

# Challenges of the introduction of the digital euro - search for a compatibility model for North Macedonia

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**XII International Conference on  
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PROCEEDINGS**

**23-25 September, 2022 Prilep, North Macedonia**

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CHALLENGES OF THE INTRODUCTION OF THE  
DIGITAL EURO - SEARCH FOR A COMPATIBILITY  
MODEL FOR NORTH MACEDONIA

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**Abstract**

*The introduction of the digital euro will have an impact on the implementation of the financial policy of North Macedonia. Based on an assessment of its own interests and capabilities, North Macedonia can decide on a model for compatibility with the digital euro. The paper analyses three possible models for cross-border system compatibility. Assuming that a digital euro provides a new channel for the transmission of domestic monetary policy shocks, the basic cross-border effects of the introduction of the digital euro can be summarised as an increase in euroisation, a reduction in monetary policy independence and a reduction in the creditor function of last resort. These effects need to be countered with integrated smart features such as automatic remuneration and bilateral cooperation with the ECB or a combination of these models. According to the analysis, this functionality can be achieved through the model, which is a technological bridge between the systems, as opposed to the model, which is a separate system, or the model, which is integrated. Although the proposed model is the most desirable in terms of potential gains and addressing potential risks, this model involves the development of an own digital currency (digital denar).*

**Keywords:** Digital Euro, Compatibility Model for North Macedonia, Digital euro Challenges.

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## 1. Introduction

Research on the advantages and disadvantages of introducing centralised central bank digital currencies (CBDCs) has been particularly topical recently. Indeed, numerous advantages are highlighted and a number of pilot projects exist, regardless of the degree and size of the countries. Given the importance of the euro area and the euro integration process, the introduction of the digital euro is of particular importance in research. The digital euro could benefit the entire economic policy of the European Union (EU), as it is a secure digital asset with state-of-the-art features, in addition to currency, capable of meeting the evolving payment needs of a modern economy. The public sector may be best placed to provide the security, scale, level of accessibility and convenience required for individuals, businesses and financial institutions to engage in digital payments.

Depending on the model chosen, not only the non-euro countries of the EU are affected, but also third countries, especially those in the process of European integration, including North Macedonia. Unfortunately, there are very few studies of this kind, even in conceptual form, both because of the uncertainty about the final model of the digital euro, whose introduction is more important especially for retail than for wholesale, and because of the passive attitude of small open economies, whose fate is expected sooner or later in the euro area, so that the strategy of waiting is the most acceptable.

One of the main objectives of the introduction of the digital euro is to expand the international role of the euro. According to ECB the digital euro will be introduced alongside cash, and it would not replace it<sup>3</sup>. Thus, there is one goal of expanding the international importance of the euro, which is to be expected to be affected in a certain way in North Macedonia. North Macedonia is highly euroized country (high share of credit and deposit euroization) with a fixed exchange rate pegged to the euro. The issue of currency sovereignty is not crucial for the country. Remittances from abroad in euro are a significant source of foreign exchange in the country. Additionally, North Macedonia has agreement with the ECB for the use of repo agreement which provide exchange rate stability.

Taking into account the adopted account-based model of the introduction of the digital euro on the one hand, and the interests of North Macedonia on the other, the paper analyses the strategy and fundamentals of a model-based solution approach that would be compatible with the digital euro and would allow for rapid integration with minimal adjustment costs. The main objective of this paper is to open the conceptual issues of the impact of the introduction of the digital euro for North Macedonia, as well as to highlight the limitations and obstacles.

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<sup>3</sup> European Central Bank, Report on a digital euro, October 2020, p. 6, available at [https://www.ecb.europa.eu/pub/pdf/other/Report\\_on\\_a\\_digital\\_euro~4d7268b458.en.pdf](https://www.ecb.europa.eu/pub/pdf/other/Report_on_a_digital_euro~4d7268b458.en.pdf), accessed: 9 August, 2022, further in the text: Report on a digital euro.

Macedonia has to rely more on its own development, although this implies the use of an interlink model, which implies the use of the positive effects of digital currency through a system that will be compatible or linked to the ECB.

