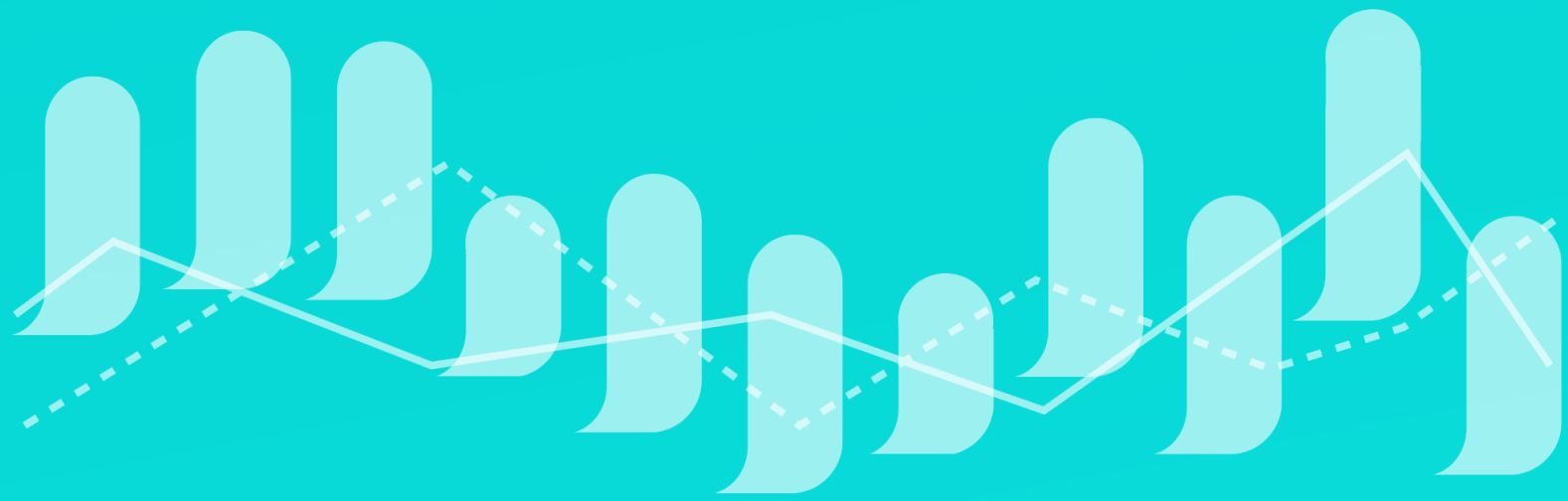
BETTER WAY | NATIONAL CASHLESS PAYMENT INITIATIVE

Comparative Analysis of the Best Practices for **Encouraging and Developing Cashless Payments** in other European Countries and the World



Authors: Dušan Vujović, PhD, IGC, Marko Danon, PhD, NALED

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Authors*:
Dušan Vujović, PhD
Marko Danon, PhD
Dušan Kovačević

*Team of authors, led by Dušan Vujović, PhD, **IGC (Infinity Global Consulting)** with Marko Danon, PhD, as a co-author, and supported technically by Dušan Kovačević NALED **(National Alliance for Local Economic Development)**
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Glossary

AML – Anti-Money Laundering
ATM – Automated teller machine
BIS – Bank for International Settlements
CBDC – Central Bank Digital Currencies
CBP – Cross border payment
CEE – Central Eastern Europe

CFM – Capital flow management
CFT – Countering the Financing of Terrorism
DD – Direct Debit
DPI – Digital public infrastructure
ECB – European Central Bank
e-Money – Electronic money
EU – European Union
EUR – Euro
FAS – Financial Access Survey
Fin-Tech – Financial technology
FREN – Foundation for the Advancement of Economics
FX Deposits – Foreign exchange deposits
G2X – Government-to-person or business payment
GB – Gigabyte
GDP – Gross domestic product
GSMA – Global Systems for Mobile Communications
ID – Identification
IMF – International Monetary Fund
IT – Information technology
MB – Megabyte
MIMIC – Multiple Indicators Multiple Causes
MNO – Mobile network operators
MNO – Mobile network operators
NBS – National Bank of Serbia
NPCI – National Payments Corporation of India
OPEX – Operational costs
P2P – Peer-to-peer
PBC – People's Bank of China
PIN – Personal identification number
POS – Point of sale
PPP – Purchasing power parity
PSP – Payment service providers
QR Code – Quick Response Code
RBI – Reserve Bank of India

RSD – Serbian dinar
SEK – Swedish Krona
SIM – Subscriber identity module
SME – Small medium enterprises
TCI – Transparency corruption index
TIPS – Target Instant Payment Settlement
UIS – Unique identity system
UK – United Kingdom
UPI – Unified Payments Interface
US – United States
USD – United States Dollar
USSD – Unstructured Supplementary Service Data
VAT – Value added tax
X2G – Person or business-to-government payment
XT platform – Cryptocurrency exchange platform

FOREWORD

By Marek Dabrowski[1]

The rapid development of cashless payments worldwide since the 1990s has been possible due to revolutionary changes in information and communication technologies (ICTs). In the 2010s, the proliferation of smartphones and secure payment platforms enabled easier cashless transactions. Finally, the COVID-19 pandemic accelerated the shift to cashless payments. The new non-cash instruments such as credit and debit cards, wire transfers via electronic banking, digital wallets, and various mobile payment apps have offered safer, more convenient, and less expensive transactions than the bills of exchange, cheques, and traditional bank-to-bank transfers. This expansion has been driven by the bottom-up business initiatives of banks and non-bank financial institutions, mobile telephone companies, e-commerce platforms, etc. The economy of scale matters: the larger the domestic market, the stronger the business interest in offering cashless payment services.

Government and central bank policies have also played an important role. They have overseen regulations that determine the access of various types of economic agents to the market of cashless payment services (only banks, or also non-banking and non-financial institutions), standards of such services (especially their reliability and security), and their maximum costs. They may build national payment platforms and associated e-government digital infrastructure. They can push for specific categories of payments (for example, taxes, salaries, pensions, and other social benefits) to be conducted in cashless form.

Characteristics of cashless payment systems differ between countries. They depend on the level of economic development, size, reliability and technical maturity of the financial system, development of communication networks and e-commerce, regulatory environment, and cultural tradition. Not surprisingly, in economies with well-developed banking systems (for example, in the EU or Japan), cashless payments are served mainly through banks. There is more room for non-bank providers of cashless payment services in economies with less developed banking systems. It has happened in several large emerging-market economies in Asia, the experience presented in this study.

The share of cashless payments in total payments also differs between individual economies. Again, it depends on many factors, such as the development and technical features of cashless payment systems, government regulations, costs of cashless transactions (especially for merchants), incentives to move from cash to non-cash transactions, public trust

to domestic currency and providers of payment services, and cultural tradition. The report discusses a differentiated situation and experience in individual European countries: a high share of cashless transactions in Scandinavian countries or the Netherlands vs. continuous preference for cash in Germany, Austria, and Switzerland.

The 2010s and early 2020s brought experiments with the so-called virtual currencies (also called cryptocurrencies) such as Bitcoin and Ethereum, some using blockchain technology, which revolutionized digital money and payment systems in many ways. They offered a higher degree of security and decentralization of payments (without a need for a central authority to verify and authorize transactions) and more transparency.

The private virtual currencies aimed to compete with the leading global currencies, such as the US dollar or Euro, and facilitate cross-border payments. However, they continue struggling to gain broader acceptance against legal preferences for using traditional sovereign currencies in most jurisdictions and the unfriendly attitude of many experts and regulatory authorities (who have been afraid of money laundering, financing crime and terrorism, etc.). Technical barriers in their broad and daily use, the high energy intensity of Bitcoin and other first generation virtual currencies, and problems with their unstable market value have also decreased their attractiveness. For example, the founders of Bitcoin fixed the maximum supply of this currency, which increased its credibility but made it vulnerable to fluctuation in demand.

The next generation of private virtual currencies, the so-called stable coins (with fixed exchange rates to the US dollar or other major currencies), have eliminated the instability problem. However, they have not been independent from the anchor currencies.

Central banks in many jurisdictions responded with their digital currency projects. When writing this foreword (February 2024), these projects are still at the stage of analytical work, discussion and, in a few cases, experimentation. Therefore, predicting their final design and impact on monetary policies, payment systems, and the financial sector is challenging. However, some of their characteristics are already known. They cannot be considered an alternative to private global virtual currencies like Bitcoin. Instead, they will be a new, digital form of the existing sovereign currencies. They will also probably offer a new payment system. How much they can reduce the use of traditional cash (banknotes and coins) and affect commercial bank intermediation remains unknown.

The existing and proposed cashless payment systems, including central bank digital currencies (CBDCs), focus predominantly on national markets. Of course, most credit and debit cards and mobile payment apps can be used internationally. The same relates to wire transfers. However, such transactions involve additional costs, usually requiring time to complete and settle. The use of different currencies (and the necessity to convert them), various designs of national payment systems and differences in their regulatory regimes and, in many jurisdictions, control of capital movement and other limitations (or reporting requirements) on transactions with non-residents impede the development of easily accessible cross-border payment systems.

The IMF blueprint of a multi-layer cross-border payment platform endorsed by the G20 group may decrease the costs of international financial flows and make them faster, among other things, by eliminating intermediation of corresponding banks. It would help trade-related payments, financial and investment transactions, and private transfers. The latter is essential in Serbia, where remittances of labor migrants constitute a significant balance-of-payment item and source of income for many households. However, implementing the proposed platform will depend on each IMF member country's regulatory and technical decisions.

Cashless payments and e-money offer numerous benefits. They speed up payments and decrease their costs. They facilitate the development of a digital economy, such as e-commerce and various private and public e-services. They make business management more accessible and efficient, for example, by creating opportunities to employ various e-monitoring, e-accounting, and e-reporting tools. They also help to reduce a shadow economy, the problem extensively analyzed in this study. However, one must remember that developing cashless payments is only one of several measures to fight informality and tax evasion. Others include administrative ease of doing business, simple and non-distortive tax system, transparent and fair tax administration practices, property rights protection and effective contract enforcement, and many others.

On the other hand, the development of cashless payments and e-money creates new tasks, for example, in the security sphere. Although the risk of 'traditional' crimes related to cash transactions and storage (robbery, counterfeiting banknotes) decreases, cyber security becomes a real challenge for individual economic agents and the entire financial and payment system. The development of financial literacy is another task of public policy.

The expansion of cashless payments changes monetary policy parameters. It decreases demand for cash, an essential component of central bank money (monetary base) and increases money multiplier (ratio of broad money to monetary base), other things being equal. It can also decrease central bank profits and transfers to the state budget. These effects can be partly compensated by higher commercial bank deposits in a central bank, depending on specific features of the payment system/s and whether such deposits are remunerated.

Launching CBDCs will additionally impact monetary policy but will probably go in the opposite direction. It may create demand for digital cash and crowd out commercial banks as intermediaries for some transactions. Again, it will depend on the detailed characteristics of CBDC, which are unknown yet.

The report analyses the history of cashless payments in Serbia and proposes further expansion. At the same time, it offers a broad comparative picture of other countries' experiences and discusses new trends in financial innovation, fintech, and digital currencies CBDCs. They already affect or may affect the situation in Serbia in the future.

Serbia is a small, open economy closely integrated with the EU market and has a bank-centric financial system. It lags other European economies in developing cashless payments despite the progress accomplished in the 2010s and early 2020s. For further improvement, it is necessary to identify constraints in developing cashless payments.

A far-going euroization of the Serbian economy seems to be the most critical constraint. The limited trust in the Dinar is the legacy of macroeconomic and financial instability in the 1980s and 1990s. However, currency substitution also results from the inflow of remittances earned predominantly in the Euro area. Conducting and paying several private transactions (related, for example, to real estate or car market) in Euro cash sets limits to expanding the cashless payment system in Dinars. On the other hand, future implementation of the digital Euro can further increase using this currency for transaction purposes.

The relatively small volume of domestic cashless payments is another obstacle. For non-banking providers of payment services (like mobile operators), entering the Serbian market can be too costly (because of the economy of scale constraints) unless there is a perspective of building a regional network involving more countries.

Serbia's accession to the EU can help build a cashless economy in many ways. Removing barriers to capital movement, joining the Single European Market, including its financial segment, and then adopting the Euro will make cross-border transactions and payments more accessible and less expensive and eliminate currency substitution. They also can increase the interest of international providers of mobile payment services in entering the Serbian market.

EXECUTIVE SUMMARY

While cashless payments have been soaring in the recent period across the globe, Serbia still has ample room to improve along this transition. This report analyzes this transition, while situating the Serbian experience within a wider global context. It also investigates the corollaries of the shift on other socio-economic phenomenon, most notably shadow economy. In doing so, it relies on a mix of quantitative and qualitative methods and case studies to provide a deeper understanding of the shift towards cashless economy, and of the correlated effects.

In the context of the effect of the transition towards a higher cashless acceptance, this shift catalyzes a significant socio-economic transformation, which also has a positive effect on fiscal transparency and efficiency. For Serbia, moving beyond traditional cash related paying methods, significantly reduces the shadow economy, contributing to a deeper move towards transparent, efficient, and regulated economic practices.

Indeed, a significant body of empirical evidence underscores a negative correlation between cashless payments and shadow economy, suggesting that an increase in share of cashless in total transactions could significantly diminish the shadow economy. However, this transition is nuanced by Serbia's unique economic attributes, such as its high Euroization and the substantial inflows of remittances, which add layers of complexity to the straightforward adoption of cashless systems.

To provide some predictions of cashless payments as an instrument of a decrease of shadow economy, this report also develops three potential scenarios for Serbia's cashless shift by 2030. These scenarios are shaped by technological advancements and a gradual shift in cultural attitudes towards digital transactions.

Nevertheless, a full transition to a cashless society may be attained through different paths – there may not be a single one-size-fits-all approach. In order to shed some light on possible way forward, the report dives in three archetypical cases: Sweden – a representative of a traditional shift, India – with its novel approach to mobile money, and the EU – as an economic space which currently develops the so-called Central Bank Digital Currencies (CBDCs), paving path for a blockchain-based, digital Euro.

Sweden's transition to a cashless society, particularly with the launch of the mobile payment service Swish in 2012, serves as a remarkable case study of a fully developed and relatively bank-centric country taking the road of a fully cashless-oriented socio-economy. The Scandinavian nation successfully reduced its reliance on cash through a combination of technology adoption and policy changes, resulting in Swish becoming an almost ubiquitous tool for personal transactions.

In contrast, India’s road to cashless acceptance was more bumpy, primarily due to the challenges it faced, such as a large and significantly unbanked population. However, the country's digital leap was marked by the

introduction of the Unified Payments Interface (UPI), digital public infrastructure and other fintech solutions that significantly expanded access to digital payments. This shift has been particularly transformative, illustrating how an economy with vast disparities can integrate digital payment systems on a large scale, enhancing financial inclusion.

The report also examines the significant evolution of Central Bank Digital Currencies (CBDCs), with a focus on the prospective implications of the digital Euro for countries like Serbia. CBDCs have emerged in response to the growing influence of decentralized cryptocurrencies and the expansion of e-Money. They represent an effort to combine the stability and trust of traditional central bank issued currency with the efficiency of digital transactions. The development of a digital Euro, in particular, poses a range of implications for monetary and fiscal policies in various economies, highlighting the need for adaptive strategies in the face of rapidly evolving digital financial landscapes including the emergence of digital cross-border payment platforms.

The study shows that the shift towards cashless economy hinges on a time-dependent mix of policy, payment instruments and infrastructure upgrades. But it also emphasizes that this is not merely a technological upgrade but a profound economic and societal transformation. It requires a holistic approach encompassing regulatory measures, educational initiatives, and infrastructural development; and implies a comprehensive policy mix over a relatively longer period.

Indeed, In the short term, Serbia should focus on leveraging its existing legal and regulatory framework, along with its current payment network infrastructure, to enhance cashless payment options. This includes boosting the awareness and capacity of key stakeholders such as merchants, consumers, and government bodies, while also strengthening management capacity and control functions. Immediate steps could include limiting cash transactions, making cash payments more cumbersome, and introducing incentives for electronic payments.

Over the medium term, Serbia should aim for moderate reforms in its legal and regulatory environment to align with EU standards and international best practices. This involves upgrading payment networks for better efficiency and security, introducing platforms for secure international payments, and further building stakeholder capacity. Key initiatives would include the development of e-money and mobile payment technologies, establishment of a comprehensive Digital Public Infrastructure, preparation for global digital currencies like the digital Euro, and integration of payment systems with fiscal systems for improved financial transparency and efficiency. These measures aim to reduce reliance on cash, combat the shadow economy, and foster a more digitally advanced and economically robust Serbia.

1. CONTEXT AND BEYOND

Text box 1. Key takeaways from this section

This section of the report contextualizes the study within broader efforts to reduce Serbia's grey economy by enhancing cashless transactions. It highlights the potential of electronic payments to diminish the shadow economy and improve fiscal transparency. The complex relationship between cashless payments and the shadow economy is influenced by both tax and non-tax factors, and public sentiment that still values cash for its perceived sovereignty. The section discusses measures and their potential impact, while reflecting on regulatory strategies.

1.1 Context of the Study and Background

This study is a part of a wider effort to reduce grey economy in Serbia. Indeed, its main trust is to reduce the level of grey economy in Serbia by increasing the number and value of cashless transactions. The importance of cashless payments has been recognized in the National Program for Countering Shadow Economy 2019-2020.

Recent studies suggest[1] that the widespread use of cash and inadequate payment systems contribute to tax evasion, highlighting the potential of electronic payments to shrink the shadow economy. The logic of this approach hinges on the nature of cash payments which leave no trace and allow buyers and sellers not to report taxable transactions and, thus, evade tax payment. In support of that, the recent consumer and business surveys indicate that in 2018 more than 70% of consumers used cash in the majority of their transactions. The reasons include lack of information (awareness), distrust in financial institutions, and lack of an adequate (efficient and reliable) payment infrastructure. Surveys also indicate that the opportunity driven part of the shadow economy (the so called "passive shadow economy") could be reduced by effectively promoting electronic payments.

Thus, the main objective of the Cashless Initiative is to foster cashless transactions. It promotes them in both private and public sector as means of curbing unfair competition from unregistered – as well as some registered but non-complaint – enterprises, promoting greater fiscal discipline and higher collection of budgetary revenues needed to fund an improved quality of health, education, and other public services as an integral part of better living standards for all citizens in the Republic of Serbia.

[1] For more detailed information, for example, refer to Rainone (2023), Chan et al (2023), or Russo (2020)

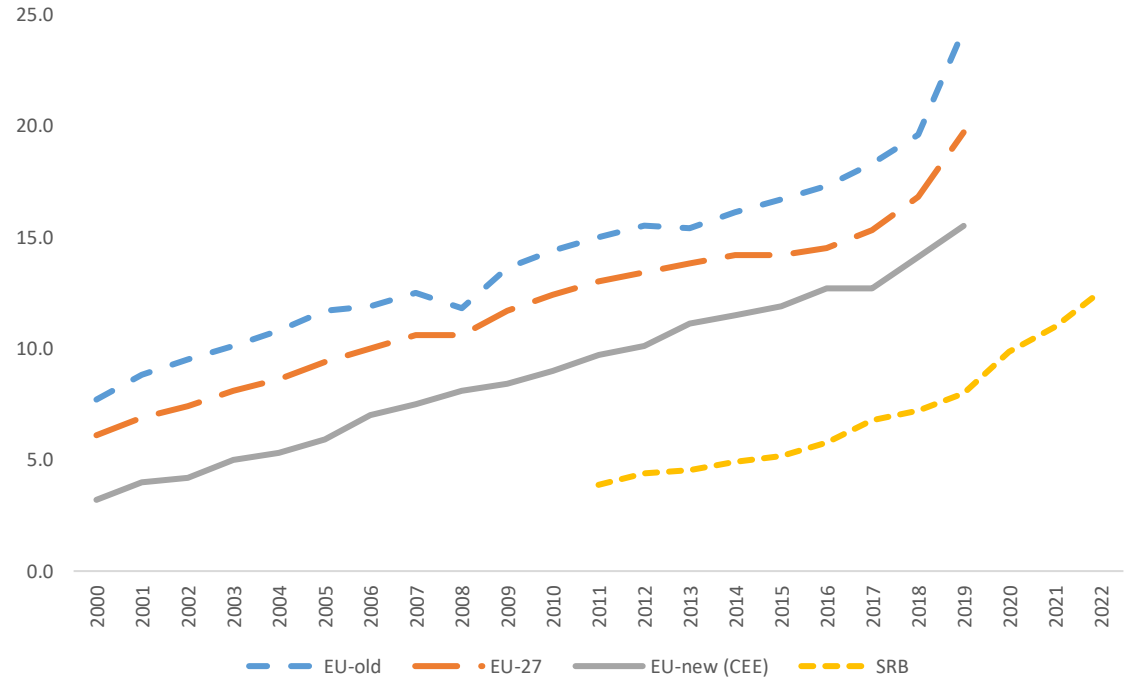
1.2 Evolving relationship between cashless payments and shadow economy

The economic size of cashless payments globally has been steadily increasing, especially in the most developed areas. Indeed, only during the 2010s, they even grew faster in most developed "old EU members" (blue dashed line) than in "new EU states", and in Serbia. The gap between Serbia and EU-27 has gradually increased from around 9 percentage points in 2011 to about 12 percentage points in 2019. The gap vis-à-vis most developed EU-old member states has widened even more: from about 11 pp in 2011 to more than 16 pp in 2019.

Serbia's cashless infrastructure is starting to catch up with EU. The situation in Serbia has changed significantly in early 2020s. The value of POS transactions increased from about 8 percent of GDP in 2019 to 12.6 percent of GDP in 2022 based both on a 34 percent larger number of POS terminals and a 77 percent growth in the number of POS transactions (see figure below).

However, despite the recent improvement, Serbia remains well behind EU countries in terms of cashless payments. As FREN (2019) reports, Serbia lags behind comparator countries in financial inclusion, cashless payment infrastructure and the relative size of cashless transactions in the economy. In terms of financial inclusion, Serbia had around 62 active payment cards per 100 inhabitants in 2019, lagging by 50 percent behind CEE and 2/3 behind "old EU member states". Similarly, with 1,313 POS terminals per 100,000 inhabitants, Serbia performs relatively modestly in terms of the proliferation and development of cashless payment infrastructure, compared with the EU27 at around 4,197 per 100,000 inhabitants, and even the new EU member states form the CEE region at 1,988 POS terminals. Most importantly, the value of POS transactions in Serbia in 2019 amounted to 8% of GDP, almost 50% less than the CEE average and 60% less than the average of developed European countries.

Figure 1: Cashless payments measured by share of POS payments in GDP (in % of GDP)



Source: ECB, NBS, FREN study and authors calculations.

A growing body of research shows that an increase in cashless payments might have a causal impact on shadow economy. For instance, FREN (2022) empirically shows that an increase in the size of the cashless economy has a statistically significant negative impact on the shadow economy, and that their model indicates that a one percent increase in the value of POS transactions is linked to a decrease in the shadow economy of 0.041 percents, while a one percent increase in the ratio of the values of POS-to-ATM transactions is associated with a similar decrease in the shadow economy of 0.037 percent. The FREN study concludes that if Serbia increased the share of cashless payments to the CEE average recorded in 2019, the share of the shadow economy would decline by approximately 3.4 percentage points of GDP. With other things being constant (i.e. under ceteris paribus conditions), tax revenues would increase by EUR 700 million per year (1.35% of GDP).

