SPEECH

“Hic sunt leones” – open research questions on the international dimension of central bank digital currencies

Speech by Fabio Panetta, Member of the Executive Board of the ECB, at the ECB-CEBRA conference on international aspects of digital currencies and fintech

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It is a pleasure to welcome you on behalf of the European Central Bank (ECB) to the fifth annual meeting of the International Finance and Macroeconomics Program of the Central Bank Research Association (CEBRA). This year’s meeting is taking place virtually. And it brings together participants from nearly 20 time zones, which is fitting for a conference that seeks to shed light on how digitalisation is changing money and finance globally.

In my remarks today, I will focus on the international dimension of central bank digital currencies, or CBDCs. The ECB launched an investigation phase for the digital euro over the summer.[1] One of the aspects we are investigating is whether it would be possible to use the digital euro in cross-border contexts, and under which conditions. Many other central banks are reflecting on whether they would allow non-residents to access their own digital currency if they were to decide to introduce one.[2]

Decisions about the issuance and design of CBDCs require a careful assessment of the trade-offs between risks and opportunities. The international dimension makes that assessment more challenging still. So, it is already worth thinking about the implications of the cross-border use of CBDCs.

This is where research can help policy. The international dimension of CBDCs is almost unexplored in terms of research. The Latin phrase “hic sunt leones” – here be lions – was used in pre-Renaissance maps to identify uncharted territories that could potentially be dangerous. And in the realm of digital currencies, just like in the pre-Renaissance world, we need research to map those territories. To replace myths with knowledge. To provide the conceptual backbone and evidence that guide our thinking. And to point to the opportunities and challenges ahead.

The literature on the international aspects of CBDCs is still in its infancy. Many of you are contributing to this literature. After reviewing what we already know about the international dimension of CBDCs, I will discuss today open questions of direct policy relevance, in particular: what is different about CBDCs compared to alternative monetary and financial instruments? And how much international cooperation do we need in view of externalities from CBDC issuance, interactions among CBDCs, and the emergence of other innovations such as global stablecoins?

In international fora, the ECB is also involved in technical and policy discussions on how CBDCs could facilitate cross-border payments through different degrees of integration and cooperation – ranging from basic compatibility with common standards to establishing international payment infrastructures.[3] Today, however, I will focus on aspects that are relevant for research on international macroeconomics and finance.

Charted territories

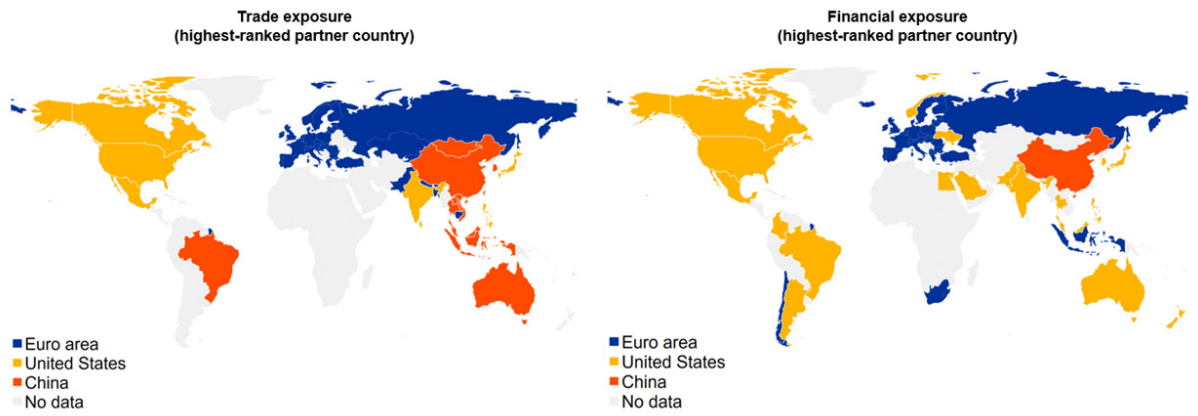
Let’s start by considering what we already know about the international dimension of CBDCs. Available research points to three main implications of allowing non-residents unrestricted access to a

given CBDC.