The ECB analysis highlights the necessity for a cap on the usage of a digital euro outside the eurozone, particularly when considering the cross-border effects. To be coordinated through international coordination with other central banks, such a limit may be required to stop uncontrollable capital flows (Report on a digital euro, 2020). To ensure that it does not cause unduly volatile money flows or exchange rates, the architecture of the digital euro should incorporate certain conditions for access and use by citizens outside the euro region.

However, the National Bank of North Macedonia cannot be forced to start building its own CBDC. Nevertheless, the National Bank of Northern Macedonia is still free to decide now whether it wants to participate in the architecture of the system. Later, when the technological gap between the Eurozone and North Macedonia widens, it is more likely that North Macedonia will have to resort to ready-made EU solutions in order to maintain control over currency flows and its own monetary policy. Therefore, it would be best for the National Bank of North Macedonia to re-evaluate its position on a digital denar and work aggressively with the EU now to create a cross-currency system suitable for its own monetary policy (Pečarić et al, 2022).

Within the proposed models of BIS (2021) as a theoretical starting framework and considering the constraints of North Macedonia, an active adjustment strategy is proposed. The challenges of the digital euro are an opportunity to improve and reform the financial system of North Macedonia with the help of FinTechs in order to make finances more efficient. For the case of North Macedonia, we propose networked CBDC systems. It could expand these potential improvements and provide more protection.

The content of the paper is reproduced below: The second part is dedicated to the possible choice of the digital euro model and the cross-border implications of the digital euro. The focus is on the trade-off between the choice of model and the expected impact, with financial technologies aimed at achieving the objectives. Based on the findings of the second part, the possible strategies and models of compatibility with the digital euro in Northern Macedonia are analysed in order to select a conceptual model. New insights on this topic can be found in the concluding remarks at the end.



## **2. Digital Euro**

### ***2.1. The digital Euro probable model***

According to Pečarić et al. (2022), we can assume that the most likely design of a digital euro will be a legal tender built on a hybrid account-based system with potential tokenisation features at a later stage. Cipollone (2021) stresses that the creation of the digital euro is a very complex project from an economic, technical, legal and organisational point of view. The choice of an institutional solution is a weighing of the advantages and disadvantages of the identified models in the context of achieving the set objectives with the introduction of the digital euro. The new means of payment must be widely available, even to those who do not have a bank account, easy to use, secure and resistant to cyber-attacks or network failures. It must also protect privacy and allow for verification. One of the biggest challenges will be to limit bank disintermediation. Although this risk is probably overestimated, it is crucial for Europe as European businesses, especially SMEs, rely heavily on bank intermediation. Papers and publications from ECB mention two main models, the account-based model and the token-based model. The account-based model is further divided into direct trading, indirect trading and hybrid digital euro trading. Each of the models has its advantages and disadvantages.

The analyses show that the objectives of the digital euro are best achieved in an account-based model - a hybrid retail form - as it enables improved digital efficiency at a very high level, has similar characteristics to cash and enables competition and digital transformation of the European Union and the banking sector. In addition, the security system will be fulfilled, the international role of the euro will be significantly strengthened, cost savings will be clearly visible and environmental sustainability will also be fulfilled. Financial inclusion is much more promoted, financial stability is visible, anonymity of transactions is not fulfilled in any model, including this one. The main arguments in favour of the account-based model, or more precisely the hybrid model, are the use of the infrastructure already in place, which allows lower costs for the introduction of the digital euro, technological resilience and resource efficiency.

### ***2.2. Cross-border effects of a digital euro***

Through integrated smart features such as automatic remuneration, bilateral engagement with countries that have adopted the euro, or a mix of these two strategies, cross-border effects, particularly in terms of currency

substitution and currency hoarding, need to be addressed. Without these safeguards, negative effects could occur both within the euro area and in the affected countries outside the euro area. The analysis of ECB underlines the need for a cap on the use of a digital euro outside the euro area, especially when considering the cross-border implications. Such a cap needs to be coordinated internationally with other central banks to stop uncontrollable capital flows (Report on a digital euro, 2020). To ensure that it does not cause excessively volatile money flows or exchange rates, the architecture of the digital euro should include certain conditions for access and use by citizens outside the euro area. The introduction of a digital euro is expected to have several cross-border implications.