The relationship between cash(less) payments and shadow economy is complex. Mechanics of shadow economy depend on many heterogeneous factors, grouped into the following:

Text box 2. Different approaches to measuring the extent of shadow economy in Serbia.

According to our best knowledge, these are the methods used in recent period to quantify the extent of shadow economy in Serbia:

1) **Monetary method** – assumes shadow economy transactions occur in cash, estimating its amount in circulation, and comparing it to the cash demand expected in the absence of the shadow economy, with the discrepancy indicating the amount of cash used in the shadow economy. The method indicates a downward trend in recent years, probably driven by positive macro trends and a systemic approach to combating it. It estimates that the shadow economy in 2021 reached cca 20.1% of GDP, down around 10pp vs 2005. (Atanasijevic et al 2021)
2) **Survey method** – is based on questionnaires that are aimed at registered businesses, they attempt to gauge their perceptions of shadow economy. This method has been used in Serbia in two instances 2017 and 2022, these results also indicate a downward trend – in 2022 it was at cca 11.7% of GDP, down by around 4pp since 2017. (Krstic & Radulovic 2017, 2022)
3) **MIMIC method** – the method aggregates a large extent of data as it identifies multiple indicators and multiple causes, this method is very intensive while last data available for Serbia is from 2016. It found the level at around 34% of GDP. (Kelmanson et al 2019)
4) **Efficiency of VAT collection (C-Efficiency)** – the method is based on estimating the gap between the potential collection capacity and actual collection, in a perfect case these would be no gap, indicating there is no VAT tax evasion, and consequently no shadow economy. The projections for 2023 indicate that the efficiency has dropped by around 6pp or around 340 mil EUR according to the findings of the Fiscal Council (2023)

(a) tax-related factors, such as the level of tax burden, the system of fines and penalties, the efficiency of tax enforcement, the level of tax morale, and
(b) non-tax factors, including the size of regulatory costs and opportunities to hide transactions – fundamentally shaped by the methods of transaction settlement.

Based on the fact that cash-based transactions are easier to hide, whilst cashless transactions are more traceable, theoretical and empirical studies postulate that reducing the share of cash could limit opportunities to hide transactions, thus reducing shadow economy and boosting tax revenue collection. ***For a more detailed theoretical discussion on the relationship between cash and shadow economy, please refer to the Annex 1.***

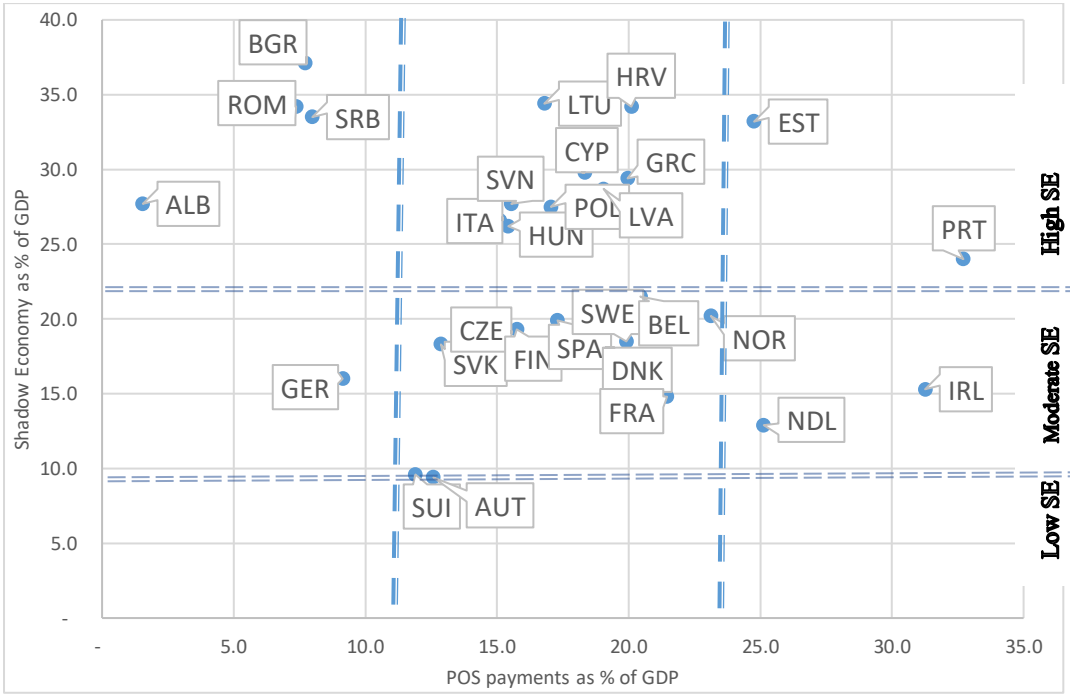
The intensity of the causal relationship might vary due to several reasons. The econometric results ought to be interpreted with due caution and used carefully as a guide for policy making and institutional reforms[2]. For example, some countries, like Germany or Switzerland, seem to have relatively subdued shadow economy and in the same time relatively low levels of cashless payment development – in line with their country-specific institutional reasons. In some others, such as many emerging economies, might have a de facto dual currency system, where local monetary policy impact is extremely limited. Thus, the expected effect of a developing cashless infrastructure system may be somewhat limited, i.e. yield less generous effect than estimated in various cases. Such illustrative examples might include the following:

- **Example #1:** Coexistence between relatively large share of cash with low and stable (non-increasing) share of shadow economy in important economies such as Germany, Switzerland and Austria. Country specific institutional, legal and behavioral characteristics do not lead to increased informality in the presence of "excess cash".
- **Example #2:** Persistence of moderate shares of shadow economy (of around 20 percent of GDP or more) in countries that are making great advances in reducing the share of cash transactions and are at the forefront of cashless payment revolution (Sweden, Norway, Denmark, Finland, Belgium). Again, country specific behavioral, fiscal (tax burden) and other factors may have an important role in explaining the slow elimination of informality.
- **Example #3**: Finally, we have a large number of countries at the middle level of institutional and policy development (including Poland, Bulgaria, Romania, Hungary, Serbia etc.) who have been making notable progress in all measurable aspects of advancing cashless payments

[2] This is particularly relevant in a situation where econometric results are obtained based on panel data involving multiple countries with very different levels of economic and institutional development, great variation across most drivers of shadow economy, and levels of cashless payments.

but fail to substantially reduce the high share of the shadow economy (ranging from 25 to 35 percent of GDP).

Figure 2 Shadow Economy and Cashless POS payments in 2019 (as % of GDP)



Source: ECB, authors calculations.

Text box 3. On Serbia-specific structure of monetary aggregates

As the theoretical literature shows that a reduction in share of cash in total transactions may lead to a drop in shadow economy, policy makers are interested in fostering cashless payment infrastructure. However, in some cases, the amount of cash used in transactions might already be very low – such as in the Nordics – and so the potential impact of this policy measure might be limited.

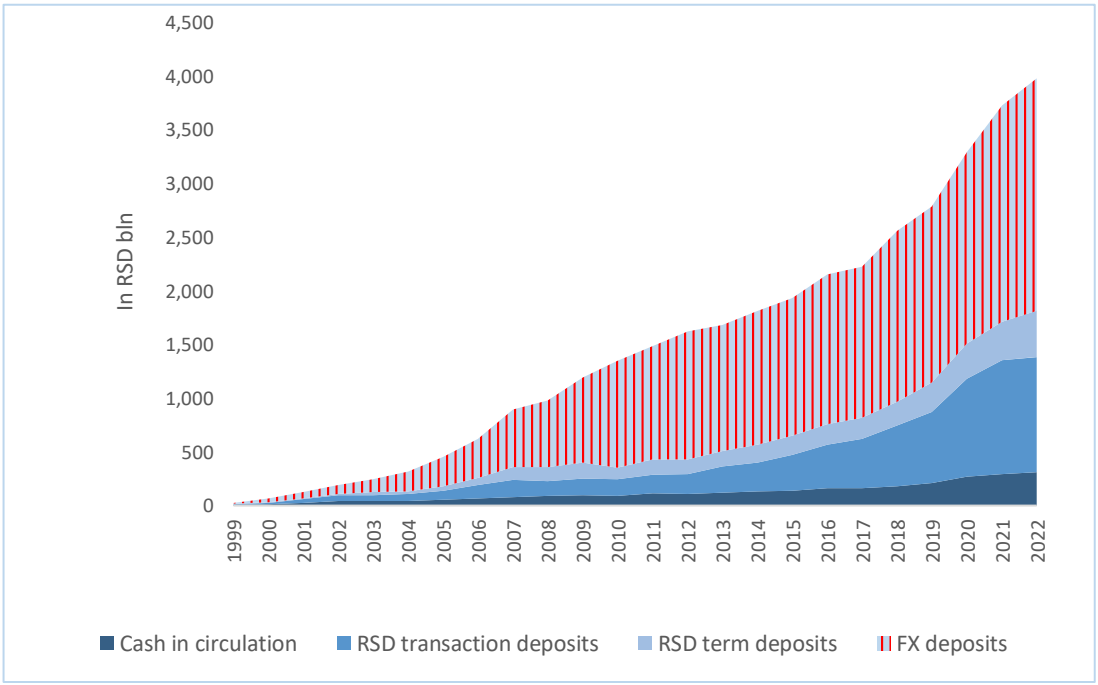
The official macro data for Serbia paint a counterintuitive story – The size of local currency (dinar) cash in Serbia is closer to most advanced cashless economies in Europe (Sweden, Norway, Denmark) than to usual comparators (Romania, Bulgaria, Hungary, Poland). The second atypical feature is the structure of standard macro-monetary aggregates characterized by very large gap between M3 (which includes FOREX deposits) and other aggregates (M2, M1 and cash). Combined, these two factors imply that the effect of improvements in cashless payments might be significantly limited.

However, this official data set needs to be taken with a grain of salt: Serbian economy is very highly euroized. The EUR is widely and legally used as legal tender in some important transactions, such as car or real estate purchases. It is also often used by citizens and firms to quote prices, while the general population traditionally prefers to save in the EUR. It is also used to pay for some typical expenses, like monthly rent. Serbia is also one of the countries with relatively high inflows of remittances to GDP – its's 9% match countries like Albania, Ukraine, Bosnia and Herzegovina, Morocco, or Pakistan.

The figure below illustrates this case: it consists of the sum of cash in circulation and RSD and FX deposits – which is the lion's share of total monetary aggregates. The figure shows that FX holdings (of which most in EUR) constitute the largest part of this observed part of the monetary aggregates – as soon as the banking sector liberalized in the early 2000s, and as citizens' trust in institutions grew, share of FX deposits quickly rose to prominence. Currently, there is some EUR 18 bn of such savings – whereas remittances, wages, rents constitute the most significant streams of this stock.

These funds are not always used as typical savings, but they also constitute a reserve liquidity for citizens' or firms' purchases. This means that in many cases, citizens exchange parts of their FX deposits into RSD ahead of a purchase; while a merchant instantly exchanges the received RSD back into EUR. However, as this part of monetary mass often changes currency indexation, it is not registered within RSD-indexed currency in circulation. This claim is well illustrated by the fact that commercial banks net purchase some EUR 3 bln annually – largely from firms and smaller exchange offices.

Figure 3: Money Supply in Serbia



Source: NBS and authors' calculations

However, the literature also shows some factors which could boost the effect of cashless payment infrastructure on shadow economy. Considering significant potential benefits associated with the development of cashless economy, there is a strong case in favor of developing a comprehensive stimulus program including:

- Regulatory measures (rules and restrictions on cash-based and cashless payments),
- Fiscal measures (e.g. well-targeted subsidies and/or tax breaks),
- Educational actions and awareness raising programs explaining the individual and social benefits associated with the development of the cashless economy and reduction of the shadow economy.

For more pronounced and lasting results, measures to increase cashless payments should be accompanied by structural measures, including an improvement in the efficiency of tax enforcement, reduction of the tax burden, and enhancement of tax morale. A coordinated policy action is needed to implement the set of regulatory changes and fiscal incentives, along with capacity building and broad educational measures.

1.3 Cash vs cashless: broader social and payment sovereignty considerations

***Strong global growth of cashless payments brought clear reduction in direct and indirect payment costs to companies and individuals*.** Cashless revolution received a widespread enthusiastic public support together with the idea of mobile payments (including instant payments) yet to be developed as it offered unprecedented convenience in payments, travel, and quality of life. Banks, telecom operators and innovative start-ups intensified their efforts to further advance payment services and exploit the advantages of new cashless world. Many countries followed similar methods to reduce the use of cash due to high cost of printing, handling and distributing cash, serious security considerations, and, most importantly, as a major factor improving fiscal transparency and enhancing public revenues.

The prevailing sentiment among citizens regarding cashless payments highlights a significant shift towards embracing the convenience and security offered by such transactions. In recent years, in Serbia and abroad, there has been a notable increase in the number of people who perceive cashless payments as a beneficial change. This trend is evident from a study conducted in 2022, which reveals that over half of the citizens in Serbia (53%) are now utilizing some form of cashless payment, a notable rise from previous years. The advantages of cashless payments, as identified by the citizens, include not having to carry cash, quicker and easier transactions, and a reduction in the risks associated with carrying large amounts of money. Additionally, these methods are seen as instrumental in curbing the grey economy and ensuring consumer protection. While older and more traditional forms of payment are still prevalent for smaller, everyday purchases, there's a clear preference for cashless methods for larger transactions and in sectors like technology and furniture. The study also notes that the primary reasons for some citizens not adopting cashless payments include the ease of using cash and lack of access to payment cards, suggesting areas for improvement in financial education and infrastructure.

On the opposite end of the spectrum, there was a growing public sentiment against elimination of cash. Many studies done in Sweden, Austria and other European countries revealed that a strong majority of respondents who often use payment cards and other cashless payment methods, still perceive cash as “legal tender” and their constitutional human right, comparable to rule of law, free speech, etc. Cash has a tradition of strong trust and is primarily used in transaction where a payer and payee meet face-to-face. This aspect of demand for cash based on “payment sovereignty” survived the strong growth of e-commerce and proportionate use of electronic payments, with the

resulting growing need for cashless transactions and diminished role of cash. New cashless payment instrument (such as Swish in Sweden) are a perfect substitute for cash as they enable real-time person-to-person transactions without fees and trace. But that does not eliminate the demand for physical cash which has long-rooted, intrinsic value to some social groups.

2. CURRENT STATE OF SERBIA'S PAYMENT SYSTEM AND FUTURE POTENTIAL

2.1 Current state of payment system in Serbia

Text box 4. Key takeaways from Section 2

This section highlights Serbia's current state in transitioning to a cashless economy against the backdrop of its strategy to reduce the grey economy. It notes the high usage of cash transactions but also points to a growing trend towards cashless payments, evidenced by the significant increase in POS terminals in the context of stagnant ATM numbers. The section reflects on the potential for further growth in cashless transactions by 2030, emphasizing the shift from traditional payment methods to modern systems like credit cards and mobile money, influenced by evolving technology and consumer preferences.

Serbia is at a crucial juncture in its journey towards a cashless economy, as highlighted by recent studies and projections. Although a significant portion of transactions in Serbia still involves cash, the trend is shifting. The number of traditional POS terminals has grown substantially, and the introduction of e-money and virtual POS terminals is accelerating. The stagnation in ATM numbers of contrasts with the rapid growth in cashless options, indicating a shift in consumer behaviour. This section comes down with three possible scenarios for the next decade – foreseeing that the total number of POS terminals per capita could reach levels closer to EU average by 2030. These developments are driven by technological advancements and a gradual cultural shift towards cashless transactions. The extent to which this shift impacts the shadow economy will depend on the intensity of cashless acceptance and the effectiveness of current policies and reforms.

National initiative for cashless payments – Better way seeks to reduce the size of informal economy in Serbia by expanding cashless infrastructure. The importance of cashless payments has been recognized in the Program for Countering Shadow Economy 2023-2025 which stressed the necessity to stimulate non-cash payments and, thus, reduce

availability of cash payments as a quintessential factor for the operation of most types of shadow economy: cash transactions do not leave any paper or electronic trace and, thus, allow the seller and the buyer not to report transaction and evade taxes. The Program specifically has three measures that concern cashless payments, the first is meant to stimulate cashless payments in the public sector,

the second is meant to stimulate them in the private sector and the third measure is designed to promote cashless payments to the general public.

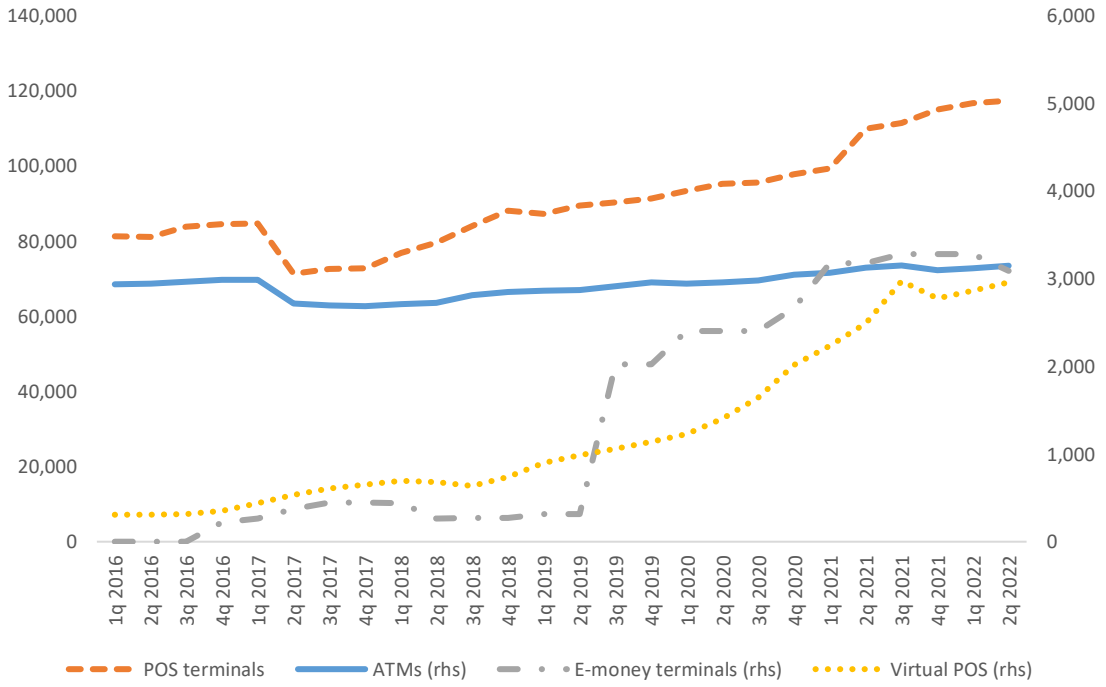
Serbia's network and value of transactions has been rapidly increasing recently. The payment network in Serbia is characterized by continuously growing number of traditional physical POS terminals (from 80 thousand in 2016 to over 120 thousand in 2022 or 6.9 percent per annum). In recent years, the cashless payment network was augmented further by very fast growth in e-money terminals (over 46 percent annually during 2016-2022 and 77.2 percent per annum since mid-2019) and virtual POS terminal (39.4 percent annually). By contrast, the number of ATMs, the main source of cash withdrawals, remained almost constant (i.e. grew at 0.6 percent annually during the 2016-2022 period).

Recent survey data indicated that there is substantial room for improvement in this area. Some recent surveys conducted among households, like the one carried out in 2023[3] show that roughly a half of the population uses some form of cashless payments. While the possible reasons for not using cashless payments more include lack of reliable information, distrust in the financial institutions and lack of an adequate infrastructure, rather than intent to evade taxes, the widespread use of cash creates an opportunity for shadow economy ("passive shadow economy").

Number of ATMs stagnate while cashless options burgeon – painting a picture of an expanding cashless background. A stagnant number of ATMs is used predominantly for cash withdrawals, whereas numbers on POS and e-money terminals indicates a fairly developed and quickly-growing cashless segments of the payment system. This conclusion is confirmed by the fast-growing number and value of combined POS cashless transactions. As indicated in Figure 4, during the 2016-2022 period, the total number of cashless transactions grew from slightly over 142 to almost 435 million (or 20.5 percent per annum), while the value of cashless payments increased from 260 to almost 900 billion dinars (or 22.7 percent annually).

[3] For instance, see NALED (2023)

Figure 4: Serbia – Payment network 2016-2022, in number of terminal units



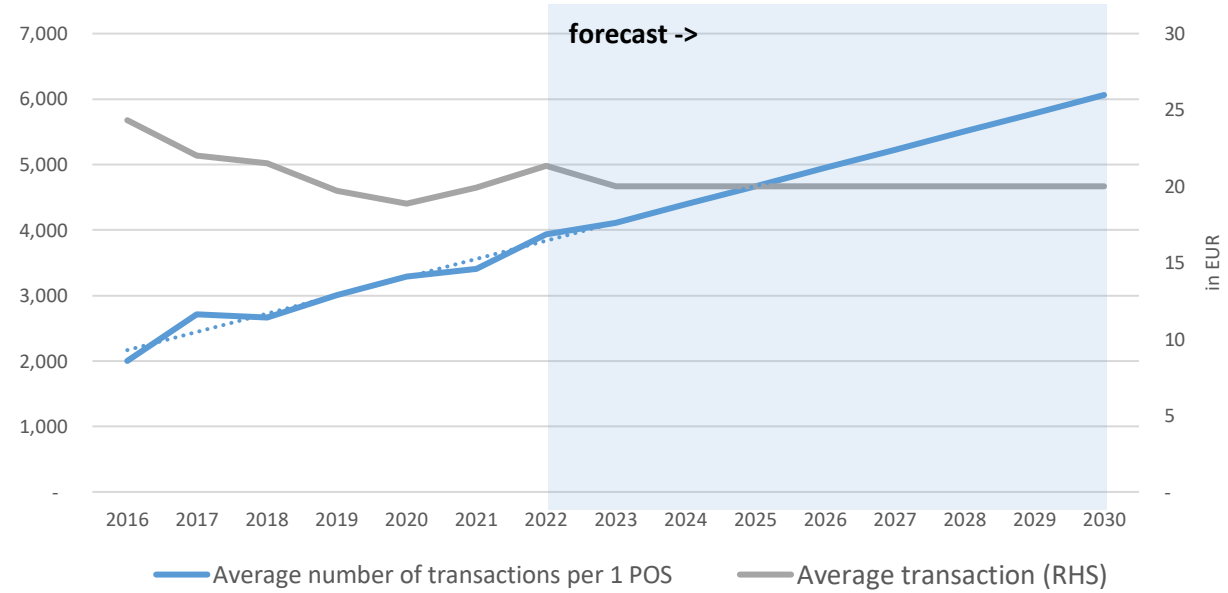
Source: NBS and own calculations.

2.2 Looking ahead: scenarios for growth of POS terminals and related cashless payments

Starting from Serbia's strong cashless growth in the past seven years, we have developed three scenarios to discern potential for growth paths in the future. In the first, **base case scenario**, we assume that by 2030 Serbia's number of POS terminals per capita would reach a level somewhere in between the current EU27 and CEE averages. The second, **pessimistic (bearish) growth scenario** for 2023-2030 period, assumes that Serbia's level of POS per capita would only reach the current CEE average. This means that in this scenario, the payment gap vis-à-vis CEE would be narrowed down for expected improvements in CEE countries by 2030. The third, **optimistic (bullish) growth scenario,** assumes that Serbia would perform better and reach the current EU 27 average of by 2030. This means that the payment gap vis-à-vis CEE would close, and significantly narrow compared to EU27.