First, a CBDC that can be used outside the jurisdiction where it is issued might increase the risk of digital currency substitution – or digital "dollarisation".[4] If a foreign CBDC were to be widely adopted, this might lead to the domestic currency losing its function as a medium of exchange, unit of account and store of value – ultimately impairing the effectiveness of domestic monetary policy and raising financial stability risks. These risks are particularly relevant for emerging markets and less developed economies that have unstable currencies and weak fundamentals. Currency substitution could also occur in small advanced economies that are open to trade and integrated in global value chains.[5] Since international trade and finance are complements to each other, financial integration may matter, too.[6] It is hard to gauge in advance how significant the risks of digital currency substitution could be, and in which currencies this substitution could occur. Trade and finance linkages with the issuers of international reserve currencies – the United States, the euro area and China – vary considerably across countries (Chart 1). That, in turn, suggests that the risks of currency substitution vary significantly across countries and currencies. In any case, the introduction of a CBDC in one jurisdiction must do no harm.[7] In particular, it must not put the financial system of other jurisdictions at risk.

Chart 1

International trade and financial linkages with the United States, the euro area and China



Sources: ADB MRIO 2019, IMF CPIS, Haver Analytics, IntLink and ECB staff calculations.

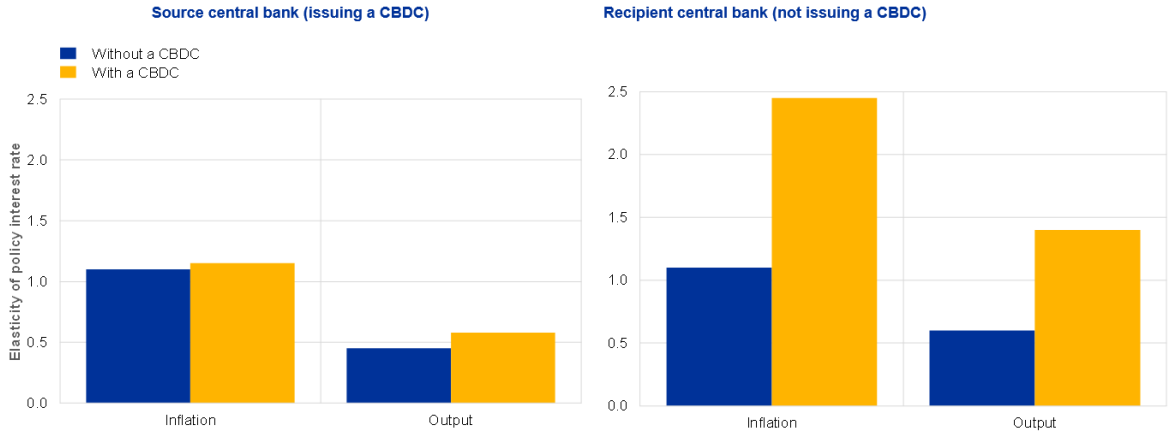
Notes: International trade and financial exposures as of 2019. Trade exposures vis-à-vis the United States, the euro area and China are calculated based on Belotti, F. et al. (2021), "icio – Economic Analysis with Inter-Country Input-Output tables", *Stata Journal*, forthcoming. Financial exposures are calculated as the sum of total portfolio investment assets and liabilities of a country held in either the United States, the euro area or China. All data are in US dollars. The financial exposures to China include Hong Kong.

The second implication of allowing non-residents to use CBDCs relates to global spillovers. Issuing a CBDC can magnify the cross-border transmission of shocks, increase exchange rate volatility and alter capital flow dynamics.[8] One reason for this is that CBDCs combine characteristics such as scalability, liquidity and (potentially) renumeration, which make them appealing relative to financial assets that are traded internationally. Research finds that introducing a CBDC available to non-residents "super charges" uncovered interest rate parity – in other words, it alters the standard relation between interest rate differentials across countries and the exchange rate. That, in turn, leads to a stronger rebalancing of global portfolios in response to shocks, and to higher exchange rate volatility. Economies not issuing a CBDC are then subject to stronger spillovers. And their central banks need to

be more reactive to output and inflation fluctuations, which reduces their autonomy. Chart 2 shows model simulations by ECB staff illustrating how the presence of a foreign CBDC affects the reaction function of a recipient central bank. That central bank faces stronger shock spillovers and may need to be twice as reactive to inflation and output fluctuations.[9] By contrast, the reaction function of the central bank issuing the CBDC hardly changes. Of course, the design of the CBDC, including the introduction of restrictions on remuneration and quantities, has a considerable influence on the extent of these spillovers.[10]

Chart 2

Optimal monetary policy in the presence and absence of a CBDC



Source: Ferrari, M., Mehl, A. and Stracca, L. (2020), "Central bank digital currency in an open economy", CEPR Discussion Paper Series, No 15335, Centre for Economic Policy Research, October.

