferring remittances. Without incentives from political and monetary authorities (λ high, μ small), cases 1 or 2 appear (no transfer with CBDC, except with exceptional clustering of recipients and optimistic initial expectations in case 2). Without any initiative from the public authorities, the adoption of CBDCs in terms of transfers therefore seems doubtful. Let's now consider the case where public authorities encourage this adoption, by increasing on the anonymity of CBDC holdings or by paying civil servants in part in CBDC.

Proposition 2 *All things equal, weak incentives to use CBDC combined with a level of anonymity and conversion possibilities equivalent to those offered by fintechs ensure CBDC adoption as a mean to remit, even when recipients are poorly clusterized.*

Proof: When $n^e = 0$, then $n^* = \min(\max(0, \int_{\theta_i^*}^{1} A\theta_i + Cn^e + H), n)$, with $\theta_i^* = F - Gn^e$, *i.e.*, $n^* = \min(\max(0, n(\frac{A}{2}(1 - F^2) + H(1 - F))), n)$. When μ increases, F decreases and H increases. Then, all things being equal, n^* increases with μ when $n^e = 0$. Also and again, all things being equal we can derive that, when $n^e = 0$ and $\mu = 1$, $n^* = 0$, then $\forall \mu, n^* = 0$ when $n^e = 0$. Conversely, imagine that $\gamma_f = \gamma_d$, and $\lambda \leq a_f$, then for sufficiently high values of $\bar{x}$, $(1 - F)$ and H are both positive, if μ is close to 1 even if $n^e = 0$. Then $n^* = 0$ is not a stationary equilibrium, and case 1 and case 2 represented in the first line of figure 2 are no longer relevant □

Once the prejudice of CBDCs' non-anonymity is reduced, and if their conversion into cash is facilitated, their advantages in terms of transaction cost and