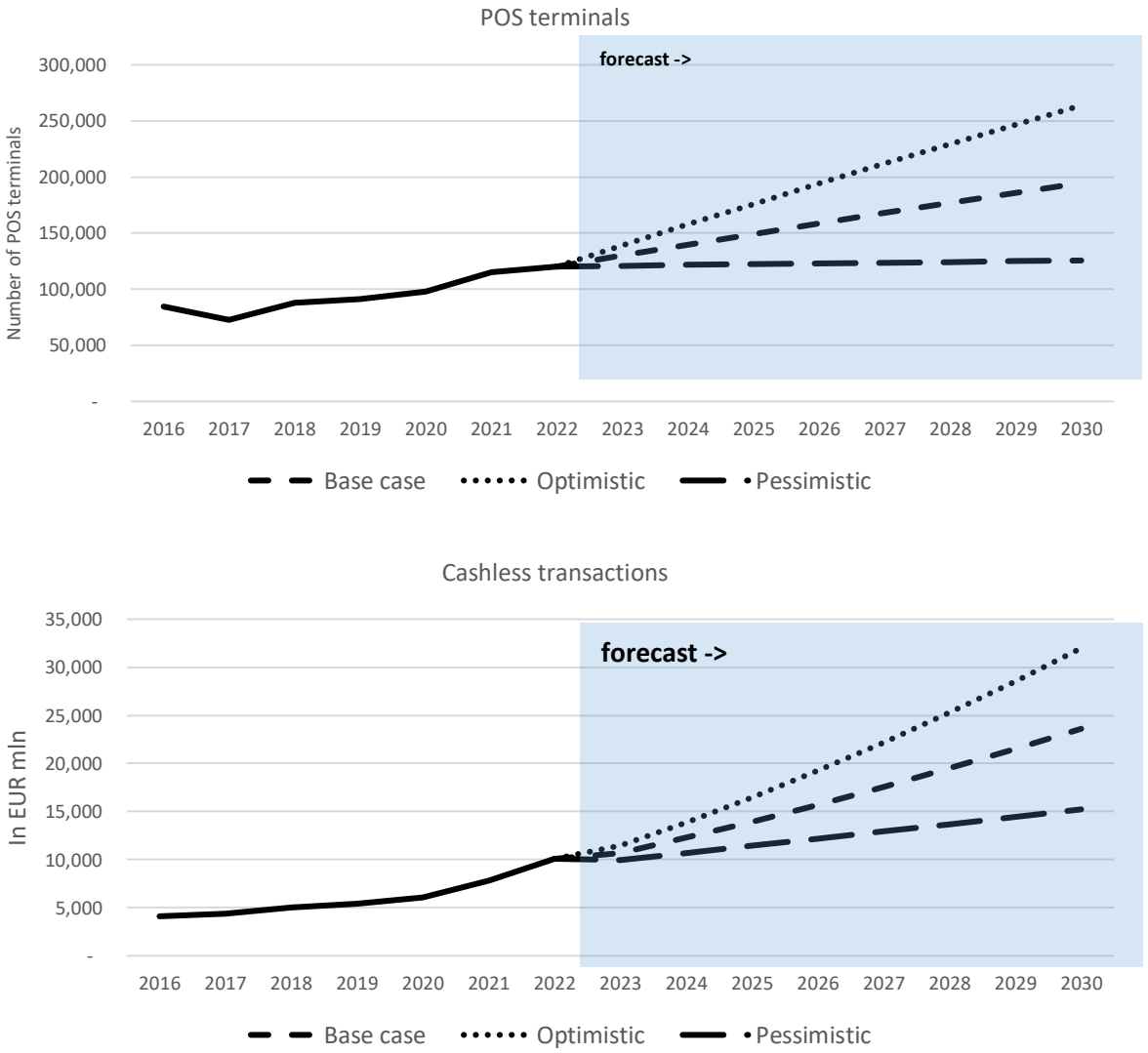
We use a set of assumptions for the dynamics until 2030. Across all three scenarios, we assume that the average number of transactions per 1 POS would gradually and linearly increase over time, from the current level of some 3.9k transactions per year per POS, to some 6k by end 2030. This assumption is the same in all three scenarios, because we expect that regardless of intensity of expansion of the network, cashless payments as a lifestyle choice would become more and more prevalent. We also assume that the average transaction value would gradually decrease and would reach some EUR 20 per transaction by 2030. Finally, we assume that Serbia's GDP would expand by 2% annually in real terms – which is approximately a tad below its potential growth rate; and we also assume that population would shrink by 0.7% annually (or by some 45k population), which has been an average population decline rate recorded between 1995 and 2022.

Figure 5: Assumptions used in the model.



Source: NBS, authors' calculations

Figure 6: Key results of the model



Source: NBS, authors' calculations

***Serbia at a payment crossroad*.** The scenarios show that Serbia might face very different trends in the next mid to long term horizon, with significantly varying levels of cashless payment acceptance in the next years, and consequently, very different impacts of cashless payments on shadow economy. The three scenarios differ in the intensity of cashless acceptance, while the concrete path that Serbia would take depends on current policies and reforms. In a nutshell, the scenarios foresee the following paths:

- **In base case scenario,** Serbia tops some 200k terminals by 2030, up from the current cca 120k. This projected level is equivalent to some 3.1k terminals per 100k population, up from the current level of 1.8k, and roughly at mid-point between the current averages of the CEE and the EU27 (2k and 4.1k respectively). Payments through this channel would increase from some EUR 10 bln annually, to approximately EUR 24-25 bln. This is equivalent to an increase from 17% to 27% of GDP, and implies that in the base case scenario close to half of total transactions[4] would plausibly be cashless.
- **In optimistic scenario,** Serbia tops some 260k terminals by 2030. This projected level is equivalent to some 4.1k terminals per 100k population (i.e. current EU average), up significantly from the current level of 1.8k. Payments through this channel would increase to approximately EUR 32 bln, or 36% of GDP – in which case Serbia would truly become a cashless society, with more than half of its transactions being cashless.
- **In pessimistic scenario**, Serbia reaches only 125k terminals by 2030 – a tad above the current level. Relative to population, this implies only a marginal increase from 1.8k to 2k per 100k population. In this scenario, cashless payments would reach only EUR 15 bln or 17% of GDP – causing Serbia deviate further from European standards and lag behind compators.

[4] There is no official data on total transactions, but it is possible to approximate. In this case, we use total revenues of the sector of wholesale and retail trade as total potential, which is currently at the level of EUR 47 bln (77% of GDP). We also look at total consumption of households – an aggregate which is a part of the overall GDP – and which amounts to some EUR 41 bln (67% of GDP).

2.3 Unlocking cashless growth: key drivers of payment system evolution

It takes more than just infrastructure. POS terminals and the overall payment infrastructure, number payment (credit and debit) cards and other payment instruments are important but not the only drivers of cashless payments. The main drivers behind the continuous decline in the share of cash and growing share of cashless payments shifted over time.

The first stage was marked by a move to account-to-account transfers led by corporations and banks. It was enabled by the new generation of mainframe computers and motivated by huge labor costs and long processing times in companies and banks executing payments related to payroll (wage and salary payments), taxes, inputs and outputs, financing, and foreign trade. On the consumer-retail side this was accompanied by personal and corporate check payments enabled by (often) national check clearing system.

The second stage was dominated by credit (payment) cards. Despite the early invention of payment cards, they came to the forefront of payments change in the 1980s and 1990s thanks to their convenience and intensified efforts by credit/debit card companies and banks. Their motivation was increasing the share of fee-earning electronic credit card payments, and to lower the share of paper-based systems (cash and checks) with hidden internal costs.

Merchants and consumers also recognize the advantages of credit (payment) card payments. As a result, the value and share credit/debit card payments increased fast during the second stage along with the enabling infrastructure (i.e. the number of POS terminals). The increased share of payment cards came mainly at the expense of reduced cash, and to a lesser extent lower shares of account-to-account and check payments.

The third stage of the cashless payment revolution was triggered by the appearance of instant payments and mobile money in the early 2010s. Technological breakthroughs and the massive availability of smart phones and powerful networks enabled close to cost-free transactions. As discussed in Annex, organizational and institutional solutions vary a great deal and so do the associated risks.

3. ARCHETYPE CASES

3.1 Hard earned trust in Swedish Crown

Sweden has a long and successful monetary policy history. Swedish monetary and payment system had a rough start in mid-17-th century. Following the crash of Stockholm Banco in 1668, Swedish parliament formed the first central bank in the world named Riksbank. Although intended to be at the center of a conservative, standardized and homogenous money and payment system, this did not happen until the central banking law passed in 1897 granted Riksbank a monopoly on issuing banknotes which came into effect in 1904. After many experiments with pegs and fixed exchange rates, the Swedish crown has become fully convertible and floating in 1992.

An early adopter of cashless payments used to be very bank-centric at first. The key features of the banking and payment system started to change in 1960's. Payment of wages and salaries started to move from cash to electronic transfers into individual bank accounts of employees. The transaction bank accounts (demand deposits) thus became and still are the core of the payment system.

Cash dropped relatively significantly to GDP. The value of cash increased in absolute terms between 1950 and 2008, as cash remained popular through much of the period (the 1990's and early 2000's). However, due to faster growth of GDP, cash has declined continuously as a share of GDP since 1953 to this day (see Figure below).

The rise of cashless payments in the 1980s and 1990s was fueled by credit card companies and

Text box 5. Key takeaways from Section 3

This section brings about three distinct case studies, each one examining alternative paths in the evolution of cashless payments – going from a traditional bank-centric development of cashless infrastructure to non-banking focused development especially prevalent in Asia, and finally to the development of novel central bank digital currencies. Sweden, a pioneer in this field, saw a significant shift towards cashless transactions since the 1960s, culminating with the introduction of Swish in 2012, leading to a dramatic decline in cash usage. India's digital payment landscape has grown rapidly, albeit most population remains unbanked. This revolution is driven by e-Money and innovative payment interfaces. Additionally, the text examines the development of Central Bank Digital Currencies (CBDCs), focusing on the EU and its potential impact of digital Euro on Serbia. The emergence of digital money, including cryptocurrencies and e-Money, has prompted central banks to explore CBDCs as a public digital money alternative to maintain monetary policy influence and ensure financial stability.

banks supplanting corporate account transfers. The main drivers behind the continuous decline in the share of cash and growing share of cashless payments shifted during this period. From the initial move to account-to-account transfers of wage and salary payments led by corporations, the next stage came in the 1980s and 1990s as a result of intensified efforts by credit card companies and banks to increase the share of electronic credit card payments and lower the share of paper-based systems (cash and checks).

Credit card usage soared in the 1990s, bolstered by consumer preferences and central bank innovations in cashless payment systems. Merchants and consumers also saw the advantages of credit (payment) card payments. As a result, credit card payments increased fast during the 1990s and the number of POS terminals increased from 25,000 to 70,000 between 1993 and 1996. Central bank provided additional incentives for cashless payments by building a new payment clearing system (RIX) and testing a new electronic form of cash (as an add-on function on traditional debit card).

The 2000s saw a surge in public support for cashless and mobile payments, spurring enhanced efforts by banks, telecoms, and startups. As the new millennium approached, cashless payments received widespread enthusiastic public support together with the idea of mobile payments (including instant payments) yet to be developed. Banks, telecom operators and innovative start-ups intensified their efforts to further advance payment services.

An important factor in further reducing the amount of cash after 2004 came from:

- Strong lobbying campaigns against cash to lower and ultimately eliminate the risk of robberies of banks, merchants and cash depots,
- Fiscal incentives to consumers to turn construction and household services into transparent, taxpaying activities and thus curb tax evasion, and
- Coercive tax administration renewed efforts to force merchants to declare all their sales through tighter control of new temper proof cash registers.

***Despite the rise of electronic payments, by the early 2010s there was some public criticism and concern about the potential elimination of cash*.** A Riksbank study done in 2013 revealed that 2/3 of respondents (who often use payment cards) saw access to cash as their human right, comparable to rule of law, free speech, etc. Cash has a tradition of strong trust and is primarily used in transactions where a payer and payee meet face-to-face. This aspect of demand for cash based on "payment sovereignty" survived the strong growth of e-commerce and proportionate use of electronic payments, with the resulting growing need for cashless transactions and diminished role of cash.

Swish revolutionized cashless payments in Sweden, becoming a popular choice and

contributing significantly to the increase in cashless transactions throughout 2010s and 2020s. In addition to payment cards, a new cashless payment instrument Swish was introduced in late 2012. Swish enabled real-time person-to-person transactions without fees and, thus, became a perfect substitute for cash. By the end of 2019, Swish had 6.5 million users out of 8.2 million adults over the age of 15 living in Sweden. In 2020 it represented 16.1 percent of cashless payments (15.2 percent of all payments) in Sweden. More importantly, instant payments (dominated by Swish system) contributed 60.3 percent of the increased cashless payments in the 2014-2020 period, compared to 23.3 and 17.5 percent contributions of bank account and payment cards contributions respectively.

Swish become a cornerstone in Sweden's digital payment landscape. Developed through a collaborative effort by six of the country's largest banks, in partnership with Bankgirot and the Central Bank of Sweden, Swish links users' mobile numbers to their bank accounts, enabling instant real-time money transfers. This system was initially designed for peer-to-peer transactions but quickly expanded to encompass broader commercial activities, including flea markets, church collections, and small business transactions.

For individual users, the allure of Swish lies in its provision of a cost-free platform for conducting real-time financial transactions. This aspect is crucial in understanding the system's widespread acceptance and use among the Swedish populace. By eliminating transaction fees for personal use, Swish has effectively democratized access to quick and efficient digital payments, making it a preferred choice for everyday transactions. This approach not only fosters financial inclusion by removing barriers to digital payment adoption but also aligns with consumer preferences for cost-effective and convenient transaction methods.

In contrast, the business model for commercial users of Swish presents a different dynamic. Businesses and organizations using Swish for transactions are subject to a transaction fee, typically ranging from 1 to 3 SEK per transaction, in addition to a nominal annual fee. This pricing strategy is a reflection of a market-driven approach, which aims to balance various economic factors. Firstly, it ensures the affordability of the service for businesses, which is crucial for encouraging adoption among a wide range of commercial entities, from small local businesses to larger corporations. Secondly, the fee structure is designed to maintain the sustainability and operational efficiency of the Swish system, ensuring that it continues to provide reliable and secure services.

This bifurcated fee structure also underlines a strategic approach in the digital payment market. By offering the service for free to individual users, Swish incentivizes widespread adoption and habitual use, laying the foundation for a robust user network. For businesses, the modest fees can be viewed as an investment in a service that offers expedited transactions and access to a broad

customer base. Furthermore, the cost for businesses is often offset by the benefits of digital transactions, such as reduced handling of cash, improved transaction speed, and enhanced customer experience.

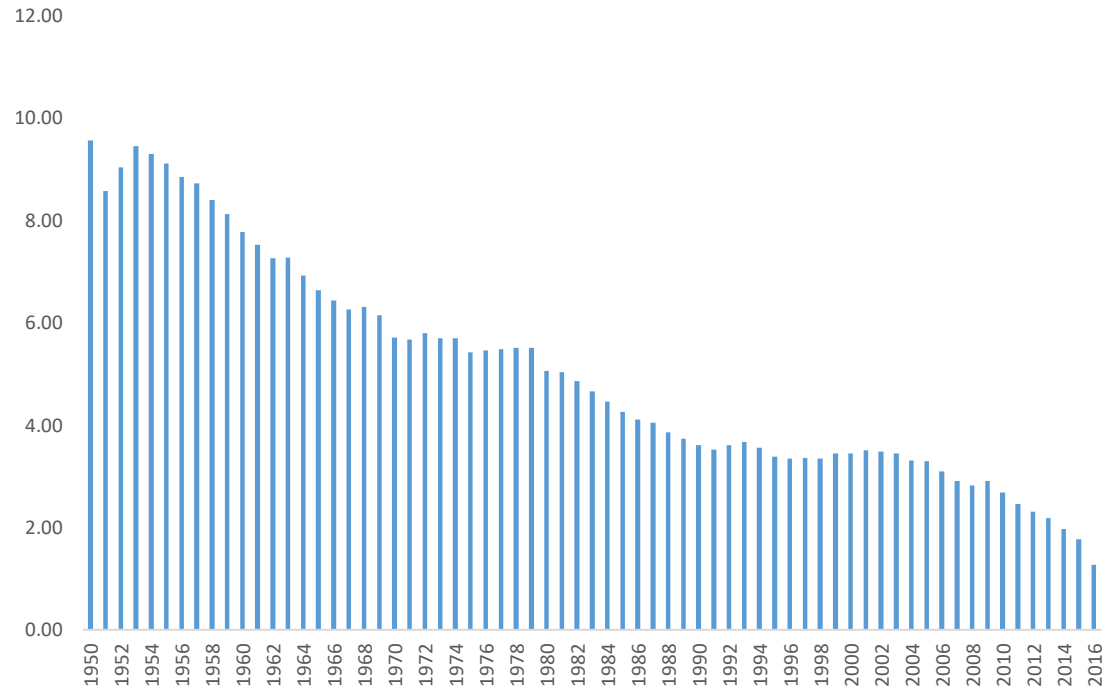
3.1.1 SWEDISH ARCHETYPE CASE – a traditional cashless path

Text box 6. Key takeaways from the Swedish case

Sweden's evolution towards a cashless society has been marked by several key phases and developments. Initially, the country's financial ecosystem was heavily reliant on cash and traditional banking practices. However, over the years, there has been a significant shift towards digital solutions. This transition accelerated in the late 20th and early 21st centuries, driven by technological advancements, changing consumer behaviors, and a strong push from both the government and the private sector towards digitalization. The rise of internet banking, mobile banking apps, and online shopping contributed to a gradual decline in the use of cash. This trend was further supported by the high level of trust in digital transactions among Swedish citizens, backed by a robust and secure banking infrastructure.

One of the most concrete measures in this transition was the introduction of Swish, a mobile payment application developed by several major Swedish banks. Launched in 2012, Swish quickly became a popular method for instant, cashless payments, allowing users to transfer money using just a mobile phone number. This innovation was critical in reducing the reliance on physical cash, particularly for small, person-to-person transactions. Alongside Swish, Sweden implemented other significant measures to encourage cashless transactions. These included reducing the denominations of cash in circulation and setting limits on cash transactions to discourage large cash-based dealings. To ensure a smooth transition, the government and regulatory bodies also focused on inclusive policies, ensuring financial access for all demographics during the shift to a cashless economy. Additionally, strict enforcement of data protection laws was crucial in maintaining public trust in the new digital payment systems. These measures, combined with a proactive approach by banks and financial institutions, have significantly shaped Sweden's current status as a leading cashless society.

Figure 7: Sweden: Cash in Circulation as Share of GDP (in percent of GDP)



Source: The Riksbank. Quoted from Arvidsson, Niklas: Building a Cashless Society: The Swedish Route to the Future of Cash Payments, Springer Briefs in Economics. 2019, page 47.

3.1.2 Swedish path to cashless economy and society

Payment system transformation is a coordinated effort among various stakeholders, reflecting a socio-technical process.

First look at the payment system as a Socio-Technical System with interplay between critical factors that explain how the transformation happens in reality. Thus, the transformation of a payment system cannot be governed from above or created by one actor (central bank, commercial banks, cash-in-transit service companies. merchants, consumers) but all of them (including

government, fiscal authority, and tax administration) in a coordinated fashion.

Second, the approach must observe the fundamental characteristics (technical, legal, regulatory) of the payment industry.

1. **Eliminate large cash banknotes and impose upper limits to cash payments** - Unlike some countries that have actively phased out large denominations of cash, Sweden's shift away from large banknotes has been more of a natural, societal change rather than a result of direct government policy. This trend can be attributed to the increasing preference for digital transactions over cash. The numbers speak volumes about this shift: in 2010, 39% of Swedes used cash for their last purchase, but by 2019, this number had drastically fallen to just 9%. This significant decline in cash usage, especially for larger transactions, reflects a broader trend in Swedish society towards digital means of payment. It's a change driven more by consumer behavior and market dynamics than by legislative action or government intervention. While Sweden hasn't imposed legal upper limits on cash payments, the market itself is moving away from cash, especially for larger transactions.

Third, Sweden followed its own path to cashless economy and society observing most of the essential steps later be recognized by Rogoff (2016) on an efficient path to cashless economy and society:

2. **Develop policies ensuring financial inclusion for all during the transition to cashless status** – for instance the issue of digital exclusion has been recognized in popular media as well, with initiatives like 'Senior Surfers'[5], a reality TV show in Sweden that aims to educate older citizens about digitalization and technological developments.
3. **Enforce laws and regulation ensuring privacy and integrity of people while using electronic payments** (i.e. preserving trust -- the cornerstone of money and payments) – for instance, Sweden has supplementary regulation, like Camera Surveillance Act, the Criminal Data Act, and the Patient Data Act, in addition to GDPR, which makes it digital environment even safer for users. Namely, it has adopted a supplementary act to address specific aspects of data protection relevant to the Swedish context.
4. Build infrastructure (clearing and settlement systems) that enables reliable real-time (or close to real-time) payments (that will make electronic payments close

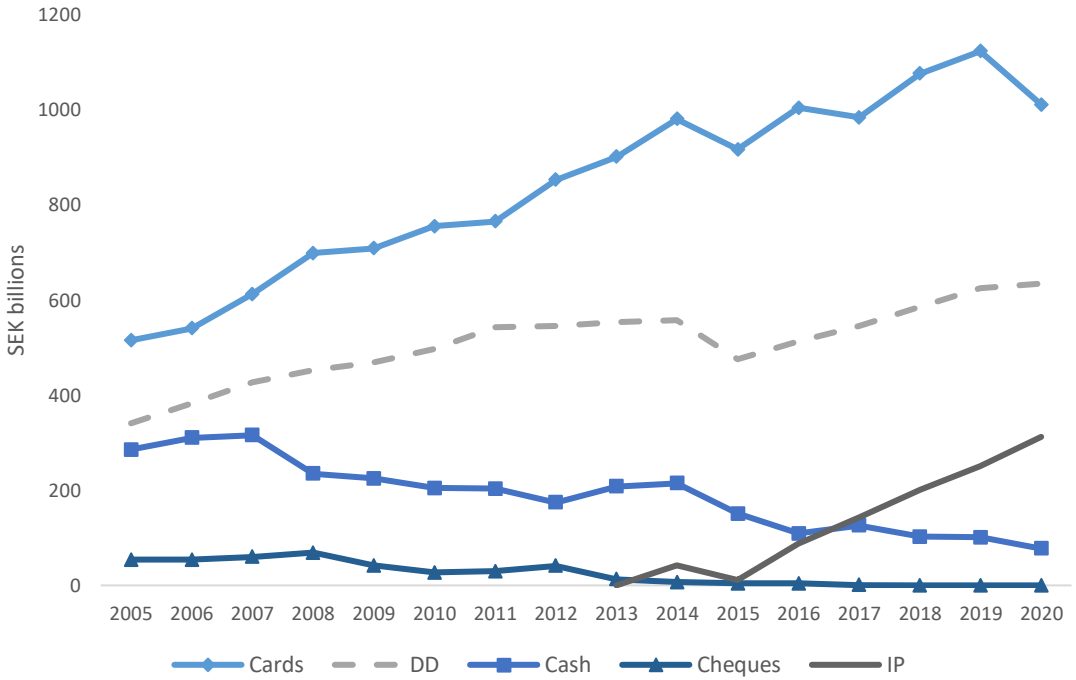
[5] https://www.thetimes.co.uk/article/sweden-leads-way-to-a-cashless-future-5kqj75mb9

substitutes of cash). More specifically some of the policy and infrastructure elements introduced in Sweden included the following:

a. Swish Payment App: Swish was launched in 2012 as a cooperative effort between major Swedish banks and the Central Bank of Sweden (Riksbank). It allows users to make instant payments using their mobile phones. Swish is widely used in Sweden; as of 2019, seven out of ten Swedes were using it for various transactions. This app is operational 24/7, every day of the year, enabling real-time transactions at any time.
b. BiR (Betalningar i realtid) System for Settlement: Swish transactions are settled through the BiR system, which is a real-time settlement platform jointly owned by the participating banks. This system operates with private bank money but is backed by central bank money, ensuring a stable and secure transaction environment. The BiR system minimizes credit risk between participants, which is crucial for the reliability of instant payments.
c. Bankgirot as a Central Payment Infrastructure: Bankgirot is Sweden's only clearing house for mass payments and plays a key role in the country's payment system. Established in 1959, it handles a large volume of transactions daily, including through its real-time payment service BiR, which is critical for the operation of Swish. Bankgirot processes approximately 7.3 million payments per day, including around 1.4 million real-time payments, amounting to a total value of SEK 73 billion.
d. Transition to TIPS (TARGET Instant Payment Settlement) Platform: The Riksbank has assessed that the best solution for settling instant payments in the future is to use the European Central Bank's TIPS platform. This transition is expected to facilitate and streamline the settlement of instant payments in Swedish Krona (SEK), further enhancing the efficiency of Sweden's payment infrastructure.
e. P27 Nordic Payments Platform and Acquisition of Bankgirot: In 2020, the P27 Nordic Payments Platform, aiming to create a unified payment platform in the

Nordic countries, signed an agreement to acquire Bankgirot. This acquisition is a significant step towards integrating and modernizing the payment infrastructure across the Nordic region, enhancing cross-border and cross-currency payment capabilities.