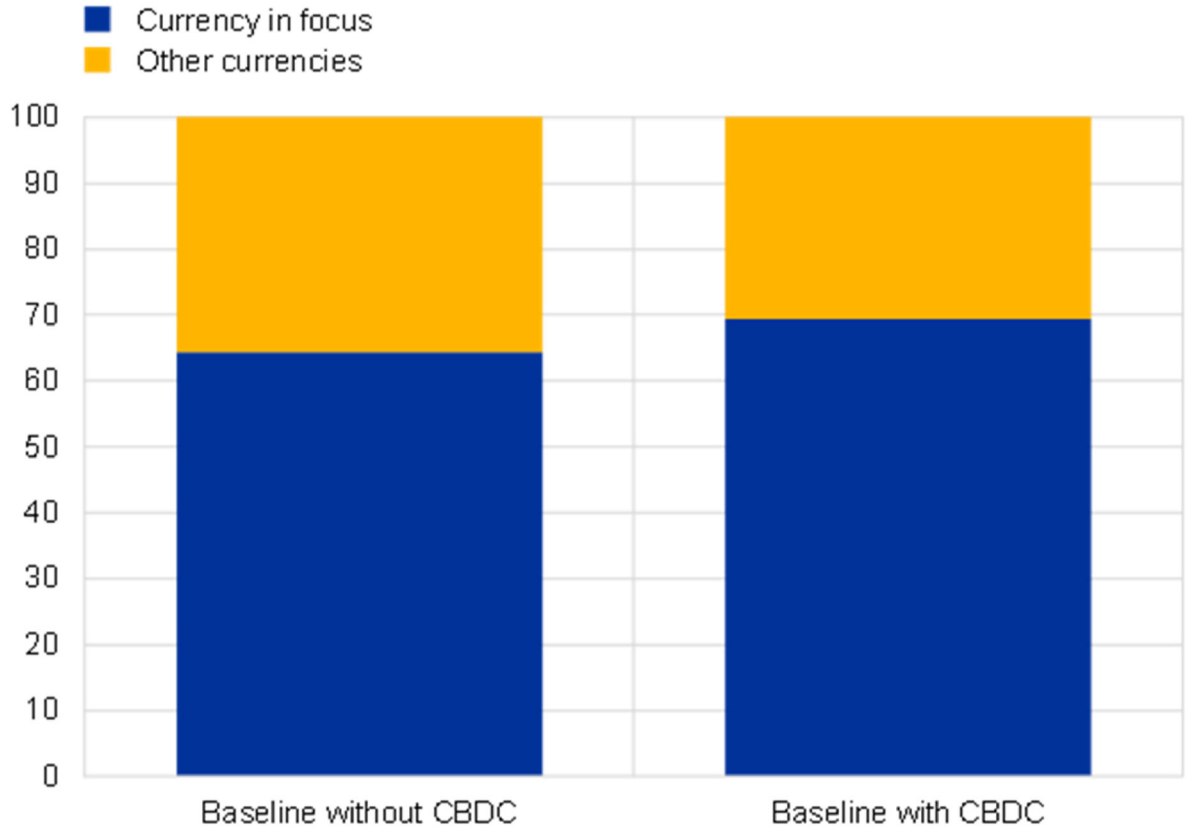
Notes: Model-based optimal response to output and inflation of the central bank Taylor rule in the presence and absence of CBDC under a fixed-remuneration design. The key parameters optimised are interest rate persistence, the elasticity with respect to inflation and the elasticity with respect to output.

Finally, research suggests that issuing a CBDC which can be used by non-residents might have an impact on the international role of currencies. The costs of cross-border payments might fall, which may enhance the role of a currency as a global payment unit. And the specific features of a CBDC – such as safety, liquidity, efficiency and scalability – might further bolster its international use. But there is a flipside to this: broader international demand may cause the exchange rate to appreciate. This could weigh on the currency's attractiveness as an invoicing unit for exports in other jurisdictions and, in turn, reduce global interest in the currency. On the whole, model simulations by ECB staff suggest that issuing a CBDC would underpin the international role of a currency, albeit not to a particularly large extent. This is visible from Chart 3, which contrasts two model simulations – one simulation without a CBDC and the other with a CBDC issued by one of the three countries in the model. The share of that country's currency in global export payments (shown as blue bars) increases when it is available as a CBDC.[11] However, the rise is modest, at about 5 percentage points – less than a 10% increase relative to the baseline simulation without a CBDC. Also here the caveat applies that the impact of CBDCs on the international role of currencies depends on choices related to their design, such as restrictions on remuneration and quantities. But the message is clear: the international role of a currency depends more on fundamental forces, such as the size of the economy and the stability of its fundamentals.

