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Tap, click and pay: how digital payments seize the day

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Tap, click and pay: how digital payments seize the day

Alberto Di Iorio, Anneke Kosse and Robert Szemere

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Tap, click and pay: how digital payments seize the day[1]

Alberto Di Iorio, Anneke Kosse and Robert Szemere

Highlights

- The use of digital payment methods continues to increase, particularly for small amounts. In tandem, cash withdrawals and the number of small-denomination banknotes in circulation have declined.
- Fast payments reached new heights and are a prominent driver of the digitalisation of countries' payment ecosystems.
- Even so, consumers continue to use cash to pay at home and abroad: both cross-border card and e-money payments and cross-border cash withdrawals increased sharply in 2022.

Introduction

It is nearly impossible to imagine a world without digital payments. Due to technological innovations and increased demand for convenience, speed, and safety, payments by cashless payment methods, such as card, e-money and credit transfers, have been on the rise for many years.[2] These trends accelerated over the Covid-19 pandemic and their growth has steadily continued since.[3] One exciting development, in particular, is the rapid and widespread growth of fast payments.

This CPMI Brief highlights key payment trends as observed in the 2022 Red Book statistics. These statistics were collected in the second half of 2023 from member jurisdictions of the Bank for International Settlements (BIS) Committee on Payments and Market Infrastructures (CPMI) and are available at the BIS

[1] We thank Jon Frost, Thomas Lammer, Tara Rice, Takeshi Shirakami and Alan Soughley for their valuable comments and are grateful to Ilaria Mattei and Amela Memetaj for excellent research assistance. The views expressed in this CPMI Brief are those of the authors and do not necessarily reflect those of the Bank for International Settlements, its Committee on Payments and Market Infrastructures or its member central banks.

[2] In this CPMI Brief, we consider cashless payments as all payments made without cash. Cheques are considered a cashless but not a digital means of payment since they start with the physical transfer of a paper cheque between the payer and the payee (even if they are now often presented in a digital form for clearing and settlement – a process called "truncation"). Digital payments as referred to in this CPMI Brief are all payments made without cash or cheques. Credit transfers initiated on paper are included under digital payments due to their negligible share in the total volume and value of credit transfers in most countries. Since the Red Book statistics do not include statistics on CBDC usage, none of the definitions as used in this CPMI Brief cover CBDC payments.

[3] See Glowka et al (2023), Auer et al (2022) and the references therein.

Data Portal (see Box 1).[4, 5] The year 2022 was marked by high and rising inflation and increasing policy rates (see Graph A1 in Appendix). The year 2022 was also when global travel soared as the remaining Covid-19 restrictions were lifted.[6] These factors may have impacted global payment habits. The trends summarised in this CPMI Brief shed light on the use of payment methods and are helpful for understanding factors driving the uptake of payment innovations. In addition, the statistics provide some insight into the demand for cross-border payments – a priority for G20 leaders who have committed to addressing the long-standing challenges of high costs, low speed and insufficient access and transparency.[7]

Box 1

Red Book statistics are now available in the BIS Data Portal

Red Book statistics

The Red Book statistics are annual statistics on payments and financial market infrastructures (FMIs) in the CPMI member jurisdictions.① The data are collected in a standardised and harmonised way, based on the Red Book Methodology published in 2017. The Red Book statistics contain data on:

- retail payment services and instruments, currency in circulation and related macroeconomic indicators. These include statistics on banknotes and coins in circulation, institutions offering payment services to end users, supply of cards and terminals, use of cashless payments, cash withdrawals and deposits. The data also contain qualitative information on card schemes and cover general macroeconomic statistics, which can be used to relate the size of a jurisdiction's payment industry to the size of its economic activity.
- financial market infrastructures and their critical service providers. These include quantitative and qualitative information on payment systems, central securities depositories and central counterparties, such as the number of participants and their overall settlement and clearing activity.

BIS Data Portal

As of December 2023, the Red Book statistics can be accessed through the BIS Data Portal. The BIS Data Portal, launched in November 2023, is the new one-stop platform for all BIS statistics. It features a variety of new tools to easily navigate and access data, metadata, dashboards and tables to gain quick insights into the BIS statistics and to export them into multiple formats. The BIS Data Portal contains global and jurisdiction-specific data – not only on payments and financial market infrastructures, but also on international banking, credit and debt securities, property prices, consumer price indexes, exchange rates and more.②

① For the list of all CPMI jurisdictions please refer to the CPMI website.
② For more on the BIS Data Portal, watch the introductory video: https://www.youtube.com/watch?v=s40w3_xeoVA.