The Swedish archetype case is well presented by the following graph.
Figure 8: Sweden: Structure of payments by instrument (in billion SEK)



Source: Riksbank.

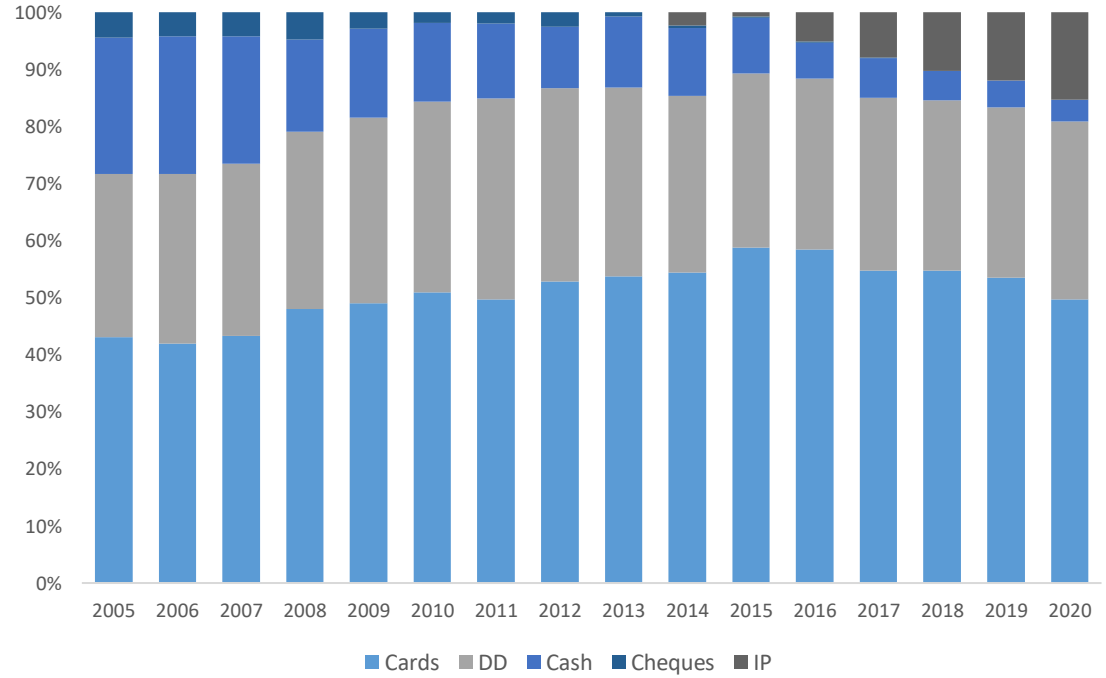
Riksbank data reveals payment cards as the dominant and rapidly growing cashless method, with instant payments surging and cash use declining. Regarding cashless payment dynamics, Riksbank data presented in Figure A.3 above, indicate that payment cards are the largest and the fastest growing payment instrument, followed by

bank account-to-account transfers. Instant payments (green dotted line) based on Swish and similar payment instruments recorded a fast growth after 2014. Checks followed a downward trend and were practically eliminated in recent years (after 2015). The use of cash peaked in 2007 and has been declining ever since. Presently it represents about 1 percent of GDP. More detailed analysis of the structure and dynamics of key payment instruments presented in figure A.4 below offers some important additional insights.

The structure of payments (by payment instrument) underwent important changes during the 2005-2020 period. As shown in table S.2 below, the share of cash declined from 23.7 to 5.9 percent, while cashless payments increased from 76.3 to 94.1 percent.

- The share of payment cards (both debit and credit) consistently increased during the 2005-2016 period from 48.3 to 59.4 percent but then gradually declined to 49 percent in 2020.
- ***Payments based on bank (demand-deposit) accounts gradually increased*** from 25.6 to 30.5 percent between 2005 and 2013 and then fluctuated around that level until the end of observed period (29.9 percent in 2020).
- ***The share of checks in total payments systematically declined*** from 2.4 percent in 2005 to less than 0.4 percent in 2013 and effectively disappeared after 2017.
- ***SWISH soars*** since it first appeared in 2014 and quickly increased to 15.2 percent of total payments in 2020 due to its efficiency (costless payments and transfers between individuals) and reliability.
- ***Contributions of different payment instruments*** to growing overall cashless payments in Sweden picture the following story line.
  - During the 2005-2020 period total payments increased by almost 1 trillion SEK.
  - Roughly half of that increase (990 bn SEK) was owed to payment cards, and 1/3 each to demand deposit payments (340 bn SEK) and new instant payments (310 bn SEK), with a negative 15 percent contribution of reduced cash (-139 bn SEK) and check payments (-25 bn SEK).
  - Main changes occurred after 2013. Including exceptional years (2015 and 2020) when the value of total payments declined due to exogenous shocks and crises, cashless payments increased by more than 500 bn SEK (i.e. about 100 bn SEK per annum) between 2013 and 2020.
  - By far the greatest contribution to increased cashless payments (71.4 percent) is owed to instant payments (SWISH) with 310 bn SEK, followed by DD payments (27.6 percent or 120 bn SEK) and only then card payments 20.7 percent or 90 bn SEK).

Figure 9: Sweden: Structure of payments 2005-2020 (in % of total payments)



Source: Riksbank, authors calculations.

Sweden case: Data analysis

Table 1: Level of payments by payment instrument: 2005, 2013-2020 (in bn SEK)

	2005	2013	2014	2015	2016	2017	2018	2019	2020	2013-2020
	Level end year									Average
Cards	510	910	980	950	1000	980	1070	1130	1000	1003
DD	270	490	500	460	480	500	530	570	610	518
Cash	250	200	210	180	140	150	140	130	120	159
Checks	25	7	5	4	3	2	1	1	1	3
IP	0	0	0	25	60	120	200	250	310	121
TOTAL	**1055**	**1607**	**1695**	**1619**	**1683**	**1752**	**1941**	**2081**	**2041**	**1802**
Cash	250	200	210	180	140	150	140	130	120	159
Cashless	805	1407	1485	1439	1543	1602	1801	1951	1921	1644

Source: Arvidsson (2019), Riksbank, authors calculations.

Table 2: Structure of payments by payment instrument: 2005, 2013-2020 (in percent)

	2005	2013	2014	2015	2016	2017	2018	2019	2020	2013-2020
	Share in total payments									Average
Cards	48.3%	56.6%	57.8%	58.7%	59.4%	55.9%	55.1%	54.3%	49.0%	55.9%
DD	25.6%	30.5%	29.5%	28.4%	28.5%	28.5%	27.3%	27.4%	29.9%	28.8%
Cash	23.7%	12.4%	12.4%	11.1%	8.3%	8.6%	7.2%	6.2%	5.9%	9.0%
Checks	2.4%	0.4%	0.3%	0.2%	0.2%	0.1%	0.1%	0.0%	0.0%	0.2%
IP	0.0%	0.0%	0.0%	1.5%	3.6%	6.8%	10.3%	12.0%	15.2%	6.2%
TOTAL	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Cash	23.7%	12.4%	12.4%	11.1%	8.3%	8.6%	7.2%	6.2%	5.9%	9.0%
Cashless	76.3%	87.6%	87.6%	88.9%	91.7%	91.4%	92.8%	93.8%	94.1%	91.0%

Source: Arvidsson (2019), Riksbank, authors calculations.

Table 3: Changes by payment instrument (in bn SEK)

	2005	2013	2014	2015	2016	2017	2018	2019	2020	2013-2020
	Delta over previous year									Delta
Cards			70	-30	50	-20	90	60	-130	90
DD			10	-40	20	20	30	40	40	120
Cash			10	-30	-40	10	-10	-10	-10	-80
Checks			-2	-1	-1	-1	-1	0	0	-6
IP			0	25	35	60	80	50	60	310
TOTAL			**88**	**-76**	**64**	**69**	**189**	**140**	**-40**	**434**
Cash			10	-30	-40	10	-10	-10	-10	-80
Cashless			78	-46	104	59	199	150	-30	514

Source: Arvidsson (2019), Riksbank, authors calculations.

Table 4: Contributions to changes in cashless payments (in percent)

	2005	2013	2014	2015	2016	2017	2018	2019	2020	2014-2020
	Contributions to increased cashless payments in percent									Delta
Cards			79.5%	39.5%	78.1%	-29.0%	47.6%	42.9%	325.0%	20.7%
DD			11.4%	52.6%	31.3%	29.0%	15.9%	28.6%	-100.0%	27.6%
Cash			11.4%	39.5%	-62.5%	14.5%	-5.3%	-7.1%	25.0%	-18.4%
Checks			-2.3%	1.3%	-1.6%	-1.4%	-0.5%	0.0%	0.0%	-1.4%
IP			0.0%	-32.9%	54.7%	87.0%	42.3%	35.7%	-150.0%	71.4%
TOTAL			**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Cash			11.4%	39.5%	-62.5%	14.5%	-5.3%	-7.1%	25.0%	-18.4%
Cashless			88.6%	60.5%	162.5%	85.5%	105.3%	107.1%	75.0%	118.4%

Source: Arvidsson (2019), Riksbank, authors calculations.

3.2 INDIA ARCHETYPE CASE – New payment instruments (e-Money)

Text box 7. Key takeaways from the Indian case

This section observes the case of India and a group of countries which have been early and massive adopters of non-bank-centric methods of cashless payments. India's digital payment landscape has rapidly evolved with the significant rise of e-Money, supported by the RBI's innovative payment interfaces and India Stack, a digital infrastructure integrating identification, payments, and data exchange. The country has witnessed a notable shift towards e-Money, with transaction values exceeding $2.7 trillion in 2020. This growth parallels trends in other Asian countries like China and Singapore, where e-Money markets, led by major players like Alipay and GrabPay, show high concentration yet robust competition. Government initiatives, particularly India's demonetization policy, have been key in spurring the development and adoption of e-Money across these regions.

3.2.1 The rise of e-Money or Mobile Money – General considerations

The global digital money revolution is driven by large fin-tech companies, with mobile or e-money, accessible through simple registration and not requiring a bank account, now offering more global access points than traditional banking.

According to IMF sources[6] large fin-tech companies are leading the global digital money revolution. Mobile money or e-money is the flagship instrument which can be acquired through a very simple registration procedure with one of local provider shops of Mobile Network Operators (MNO). Users must have a simple smart phone and some money to deposit on the mobile account. It does not require a banking account. Based on online database maintained by GSMA (Global Systems for Mobile Communications) and IMF held FAS (Financial Access Survey), mobile money presently offers more access points globally than traditional banking sector.

Data shows a tenfold increase in registered mobile money accounts globally from 2002 to 2021, with transaction values reaching one trillion USD in 2021. Based on GSMA data, Number of registered mobile money accounts in the world (excluding China) increased exponentially from 134 million in 2002 to 1.35 billion in 2021: a tenfold increase. During the same period, number of active mobile accounts increased even faster, from 62 million to 864 million, almost 14 times. The value of transactions reached one trillion USD in 2021, a 31% increase over 2020. By type of

[6] See Shirono, Kazuko, Bidisha Das, Yingjie Fan, Esha Chhabra and Hector Carcel (2021). Is Mobile Money Part of Money? Understanding the Trends and Measurement. IMF Working Paper, July 2021. WP/21/177.

transaction, person-to-person (P2P) transactions were the highest with 387 million USD (37%), followed by Cash-In payments with 261 million USD (25%) and Cash-Out withdrawals of 178 million USD (17%). The fastest growing mobile money transactions were payments to merchants (94% increase over 2020) and international remittances (48%) indicating a diversification into areas that used to be dominated by payment cards and international wire transfers, respectively.

Mobile money, as part of a suite of digital financial services provided by Fin-Tech and telecom companies, has seen exponential user growth, with rapid expansion in Africa and Asia for efficient and accepted payment services. Additionally, mobile money is usually only one of the growing array of expanding digital financial services offered by Fin-Tech (also known as non-banking financial institutions), telecom and other related companies. The number mobile money users have been growing exponentially over the past decade. In addition to Africa known as the cradle of mobile money (M-Pesa), e-money has been expanding fast in Asia (China, India) providing services to billions of people seeking reliable, efficient (inexpensive) and widely accepted payment services for literally trillions of small value transactions daily.

Mobile money, a safe and efficient form of digital money, fulfills all monetary functions and significantly influences monetary aggregates and policy transmission, with its balances notably increasing in African and Asian countries. Mobile money is a safe, simple, and efficient (affordable) form of digital money that provides all functions of money: unit of account, stable store of value and medium of exchange. It provides easy access to most people, and guarantees simple and inexpensive payments and transfers, including remittances. From the monetary statistics point of view, mobile-money outstanding balances are a part of broad money, and thus affect the value and quality of monetary aggregates, as well as the characteristics of so called transmission channels of monetary policy. The reporting of changes in mobile-money balances depends on the dominant business model and the applicable regulatory framework. Over the last 5-6 years mobile money balances have increased significantly in all African and Asian countries where e-money represents a significant portion of broad money.

Mobile banking differs from mobile money in that it involves accessing bank accounts via smartphone apps for transactions, whereas mobile money allows peer-to-peer transactions directly from deposited balances without needing individual bank accounts. It should be stressed that mobile banking is very different from mobile money or e-money. In mobile banking, users access their bank account using custom application software installed on their smart phones. All transactions in mobile banking are performed on the client's bank account. Smart phones are just used to remotely access bank account and initiate those transactions. In mobile money, transactions can also be done directly peer-to-peer between registered and authenticated users based on previously deposited

balances on the payee side and legitimate payments (for goods or services) and transfers. Individual bank accounts may be used in the process but are not needed to perform mobile-money transactions.

So far three major business models have emerged in the so called Mobile Money Ecosystem. Shirono et. al. (2021) identify three major models:

1. The original "**MNO-led model**" was created by major mobile network operators (MNO) such as M-Pesa launched by Safaricom in Kenya, Vodafone in Tanzania, and GlobeTelecom in Philippines. No bank accounts or prior credit history are needed to become mobile-money client.
2. "**Bank-led model**" is initiated by banks but relies on MNOs to manage the network and financial services based on mobile phones. Irrespective of bank involvement, no bank account is needed to become a client.
3. "**Fin-Tech-led model**" where providers of financial / payment services initiate mobile-money operation. These include some of the presently largest mobile-money providers such as AliPay, WeChat Pay, Apple Pay, Google Pay, PayPal, etc.

The MNO and Fin-Tech led models share many common features and can be merged into a "non-bank-led model". Five essential functions have been identified in each of the models:

- Network service provider role is usually carried out by one or more MNOs;
- Mobile money agents provide direct contact with present and future customers; The network of agents is supported by MNOs, and payment providers / Fin-Tech companies, as well as banks in the "bank-led model";
- Payment service provider is responsible for front end interface with agents and customers, back-end processing and, most importantly, for payment clearance and settlement; Payment services can be provided by MNOs, FinTech companies, as well as banks in the "bank-led model";
- Mobile money issuer who holds the liability for mobile money and guarantees the conversion of mobile money balances back to cash / legal tender when demanded; In the "non-bank led model" the issuer can be MNO or FinTech company, and in the "bank-led model" the issuer can only be the bank; and
- Deposit holder (usually a bank in all models) is responsible for funds deposited/pre-paid by mobile money customers.

India's 'narrow bank model' permits limited financial services by 'payment banks', focusing on deposits and payments while excluding lending, and mandates specific investment rules for stability. A variant of "bank-led model" has been created in India labeled "narrow bank model". It

allows the formation of so called "payment banks" under existing banking laws and regulatory environment with limited set of financial services. Eligible MNOs or Fin-Techs can obtain a limited banking license which allows them to accept deposits, issue ATM and debit cards, offer payments and other financial services excluding lending. Restrictions also apply on the placement of deposits requiring that 3/4 of demand deposits be invested in low risk government securities or treasury bills with up to one year maturity, and 1/4 held with commercial banks as minimal operational liquidity. Similar rules have evolved in other countries with significant share of mobile money in monetary aggregates to preserve financial stability and allow liquidity interventions in cases of a financial crisis due to external shocks or "runs". These concerns, which particularly apply at times of severe liquidity and financial crisis have led to proposals for the introduction of CBDCs discussed in the Annex 2 below.

3.2.2 The emergence of e-Money payments in India and Asia – Empirical evidence

This analysis uses the IMF's broad definition of e-Money, encompassing mobile money, prepaid cards, and web-based products, and includes mobile phone payment applications as an extension of e-Money. The definition of e-Money used in this analysis does not make a distinction between e-money, mobile money, and e-wallets. Rather it relies on IMF (IMF, 2018) definition of e-money as a "monetary value represented by a claim on the issuer that is electronically stored on a card, device, or server and used for payments to third parties". Hence, e-Money includes mobile money, prepaid cards, and web-based products. Mobile money (as a form of e-money stored in mobile phone accounts) is widely used in many emerging economies and developing countries. Although formally excluded from this definition of e-money, mobile phone payment applications linked to a bank account (activated by scanning a Quick Response [QR] code, for example), can be considered an extension of e-money.

Two important notions: One, telecom and non-bank financial institutions can issue e-money. Two, e-money can be held and used by people who do not have bank accounts. They are the essential characteristic of e-Money design and adoption to respond to "unmet user demand for payment services". The success of e-Money hinges on the skilled exploitation of both economies of scale and economies of scope (e.g., integration of payments with e-commerce and social networks).

Rise of e-Money schemes in major Asian countries has led to a significant increase in e-money payments, surpassing card transactions, with a combined value exceeding USD $2.7 trillion in 2020. Demand driven creation of many e-Money schemes helped overcome payment hurdles and allowed a substantial increase in both the volume and value of e-money payments which have eclipsed card payments in major Asian countries (China, India, Indonesia, Malaysia, Singapore, and Thailand). As detailed in Table II.1 below, the combined value of e-Money transactions

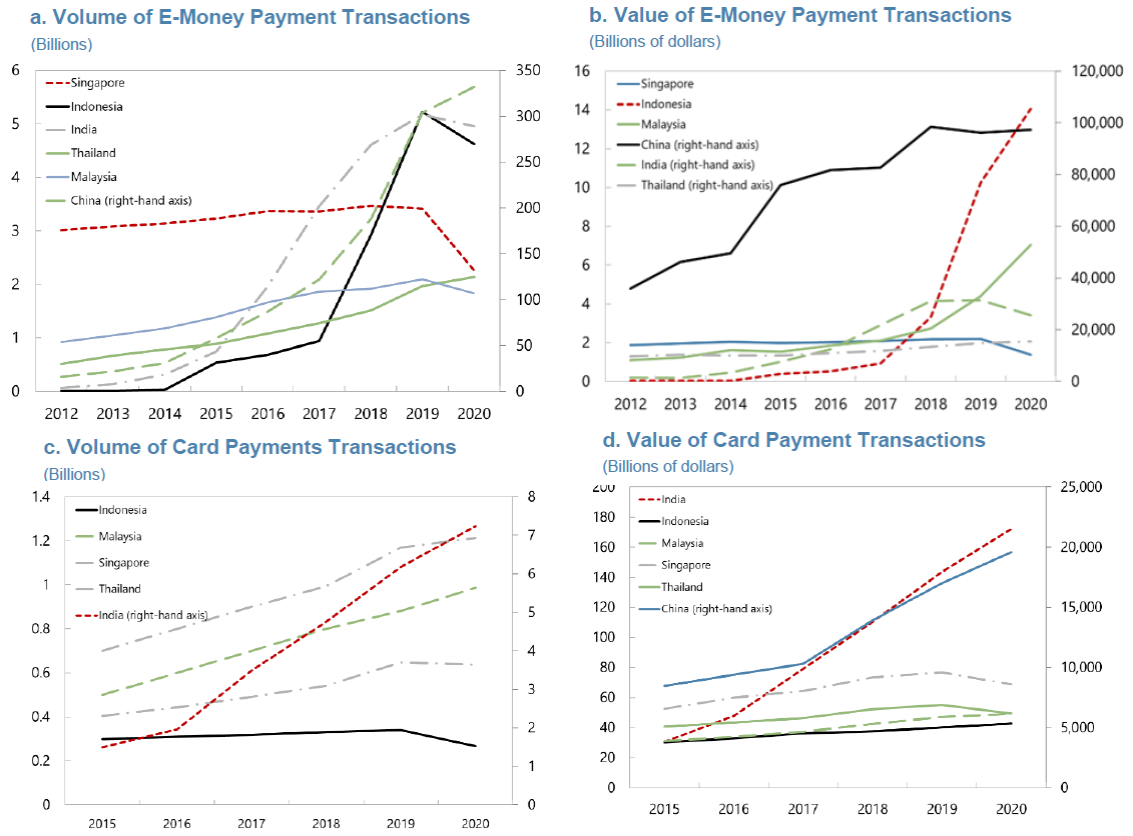
conducted by almost 1.5 billion smart phone users in five Asian countries exceeded USD $2.7 trillion in 2020. Average annual value of e-Money payments per user in 2020 was almost USD $1850, ranging from USD $415 in India to USD $2181 in China and USD $4500 in Singapore.

Table 5: Size and concentration of e-Money markets in Asia

	e-Money value bn USD	Smart phones mil	e-Money / user USD p/a	e-Money market share		
				1st PSP	2nd PSP	Other PSPs
China	$ 2,573	1180	$ 2,181	49%	41%	10%
India	$ 90	217	$ 415	26%		74%
Indonesia	$ 41	64	$ 641	38%	16%	46%
Malaysia	$ 10	10	$ 1,000	38%		62%
Singapore	$ 9	2	$ 4,500	35%		65%
TOTAL	$ 2,723	1473	$ 1,849	48%	39%	13%

Source: Tao and Rizaldy (2023). IMF and BIS databases. Authors calculations.