Chart 3

Model simulations of the impact of a CBDC and its design on international currency use

(currency breakdown of global export payments in percentages)



Source: ECB calculations.

Notes: The chart shows the currency breakdown of global export payments in alternative model simulations, where "currency in focus" is the currency of the country that issues a CBDC (one of the three countries in the model). It is based on simulations using a three-country DSGE model in the spirit of Eichenbaum et al. (2020) with baseline assumptions (no capital controls, a 1% liquidation cost for debt securities and symmetric 33%-weights for all countries). See ECB (2021), "Central bank digital currency and global currencies", *The international role of the euro*, Frankfurt am Main, June.

Uncharted territories

Let me now turn to the uncharted territories – the "terra incognita" identified by lions on medieval maps – in order to explore two broad sets of questions.

What is different about CBDCs?

The first is as follows: what is truly unique about CBDCs? And do we sufficiently account for this in our models? Existing research often models CBDCs as safe and liquid instruments. That is convenient as it allows us to draw on standard macro-monetary models, with some tweaks here and there. But to truly understand the risks and opportunities of CBDCs, we need to take them more seriously and acquire a deeper understanding of what makes them different from other monetary and financial instruments. Consider a few examples that illustrate why this is important – building on the three implications of CBDCs I just discussed.

First, how much of the discussion on the risks arising from digital dollarisation is new? The determinants emphasised in existing research often seem all too reminiscent of the macro literature of the 1990s on dollarisation. It would be good to understand what is truly unique about CBDCs now as compared with dollarisation back then. For instance, maybe the determinants are unchanged but CBDCs make dollarisation more likely by lowering transaction costs. Or perhaps CBDCs could be bundled with other useful services, such as privacy services, rewards or conditional payments.

Second, on international spillovers, introducing any other internationally traded safe and liquid instrument, such as a highly rated bond, into a macro model would also produce strong spillovers. Can we truly apply the same insights to CBDCs? We need to make sure we do not miss relevant channels and idiosyncrasies. For instance, what impact might a CBDC have on the effectiveness of capital account management measures?[12]

Third, concerning the international role of currencies, the effects obtained are likely calibration or estimation-dependent. Under which conditions will standard economic fundamentals remain the main drivers of international currency status? Research so far indicates that digitalisation does not change anything fundamental. To what extent would CBDCs still have the potential to affect the configuration of global reserve currencies and the stability of the international monetary system?[13]

So, a broad agenda for research concerns what is truly unique about CBDCs. Answering these questions is potentially important for policymaking.

First of all, it would help us to calibrate our models and better anticipate the future. For example, one challenge we face is estimating the potential demand for CBDCs, which is crucial to understanding their financial stability implications.[14] Depending on a CBDC's design, this also entails estimating international demand. One approach is to conduct surveys about the potential interest of users – consumers and firms – in CBDCs.[15] Another is to draw information from the experience with instruments that are closely related to CBDCs, such as cash and bank deposits, for instance based on surveys of consumers' payment choices and preferences.[16] Knowing what sets CBDCs apart would help us understand what is useful to look at, and what is not.

Moreover, answering these questions would also help us to assess whether lessons gleaned from history remain relevant. For instance, recent research looked at the experience of France in the 1930s to gauge whether CBDCs could make bank runs more likely.[17] And more recent systemic bank crises, like that of Japan in the 1990s, have been deemed useful episodes to consider.[18] Having a better understanding of what makes CBDCs unique would allow us to assess whether things are different this time round.

Let me stress again that the answers are likely to depend on the specific design features of CBDCs. And since design choices are best made when the implications are properly understood, this again points to the need to understand how CBDCs differ from alternative monetary and financial instruments.

International cooperation

Other questions that naturally emerge when considering the international context are: how much global cooperation is optimal? And how relevant are strategic interactions among potential digital currency issuers? This is the second set of unexplored questions which I would like to discuss today.

Allowing non-residents to use a CBDC issued in another jurisdiction may give rise to externalities, both positive and negative. An important goal is to "do no harm" if a decision to issue a CBDC were to be made. The question then is: how much international cooperation is desirable to internalise such externalities and avoid outcomes that are detrimental globally.