4 This CPMI brief has benefitted from data provided for Argentina (AR), Australia (AU), Belgium (BE), Brazil (BR), Canada (CA), China (CN), euro area (EA), France (FR), Germany (DE), Hong Kong SAR (HK), India (IN), Indonesia (ID), Italy (IT), Japan (JP), Korea (KR), Mexico (MX), Netherlands (NL), Saudi Arabia (SA), Singapore (SG), South Africa (ZA), Spain (ES), Sweden (SE), Switzerland (CH), Türkiye (TR), United Kingdom (UK) and United States (US). For the list of all CPMI jurisdictions please refer to the CPMI website.

5 The terms "country", "jurisdiction" and "economy" used in this publication also cover territorial entities that are not states as understood by international law and practice but for which data are separately and independently maintained. The designations used and the presentation of material in this publication do not imply the expression of any opinion on the part of the BIS concerning the legal status of any country, area or territory or of its authorities, or concerning the delimitation of its frontiers or boundaries. Names of countries or other territorial entities are used in a short form which is not necessarily their official name.

6 WEF (2022).

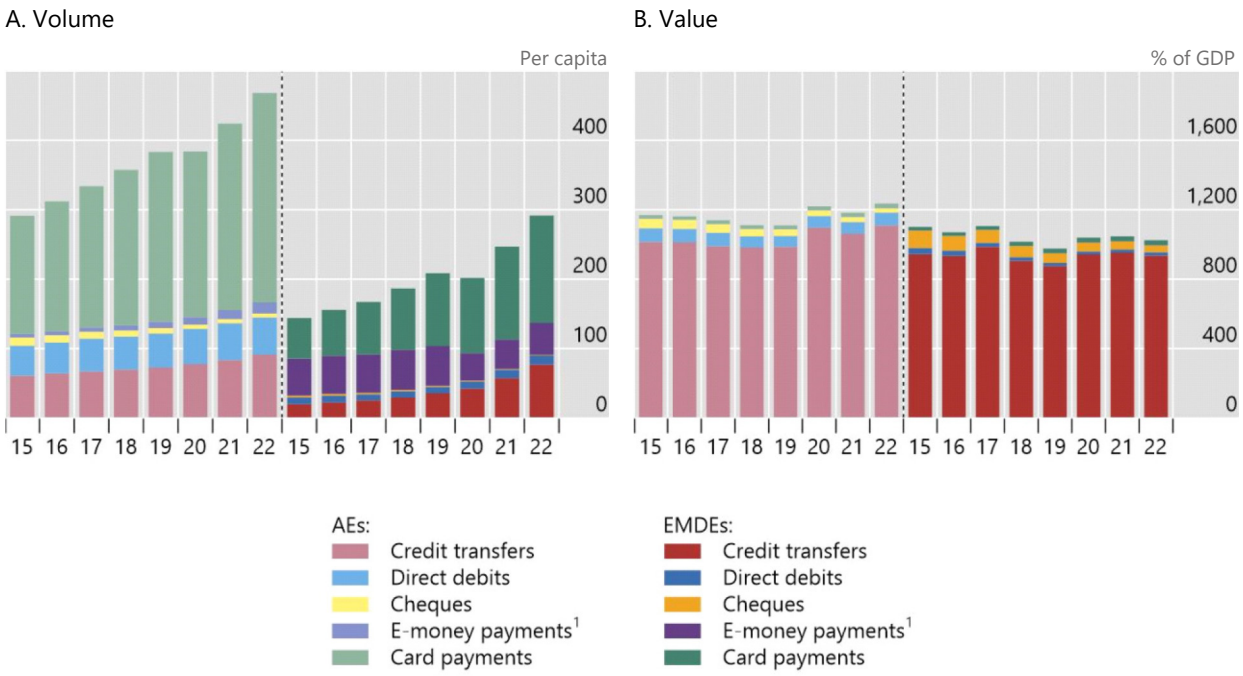
7 FSB (2023).