First, a digital euro could amplify the cross-border spillover effects of monetary policy shocks by providing a new channel for the transmission of domestic shocks. New digital forms of payments could circumvent existing techniques for managing capital flows, such as CBDCs, if they are not prohibited by design or policy. Existing transaction verification procedures could be rendered useless by new payment instruments and service providers. To ensure that measures to monitor capital flows remain resilient in the digital age, existing rules and implementation procedures need to evolve. Carefully designed CBDCs equipped with modern technology, on the other hand, can help.

Secondly, the availability of a digital euro could lead to currency exchange and 'erosion' in third countries, especially those with weak currencies and economic fundamentals, and those with significant trade links with the EU. The cross-border availability of CBDCs could minimise the cost of obtaining, holding and issuing foreign money, depending on the design and regulation. International currencies already have strong network effects, and falling prices could make existing established international currencies even more attractive. The issuance of CBDCs by foreign central banks could strengthen the reputation of some international currencies and harm others. This could lead to greater substitution of currencies with foreign CBDCs, especially in countries with high inflation and unpredictable exchange rates. As the IMF (2020) notes, currency substitution is already widespread and persistent (foreign currency deposits exceed 50 per cent in more than 18 per cent of countries worldwide). While lack of confidence in one's currency is the main cause of currency substitution, rapid currency substitution due to domestic political problems may jeopardise governments' efforts to improve domestic policies.

Third, the widespread adoption of a digital euro outside the euro area could have significant implications for the monetary sovereignty of the

countries concerned. Large-scale currency substitution would jeopardise monetary independence and pose a threat to both home and host countries. Shifts in foreign demand for CBDCs could lead to major changes in capital flows that could alter monetary policy in the issuing country. This could choke off the monetary policy transmission mechanism, i.e. how policy-induced changes in monetary policy instruments such as short-term nominal interest rates affect macroeconomic variables. Foreign currencies issued by countries whose business cycles differ from those of the host country would lead to inadequate monetary policy control and more unpredictable inflation in the host country, with a disproportionate impact on poorer and weaker families.

Fourth, currency substitution could jeopardise the ability of the domestic central bank to act as a lender of last resort. Since the central bank is unable to create foreign exchange to provide liquidity support when domestic banks have large liabilities in foreign currency, which may be the case with large-scale currency substitution, the central bank must rely on foreign reserves or the provision of liquidity by foreign central banks.

### **3. Model for North Macedonia**

For CBDCs to promote the improvement of cross-border payments, a number of factors need to be taken into account. The BIS (2021) report approaches these issues from two angles: first, from a practical perspective, on how a cross-border payment infrastructure with CSDs could be established; and second, from a macro-financial perspective, looking at the potential increase in cross-border payment flows, potential threats to financial stability and currency substitution, and reserve currency configurations and backstops.

There are two fundamentally different ways to think about cross-border payments with CBDCs. The first scenario assumes that anyone inside and outside a given jurisdiction can buy a retail CBDC, with no coordination between issuing central banks. In this scenario, non-residents would automatically have access to it, provided the design supports anonymous payments such as cash. In reality, however, few central banks are considering such systems. Unlike cash, the technology and legal framework of the CBDC could be used to apply a variety of cross-border usage restrictions. The national design of a CBDC affects this first situation. The second scenario assumes some degree of CBDC interoperability based on access and settlement agreements to enable cross-border use of CBDCs from two or more jurisdictions. Such arrangements can link wholesale and retail CSDs across international borders, require close coordination between CBDCs and involve technical, market structure and regulatory issues. This second scenario, which

is the main subject of the study, depends on the decisions on the design of the interoperability infrastructure.

All other factors being equal, cheaper and faster cross-border transactions could increase the likelihood of local banking and currency flooding. Substitution of currencies or exchanges from one currency to another can be rapid. In many emerging and developing economies, a run on the banking system is effectively already a run on the national currency as money flows out of the country (Leaven and Valencia, 2018). In addition, lower transaction costs in foreign currencies can lead to increased foreign currency risk for families, businesses and perhaps institutions, posing a threat to financial stability.