Figure 10: Volume and value of e-Money payment transactions in Asian countries



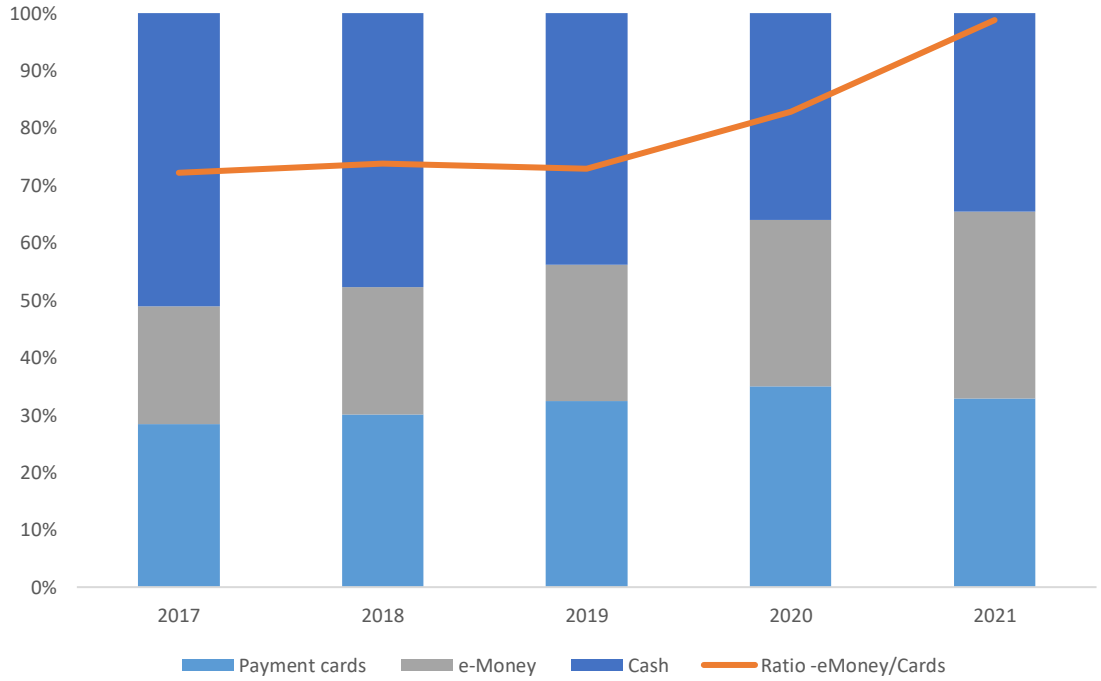
Source: Tao and Rizaldy (2023), page 8.

E-Money markets are highly concentrated, with China leading in market share through Ali Pay and WeChat Pay, and other Asian countries showing significant but less dominant shares by major players, amidst intense competition. Based on reported numbers e-Money markets have large concentration. China has the largest concentration of e-Money payments (90% of the market is shared between Ali Pay at 49% and WeChat Pay at 41%). The largest player in Thailand is TruePay with 53% share. Other Asian countries have lower market concentration ranging from 26% share of Paytm in

India, to 35-38% shares held by the largest operators in Indonesia (Ovo), Malaysia and Singapore (GrabPay). Despite large concentration, competition in e-Money markets has been very tough both in terms of competitive pricing, technological innovations, and service improvements/enhancements.

From 2017 to 2021 in India, e-Money payments surged by over 50%, card payments moderately increased, and cash payments significantly declined. During the 2017-2021 period India recorded a significant change in the structure of payments done with cash, payment cards, and e-Money. The share of e-Money payments jumped by more than 50 percent (from 20.5% to 32.5%), while the share of card payments showed a moderate increase (from 28.4% to 32.9%). These increases were done at the expense of cash payments which markedly declined from 51.1% majority share in 2017 to 34.6% in 2021. Looked at it from another angle: During the 2017-2021 period the share of cashless payments increased from 49 percent to about 2/3 of combined payments, while value of e-Money payments almost equaled payment cards (double line in the figure II.2).

Figure 11: India -e Money growth 2017-2021 (inpercent of total)



Source:BIS database

3.2.3 Establishing Digital Public Infrastructure – India experience

India's RBI has expanded mobile money accessibility with the Universal Payment Interface for non-smartphone users and USSD for those without phones or internet, alongside developing Immediate Payment Service for mobile banking users. RBI, the central bank of India, has also pioneered Universal Payment Interface as an enhancement to the mobile money system allowing

some 400 million users in Rural areas with older telephones (without smart phone features) to join mobile money and access modern payment services. To further increase financial inclusion, RBI has also sponsored Unstructured Supplementary Service Data (USSD) as another cashless option for those who do not own or carry any phone or tablet, and do not have access to the internet. On the higher end, RBI supported the development of Immediate Payment Service for users with mobile money accounts also registered for mobile banking.

India's digital revolution is underpinned by the establishment of a Foundational Digital Public Infrastructure (India Stack), encompassing digital identification, payment systems, and data exchange, aimed at supporting economic transformation and inclusive growth. Establishment of a Foundational digital public infrastructure (DPI) is a quintessential part of India's digital revolution. Foundational DPI, also called India Stack, consists of three layers: unique digital identification, payments system, and data exchange layer. It has the potential not only to support a modern inexpensive and safe payment system, but also to enable the transformation of the economy and foster inclusive sustainable growth. India Stack is designed to harness innovation and competition, expand markets, enhance financial inclusion, boost government revenue and improve public expenditure management.

India's development of a world-class Digital Public Infrastructure offers key insights for other countries on avoiding proprietary pitfalls and fostering innovation. India's experience in developing a world-class DPI highlights powerful lessons for other countries embarking on their own digital transformation. In particular, it provides tools for a new design approach that avoids the pitfalls of proprietary approach to payment and digital infrastructure in general and focuses on shared building blocks that allow and supporting innovation across the ecosystem.

India Stack refers to a DPI set of shared digital building blocks, such as applications, systems, and platforms, powered by interoperable open standards and/or specifications. It consists of three different layers:

- Unique identity system (UIS – Aadhaar),
- Complementary payments systems comprising
  - Unified Payments Interface (UPI),
  - Payments Bridge, and
  - Enabled Payment Service), and
- Data exchange system comprising
  - DigiLocker and
  - Account Aggregator.

Together they enable online, paperless, cashless, and privacy-respecting digital access to a variety of public and private services. The benefits of the new system were demonstrated during the pandemic. The Government of India estimates that during 2020 and up to March 2021, about 1.1 percent of GDP was saved by utilizing DPI to directly transfer social assistance payments and promptly provide support to an impressive 87 percent share of poor households during the pandemic.

By design, India Stack has been used as a platform to:

- Foster innovation and competition;
- Expand markets;
- Close gaps in and enhance financial inclusion;
- Boost government revenue collection; and
- Improve the efficiency of public expenditure management.

Digital payments have become universal. UPI enables 68 percent of all payment transactions by volume. DPI based digital payments have helped smaller merchants and SMEs in general expanded their customer base, document their cash flow and develop reliable accounting, as well as improve their access to finance and a full range of financial services through the Account Aggregator launched in August 2021

Digitalization has also supported formalization of the economy contributing to buoyant government revenues in recent years.

- DPI helped streamline the provision of Government services and enable citizens access state issued documents through one (integrated) platform.
- India Stack has digitized and simplified Know Your Customer procedures in banks by significantly reducing the response time and cutting the compliance cost by 99.5 percent (from USD $12 to US 6 cents).

India Stack experience offers some important lessons for other countries. DPI design and development should be:

- Guided by a foundational building blocks approach[7], and
- Focused on supporting innovation across the ecosystem.

A focus on vibrant ecosystem implies the need for interoperability between the different DPIs and a competition-focused design. In India, interoperability is supported through open standards, allowing anyone to utilize the functionality provided by India Stack.

The government had an important catalytic and leading role in developing DPI by:

- Acting as an anchor client, and
- Establishing institutions to ensure continuity in India Stack's operations.
- DPI is an example of a two-sided market where the value of the platform increases for both participants as the numbers on each side increases. By using the DPI to provide social benefits, the government encouraged take up by individuals and gave service providers the comfort of access to a large client base.

The government also:

- Promoted the use of technology as 'utilities' and

[7] The building block approach involves unbundling the components of the solution to a set of problems and identifying a minimal common core. This modular approach fosters innovation, allowing solutions to be built to multiple problems based on the common core. It allows tailored solutions for in a diverse environment (in terms of income and technical capacity).

- Created a category of non-profit companies with a public purpose (National Information Utilities).
    - Example: National Payments Corporation of India (NPCI), an initiative between the Reserve Bank of India and the Indian Banks Association, which unites and operates retail payments and settlement system.
- NPCI strikes a balance between curbing monopoly rents and providing payment and settlement services effectively and efficiently, without human resource and procurement challenges that often plague large government projects.
- The tax administration also played a pioneering role in rolling out a tax ID (PAN) using an innovative PPP approach, with important lessons for UIS Aadhaar system.

A set of enabling policies in the financial and telecommunications sector were important for the development of India Stack.

- In 2014 a push by the government was critical to provide access to a no-frills, low-cost bank accounts. It targeted the financially underserved, especially rural women and low-income families. Under this initiative 462.5 million bank accounts were opened in both urban as rural areas as of August 2022.
- In late 2016, India enacted a demonetization policy where large currency notes were invalidated. While it was disruptive initially, demonetization led to greater use of other forms of payment, including the UPI.
- Sound policies, such as foreign investment liberalization and the prohibition of discriminatory data tariffs, led to a competitive, open, and affordable telecommunications market. The entry of a new network operator in 2016 lowered the cost of mobile data by 90 percent leading to a jump in data usage from 154 MB/month in 2015 to 15.8 GB/month in 2021.

These policies must be custom tailored to specific country circumstances. But some principles and lessons can be learned.

- The in-house development of India Stack relying on domestic systems integrator firms was feasible in India and may be replicated in all countries with high level of capacity in IT within the domestic labor market (even if more competitive international wages must be paid). The benefit of this approach allowed India to avoid vendor lock-in and overcome the lack of interoperability due to proprietary hardware and software. But it created a need for a firm commitment of sufficient resources and capacity to continue maintaining and developing the DPI infrastructure.
- Other countries have approached this challenge differently, including by using open-source software under the format of digital public goods shared between countries. These types of resource and

knowledge-sharing initiatives mean that governments with shallower IT capacity can implement DPI.

- To access the full functionality of India Stack, individuals need to have access to a smartphone and a bank account. With lower adoption of smartphones and limited access to bank accounts, simpler payments systems may be appropriate based on mobile money that can be used on a simpler feature phone.

Despite significant progress with DPI system, there are important remaining challenges that need to be addressed. Digital literacy remains low in India and many countries and represents a barrier to engaging with DPI-based solutions.

- The digital divide appears along familiar geographic, gender and income lines.
- A mere 14.9 percent of rural households have internet access, compared to 42 percent among urban households.
- Women are more likely to be digitally illiterate, particularly among low-income groups.
- A significant training effort may be needed to overcome that problem, combined with an interim solution based on "free public access outlets" where users are supported to access government and offline modes are also being explored.
- Comprehensive data protection legislation is still missing in India and many other countries. A robust data protection framework is essential to protect citizens' privacy, prevent companies and governments from indiscriminately collecting data, and holding companies and governments accountable for data breaches to incentivize appropriate data handling and adequate investments in cybersecurity.
- The DPI can also help support efforts to make social assistance more resilient, adaptable and targeted.
- Leveraging the DPI, India could improve significantly the timelines, quality, and coverage of the general government fiscal reports, enhancing at the same time fiscal transparency for its citizens, a key issue to improve public sector accountability.

3.2.4 e-Money Drivers in Asian countries: Demand and Supply Framework

The rapid growth of e-Money schemes in major Asian countries is explained[8] by the following factors:

- Large population and share of young, educated population,
- High population density in urban areas,
- Rising middle class and real incomes,
- Low initial financial inclusion and bank penetration rate,

[8] For more detailed account of key factors by country, see Tao 2023 and multiple IMF FinTech notes.

- Inconvenient and costly traditional cash and non-cash (account to account, check and payment card based) payment services,
- Rapid growth of technology (internet networks, mobile operators, etc.), and
- High penetration of smart mobile phones[9] and tablets, as well as laptop computers.

These factors are best understood in a demand and supply framework by looking both at **unmet demand** for convenient and inexpensive payment services by consumers and merchants, and key characteristics of **supply** defined by limited relatively expensive supply by banks, on the one hand, and growing IT technological capabilities/opportunities, on the other.

Unmet Demand for efficient payment services

Unmet demand entailed at least three key dimensions: missing attributes, growing (expanding) use cases, and diverse buying pattern.

Missing service attributes of existing payment instruments, systems and services referred to:

1. Convenience of access and use,
2. Efficiency (speed, required time and cost), and
3. Trust.

Regarding modern, convenient payment services, growing share of consumer expected **more convenient (modern) payment services** based on easy online access from work or home, using multiple devices, with assisted data entry to avoid cumbersome, time consuming, and error-prone manual entry of key personal and payment information. At the same time they expected **greater efficiency** (reduced time and cost/charges required to initiate and complete a payment request) and **state of the art trust** in service providers and payment networks regarding protection of personal and proprietary business information.

Demand for growing (expanding) use cases refers to ability of payment instruments to expand coverage from simple purchase transactions to a full range of financial transactions and transfers including e-commerce, social network, transportation (ride-hailing), food delivery, online streaming services, and on-line media (video streaming, music, and gaming) increasing rapidly in Asia and globally. The COVID-19 pandemic additionally increased demand for e-money payment services in general and created new use cases.

[9] Smart phone penetration varies a great deal between analyzed Asian countries, from 84% in China, the highest in the World) to as little as 16% in India.

Diverse buying patterns refers to ability of new payment instruments and devices to offer in-depth comparative shopping (i.e. the ability to easily compare online the prices and quality of the same product offered by different sellers, as well as compare the service quality of merchants) on the same smart phone devices used for expanded range of payment services and social networking.

Supply limitations and untapped technological advances

Limited, inelastic and relatively expensive supply of payment services by banks across traditional noncash payment methods (account-to-account transfer, checks and payment cards) on the one hand, **and a growing gap between IT technological capabilities**/opportunities and actual use in payment systems, on the other.

In the early 2000s banking-based payment systems in Asia and many regions in the world could not provide convenient, efficient, safe, and low-cost payment services. Payment processing was slow and cumbersome. The level of institutionalized trust was low: Merchants preferred to receive noncash payment before delivering goods and services, while consumers preferred to receive goods and services before paying (being charged). Transfers were slow and expensive, especially in the case of remittances and wire transfers to/from rural areas with limited access to banking and postal outlets.

3.2.5 Stages of E-Money Adoption in Asia

Although it became clear that new payment schemes could effectively respond to growing demand for modern, efficient and inclusive payment services, help remove supply constraints and generate new supply by leveraging new technology, the **process of developing and adopting e-Money solutions was slow and complicated. It went through three stages**.

Stage 1: Promote Financial Innovation to Build Trust and Confidence

To build trust and confidence, e-money safeguarded customers' funds and transactions.

1. e-Wallet payment services were done through escrow accounts at regulated banks.
2. Compensation schemes were introduced to build confidence and trust.
    a. Alipay committed early (2005) to reimbursing the full amount paid for fraud losses, adopting the policy of "you dare to pay, I dare to compensate."
    b. GoPay reimburses the full amount as soon as it receives a report of fraud.
    c. GrabPay reimburses on-line users if item does not arrive or malfunctions.
    d. ShopeePay / Paytm have instant refund scheme.

Stage 2: Increase Convenience and Efficiency: Leverage Digital Technology, Target Use Cases, and Develop Business Models

The objective is to achieve positive payment network effects of e-Money schemes by encouraging payment service providers (PSPs) to secure increased convenience and efficiency by leveraging digital technology, targeting use cases, and developing sustainable business models.

Leveraging digital technology

E-money PSPs leveraged digital technology to reduce the cost of payment cards. Two examples:

1. Alipay introduced close to zero-cost mobile app QR code in 2011. Other Asian countries followed. QR codes eliminated the problems with malfunctioning POS card readers and lowered the cost to merchants (both installation costs and interchange fees) since QR code–based payments facilitate cheaper, faster, and more convenient transactions[10].
2. E-money schemes also leveraged digital technology to strengthen security based on multi-factor authentication to reduce the risk of fraud (including PINs, passwords, and security codes, face recognition, and biometrics).

Targeting use cases

E-money PSPs targeted clear win-win use cases in which consumers and merchants can effectively and efficiently use e-money. The examples of bundling use cases to expand networks and build ecosystems include:

1. *On-line and off-line commerce*.
    - Alipay is bundled with the Alibaba e-commerce platform,
    - Paytm is bundled with off-line and on-line commerce platforms in India, and
    - ShopeePay is bundled with the Shopee e-commerce platform.
2. *Ride-hailing*. GoPay and GrabPay are bundled with ride-hailing and food delivery.
3. *Social network and gaming*.
    - WeChat Pay is bundled with the social network of Tencent (WeChat's parent company).
4. *Other businesses*.
    - Paytm is bundled with a business through which customers top up their pre-paid mobile SIMcards.

[10] POS terminals in China utilize a four-party model for interchange fees involving card-issuing institution, acquiring institution, card schemes, and merchants. In addition, installation cost of traditional POS devices ($40–$50) constrained wider use of POS schemes in rural areas and by small merchants. See Tao (2023, p.13).

5. *Cross-border payments*.
    - Alipay set up a global payment network in 2015, and
    - Alipay Financial Services launched a cross-border remittance product for the Hong Kong SAR–Philippines corridor in 2018.

Various use cases have promoted e-money adoption by increasing economies of scale and economies of scope by adding lending, insurance, and wealth management to payment services.

Table 6: Core Products and Use Cases of Six E Money Schemes Company

	Year Started	**Core Product (Ecosystem)**	**Use Cases**
Alipay China	2004	E-commerce (Alibaba)	On-line payments support modern lifestyle (hail a taxi, book a hotel, movie tickets, pay utility bills, make doctors' appointments, and asset management products). Off-line payments available in stores.
WeChat Pay China	2013	Social networking and gaming (Tencent)	Support modern lifestyle (social networking, gaming, hail a taxi, book a hotel, movie tickets, pay utility bills, make doctors' appointments, and asset management products).
Paytm India	2014	Payment services to off- and on-line markets (One97)	This app allows users to pay bills, top up mobile phones, manage wealth (Paytm Money), use Paytm Mall, and use payment gateway services.
GoPay Indonesia	2016	Ride hailing and food delivery (Gojek)	This app allows users to purchase goods, groceries, and delivery services; pay bills; purchase healthcare and financial services; and receive social security insurance.
GrabPay Malaysia Singapore	2012	Ride hailing and food delivery (Grab)	This super-app allows users to make cashless payments, including through credit/debit cards and partner wallets like PayPal.
ShopeePay / AirPay Indonesia	2014	Gaming and supermarkets (SEA)	This app allows users to collect game credits, top up mobile phones, pay bills, buy movie tickets, shop on-line, and use other lifestyle services within one app.

Source: Tao (2023).

Developing sustainable business models

The PSPs developed business models that generate sustained revenue and cover costs.

1. Fees

Similar to payment cards, E-money schemes make their revenues from fees collected from merchants rather than from more price-sensitive consumers.

- In India, the Reserve Bank of India (RBI) capped the charge at 0.25–0.5 percent, shared by card-issuing institutions, acquiring institutions, and payment card schemes.
- In China, Alipay and WeChat Pay charge online payments merchants a 0.6 percent fee.
- In Singapore, GrabPay charges merchants a 0.8 percent fee—compared to the 1.5 percent the national payments system charge or the 1–3 percent charge by payment card companies charge.
- In Indonesia, PSPs charge merchants a 0–2 percent fee, which is also less than the charge assessed by payment card providers.

2. Interest revenue

E-money PSPs deposit their customers' funds with the central bank or regulated commercial banks and collect interest revenue (rather than pass it on to users). Regulatory policies vary by country:

- In India and Malaysia e-Money PSPs can invest their customers' funds in high-quality liquid assets, such as government securities.
- In China, Alipay and WeChat Pay are required to deposit their customers' funds at the People's Bank of China (PBC).
- In Indonesia, e-money is deposited in commercial bank accounts at market rates.
- In Southeast Asian countries (Singapore, Thailand, Malaysia), e-money PSPs are required to safeguard their customers' funds at commercial banks and/or other specialized financial institutions (such as trust funds) and earn interest revenue at market rates.

3. Cross-subsidies

E-money PSPs often cross-subsidize their services.

- In India, Paytm allows users to pay school fees; top up metro cards; make utility payments; buy, store, invest, and make cross-border payments (Law, 2020). These omni-channel ecosystems benefits are based on big data analysis leveraged across different products and services and shared with consumers and merchants as an added benefit using digital e-Money ecosystem.
- In China, Alipay benefited from its synergy between digital financial and technologically innovative services and supported (or invested in) other financial services based on its "data knowledge of user behavior".
- GrabPay collects data from multiple sources to analyze consumer and

merchant behavior and provide (sell) its analysis to merchants for improved services and increased revenue.

- In Indonesia, GoJek partnered with a POS start-up, allowing GoPay's merchants to leverage their payment data for bookkeeping and inventory management to promote sales.
- GoJek also provides loans to selected drivers and merchants through its banking arm based on transaction history in GoPay and customers' ratings of drivers and merchants. This provides incentives for drivers and merchants to use e-money, it also reduces default risks.

4. Cost management

To effectively compete in the non-cash payments market E-money PSPs had to manage their costs carefully. Fixed costs of traditional payment institutions tend to be very high limiting their ability to operate efficiently during recessions and to respond to changes in consumer and merchant demands. These demands often require PSPs to keep up with the fast changing network technology, match benefits offered by competing providers, and remain cost efficient. Examples include promotions, discounts, and point-reward systems which affect variable costs (OPEX):

- GrabPay introduced an awards points program. It does not charge merchants terminal fees or customers subscription fees,
- Paytm has a subscription-based loyalty program with an option to pay with no fees,
- Shopee provides free deliveries and low commissions as part of its marketing efforts.

Digital technology enables lower fixed costs:

- Alipay benefits from declining cost of digital technology (both equipment and cloud storage services) and increased reliance on digital activities in marketing and customer acquisition. They also save on office space since they do not need expensive down-town locations.
- E-Money PSPs can further lower their fixed costs by sharing ecosystems of their parent companies. They also benefit from large transaction volumes underpinned by digital technology which lowers both their variable and total costs.

Overall, the total cost savings of e-Money schemes over banks are huge. Examples of payment transaction fees illustrate the cost advantages of e-Money:

Table 7: Payment Transaction Fees of Six E-Money Schemes

	Examples of Payment Transaction Fees	**Other Sources of Revenues**
Alipay (China)	Online merchants pay 0.6% of the transaction value, and off-line merchants pay 0.3%. Consumers pay no transaction fees.	Ant Group uses Alipay's payment data to provide lending, insurance, and wealth management services.
WeChat Pay (China)	Online merchants pay 0.6% of the transaction value, and off-line merchants pay 0.3%. Consumers pay no transactions fees.	Tencent uses WeChat Pay's payment data to provide lending, insurance, and wealth management services.
Paytm (India)	Most transactions are free. A fee of about 1.9% of the transaction value is charged to merchants for transactions made through payment gateway services	Paytm handles many use cases (school fees, utilities, metro cards, investment in gold, cross-border remittances and payments.
GoPay (Indonesia)	Transaction fees to merchants are free. MDRs are charged for certain products (GoFood). Customers pay small fixed fees for on-line purchases.	Gojek (GoPay's parent) offers a loan program for drivers and merchant partners integrated with customers' ratings.
GrabPay (Malaysia and Singapore)	Transaction fees to merchants are 0 to 2%. Fees are slightly higher for payment gateway services, depending on the payment method. N.B. Visa and MasterCard charge 2–3% and NETS (Network Electronic Transfer) 1.5%.	GrabPay Credit is offered through its wallet and PayLater feature. The GrabPay provides merchants with data services through its partnership with payment gateways (Adyen).
ShopeePay/ AirPay (Thailand and Singapore)	Transaction fees vary. No fees in Indonesia and Thailand. In Malaysia fees are 1.5–2.0%. In Singapore 2.0–5.35% depending on the product category, type of merchant, and program.	ShopeePay/AirPay integrates e-money payments with e-commerce.