Digital payments continue to gain traction

Due to the continued rise in digital payments, the volume of cashless payments increased markedly in 2022. The average yearly number of cashless payments per capita grew from 426 to 468 (+10%) for advanced economies (AEs) and from 246 to 291 (+18%) in emerging market and developing economies (EMDEs) (Graph 1.A). Except for in Argentina, payment cards were the most used payment instruments, followed by credit transfers. Cheque payments continued to decrease almost everywhere. On average, users in AEs made five cheque payments per person in 2022 (down from six in 2021). In EMDEs, where the use of cheques was already limited, the average fell to less than one. Overall, consumers and businesses in AEs made on average twice as many cashless transactions than those in EMDEs.

On average, the value of cashless payments as a percentage of nominal gross domestic product (GDP) increased by 4% in AEs and decreased by 2% in EMDEs (Graph 1.B). In both groups of economies, credit transfers continued to account for most of the payment value. While the value of e-money payments made up only a small share of the total, it grew most strongly, both in AEs (+15%) and EMDEs (+22%).

Cashless payments continued to grow in AEs and EMDEs — Graph 1



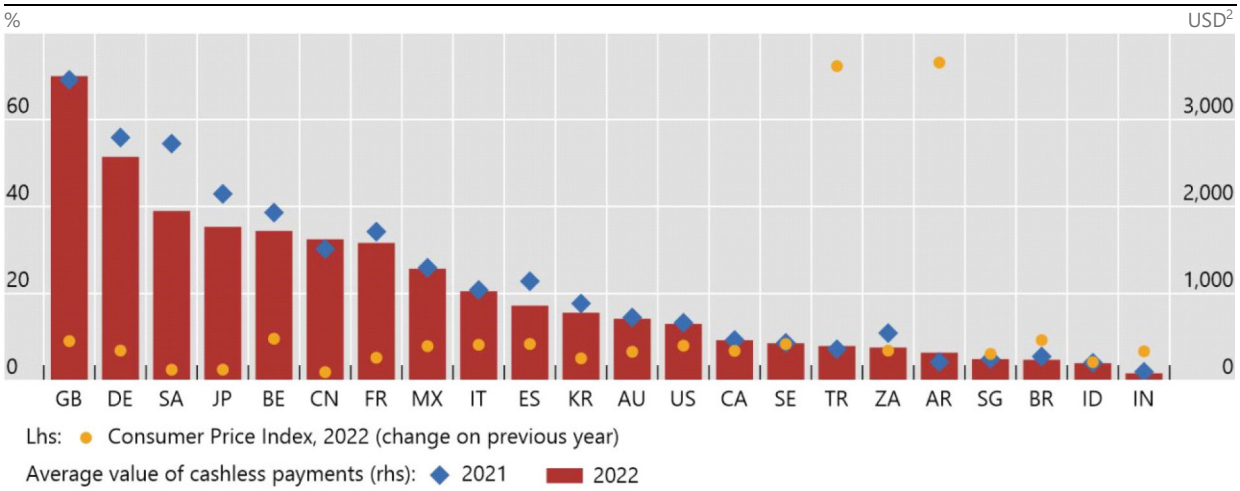
[1] The distinction between card and e-money payments is not available for CA, CN, GB, MX, SA and ZA. For these countries, e-money payments might be included in card payments.

Sources: CPMI Red Book statistics; authors' calculations.

Cashless methods are increasingly used for small payments. The (nominal) average transaction value of cashless payments either continued to decline or stabilised in most countries in 2022 (Graph 2). This shows that the general increase in price levels did not result in higher average cashless transaction values. It suggests that the number of cashless payments generally grew faster than their value and that users are becoming more accustomed to paying with cashless methods, even for smaller transactions.

Existing research shows that cash is used particularly for low-value purchases.[8] Therefore, the observed decline and stabilisation of the average value of cashless payments, and card payments in particular, might signal a reduced demand for cash as a method of payment. Due to the anonymous nature of cash, the use of cash for payments is often proxied by the value of cash in circulation. A further deep dive into the cash in circulation data from the Red Book statistics finds a significant association with the average value of card payments (see Box 2). This suggests that users indeed increasingly choose to pay digital instead of with cash, and that this trend continued in 2022.