Transactional security, mass inclusion and cost efficiency are just some of the key benefits of a CBDC system (Bindseil, 2020). The risk of bankruptcy of the deposit-taking bank is also eliminated by a digital euro, making it safer than deposit money. However, the benefits of a digital euro must be weighed against the dangers of its introduction, and it should only be introduced in a way that is tailored to the specific characteristics of the financial system. This poses dangers for the Macedonian financial system, considering the possible issuance of the digital euro. On the other hand, a concentration risk may arise if citizens rely more and more on digital payments and the use of banknotes eventually declines. Due to economies of scale, there will always be a higher degree of concentration in this situation. Larger companies would therefore likely form oligopolies or monopolies and possibly increase the cost of payment services. Consequently, prices for goods and services will increase, which could reduce the productivity of the Macedonian economy. Second, due to the strategic importance of payments to national economies, there is a risk that larger international players in the sector could quickly gain control of the Macedonian payments industry, putting the country in a weakened position where it would be difficult to maintain its own monetary sovereignty (Pečarić et al, 2022).

### ***3.2. Models of cross-border CBDC system compatibility***

Compatible CBDC systems (Model 1) could complement existing central bank money markets as a way to settle cross-border transactions. If open, competitive and interoperable domestic payment systems are developed that allow a wider group of banks and non-banks to access central bank money for payment settlement, a wider range of cross-border and cross-currency

"front-end" payment services could be available. This could help reduce payment fragmentation and concentration.

Networked CBDC systems (Model 2) could extend these potential benefits while enhancing security. For example, PvP settlement could be integrated via a technological bridge between household systems. New technologies (e.g. from the Bank of Canada (BOC) and the Monetary Authority of Singapore (MAS) (2019)) could make this possible. Common clearing methods, especially if linked to FX venues, could potentially improve efficiency.

Finally, a single mCBDC system (Model 3) could offer the same benefits as linked systems, but with more integration. For example, instead of requiring routing or special settlement instructions through an interface, all FX settlements would be PvP by default (see glossary). Trading venues could potentially be linked to mCBDC systems, which would reduce complexity, fragmentation and concentration in FX markets (assuming the right design) (Bank of Thailand and Hong Kong Monetary Authority (2020)). Such a model was used for Project Dunbar and Project Aber (see SAMA and CBUAE (2019, 2020)), and it even goes a step further with the joint issuance of a CBDC used in the single mCBDC arrangement (see SAMA and CBUAE (2019, 2020)). The issued CBDC was virtually guaranteed a fixed exchange rate to both local currencies for the duration of the proof of concept, as both the Saudi riyal and the UAE dirham are pegged to the US dollar.

**Table 1.** Potential improvements of various CBDC arrangements related to the current frictions in cross-border payments.

<b>Frictions cross-border Payments</b>	<b>Model- 1 mCBDC arrangement based on compatible CBDC systems</b>	<b>Model-2 mCBDC arrangement based on interlinked CBDC systems</b>	<b>Model-3 single mCBDC multi-currency system</b>
Legacy technology platforms	Compatible systems allow for efficiency gains in existing banking relations	A common clearing mechanism could reduce the number of relationships and provide economies of scale	A single system does not require such relations (however, a single system may add to operational costs)
Limited operating hours	CBDCs can be open 24/7, eliminating any mismatch of operating hours		
Fragmented and truncated	Compatible message standards allow	The message standard (e.g. ISO 20022) adopted by the	Single message standard across the

data formats	payments to flow without data loss or manual intervention	interlinkage would act to harmonize standards across systems	system eliminates mismatches
Unclear FX rates and unclear incoming fees	Compatibility requirements for wallet providers could enable users to calculate fees and rates prior to a payment	Common calculation of rates and fees for transfers using any interlinkage would aid transparency	A single system would likely be designed to include options for FX conversion
Long transaction chains	CBDCs could settle instantly, reducing the need for status updates		
Complex processing of compliance checks	Compatible compliance regimes reduce uncertainty and costs	Interlinking systems do not impact multiple or conflicting compliance requirements	Single set of access requirements means compliance could be equivalent across the system