Source: Tao (2023) page16.

Stage 3: Complying with Legal and Regulatory Policy to Strengthen Security

Electronic money Payment Service Providers (PSPs) have thrived with government backing, including India's demonetization and infrastructure support, China's digital framework, and incentives during COVID-19 in Malaysia and other Asian countries. E-money PSPs have benefited greatly from government support. India's demonetization policy helped Paytm attract new customers who used to rely on large cash payments. In India and China the government built a sound digital infrastructure that underlies e-money digital payments, and financial regulators have adopted policies to promote digital finance in the early 2000s. in Malaysia and most major Asian countries governments provided incentives during the COVID-19 pandemic to use cashless payments and, actually, disbursed subsidies through e-wallets which spurred the development of e-Money schemes.

E-money PSPs complied with legal and regulatory requirements in two ways:

A) Acquiring existing licenses and/or applying for new licenses

In some major Asian countries, major PSPs like Paytm, Alipay, GoPay, and GrabPay have secured necessary licenses from central banks and regulatory authorities to operate e-money services across various countries. In India, Paytm received a central bank (RBI) license to launch the Paytm Payments Bank as a separate entity. In China. Alipay met central bank requirement for nonbank on-line payment institutions and obtained a payment license in May 2011. In Indonesia, GoPay secured a payment license by acquiring an existing licensed e-money company in 2018. In Singapore, GrabPay acquired a digital banking license through a consortium with Singapore Telecommunications. Subsequently, many PSPs (Alipay, ShopeePay, and GrabPay to name a few) acquired e-Money operating licenses in many Asian countries.

B) Complying with regulatory policy on customer funds, technology, and information.

In China, Alipay's transfer of customer funds to its reserve account at the People's Bank of China, completed by early 2019, safeguarded users from commercial bank insolvencies and mitigated various financial risks. Alipay gradually transferred customer funds from banks to its reserve account at the PBC (and completed the process by early 2019), thus protected its users from insolvency risks of commercial banks, and mitigated credit, liquidity, market, and operational risks. The total balance of nonbank online payment institutions (including Alipay and WeChat Pay) in the PBC reached USD $331 billion by the end of 2022, equivalent to 6.4 percent of total central bank reserves. Moving these balances to PBC reduced systemic risks by ensuring the security of customer funds and reducing the wholesale funding risk of banks.

3.2.6 General Lessons from Asian E-Money Adoption Experience

PSPs Play a Vital Role in Facilitating E-Money Adoption. As already mentioned, PSPs accelerated the adoption of e-money by leveraging relevant digital technology, targeting clear use cases preferred by the customers, developed robust and efficient business models, and complied with existing and evolving legal and regulatory requirements. By continuously interacting with consumers and merchants in the e-Money ecosystem (see Figure below), PSPs initiated a learning process which enabled e-money schemes to gradually acquire and retain four desirable attributes: convenience, efficiency, security, and trust

Data use is becoming an increasingly important driver of PSPs' business models. Technological advances have increased the computing power, data storage capacity, and connectivity of all related IT systems. The resulting reduced (unit and overall) costs, and increased number of transactions generated large volumes of newly created and usable data. Leaving aside the issues of data ownership[11], PSPs are able to utilize users' profiles and transactional data to improve services help create sustainable business models. They can harness the economic value of user data to achieve economies of scale rapidly across different business lines, including a broad range of financial services, such as lending, insurance, and asset management.

However, harnessing the economic value of data while protecting privacy is not easy in practice. First, data-driven business models are not easy to build and maintain with fast changing use numbers and profiles. Second, mechanical reliance on payment data-driven models can lead to the formation of a monopoly. Third, actual levels of privacy and restrictions beyond legal and regulatory requirements may adversely PSPs' revenue streams and their interest / ability to add new innovative products, and optimize the diversity of participants in the system.

Contestability matters. Market concentration comes from economies of scale and scope, as well as data advantages. The payment markets in the six Asian countries very concentrated (see Figure ??? below). Most Asian e-Money PSPs expanded their business through their parent companies, which be an entry barrier for small firms. Horizontal expansions (by acquiring payment gateway companies) or vertical expansions (by acquiring e-commerce companies) had similar effects of increased concentration. In addition, the acquisition and investment activities created larger platforms with data advantages that allow incumbents to hone and personalize their products in a way that is difficult for new entrants to

[11] The company holding customer data does not necessarily have the right to make money from possessing that data, depending on how the data were collected and whether an investment was made in it. If the data were easy and cheap to collect, they ought to belong to the individual concerned, although the boundary between data ownership and processing can be hard to establish in practice.

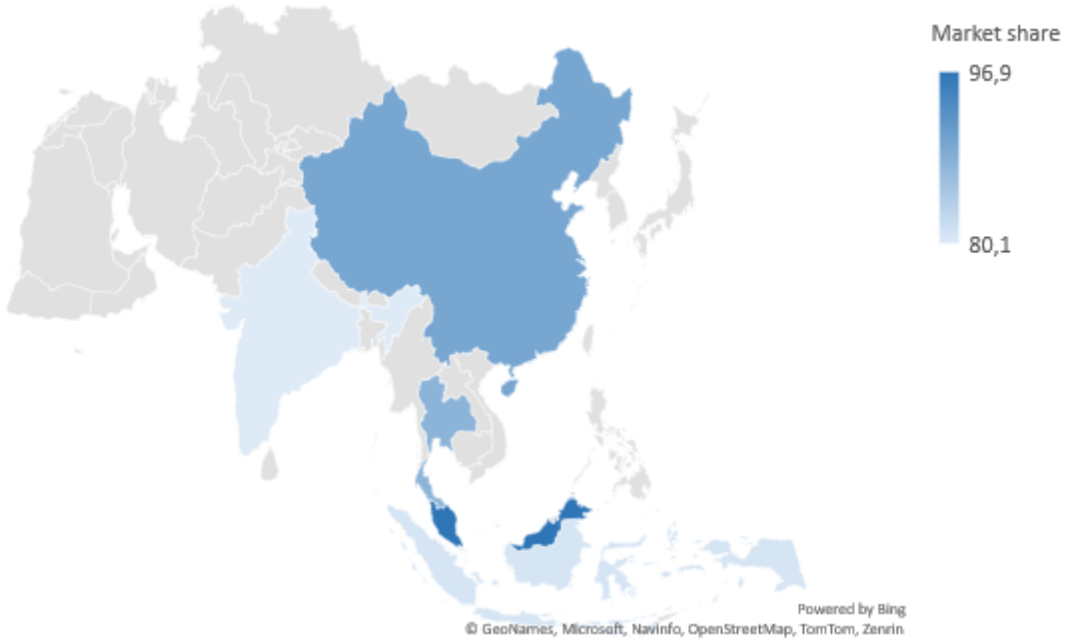
replicate, hence creating a de facto monopoly position.

However, if e-money PSPs remain contestable (that is, entry into the market is free) and a healthy degree of competition exists among the limited number of participants, a certain (even high) degree of concentration does not necessarily indicate a lack of competition or monopoly pricing. More new firms have entered into the e-money and e-commerce markets. Examples:

- In India, Paytm faces fierce competition from Google Pay, WhatsApp Pay, and PhonePe.
- In China, Pinduoduo entered the e-commerce market and has competed with Alibaba since 2015.
- ByteDance (the developer of TikTok) entered the social network market and has competed with Tencent since 2016.
- Friendster, initially a market leader in the social network industry, was quickly replaced by MySpace, which Facebook rendered almost completely obsolete.
- GoPay and GrabPay, which once dominated the Southeast Asian digital payment market, are now facing fierce competition from ShopeePay, especially since the onset of the COVID-19 pandemic. Competition from this new player is broad-based, as its rapid expansion is apparent in all the traditional markets of GrabPay and GoPay.

  Markets are contestable if they allow PSPs to compete for users, reach critical mass, and expand their networks. In theory, high concentration and even monopolies are not harmful to consumers as long as (a) incumbents compete in prices and innovation (which benefit consumers) and not through dirty tricks and (b) innovative firms enter the market.

Figure 12: Market Shares of Four Largest E-Money PSPs in Asia, 2020



Source: Tao (2023), fintechnew.sg, Statista, Boku, and Lingyi Finance.

3.3 EU ARCHETYPE CASE - Archetype regional case for CBDC

3.3.1 The Need for Central Bank Digital Money – CBDC

Text box 8. Key takeaways from the EU case

This section looks at Central bank digital currencies, while focusing the analysis on the EU case and observing the EU' CBDC potential impact on Serbia. The evolution of digital money, encompassing decentralized cryptocurrencies like Bitcoin, stablecoins, and e-Money, has significantly disrupted traditional financial systems. This shift has led to the exploration of CBDCs as a stabilizing public digital money alternative. Central banks globally are researching CBDCs to maintain their influence in monetary policy amidst the growing prominence of private digital currencies. The focus is on creating a CBDC that ensures financial stability, complements existing monetary forms, and addresses risks such as liquidity, default, market, and foreign exchange risks associated with private digital money. The development of a digital Euro exemplifies these efforts, aiming to combine the benefits of euro cash with the efficiency of digital transactions, while addressing issues like financial inclusion, privacy, and policy implications in various economic contexts like Serbia, where digital money could significantly impact monetary and fiscal policies.

The rise of digital money has fundamentally changed the traditional structure of money and payment systems. Three types of private digital money emerged thus far:

First, Bitcoin and other types of "decentralized cryptocurrency" or private digital money. Cryptocurrencies (or rather, digital crypto-assets) use blockchain encryption to ensure security and are NOT backed up by another asset. Their value / price depends on demand (because people want them primarily as investment) and scarcity due to complex and energy intensive encryption procedure. Due to extreme price volatility, Bitcoin is viewed as an investment asset rather than a substitute for money. Hence, Bitcoin and similar unbacked cryptocurrencies attracted significant investment but did not account for a visible portion of recorded payments.

Second, Stablecoins and similar cryptocurrencies pegged to and backed up by a reserve asset (such as the US dollar, Euro, a basket of currencies, or gold) are less volatile. This makes them more suitable as digital money substitutes, but less attractive for private investment. As a result, the share of stable coins remains insignificant both in stock and recorded payments.

Third, e-Money described in detail in the previous section represents is operated by fin-tech and retail networks mainly outside the traditional banking sector. It responds to the needs of billions of users left out of the standard banking and payment card services either due to limited access or prohibitively large transaction costs relative to the value of purchases.

Public digital money response to instability and growing risks of private digital money. Given the enormous size of private digital assets and of e-

money stock, Adrian et. al. (2022) ask a critical question: How stable is e-money compared to other competing forms of money (crypto-assets, stablecoins, commercial bank deposit money, cash or CBDC) given that it is:

- Exposed to liquidity risk which depends directly on the market liquidity of the asset mix held by the issuer of mobile money. In normal times this may not be an issue. In times of financial crisis, however, the issuer may not be able to convert less liquid assets to cash fast enough to prevent the "run" in the absence of central bank liquidity backstop.
- Subject to default risk of the issuing entity due to losses (bankruptcy) or inability to meet short-term obligations. In that case, pre-paid funds in mobile-money accounts could be frozen or seized by creditors which represents a serious risk with potential spillovers and damaged reputation.
- Market risk can affect assets held by an e-money provider if his net worth becomes negative (i.e. if losses exceed equity).
- e-Money can also be subject to foreign exchange risk if some claims are denominated in foreign currency or a basket of currencies.

Text box 9. Mobile money across the world

The unprecedented growth of mobile money in Africa, South and East Asia generated 1.35 billion users worldwide in 2021. This number is more than doubled when supplemented by the numbers for China (1.3 billion for Ali Pay and 900 million for WeChat Pay), and corrected for under-reported users in Europe and North America (as suggested by data of major mobile money operators such as Apple Pay, Google pay, PayPal, Samsung Pay and Venmo). With fast increasing value of e-money transactions and growing balances, mobile money proved to be very convenient and a reliable unit of account for billions of users.

The importance of these risks will likely increase with high potential for further growth and widespread adoption of private digital money. Mobile money represents a major potential challenge for the stability of the monetary system in case of crisis unless adequate liquidity backstop solutions can be designed and implemented seamlessly. One possibility is based on inclusion of Fin-Tech companies into the banking system following the "narrow banking model" introduced in India. More general solution hinges on the introduction of a public digital money issued by the central bank discussed in the remainder of this section.

3.3.2 CBDC General Design Issues: Research and Objectives

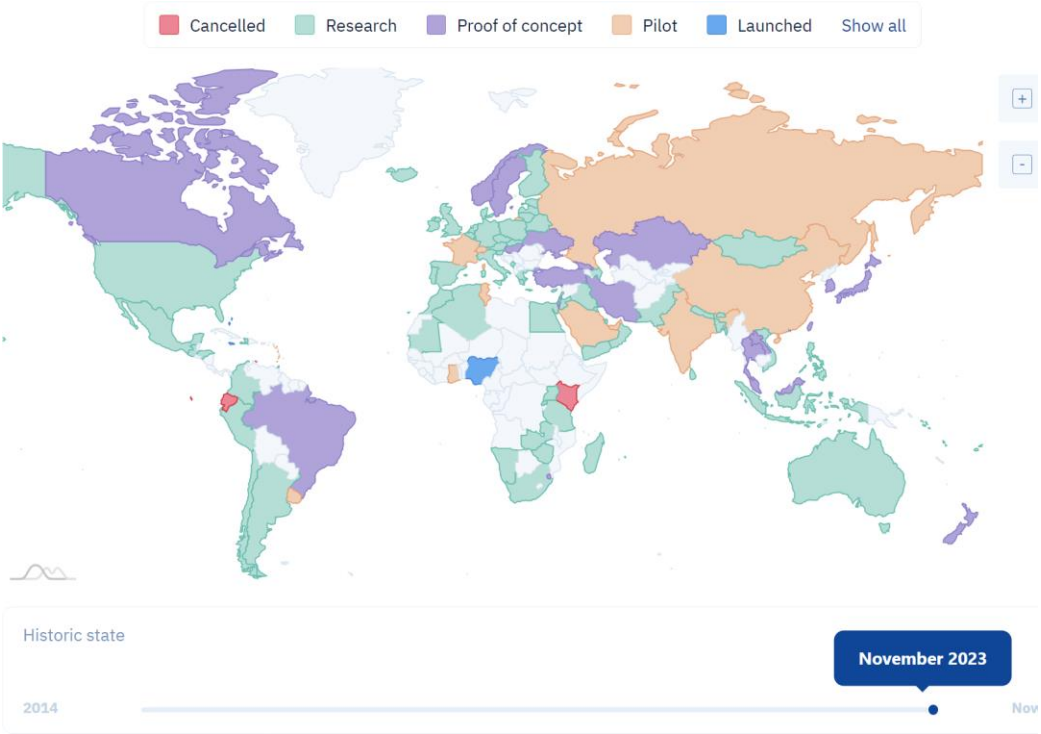
The role of CBDC in restoring central bank leverage in conducting monetary policy. The growing size and share of private digital money with the concurrent reduction in size and importance of cash

has significantly reduced the leverage of central bank issued "fiat" currency which serves as legal tender with universal acceptance. This has triggered worldwide concern about restoring the relative size and importance of public money by issuing public digital money (i.e. **"Central Bank Digital Currency" or CBDC)** as a modern digital representation of the national "fiat" currency.

Central bank efforts in developing CBDC. Central banks around the world have been exploring the possibility of issuing retail central bank (public) digital money since 2014. Based on October 2023 online tracker data (detailed in Figure 11 below). Out of 131 countries around the world, CBDCs have been Launched already in 11 countries, and Piloted in 21. In addition, 46 countries are at Research stage and 33 at Development stage. In 16 countries work on CBDCs is inactive at present, and in 2 countries CBDC work has been cancelled.[12]

[12] CBDC Stage of Research and Development, by Country as of October2023 can be accessed at Central Bank Digital Currency (CBDC) Tracker (cbdctracker.org) as well as specialized site sponsored by Atlantic Council. Central Bank Digital Currency Tracker - Atlantic Council.

Figure 13: CBDC Stage of Research and Development, by Country



Source: CBDC Tracker Central Bank Digital Currency (CBDC) Tracker (cbdctracker.org)

The role and objectives of CBDC. A wide range of CBDC objectives is quoted in the ample literature on the subject. Panetta et. al. (2022) emphasize that the primary objective of issuing CBDCs is a necessity to secure access to public money in an economy increasingly dominated by private digital money.

In a survey of pragmatic CBDC issues, conducted by US Federal Reserve, found that ***CBDCs should:***

- provide positive net benefits to the economy (adjusted for risks and time distribution of effects);
- be more efficient and effective in achieving desired objectives than alternative instruments;

- complement, rather than abruptly replace, existing forms of money and methods of financial services;
- protect consumer privacy;
- safeguard against criminal activity; and
- enjoy broad support from a broad range of key stakeholders.

Bordo and Levine (2017) recognized early in the academic debate that CBDCs can either be

- wholesale digital money instrument made available only to commercial banks, much like the present central bank reserves, or
- retail digital money instrument available to all economic agents in an economy, much like central bank FIAT money (cash or legal tender). Retail CBDCs can be
    - account based or
    - token based digital monies.

The potential for both wholesale and retail CBDCs to be interest-bearing or non-interest-bearing is highly debated. Both wholesale and retail CBDCs can have interest bearing as deposit money or no interest bearing. This is presently a heavily debated issue with possible significance in the conduct of monetary policy, currency substitution, crowd out commercial bank deposits with possible far reaching consequences on consequences on the volume and cost of lending.

Effects of CBDCs on financial stability and efficiency could be managed through specific design choices and policy measures. Recent research suggests that these effects could be managed through the design of CBDCs and targeted policy measures that could limit the size of CBDC holdings, provide multi-tier remuneration (interest payments) depending on share of CBDCs in bank portfolios, use of CBDC caps etc. Positive impact of CBDCs on the stability of the financial system based on sovereign digital money, faster and more efficient (cheaper) payments and financial transactions in general.

The potential impact of CBDC during financial crises has garnered significant attention. One issue that attracted a lot of attention is the potential impact of CBDC during times of financial crisis and a potential loss of confidence in commercial banks. The fact that retail CBDCs can be held with zero financial and handling cost (unlike cash) may exacerbate run on banks if no restrictions are put in place beforehand. Paneta et al. (2022) quote recent research results which indicate that increased risks of bank run in the presence of CBDC can be effectively contained by design features of the instrument itself, as well as through properly calibrated safeguards and information of deposit flows enabled by tracking properties of digital instruments.

It should be noted that design features and safeguards also help in sustaining the monetary policy transmission channels. More research is needed to resolve the dilemma of CBDC remuneration and constraints on CBDC holdings in the realistic context of real life policy choices. Zero lower bound on interest rates is one such issue. The attractiveness of CBDC as an efficient payment

instrument, form of investment at times of crisis, and an anchor of price and financial stability. As Schiling et al. (2020) put it: the objectives of payment efficiency, financial system stability and price stability cannot be all achieved at the same time.

3.3.3 Lessons from e-Money developments lessons for future CBDC efforts

The unprecedented growth and success of e-Money instruments in recent years has:

- Revealed key instrument attributes and adoption channels of e-money schemes that could be relevant for CBDC design and adoption, and
- Raised some concerns and created challenges related to "market dominance" either by size or privileged position to exclude competitors by harnessing the data-network-activities (DNA) loop, which may be important in using CBDC to promote contestability in the payment systems.

What might be the key building blocks of future CBDCs? Recent IMF working paper (see Tao 2023) draws four important lessons from the experiences of six Asian e-money schemes that could facilitate the development and implementation of CBDC considered by central banks in more than 100 countries:

(i) Future CBDC should embody four attributes proven during e-Money development:

- Build trust,
- Offer convenience to consumers and merchants,
- Generate efficient solutions, and
- Provide security;

(ii) CBDC service providers could facilitate CBDC adoption by:

- leveraging digital technology (*inter alia:* smart phones and internet),
- targeting use cases (e-commerce and social networks),
- developing business models (that secure financial sustainability), and
- complying with legal and regulatory requirements (e.g. by providing security of customer funds security and meeting financial integrity requirements).

(iii) Central banks could (should) provide incentives to CBDC service providers to develop these four channels as part of CBDC development and adoption; and

(iv) Central banks may be able to establish data-sharing arrangements that

- preserve legally defined privacy while
- leaving room for CBDC service providers to explore the economic value of data and, thus, provide efficient and reliable service.

CBDC should coexist with and complement current monetary forms – according to most policy makers. At the same time, it appears that some adoption of

CBDC is critical for central banks to achieve a complex set of policy objectives, such as promoting financial inclusion and monetary stability, and complementing declining cash use in the presence of digital money revolution. Adoption benefits from a well-designed public-private partnership in the broad CBDC area also seem evident.

However, little research has been done on its practical role. Despite extensive preparation for and tests of CBDCs, little research has been done regarding the practical role of CBDC payment service providers (PSPs), their incentive system and business model. Almost all CBDC designs and experiments assume a two-tier architecture based on "hybrid" and "intermediated" models[13], but the adoption model remains uncertain posing possible implementation risks (stemming from too narrow adoption base to achieve policy objectives).

Experience teaches that success is anchored in successful tech firms. Lessons from the experiences of six Asian e-money schemes is based on large and successful "Big Tech" companies with decades of operation with millions of consumers and merchants using e-wallets for small-value transactions. They used either application or card-based products, known as electronic money or e-Money.

3.3.4 The case for a digital Euro: EU Archetype Case of Public Digital Money

The European monetary union already enjoys the benefits from a generally accepted single currency – euro cash. Euro is widely available and can be used everywhere in the euro area, free of charge, with full protection of privacy. It is secure and risk-free. It allows instant settlement of person-to-person and point of sale payments.

The digital euro aims to match the benefits of euro cash in a digital format. The fast-growing means of digital payment are well suited to meet Europeans' increasing preference to pay digitally, but none provides the full range of benefits of euro cash. A digital euro is designed to fill this gap and offer the same benefits as euro cash. Euro cash will continue to be available, while the digital euro would act as its equivalent for both online and offline digital payments, throughout the euro area, free of charge.

Design features of digital euro. In an increasingly digital world, the introduction of a digital euro would be a logical next step in the evolution of EU currency. It would ensure the same levels of trust and stability of the present money and payments system, while providing access to evolving digital options that overcome some of the limitations of

[13] In a hybrid model, PSPs provide retail services to end users but the CB retains a ledger of all retail transactions and operates the payment system. In case a PSP fails, CB can step and operate payment system.