So far, the academic literature does not provide much guidance. But international cooperation offers clear benefits. Exchanging information on the progress of national CBDC projects in international fora allows us to share our experiences about possible problems and solutions, to draw attention to neglected issues and to further everyone's understanding of the policy and technical challenges. It helps to forge consensus on what works and what doesn't.[19] There are also benefits to discussing

high-level principles at the international level, for instance to find consensus on important economic, financial and regulatory issues of common interest.[20] And there might be gains from reflecting on common standards to make CBDC projects interoperable, for instance to move from the cross-border use of CBDCs to cross-currency payments between CBDCs. Therefore, it might be beneficial to discuss common technical or regulatory standards to foster cross-border payments while limiting the impact on the monetary system.[21]

Cooperation is not without costs, however. And the costs may increase with the number of central banks involved and with their diverse objectives, legal frameworks, financial structures, mandates and preferences, which would likely be reflected in different CBDC designs. So the natural question to ask is: how much global cooperation is optimal?

This is a complex question to answer. One might be tempted to aim for uniform standards for CBDCs – a "one size fits all" approach. But the question then is whether meaningful cooperation is possible at all if conditions differ sharply across countries. Take privacy – an important design feature of a digital euro that was raised by members of the public and professionals in the public consultation we concluded earlier this year.[22] Privacy is unlikely to be equally important in all regions of the world. Where diverse preferences exist, some stakeholders might not see much merit in enforcing global standards. For instance, one concrete open question is: how could a jurisdiction with more stringent requirements on the traceability of payments allow cross-currency transactions with a jurisdiction granting higher privacy standards?

Another point to consider is the existence of strategic interactions – where decisions of one player depend on the actions of the other players – as they can tilt the balance of the benefits and costs of global cooperation. Many countries are simultaneously reflecting on CBDCs. But strategic interactions have not been studied much in the context of CBDCs, and the international dimension even less so. In fact, it is not only strategic interactions among potential CBDC issuers that might matter. Strategic interactions between CBDCs and innovative payment solution providers from the private sector, such as global stablecoins, also potentially matter, notably when such providers can leverage their large existing user base and their experience in bundling appealing services together.

There are still lots of open questions surrounding strategic interactions and the timing of actions. The field of CBDCs could be seen as a clean slate at the moment. But this will not last for long.[23] The countries that have already introduced their own CBDC (such as the Bahamas) cannot set global standards. But this will change. China is expected to introduce the digital renminbi relatively soon, while other jurisdictions – including the euro area – are actively preparing to potentially launch their own digital currency. Can the "pioneer" central banks that have decided, or are deciding, on the design of their CBDC based on their own considerations, be expected to seek general consensus on a standard approach before moving forward? The costs and benefits of being the first to issue a digital currency are not well understood. Is it better to get it first – by aiming to set standards for others while putting domestic objectives at risk – than it is to get it right? Late adopters might have a more limited menu of potential design features to choose from. Another risk is that of a fragmented equilibrium emerging, with isolated islands of a few interoperable CBDCs that cannot interact with other CBDCs outside of their own small group.

In any case, when reflecting on cooperation or strategic interactions, we need to be mindful of the differences between jurisdictions. Crucially, the domestic central bank's mandate should always be preserved.

Conclusion

Let me now conclude. This conference brings together academics and policymakers to discuss issues related to the international dimension of CBDCs. We are seeing clear progress in better understanding the technical implications of allowing non-residents access to CBDCs. Yet many policy and research questions remain open. Today I have outlined two high-level themes that could steer the discussion. I hope that this conference will provide a platform to explore these questions and many others. In turn, this will help us push the frontier of knowledge deeper into the uncharted territories in the realm of CBDCs, and show that they are not, in fact, a lion's den but rather full of potential opportunities.

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17. Monnet, E., Riva, A. and Ungaro, S. (2021), "The Real Effects of Bank Runs. Evidence from the French Great Depression (1930-1931)", *Discussion Papers*, No 16054, Centre for Economic Policy Research, April. Back then, savers had a safe alternative to banks in the form of government-backed savings institutions, which shared similarities with CBDCs. The experience from that time shows that the existence of safe deposits other than banks played a substantial role in triggering bank runs.
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CONTACT
European Central Bank
Directorate General Communications
- Sonnemannstrasse 20
- 60314 Frankfurt am Main, Germany
- +49 69 1344 7455
- media@ecb.europa.eu

Media contacts