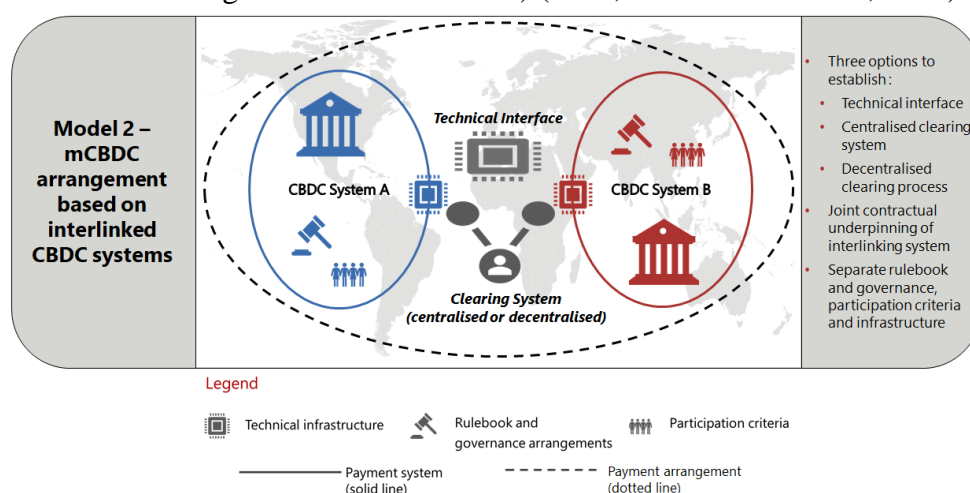
**Source:** Adapted from Auer R., Haene and Holden (2021), “Multi-CBDC arrangements and the future of cross-border payments”, BIS Papers No 115

After the preceding discussion, it is impossible to determine what kind of cooperation will exist between the other central banks and the ECB. It will depend on the degree of integration into the European financial system. Depending on how well a state meets the requirements for the introduction of the euro in general, there may be differences. Later, as the technological gap between the euro area and other non-EU countries widens, it is increasingly likely that they will be forced to adopt ready-made EU solutions in order to maintain control over money flows and their own monetary policy. It is therefore in the best interest of the central banks of other countries that are heavily oriented towards the euro to actively cooperate with the EU at this early stage in order to develop a cross-currency system that is suitable for their national monetary policies.

### *3.3. Models of cross-border CBDC and North Macedonia*

Connecting payment systems is a difficult task and often requires compatibility measures. In reality, this can take two forms: (a) a common technological interface or (b) a common clearing mechanism (which in the case of CBDCs could be through decentralised mutual accounts or a more centralised common clearing house or system). Participants in one system can send payments to participants in another system thanks to a common technical interface supported by contractual arrangements between the systems. A

common clearing house (Figure 1) follows a different strategy and connects systems through dedicated settlement accounts instead. Arrangements for CBDCs could include foreign exchange provided by central banks or private companies. A trusted third party could serve as a clearing mechanism for participating central banks in a more centralised model. For example, if the CBDC is offered domestically through a hybrid CBDC architecture that allows the private sector to connect to the central bank server in a flexible manner, this would favour common technological interfaces and a centralised common clearing mechanism. Directly offered CBDCs would arguably be better suited to a decentralised approach, with central banks providing users with foreign exchange or access to other currencies through bilateral arrangements with other central banks. Building a robust ecosystem with the right balance of incentives for users to use the system safely and efficiently is a significant undertaking with significant risks. In particular, if CBDC is distributed by the private sector, significant difficulties may arise from disrupting the business models of incumbents (e.g. a new connection might require participants to invest too much or compete with their existing profitable services). A lack of full compatibility may also imply costs and risks that would make the use of interconnection unattractive. In the past, simply interconnecting systems without spending money on broader coordination to achieve interoperability was not enough to enable effective cross-border payments. However, if systems have a high level of interoperability, improvements in security and efficiency are possible. Systems that are interconnected can perform various functions that are not possible in purely informal arrangements (e.g. PVP maintained through a technical interface) (Auer, Haene and Holden, 2021).



**Figure 1** mCBDC arrangements based on linking multiple CBDC systems – Model 2  
**Source:** Auer, Haene, and Holden (2021).