In an intermediated model CB issues CBDC, while private sector firms interact with end users. CB does not record retail transactions but only the wholesale balances of individual PSPs.

current payment systems and allow efficiency gains. Hence, digital euro is designed to

- Be standardized means of payment across all euro area countries for payment in stores and online, as well as for person-to-person transactions.
- Provide the highest possible level of privacy: ECB has no mandate or interest in individual payment information for tracking or commercial reasons. By legal and technical design, the ECB would not have access to screen or store individual personal data.
- Be inclusive and easy to use, ensuring that all individuals and businesses have access to digital payments, including those without internet connection, bank account or credit card.
- Secure smooth functioning of the payments system.
- Increase resilience against cyber-attacks and other risks.
- Reduce EU dependence on non-European payment providers.
- Foster further innovation in the private sector by increasing market competitiveness.
- Enhance European integration a step further.

In short, digital euro is designed to provide an unprecedented pan-European platform for innovative payment services, based on the relevant legal framework to be adopted by the European Union (EU).

Practical aspects of digital euro implementation. Digital euro is not intended to replace cash or to displace existing private providers in electronic payments. Rather, its aim is to give end-users an additional payment option, while ensuring that public money is not crowded during increasing payment digitalization.

To become a successful payment alternative, digital euro must bring added value to users and businesses alike. Consumer surveys indicated preference for cash-like features and continuous availability. Hence, an effort was made to combine cash-like features with a seamless digital experience in a digital euro that:

- Allows individuals to make secure payments in real time in shops and online, and person-to-person, while accessing digital euro digitally (via mobile phone or computer) or physically using a card.
- Complement other payment options while providing greater freedom of choice.
- Has true pan-European reach by being equally available in all euro area countries, for payments to all merchants that accept digital payments.
- Allows users to access their digital euro wallets via either their existing banking apps, with which they are already familiar, or via new dedicated digital euro app developed by the Eurosystem.

- Is highly inclusive, i.e. user-friendly and accessible to everyone throughout the euro area. People without access to a bank account or digital devices would be able to pay with digital euro using a prepaid card available from post offices.
- Allows users would to exchange digital euro into cash or vice versa at cash machines.
- Provides businesses with positive network effects from adopting digital euro payments.

Main use cases for digital euro. In an increasingly digitalized payment systems, digital euro would safeguard the role of central bank public digital money and preserve trust in the euro currency. To ensure that a digital euro brings added value and becomes a true payment alternative, four use cases were identified during investigation phase:

- ***Person-to-person (P2P) payments*** complement cash transactions, are always instant and available across the entire euro area.
- ***Point-of-sale (POS) payments*** enable the shift towards digital, fast and convenient applied in physical stores.
- ***E-commerce payments*** accommodate growing importance of digital shopping.
- ***Government transactions (G2X, X2G)*** strengthen the digital euro's position as the official currency, including the benefit of lower costs.

These use cases will be detailed and prioritized during the preparation phase of the digital euro project.

Who will have access to digital euro? Euro area citizens and businesses would be able to use the digital euro in all euro area countries. Residents would be able to access digital euro-related services. Foreign visitors with an account at a European payment service provider (PSP).

Merchants within the euro area would be able to accept digital euro payments, as well as process payment returns, without accumulating digital euro holdings. Other merchants in the European Economic Area or third countries serving euro area residents would be able to accept digital euro payments by acquiring providers within the euro area.

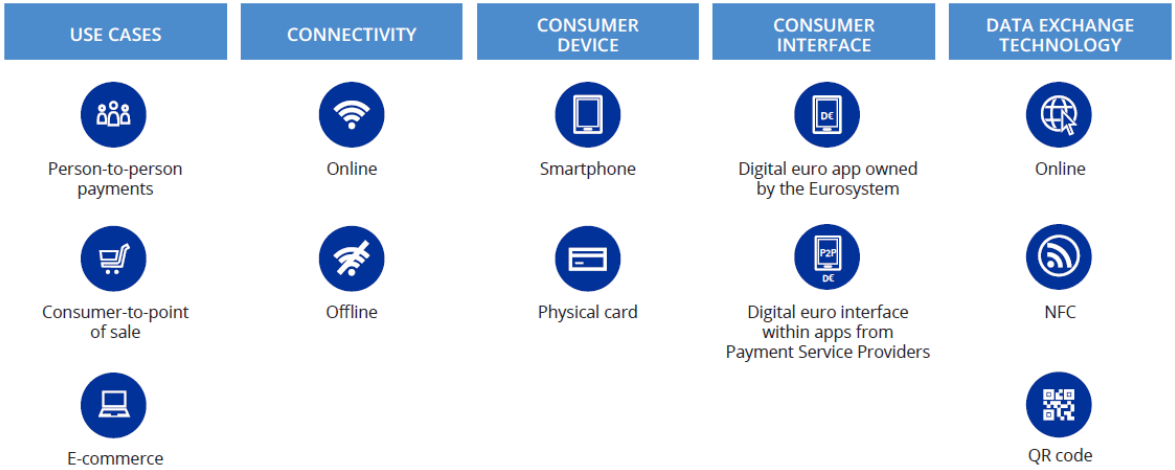
Similarly, the ***public sector within the euro area*** would also be able to engage in digital euro payments, without accumulating digital euro holdings.

Basic payment modalities. Two modes are envisaged:

- ***Online mode*** which allows remote payments using central bank digital money, suitable for various use cases, and reduces dependence on physical cash.
- ***Offline mode*** which hinges on cash-like attributes, allowing proximity payments without online connectivity.

Users would be able to choose between online and offline digital euro payment modes. The online mode would be suitable for remote payments and budgeting, and would require validation by a PSP. The offline mode supports close-range transactions, allows full privacy, and requires pre-funding via internet or cash points and peer-to-peer validation. In case of lost or stolen device for offline payments, the funds would be unrecoverable, akin to losing cash.

Figure 14: Proposed digital euro payment devices and technologies



Digital euro funding limits and modalities. To balance accessibility and convenience for users with the stability of the financial system, limits per person on individual digital euro holdings to moderate the outflows of deposits from the banking sector. These thresholds would be calibrated closer to digital euro release in line with the prevailing economic and financial environment. Since digital euro would not be interest bearing, similar to cash, excessive outflow of deposits is not likely.

Onboarding and portability. PSPs, as the main counterparts for digital euro users, would take care of onboarding, focusing on ease and convenience. Historical information will be used in case of clients with pre-existing relationships to simplify the process and ensure efficiency. If new relationships were required, only essential data would have to be provided for the necessary due diligence. Special attention will be paid to reach out to digitally and financially excluded groups across the euro area.

A universal account identifier across PSPs would enable flexibility, avoid PSP lock-in, and ensure quick and smooth portability.

Data and privacy protection features are of paramount importance. The right to privacy and personal data protection are fundamental rights are set as key goals for a digital euro. The ECB's interactions with the public emphasize the importance of protecting privacy and ensuring control over personal data. Trust in the digital euro depends on robust privacy standards, data protection and transparent data usage. The Eurosystem would not be able to identify users in transactions and would ensure data segregation between PSPs and the Eurosystem, adopting privacy-enhancing techniques to achieve this.

The digital euro's privacy policy is governed by EU laws. The privacy policy for the distributing intermediaries would aim to balance privacy and data protection needs with other public policy objectives, such as anti-money laundering, counter-terrorism financing, prevention of tax evasion and open banking. The digital euro would adhere to applicable legal frameworks, to be determined by European legislators, in order to maintain this balance. The Eurosystem would ensure that it cannot identify natural persons. Online digital euro payments would be aligned with existing AML/CFT rules and any relevant legislation for electronic payments. Consequently, PSPs would have access to data in accordance with applicable regulations, such as the General Data Protection Regulation. Subject to legislative deliberations, enhanced privacy could be considered for low-value remote online payments.

Promoting digital financial inclusion is a key principle underlying the concept of a digital euro. This is particularly important considering the digital euro's status as a public good. A digital euro would be designed to be inclusive and accessible to people with low digital and financial skills and resources, as well as people with disabilities and the elderly. A digital euro payment card would be available for those who are vulnerable to digital financial exclusion and who would prefer to use a physical card instead of a digital wallet, while the option to fund and defund the card using cash would offer a simple top-up option without the need for a smartphone. Users should be able to onboard to a digital euro either remotely or in-person and be able to easily switch intermediaries. The offline functionality would also support digital euro payments in areas with poor network coverage.

There will be at least one public entity to offer digital euro services. The Eurosystem has proposed that at least one dedicated and licensed public entity could be identified in each euro area country (for example a post office, giro institution or credit union) to facilitate onboarding, even for those without a bank account. This entity would provide access to digital euro services and the necessary support to those vulnerable to digital financial exclusion, without any cost to the customer.

The staggered roll-out approach. Rolling out a new payment method is not an easy task. It requires the

involvement of multiple stakeholders in implementing their part of the solution. It involves stakeholder engagement, technological development and testing across multiple systems. A roll-out plan is therefore essential. Once a decision is taken to issue a digital euro, the Eurosystem would stagger the roll-out in two steps for prioritized use cases. This gradual approach is common for complex payment instruments like the digital euro. It would mitigate risks, allow for issue resolution and enable users to gradually familiarize themselves with the digital euro.

The first step could include roll-out of a digital euro for person-to-person and e-commerce payments, which are valued by both businesses and consumers and are technically less complex.

The second step could cover point-of-sale payments, giving merchants more time to adjust their systems and ensuring smoother implementation.

Stages of digital euro development and roll-out. Following a two-year investigation phase, the Governing Council of the ECB has decided to launch the digital euro preparation phase starting November 1, 2023.

During this preparation phase, the Eurosystem will focus on further testing aspects relating to the design, user experience, privacy, financial inclusion and ecological footprint of a digital euro. This will include further work on the digital euro scheme rulebook and defining a selection process for potential service providers.

The preparation phase will last two years and run in parallel to the legislative deliberations. Based on the outcome of the first step of the preparation phase and developments in the legislative process, a decision will be made to move towards achieving operational readiness for possible future issuance and roll-out of the digital euro starting November 2025.

3.3.5 Possible Impact of Digital Euro on Payments, Monetary, and Fiscal Policy in Serbia

Mobile money would provide more effect on monetary aggregates than crypto assets. The effect of crypto assets on money aggregates is small primarily because bitcoin and similar crypto assets do not satisfy the definition of money and are normally not recorded as addition to broad money. Stablecoins backed by major currencies may add to the value of monetary aggregates, but their size remains marginal at present. Mobile money is officially considered as money which adds to the size of broad money. The reporting depends on the business model followed: In "bank-based e-money models" outstanding balances should automatically be reported as additions to M2. In "non-bank based models" the reporting depends on the specific legal and regulatory arrangements. The responsibility for reporting can be placed on banks holding e-money deposits, or MNOs or Fin-Tech companies issuing e-money. CBDCs are part of CB money issued in digital form and thus gets reported in a standard way.

Private digital money provides efficient payment services and can impact monetary system stability, with ongoing research exploring design features and safeguards to mitigate risks. Private digital money is a convenient and efficient way to provide payment and transfer services. In all aspects they are equal or more efficient than the traditional payment instruments. The effect on the stability of the monetary system and transmission channels depends on the inherent financial characteristics of mobile money issuers. As discussed in the previous section, both mobile money and CBDCs bring some stability and policy effectiveness issues. Current research has already identified several design features and safeguards that can help address main risks in normal times, as well as prevent "runs" and widespread costs during crisis. The ongoing research of the impact on transmission channels is limited by the lack of both adequate models and empirical evidence. Much of modern monetary policy wisdom is based on empirical relations as a basis of evaluating and calibrating the policy interest rate channel and other instruments at central bank disposal.

Policy debates on CBDCs focus on the risk of further intensifying of dollarization. Much of the policy discussion surrounding the development of CBDC instrument is focused on the challenges that could potentially be caused by currency substitution. The advent of strong major digital central bank currencies, such as digital US Dollar or digital Euro may create incentives for currency substitution in countries with weaker currencies and macroeconomic fundamentals. This could trigger a process of digital dollarization or digital euroization that is faster and deeper than similar processes observed in the past, based on traditional major currencies. Excessive currency substitution may adversely affect domestic monetary policy due to limited control over domestic liquidity and,

hence, less efficient impact on price stability and real performance.

Addressing currency substitution in small economies might need new approaches. Currency substitution in the presence of digital CBDC is not very different from present dual currency situations faced by many small economies with large remittances and share of shadow economy. Methods of dealing with the currency substitution problem may have to be adapted to much faster financial flows associated with the dominance of digital currencies. The fact that most digital money types would leave a trace which could help fight shadow economy and illegal economic activity may diminish one the main drivers of dual currency.

The digital revolution's impact on cross-border payments might affect traditional capital controls. Digital revolution is expected to have a profound impact on the ease and transaction cost of cross border payments. This will create considerable savings for workers' remittances, SME transactions, trade flows and international transfers. At the same time, digitalization of international payments will remove most barriers to capital flows and make standard policies of "capital account restrictions" more difficult if not impossible without stark violations of the spirit of public and private digital monies. Furthermore, the presence of public CB digital currency with practically unlimited capital mobility will require adequate choices regarding foreign exchange rate regime, and the independence of monetary policy.

The digital money revolution could significantly reduce the shadow economy and enhance fiscal transparency. On the fiscal side, digital money revolution will bring a possibility of a major reduction in the shadow economy based on digital tracking left behind every transaction (payment or transfer) and much higher level of transparency of accounting and fiscal / tax reporting. Carefully drafted laws should increase fiscal transparency and revenues without violating privacy and personal information. Challenges in protecting privacy and data integrity are very serious and merit the utmost attention of the government, the legislature and the broad public.

Digital transactions will streamline public spending, improving transparency in procurement and budget management in critical sectors, aligning with development objectives. Digital transactions would also help improve the efficiency of public spending through transparent and truly competitive procurement procedures, and monitoring of public spending effects on the achievement of stated budget objectives in health, education, social assistance, and infrastructure investment. As a result, there will be an improved base for better public expenditure management based on multi-year expenditure framework and program-based budgeting aligned with development objectives. Finally, the digital monetary revolution will accelerate all flows and processes and pose new challenges in the areas of monetary and fiscal policy coordination.

***Serbia could benefit from the digital money revolution, but this will need legal and tax administration reforms for optimal impact*.** Serbia would likely benefit greatly from improved fiscal transparency and reduced shadow economy associated with digital money revolution. Despite significant variation in the estimates, the shadow economy remains a serious concern strongly linked to the share of cash transactions (in both local currency and Euros). All other factors being equal, declining share of cash and growing use of digital monies with tracking capabilities are likely to bring many shadow activities in the open, reduce or eliminate under-reporting of taxable income and transactions in otherwise registered businesses, and increase fiscal transparency on both the revenue and expenditure side of the budget. To internalize these benefits, Serbia will have to revisit its tax, budget and procurement laws, and modernize tax administration to target likely pockets of tax evasion among large tax payers, and in unregistered and illegal activities, instead of putting undue pressure on SMEs with poorly disguised urge to collect revenues ignoring social and long-term growth consequences.

***However, Serbia's reliance on Euro area remittances makes it vulnerable to currency substitution*.** At the same time Serbia will be vulnerable to currency substitution pressures from future digital Euro due to high dependence on remittances coming mostly from Euro area, and the possibly large stock of dual currency in the country. Furthermore, reduced effectiveness and traction of monetary policy caused by currency substitution will be stressed further by: (a) the presence of likely multiple exogenous e-money flows spreading like wild fire in many EU and other countries with significant trade and remittance flows, and (b) inability to fine tune capital flows.

For best efforts, Serbia needs to start preparing. To effectively respond to these challenges Serbia is best advised to engage in timely legal preparations for the anticipated needs of a possible (or likely) increase in “bank-led mobile money” and central bank digital currency. In parallel, mirroring the initiatives of ECB, BIS and u Fed, Serbia should initiate applied research of complex future policy risks and seek effective institutional and policy responses.

4. POLICY LESSONS AND PRACTICAL RECOMMENDATIONS FOR SERBIA

Text box 10. Key takeaways from Section 4

The section proposes a comprehensive set of measures for Serbia to enhance its cashless infrastructure, divided into three main categories for implementation across different time frames. In the short term, it suggests measures that align with the current legal, regulatory, and infrastructural status, focusing on enhancing stakeholder awareness and management capacities. The medium-term strategies involve moderate legal adjustments, infrastructure upgrades, and stakeholder capacity building to introduce efficient international payment platforms and improve control functions. Long-term measures aim to align with significant digital currency advancements, preparing for the introduction of Central Bank Digital Currencies (CBDCs). These strategies encompass limiting cash usage, developing payment infrastructures, promoting electronic payments, and strengthening management and control functions, all while considering the impacts on various stakeholders, including merchants, consumers, and the government.

First, measures and payment instruments that can be implemented immediately (or in the short run within one year) based on:

- The existing legal and regulatory environment,
- Present status of receiving/enabling infrastructure (payment network),
- The level of awareness, acceptance, and capacity of key stakeholders (merchants, consumers, government), and
- Actual development of management capacity and control functions.

Second, measures and (cashless) payment instruments that may be ready in the medium run (2-3 years) requiring leadership, policy and institutional reform coordination to secure:

- Small-to-moderate changes in the legal and regulatory environment (some new laws and necessary amendments to keep pace with EU and best international practice),
- Some necessary upgrades of the enabling infrastructure (payment network) to secure efficient and secure operation,
- Introduction of new platforms for efficient and secure international payments,
- Sufficient awareness and necessary capacity building among key stakeholders (merchants, consumers, government), and
- Improved management capacity and control functions.

Third, measures aimed at creating legal, institutional, technical/infrastructure and knowledge capacity to keep pace with the quantum changes likely to happen with the unfolding of the new stage of public digital money (CBDC) now approaching implementation in the Euro zone, the US, and many leading national and supranational central bank initiatives.

In this context, we have grouped a list of measures in the following categories:

- Limit the use of cash and introduce disincentives for cash payments.
- Promote / stimulate payment infrastructure development.
- Promote electronic (cashless) payments and e-fiscalization.
- Strengthen management capacity and control functions.

LIMIT THE USE OF CASH AND INTRODUCE DISINCENTIVES FOR CASH PAYMENTS

1. ***Limit cash payments: Setting ceilings for consumers and merchants***
    - Many EU countries have set
    - **maximum limits** for both receipts and payments in cash,
    - **applicable to individuals** and **merchants**
    - ranging between 400 and 15.000 Euros or
    - between 3% -153% of the average income per capita
    - Reportedly, cash limits have a significant impact on reducing shadow economy in cases where the ceiling were set at below 20% of average income per capita (i.e. Slovenia, France, Greece, Italy, Portugal, Belgium, Spain).

2. ***Make cash payments more cumbersome: Eliminate largest cash denominations***
    - Many countries/regions eliminated (i.e. India) or reduced the share (i.e. EU) of largest cash denominations to create negative incentives for both merchants and consumers to use cash payments.
    - Serbia could eliminate 5.000 dinar bills which are rarely used by consumers and, hence, merchants for legal transactions.

3. ***Make large cash withdrawals more difficult: Limit the amount of ATM withdrawals***
    - Limit the amount of ATM and bank teller withdrawals at levels that do not constrain average customers / consumers and make access to large amounts of cash for shadow transactions more difficult

4. ***Introduce inexpensive or free transfer of remittances: Following FedNow model***
    - Provide incentives to increase cashless transfer of remittances and hence increase transparency.
    - See more detailed related proposal to prepare for the adoption of cross border payment platforms proposed by the IMF and endorsed by the G20 Group of countries set out in Annex 2.

5. ***Mandatory payment of wages, pensions, and social benefits (including taxes and contributions) using account transfers.***
    - Presently, most pensions are paid to accounts held at Postal bank. Unconfirmed information suggests that a large number of retirees withdraws the entire pension as soon as it is deposited and spends it in cash. Exceptions may be granted based on written request on a case-by-case basis.
    - Explore a possibility of offering them higher interest rates for balances left in their deposit accounts.

PROMOTE / STIMULATE PAYMENT INFRASTRUCTURE DEVELOPMENT

6. ***Increase the number of new POS terminals and modernize existing***

- Provide POS terminals free of charge during the first year. An incentive scheme along these lines has already been designed following Poland model with an aim to attract 25.000 new POS terminal users and, thus, increase noncash payments with associated benefits for small merchants and consumers, and positive impact on fiscal revenues and reduced shadow economy.

7. ***Increase the effective use of payment cards through incentives expanded infrastructure***

   - Based on NBS data, at the end of 2022 Serbia already had more than 10.7 million issued and delivered payment cards, and only about 5 million active payment cards.
   - One factor may be underdeveloped payment acceptance infrastructure (number and type of POS terminals, their geographical location and availability by type and size of businesses), or acceptance by certain businesses.
   - Another factor may be the lack of incentives to use payment cards as opposed to cash or other forms of cashless payments (account transfers, checks, e-money payments).

8. ***Prepare for and Implement new technology: e-Money, mobile phone payments etc.***

As discussed in detail the context of India archetype case and noted in the discussion of recent cashless payment developments in Sweden archetype case, e-Money payments have become an important part of growing cashless economy and a major source of efficiency (in terms of both payment speed and lower transaction costs).

e-Money developments in Serbia are in early stages. It would be helpful to provide a stronger legal and institutional support for the growth of e-Money payments in response to unmet demand for (secure, small, and convenient) payments relying on large smart telephone penetration, limited access to a full range of banking services (e.g. all registered Mes have a bank account but only 20% use bank financing for current operations and investment), and growing share of younger generation of consumers with diversified bundled payment and social networking needs. India and China experiences provide a good starting point. Further work will be needed to address other issues (necessary legal basis, capacity of payment service providers, relationship between e-Money operators and the financial system dominated by commercial banks and major payment cards, etc.).

9. ***Develop (complete) Digital Public Infrastructure (DPI): Following India experience***

The experience of India archetype case suggests considerable benefits from developing an integrated Foundational Digital Public Infrastructure (DPI) based on national IT capacity as detailed in the section 3.2. India's DPI or so also called India Stack, consists of three layers: unique digital identification, payments system, and data exchange.

It supports a modern inexpensive and safe payment system and avoids the pitfalls of proprietary approach to payment and digital infrastructure in general by relying on shared building blocks that allow and supporting innovation across the ecosystem. DPI enables online, paperless, cashless, and privacy-respecting digital access to a variety of public and private services.

The advantages of DPI based on India experience have been recognized and endorsed by the most recent meetings of the G20 group of countries.

10. ***Develop / Prepare for the Introduction of Cross Border Payment (CBP) Platforms***

Cross border payments (CBP), the foundation for the global financial system, have seen the least innovation in recent years (see section 3.2). A large fraction of the global CBPs faces many challenges due to expensive, slow, and opaque processes caused by outdated and limited infrastructure.

The G20 group of countries has endorsed an enhanced CBP system based on the IMF's visionary blueprint for a multi-layer payment and contracting platform. The proposed XC platform includes three layers (for payment settlement, programing, and information management) and a solid, transparent, and effective governance system.

XC platform offer a solution for CBP by:

- Enabling fast, secure and efficient **settlement** of cross border payments by escrowing and transferring safe central bank reserves of participating countries held in one ledger;
- Providing additional complementary services under the **programming layer** to meet demand and expectations of modern customers (such as obtaining needed foreign currency, synchronizing or delaying payments, managing risks, and implementing capital flow management (CFMs) measures, and
- **Managing** information to protect user identities, and reduce frictions related to contract enforceability and asymmetric information.

XC platforms do not require participating countries to adopt a central bank digital currency (CBDC), albeit XT platform architecture and functionality may be related to solutions developed around some CBDCs, and *vice-versa.*

XC platforms could be applied to:

- All other trade related and commercial payments and transfers, as well as
- Remittances and other low value payments, where inefficiencies are the greatest (on average, transfer fees are as high as 6.5 percent transfer of payment values).