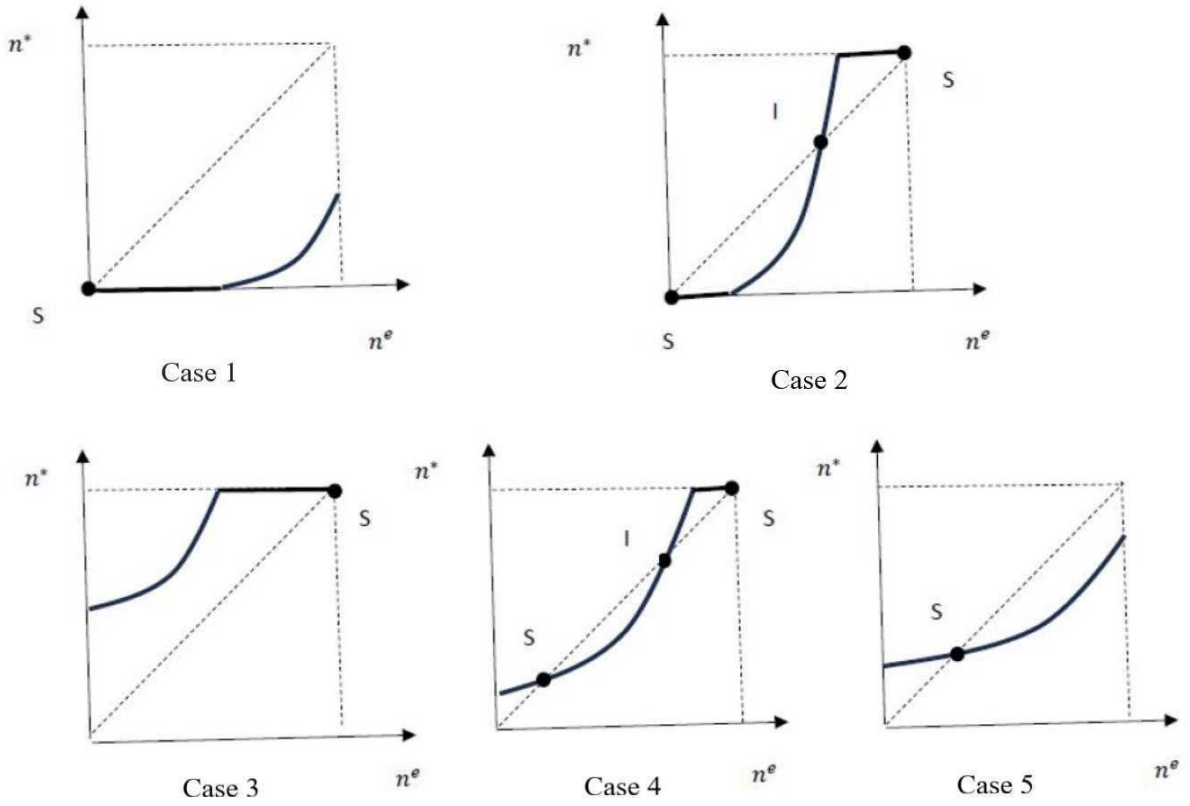

Figure 2: Possible configurations of stationary equilibria of the developed model (number of CBDC users among migrants/families)

security enable them to compete with other digital transfer methods, even if these last offer advantages such as access to online resources or services. In this case, recipients' clustering can improve their adoption but is no longer a necessary condition of their adoption. The question now is whether, for fiscal reasons for example, it is in the interest of the authorities to increase the anonymity of CBDC holdings.

4 Conclusion

Our exercise assumes that a central bank decides to make a CBDC available to non-residents. The objective could be to enhance trade with partners, to facilitate

labour mobility, or simply to propose an international means of payment able to compete with major international currencies. We test both the interest of migrants in using this CBDC to transfer remittances and the capacity of the recipient country's monetary authority to develop local use or to make this CBDC convertible into the local currency or able to circulate in parallel with it.

Two scenarios emerge from this exercise. The first is that "clustered migrants families" could autonomously adopt more rapidly CBDC than the rest of the population of recipients' countries, like it has been observed for ICT adoption (Ali et al., 2024), the use of deposit accounts (Anzoategui et al., 2014) and other forms of financialization (Ambrosius and Cuecuecha, 2016; Azizi, 2020). The second is that local political and monetary authorities encourage the adoption of CBDC to increase financial transparency or reduce the size of informal sector. In this case, the natural advantages of CBDC in terms of security and transfer costs would no longer be hampered by poor acceptability within the recipients' countries. At the moment, it remains undecided whether CBDCs will be freely available or more or less restricted to foreigners. This is an important question if the use of CBDCs is to become established in developing countries. The trade-off between the risks associated with speculative use of these holdings, which could lead to excessive exchange-rate volatility (CPMI, 2021; Alfonso et al., 2024) and an excessive dependence of monetary policies (Minesso et al., 2022), and the benefits of spreading external use of competing national currencies, should govern these decisions.

References

Agur, I., A. Ari, and G. Dell'Ariccia (2022). Designing central bank digital currencies. *Journal of Monetary Economics 125*, 62–79.

Alfonso, V. C., S. Kamin, and F. Zampolli (2024). Central bank digital currencies (CBDCs) in Latin America and the Caribbean. *Latin American Journal of Central Banking*, 100140.

Ali, U., M. Mughal, M. Ayaz, and J. Ahmed (2024). Migrant remittances and the adoption of information and communication technology. *Information Economics and Policy 68*, 101101.

Ambrosius, C. and A. Cuecuecha (2016). Remittances and the use of formal and informal financial services. *World Development 77*, 80–98.

Anzoategui, D., A. Demirgüç-Kunt, and M. S. M. Pería (2014). Remittances and financial inclusion: Evidence from El Salvador. *World Development 54*, 338–349.

Assenmacher, K., L. Bitter, and A. Ristiniemi (2023). CBDC and business cycle dynamics in a New Monetarist New Keynesian model. *ECB Working Paper*.