Interestingly, the results of the BIS survey by Auer et al. (2021) show that most central banks are undecided about the mCBDC. Moreover, more than a quarter of central banks are considering incorporating interoperable features when setting up their CBDCs to reduce frictions in cross-border and cross-currency settlement. According to the responses, linking the local CBDC system with a foreign system is the mCBDC configuration, the most favoured option. Most central banks are also considering taking over operational responsibility. The degree of involvement could vary widely, from providing liquidity directly to monitoring and facilitating foreign exchange conversions.

Similarly, we propose this model because:

- It is better to work on this issue and to be ready
- The Central Bank of Macedonia will show that it is capable of designing its own CBDC.
- Given that the Macedonian economy is highly dependent on remittances from abroad, this will reduce the cost and percentage of cash transfers across borders (thefts, penalties, etc.).
- In the meantime, North Macedonia can integrate into the payment infrastructure to be ready later when it joins the EU. In order to achieve a higher level of payment integration with the EU, the system for cross-border payments in euro should be restored by connecting the Macedonian Interbank Payment System (MIPS) with the payment system TARGET 2 (Trans-European Automated Real-time Gross settlement) Express Transfer system).
- This will encourage the private sector (especially banks, but also other financial institutions) to innovate in the area of payments.

PvP settlement could be integrated through a technical link between domestic systems. According to the Bank of Canada (BOC) and the Monetary Authority of Singapore (MAS) (2019), new technologies could enable this through creative methods. In addition, joint clearing processes, when linked to FX venues, could offer greater efficiency.

On the other hand, however, this is optimistic given the past behaviour of the National Bank of Republic of North Macedonia (NBRNM). After all, although the NBRM was connected to TARGET 2 through the Central Bank of Italy, this facility was terminated in 2018 and there is still no will to restore it. At the beginning of 2017, the National Bank of the Republic of Macedonia



started operating a system for cross-border payments in euro by connecting the Macedonian Interbank Payment System (MIPS) to TARGET 2 of the Eurosystem. To this end, the bank's MIPS was upgraded to make euro payments and connect to TARGET 2 through the Central Bank of Italy, making MIPS a dual currency system for payments in denar and euro (NBRNM, 2017). Later, with the changes to the operating rules of the Macedonian interbank payment system, without further explanation except that the Italian central bank increased the fees, the NBRNM restricted this channel (NBRNM, 2019).

#### **4. Conclusion**

North Macedonia, as a small open economy in the process of EU integration, must take into account the changes in the Eurozone monetary system with the introduction of the digital euro. One of the objectives of the introduction of the digital euro is to strengthen the international role of the euro as a world reserve currency. Although the model for the introduction of the digital euro is likely to take the form of a hybrid account base model, which primarily concerns the retail sector, the need to develop a strategy or compatible model arises due to the cooperation of North Macedonia and its monetary policy with the Eurozone.

With regard to the introduction of CBDC, central banks have to choose between reactive and inactive or proactive. If the central bank takes a passive stance, it relies on the experience of other central banks that were CBDC pioneers and follows the development. While this may seem prudent, it has a number of unintended consequences given recent technological advances in the financial industry (Ilievski and Delova-Jolevska, 2021). Networked CBDC systems (Model 2) could extend these potential benefits while enhancing security. For example, PvP settlement could be integrated via a technological bridge between household systems. A common clearing mechanism could reduce the number of relationships and provide economies of scale. The message standard chosen by the link (e.g. ISO 20022) would help to unify standards between systems. Transparency would be improved by using a standard formula for calculating rates and charges for transfers. The impact of different or conflicting compliance requirements is not affected by interconnected systems. Economies of scale and a common billing system could help reduce interconnectedness. Interconnection would help to unify standards between systems as the messaging standard (e.g. ISO 20022) is accepted by them. Transparency would be improved by adopting standardised rates and charges for transfers over a given link. Multiple or conflicting standards are not affected by interconnected systems.

Systems that are interconnected can perform various functions that are not possible in purely informal arrangements (e.g. PvP maintained through a

technical interface) (Auer, Haene and Holden, 2021). However, when CBDC is distributed by the private sector, major difficulties can arise because incumbents' business models are disrupted (e.g. a new connection may require too much investment from subscribers or compete with their existing profitable services). A lack of interoperability may also entail costs and risks that would make the use of the connection unattractive. However, high interoperability of systems can lead to greater security and efficiency.

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