Serbia could benefit greatly from developing own solutions for inexpensive transfer of remittances (e.g. by following the US FedNow model introduced in July 2023) and preparing to join the forthcoming CXBP XT platforms expected in the near future

11. ***Prepare for the introduction of Digital Euro & Digital Dollar***

Preparations for the rollout of digital Euro are approaching final stages. The initial coverage will be focused on businesses registered in the EU and consumers residing in EU countries. In addition, countries with strong financial and economic ties with the EU economic space will also be included.

Given the size of trade with the EU countries and the importance of remittances coming from the EU countries, Serbia should urgently initiate steps to participate in the digital Euro system and prepare to absorb possible impact on financial flows, new tide of Eurization, and effective measures for capital flow controls under new circumstances.

Indirectly, this could have a significant impact on the size and role of cash (both in local currency and in Euros), cashless payments, as well as the analyzed factors shaping the size and scope of the shadow economy.

Preparations should include the passage of necessary laws, institutional, technical and policy readiness for the likely impact of digital Euro.

12. ***Gradually implement full payment sovereignty rules*** by mandating merchants to accept both cash and cashless payments, i.e. allow consumers to choose.

PROMOTE ELECTRONIC (CASHLESS) PAYMENTS AND E-FISCALIZATION

13. ***Provide additional incentives for the use of 2-in-1 POS (payment & fiscal) terminals***

Integrated 2-in-1 POS terminals (i.e. electronic cash registers with integrated POS functions) offer a seemless connection between e-Fiscalization, e-Invoice and e-Payment functions. This may create a case for coordinated effort by all stakeholders (Ministry of Finance, Tax administration, NBS, commercial banks, payment card operators, merchants, consumers) to promote greater use of integrated POS terminals (both in upgrading existing and providing new POS terminals, both as physical units and android / IOS applications).

This initiative holds great potential and requires further analysis and coordination.

14. ***Integrate (connect) personal/business, payment and fiscal (tax) databases***

Related to proposal above, the introduction of a comprehensive Digital Public Infrastructure (DPI) would offer these types of improvements. In the meantime, a separate initial effort to provide those links for the benefit of an effective integration of e-Fiscalization, e-Invoice and cashless payment initiatives would make perfect sense. It will have a strong positive synergy between mandated e-Fiscalization and e-Invoice requirements, and broader positive impact on incentives in favor of accepting, enabling and promoting cashless economy overall.

These effects would be even stronger with the introduction of cross border payment platforms and digital Euro in the foreseeable future.

15. ***Encourage electronic payments through tax incentives***

    - Strengthening fiscal discipline through smart design of on-site and off-site tax inspections, increased monitoring, cross checks etc.

16. ***Provide new incentives for all legal transactions: Lotteries based on fiscal receipts***

    - Many countries provide incentives to consumers to demand sales receipts for both cash and cashless transactions by organizing lotteries.
    - Serbia is already using sales receipts lotteries to stimulate demand for legal fiscal receipts which translates into lower shadow economy through better fiscal discipline (fiscalization)
    - With 2-in-1 POS terminals provided under the Better way project, one could combine incentives for both greater cashless economy and fiscalization.

17. ***Enable instant / online payments of e-Invoices.***
18. ***Enable payment of taxes through electronic online payments on e-Tax (ePorezi) portal.***
19. ***Enable common electronic identity (e-ID)*** and authentication system for eBanking, mBanking and eGovernment (Uprava) to promote electronic payments.

STRENGTHEN MANAGEMENT CAPACITY AND CONTROL FUNCTIONS

20. ***Modernize cash registers***

    - Experience from many countries indicates that modernization of cash registers (especially the introduction of online cash registers) significantly improves tax administration management and controls functions.
    - The impact is further enhanced if online cash registers are combined with POS terminals.
    - Serbia has already embarked on a broad based modern e-Fiscalization project integrated with e-Invoice initiative.
    - These two initiatives would best be complemented with cashless initiative through a program of upgrading existing offline cash registers with online integrated 2-in-1 POS terminals offering both "online cash register" functions and cashless payments (both traditional swipe and contactless).
    - Consider providing incentives for upgrading existing fiscal cash registers (physical or android based) to integrated POS terminals compatible with e-Fiscalization, e-Invoice and contact and contactless cashless payments.
    - Incentives could include electronically generated tax filing procedure (thus lowering accounting and admin costs for SMEs), accelerated VAT refund (within 15

days), etc. provided merchants (SMEs) meet one or more qualifying criteria (such as more than X amount of total revenues and a certain share cashless payments, etc.).

21. ***Improve the effectiveness and efficiency tax inspections by enhancing the risk matrix*** with all relevant risk factors (i.e. the adequate inclusion of the share of cashless payments as an indication of lower tax filing risk). This should enable a simpler (onsite) tax inspections

5. ANNEX 1 – A THEORETICAL DISCUSSION ON THE RELATIONSHIP BETWEEN CASH AND SHADOW ECONOMY

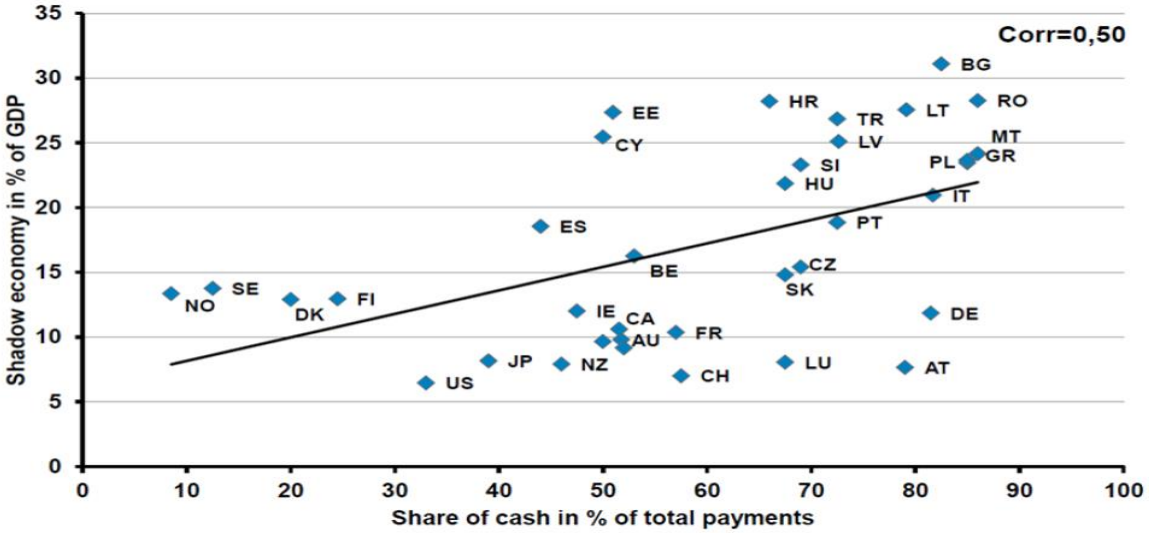
In his 2019 policy note[14] Schneider provided an overview of a subset of key approaches to empirically studying the relationship between cash and shadow economy, a topic much debated in the theoretical and policy literature. A decade long debate was triggered by Rogoff seminal 2014 paper[15] on the costs and benefits of phasing out paper currency. More recently many authors suggested that the restriction or even abolition of cash would result in much less crime and drastically reduced shadow economy based on transactions usually undertaken in cash. In addition, it was argued that if cash were not easily available, terrorist attacks would be severely hampered.

Figure 3, based on 2013-2015 data for 36 developed countries, shows a positive relationship between the share of cash in total payments and the size of the shadow economy as percent of GDP (with statistically highly significant correlation coefficient of 0.50). There are some distinct exceptions to this rule. For example Germany, Luxemburg, Austria, France and Switzerland are all cash-intensive countries with relatively small shadow economies. By contrast, Sweden, Norway, Denmark and Finland have low shares of cash payments with medium-sized shadow economy.

[14] Schneider, Friedrich (2019).

[15] Rogoff, Kenneth S. (2014).

Figure 15: Share of cash in total payments vs. share of shadow economy in GDP (2013-2015)



Source: Schneider (2019).

We provide an overview of Schneider's empirical investigations of the relationship between cash and shadow economy, while noting that the shadow economy is also driven by tax burden, government regulation, and quality of public institutions, unemployment, tax morale, and other factors. In addition, we briefly report his results on the relation between cash and corruption, as well as discussion of the intrinsic social value of cash as a measure of freedom.

1. In the first type of MIMIC[16] model estimations, shadow economy is caused by tax burden, government regulatory measures, economic freedom, legal system, tax morale, and other factors. These variables are regressed on cash availability (i.e. share of cash in total payments), on cash limits, and on GDP per capita.

- Schneider (2019) results show a positive and statistically significant relationship between the share of cash payments and the size and development of the shadow economy. The estimated coefficient of cash limits have a theoretically expected negative sign, but are not statistically significant.
- Simulation results suggest that shadow economy increases (by 18.4 percent) when GDP decreases (by 10 percent), and decreases by 2 percent when the share of cash payments decreases by 10 percent. Cash limits have no significant effect.

2. In the second type of MIMIC model estimations, the focus is on testing importance of cash limits for the shadow economy.

- Schneider (2019) results again confirm that cash limit variable has no statistically significant influence as a causal factor on the size of the shadow economy whereas the tax burden, rule of law index, inflation rate and unemployment all have theoretically expected signs and are highly statistically significant (with the exception of unemployment).

3. The third empirical test of the relationship between cash and shadow economy is based on a micro study (questionnaire) reported in Schneider (2019).

- More than one thousand respondents in Austria were asked in May-June 2016 what would be their reaction if "cash was eliminated". More than 40 percent of respondents said that they would negotiate another anonymous (untraceable) type of payment/compensation. One third said that they would still demand the service and would pay cashless. The remaining respondents were equally divided between "not demanding the service anymore" and "still demanding the services but paying more attention to correct tax treatment".
- Large percentage of respondents seeking an alternative anonymous payment method confirms that cash is an important element in

[16] MIMIC stands for Multiple Indicators Multiple Causes model.

the prevailing behavioral model and an enabling factor of the shadow economy.

- However, cash is by no means a causal factor of the shadow economy and its impact on the shadow economy is quantitatively limited: without any cash shadow economy might be reduced between 15 to 20%.

4. Cash is often blamed (in media and widespread public perceptions) as the main enabler of bribery, corruption and other illegal activities. But there are notable exceptions to this rule. In countries such as Switzerland, Austria and Germany low levels of perceived public-sector corruption and bribery occur alongside a high share of cash in total payments and/or low number of cashless payments per person.

- Schneider's (2019) econometric investigation showed that corruption has a considerable impact on economic, political and social factors and is subject to a vast range of institutional, jurisdictional, society and economic conditions. Using the transparency corruption index (TCI) as dependent variable, and indices of rule of law and economic freedom, GDP per capita, share of cash payments and cash limits as independent variables (for 38 highly developed countries over 2014/2015 period) the regression results predictably show that:

o better rule of law and more economic freedom are associated with lower corruption;

o higher GDP per capita is associated with lower is corruption;

o while higher the share of cash payments is associated with higher corruption.

o all estimated coefficients are statistically significant. Again, the cash limit dummy variable has the wrong sign and is not statistically significant.

Simulation results about quantitative importance between cash and corruption, under ceteris paribus conditions, indicate that:

- A 10 percent increase in the rule of law (economic freedom) leads to a 6.1 percent increase in TCI (meaning less corruption), and
- A 10 percent reduction in the share of cash payments leads to a 1.8 percent increase in TCI (meaning less corruption).

5. On the other end of the spectrum, Schneider (2019) confirms that cash has intrinsic value in liberal, democratic societies. It reflects the fundamental relation between citizens or taxpayers and state authorities: a relation of trust in the state and monetary authorities through cash as "legal tender", on the one hand, and individual freedom, independence and personal fulfillment as citizens and consumer who do not want the state to intervene or monitor their discretionary use of income (cash).

Public debate on the issue often reflects two opposing views.

One view calls for the **limitation** or **abolishment of cash** through tighter and more comprehensive state control over individuals' financial flows (i.e. freedom) as it will effectively fight crime, shadow economy and terrorism. Despite weak empirical evidence, this view claims that ample anonymous cash makes tax evasion easier.

The opposing view notes that **easily available cash may facilitate tax evasion but is not the main reason for tax evasion**. Citizens' willingness to pay taxes crucially depends on tax morale which is nested deeper in the nature and quality of the relation between citizens and the government. The tax morale (i.e. willingness to pay higher taxes), in turn, is based on citizens' trust in the political system and decision making (i.e. their ability to influence decisions through direct or representative democracy), and the credibility and accountability of the state in delivering promised goods and services. In other words, fundamental basic contract between the taxpayer and the state is crucial for the functioning of society.

N.B. Regarding the role of cash, abolishing or limiting cash may weaken trust in state. The participants in surveys underline the importance of the so called Payment sovereignty – allowing all forms of payment (electronic and physical) – to all citizens. Attempts to enforce state control over citizens through forced expansion of cashless payments may prove to be counter-productive. Limitation or abolition of cash must be justified by sound reasons and large benefits in order to preserve the trust between citizens and authorities.

Besides, knowing that cash is neither the motivation for nor the main reason (cause) of shadow economy or corruption, its abolition would have limited welfare gains. In a democracy, the ultimate choice between cash and various cashless payment should be left to users (citizens, taxpayers, consumers, and producers). The state may provide a level playing field by establishing rules that would ensure competition (limit monopolies) and cost efficiency, as well as provide incentives that would improve transparency and broaden the tax base. The users should be free to choose which payment instrument they use.

6. ANNEX 2 – NEW GLOBAL PAYMENT INFRASTRUCTURE – A DISCUSSION ON CROSS BORDER PAYMENTS[17]

Money is the cornerstone of the financial and economic system. Contracts are denominated in money, exchange is conducted in monetary units, and central banks, regulators, and finance ministries manage money supply via monetary policy, payment oversight, infrastructure, and banking supervision.

The history of money reflects the combined impact of technological innovation, governance mechanisms, economic forces, and policy action. Money evolved from metal coins to fiat currencies, from letters of credit to paper fiat money and non-cash account-based systems. In recent years the use of cash is decreasing in many countries, while non-cash payments and digital innovation dominate the monetary system. Technology provides continuously expanding opportunities for further evolution of money.

Block chain crypto security, tokenization, and programmability are at the center of money and payments innovations. Banks and other financial institutions are exploring deposit and financial asset tokenization, central banks experiment with digital currencies, and fin-tech companies innovate around all dimensions of money and payments to better respond to changing consumer demands and preferences.

Cross border payments (CBP), the foundation for the global financial system, have seen the least innovation in recent years. While some CBPs are well governed, operationally efficient, and cheap, a large fraction of the global financial system CBP faces many challenges due to expensive, slow, and opaque processes. On average, CBP infrastructure is outdated (inadequate and scarce, mostly limited to messaging). Governance is sporadic, giving rise to substantial indirect legal and operational costs. Recourse is expensive, and settlement assets are risky.

There are concerted efforts to create a multi-layered XC platform for payment settlement,

[17] Based on: Tobias and Mancini-Griffoli (2023)

programming, and information management, with robust governance. The international community – G20 has proposed A Roadmap to Enhance Cross-Border Payments in 2020, and have since issues two progress reports in 2021 and 2022. This note is largely based on IMF FINTECH note published this year (see Tobias and Mancini-Griffoli 2023) which builds on previous work and proposes a visionary blueprint for advancing cross border payments based on a multi-layer payment and contracting platform. The proposed XC platform includes three layers (for payment settlement, programing, and information management) and a solid, transparent, and effective governance system.

The proposed blueprint is flexible and can be applied to:

- Remittances and other low value payments, where frictions and inefficiencies are the greatest: On average remittances are subject to very high 6.5 percent transfer fees and cost (mostly low income and poor) recipients an estimated USD $45 annually.
- All other international payments and transfers.

CBP or XC platforms are a digital equivalent of traditional "town square" or market, where people and businesses meet to make financial transactions under the auspices of local and global rules and laws. XC platforms are based on a trusted single ledger which contains:

Standardized digital representations of participating central bank reserves in any currency that

- Can be exchanged (settled) efficiently, and
- Programmed additionally to replicate provisions of:
  - a basic financial contracts in
  - a privacy preserving fashion,
  - among selected public and private sector participants
  - subject to clear strong and clear governance, standards, and rules.

XC platforms rest on transparent and rule-based governance system supporting the stability of the international monetary system and the interests of IMF member countries. They offer the following key advantages:

- scalability and potentially wide participation;
- safety, by settling with secure central bank reserves;
- interoperability among national currencies and legal systems;
- greater competition and liquidity in certain payment corridors;
- efficiency and lower risks in devising and trading financial contracts;
- innovation, by allowing the private sector to tailor basic functions and financial services through programming;
- modularity and compliance relative to information management; and, of course,
- resilience and stability.

Improvements in cross-border payments based on XC platforms can have notable positive micro- and macro-economic benefits through:

- Lower transaction costs for all (especially small and medium size) businesses involved in international trade and payments;

- Lower charge fees for (poorer) households receiving remittances;
- Faster payments and more liquid exchange rate corridors facilitating trade and market integration
- Easier monitoring and management of capital flows, and more effective balance of payments policymaking and foreign exchange interventions; and
- Better integration of financial and commercial flows based on greater payment integration and transparent governance, thus countering fragmentation pressures.
- Allow a multicurrency system, without imposing a single or new settlement asset. Participants will

XC platforms facilitate cross-border payments independently of central bank digital currencies (CBDCs), yet can integrate CBDC technologies to improve both domestic and international financial systems, as seen in experiments by several central banks. XC platforms do not require participating countries to adopt a central bank digital currency (CBDC), albeit XT platform architecture and functionality may be anchored in the insights and technologies developed around some CBDCs, and *vice-versa*. In other words, while XC platforms are designed with cross-border payments and contracting in mind, their basic design is sufficiently general to directly apply to domestic financial systems, where benefits could also be substantial in advancing the concept of wholesale CBDC. Platforms would allow the settlement of tokenized assets with safe central bank money, as well as interoperability among assets and money tokenized by the private sector. In addition, platforms would usefully instill standards and a safe environment with which to

To deliver these advantages under present circumstances, XC platforms must:

- Leverage novel technologies—including a single ledger, programmability, and encryption—albeit not require them of countries or participating institutions.
- Be compatible with existing national payment systems, as well as national arrangements between central banks and commercial banks.
- Work with the present banking system, while strongly aiming to inject more competition and transparency in correspondent banking.

choose currency used on the platform within the realm of central bank reserves.

program financial contracts. Several central banks have begun experiments along these lines, such as those of Brazil, France, Italy, Singapore, and the UK.

To properly understand the anatomy of payments and the issues of interoperability in the domestic and cross-border international context let us recall some key underlying concepts and definitions.

First, money is debt, i.e. the liability of an issuer. Thus, cash (legal tender) is the liability of the central bank, while deposits are a liability of commercial banks.

Second, as debt/liability, money must be recorded on ledgers—documents that show proof of the money's existence and, in most cases, of its allocation. Cash, as a bearer instrument, is an exception: central bank records how many bills were issued but does not record information on who holds them. Hence, cash has been, is and will remain anonymous money form.

Third, ledger is the history book of money. It represents a consensus view among participants who hold property rights on the ledger, verify that these rights exist, and have the power to pass these on to others to settle their contractual obligations.

Fourth, making a payment in deposit money[18] amounts to updating ledgers by debiting the sender (payer) account and crediting the recipient (payee) account.

Fifth, the payment transaction rests on three essential TRUST conditions or pillars:

1. **Both** the sender and recipient must **trust the settlement process**—including the technology and the governance involved in maintaining and updating of ledgers.
2. The **recipient** must **trust the sender's money** (debt instrument).
3. The **issuer** of the sender's money must **trust that the recipient meets legal requirements** i.e. satisfies AML/CFT requirements (assuming that the sender already met AML/CFT requirements when the money was deposited).

Trust issues are simple and the three trust conditions are easily satisfied if both senders and recipients are clients of the same bank. But trust conditions may quickly become more complicated when different banks, currencies and forms of money (i.e. different ledgers) are involved. In other words, if the sender and recipient do not have access to the same ledger, payments require interoperability so that the three trust conditions can be maintained across ledgers. The settlement process must involve a trusted and synchronous update of both ledgers. The recipient must trust money that is not necessarily native to his or her ledger. And the issuer of the money used for settlement must trust both the sender and recipient—one of which is unlikely to be its client.

The issues of interoperability arise in both domestic and cross-border payments. The solutions, however, are simpler and more advanced in the domestic case. There are two basic models of interoperability: the intermediated and the platform model.

- In the intermediated model, where the issuers (usually banks) play a key role on behalf of the sender and recipient. The trust conditions cannot be met in one step and issuers (banks) involved in the process take time and resources, and assume risks the cost of which is passed on to senders and recipients.
- The platform model has two variants distinguished by whether the platform issues its own money. The platform can be conceived as an institution offering a ledger that is compatible with the sender's and recipient's ledgers.

[18] Making payments in cash involves passing FIAT money paper bills (or coins) from buyer to seller of goods and services.

- In the second variant, the **platform issues its own money**, which both the sender's and recipient's issuers hold. A payment amounts to transferring that money from one to the other on the platform's books, and updating all ledgers.

  At the national level, Central banks adopted the second variant offering central bank reserves as a common liquid and safe asset. These became the backbone of domestic payment systems. Commercial banks trusted the settlement process and the central bank's money, and the central bank trusted the banks as their supervisor. In this model, the sender's bank debits the sender's account (uses or burns money), transfers central bank reserves to the recipient's bank account at the central bank, and the recipient's account is credited (money is created or minted).

  But cross border payments remained in the intermediated model. The recipient's bank in one country extends credit to the sender's bank in another country by way of a foreign currency deposit ("Nostro") account, then credits the recipient's account. Banks specialized in holding each other's claims and managing ensuing risks—counterparty, foreign exchange, and liquidity risks—have emerged as a result. These are called "correspondent banks" and relatively few exist worldwide. The industry is concentrated due to the substantial fixed costs required to build trust and manage risks, and cross border payment services are expensive as a result.

  Attempts to overcome these constraints through a platform based on a common asset (money), including cryptocurrencies / assets, have not been successful. A more plausible solution comes from the **escrow model of platforms**. The platform offers a common ledger and governance arrangements to leverage existing forms of money: either commercial bank money or central bank reserves. Despite some feasible technical solutions involving digital representation of money, risks remain related to the creditworthiness of the claims exchanged on the platform. Presently, the second condition—of trusting the money used in settlement—may not be fully satisfied and relatively few banks may be able to ascertain and manage related risks. In summary, although the "escrow design of platforms" has merits and may be pursued further by commercial banks, it has unresolved issues which could stand in the way of achieving efficiency and wider acceptance.

  In a nutshell, the essence of the XC platform solution to noted CBP issues and needs is to:

- Enable fast, secure and efficient cross border payments through the **settlement layer** based on escrowing and transferring safe central bank reserves held in one ledger;
- Provide additional complementary services under the **programming layer** to meet demand and expectations of modern customers (based on their domestic payment experiences), such as
  - Obtaining necessary foreign currency,
  - Securing desired timing of payments (by synchronizing or delaying payments),
  - Managing risks, and
  - Effectively implementing capital flow management (CFMs) measures,

- Further enhance functionality of the platform through **information management layer** which adds features related to:
  - Legally mandated protection of users' identities, and
  - Reducing frictions associated with payments (limited contract enforceability and asymmetric information).

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