Auer, R. and R. Böhme (2020). The technology of retail central bank digital currency. *BIS Quarterly Review, March*.

Azizi, S. (2020). Impacts of remittances on financial development. *Journal of Economic Studies 47*(3), 467–477.

Batiz-Lazo, B. and I. González-Correa (2022). The Journey of a Remittance in the US-Mexico Corridor: From My Salary to My Family. *MPRA Paper* (114233, August).

Bhaskar, R., A. I. Hunjra, S. Bansal, and D. K. Pandey (2022). Central Bank Digital Currencies: Agendas for future research. *Research in International Business and Finance 62*, 101737.

Bilotta, N. and F. Botti (2021). *The (near) future of central bank digital currencies: risks and opportunities for the global economy and society.* Peter Lang International Academic Publishers.

BIS (2021). Central bank digital currencies for cross-border payments. https://www.bis.org/publ/othp38.pdf.

Chiu, J. and T. Keister (2022). The economics of digital currencies: Progress and open questions. *Journal of Economic Dynamics and Control 142*, 104496.

Chort, I., F. Gubert, and J.-N. Senne (2012). Migrant networks as a basis for social control: Remittance incentives among Senegalese in France and Italy. *Regional Science and Urban Economics 42*(5), 858–874.

CPMI, B. (2021). Application of the principles for financial market infrastructures to stablecoin arrangements. *Committee on Payments and Market Infrastructures*.

Eichenbaum, M. S., B. K. Johannsen, and S. T. Rebelo (2021). Monetary policy and the predictability of nominal exchange rates. *The Review of Economic Studies 88*(1), 192–228.

Failler, P. and T. Binet (2010). Sénégal. les pêcheurs migrants: réfugiés climatiques et écologiques: Sénégal. *Hommes & migrations 1284*(2), 98–111.

Garip, F. and A. L. Asad (2015). *Migrant networks*. DASH.Harvard Edu.

Garip, F. and A. L. Asad (2016). Network effects in Mexico–US migration: Disentangling the underlying social mechanisms. *American Behavioral Scientist 60*(10), 1168–1193.

Kumhof, M. and C. Noone (2021). Central bank digital currencies-Design principles for financial stability. *Economic Analysis and Policy 71*, 553–572.

Liu, M.-M. (2013). Migrant networks and international migration: Testing weak ties. *Demography 50*(4), 1243–1277.

Magin, J. A., U. Neyer, and D. Stempel (2023). *The macroeconomic effects of different CBDC regimes in an economy with a heterogeneous household sector*. Number 396. DICE Discussion Paper.

Mines, R. (1981). Developing a community tradition of migration: A field study in rural Zacatecas, Mexico, and California settlement areas. *UC San Diego Monograph Series*.

Minesso, M. F., A. Mehl, and L. Stracca (2022). Central bank digital currency in an open economy. *Journal of Monetary Economics 127*, 54–68.

Padhi, P. K. (2022). Emergence of Central Bank Digital Currency in Indian Perpective: A conceptual Analysis. *An Approach towards Central Bank Digital Currency*, 237.

Piotrowski, M. (2006). The effect of social networks at origin communities on migrant remittances: Evidence from nang rong district. *European Journal of Population/Revue européenne de Démographie 22*, 67–94.

Rojas-Breu, M. (2022). Discussion of "Central-bank digital currency and monetary policy". *Journal of Economic Dynamics and Control*, 104151.

Shah, N. M. and I. Menon (1999). Chain migration through the social network: experience of labour migrants in Kuwait. *International migration 37*(2), 361–382.

Williamson, S. D. (2022). Central bank digital currency and flight to safety. *Journal of Economic Dynamics and Control 142*, 104146.

Xin, B. and K. Jiang (2023). Central bank digital currency and the effectiveness of negative interest rate policy: A DSGE analysis. *Research in International Business and Finance 64*, 101901.