High inflation did not result in higher average cashless payment values[1] Graph 2



[1] CH is not represented because of a change in reporting methodology in 2022. NL is neither represented because data were not available for 2022. [2] To remove the effect of the variability of the exchange rates over time, we used the average exchange rates over 2021–22 to convert values expressed in domestic currency to US dollars.

Sources: CPMI Red Book statistics; authors' calculations.

[8] See Bagnall et al (2016), Arango-Arango et al (2018), Di Iorio and Rocco (2022), Khiaonarong and Humphrey (2023).

Box 2

The average value of transactions: what does it tell us about users' choice between cash and card payments?

Over the last decade, the role of cash for making payments (instead of storing value) has decreased, while the demand for alternative digital payment methods grew. Initially, the increase of digital payments and decline in cash usage was more pronounced for higher value transactions than for lower value purchases.① However, due to increased user awareness and ongoing innovation, digital means of payment are increasingly being adopted and used for small purchases as well.

The decline in average values of card payments is commonly considered an indicator of cards taking over the role of cash. But is this really the case? For example, in a growing economy, declining average card values could be the result of more frequent use of payment cards without impacting the use of cash. To answer this question, we run the following panel regression using the annual Red Book statistics from 2012 to 2022:②

$$CIC_{it} = \beta_1 Ave_{it} + \beta_2 Wdraw_{it} + \beta_3 Rate_{it} + \alpha_i + \delta_t + \epsilon_{it} \quad (1)$$

where CIC_{it} is the value of cash in circulation as a percentage of GDP in jurisdiction i in year t. Ave_{it} is the average value of card and e-money transactions expressed in US dollars.③ $Wdraw_{it}$ is the number of cash withdrawals and proxies the demand for cash.④ $Rate_{it}$ is the policy rate and is used to control for the opportunity cost of holding cash instead of depositing it with a bank. This variable is particularly relevant in the wake of recent policy rate increases by central banks to fight inflation. α_i is the jurisdiction fixed effect, δ_t is the time fixed effect, and ϵ_{it} is the error term.

The results show that lower average card transaction values are significantly associated with a reduction in cash in circulation (Table 1). This confirms that lower-value card payments are tied to fewer cash payments in an economy. However, the effect is economically small: a reduction of an average card payment by US$ 10 is associated with a 0.08 percentage point decrease of the share of cash in circulation. This could be because average card transaction values are primarily correlated with the demand for small-denomination banknotes, which in many jurisdictions is decreasing and presenting a minor proportion of cash in circulation.⑤ Additionally, in line with the literature,⑥ we find a negative association between interest rates and cash in circulation. This suggests that when interest rates rise, consumers and businesses deposit more cash in banks to benefit from the higher rates.

Cash in circulation is changing with the size of card payments and level of interest rates[1] Table 1

	Coefficient	Std error	P-value
Average value of card and e-money payments	0.008**	0.003	0.022
Policy interest rates	–0.077***	0.014	<0.001
Number of cash withdrawals	0.008	0.071	0.904

[1] ***/**/* indicates statistical significance at the 1/5/10% level.

Source: Authors' calculations.

① See Bagnall et al (2016), Arango-Arango et al (2018), Khiaonarong and Humphrey (2023).

② We estimate the model using the Red Book statistics for 14 jurisdictions for which data for these variables are available: AR, AU, CA, CH, CN, GB, ID, IN, MX, SA, SE, TR, EA and ZA. Data on EA cash withdrawals and average value of card payments were approximated using data from BE, DE, IT, ES, FR and SP. For a few of these EA jurisdictions, some data are missing for 2012-13. For CA, some data points are missing for 2018-22. Therefore, the analysis is based on an unbalanced panel with a total of 147 observations.

③ For comparability, we converted all local values into US dollars. To remove the effect of the variability of the exchange rates over time, we used the average exchange rates over 2012–22 for the conversion. Data on exchange rates can be found at https://data.bis.org/topics/CPMI_CT/tables-and-dashboards/BIS,CPMI_CT1,1.0.

④ We also ran the regression using the number of ATMs per capita and the value of withdrawals to proxy the demand for cash, which generated similar results. Given the strong correlation between the number of ATMs and the number or value of withdrawals, we only included one cash demand variable to avoid collinearity problems.

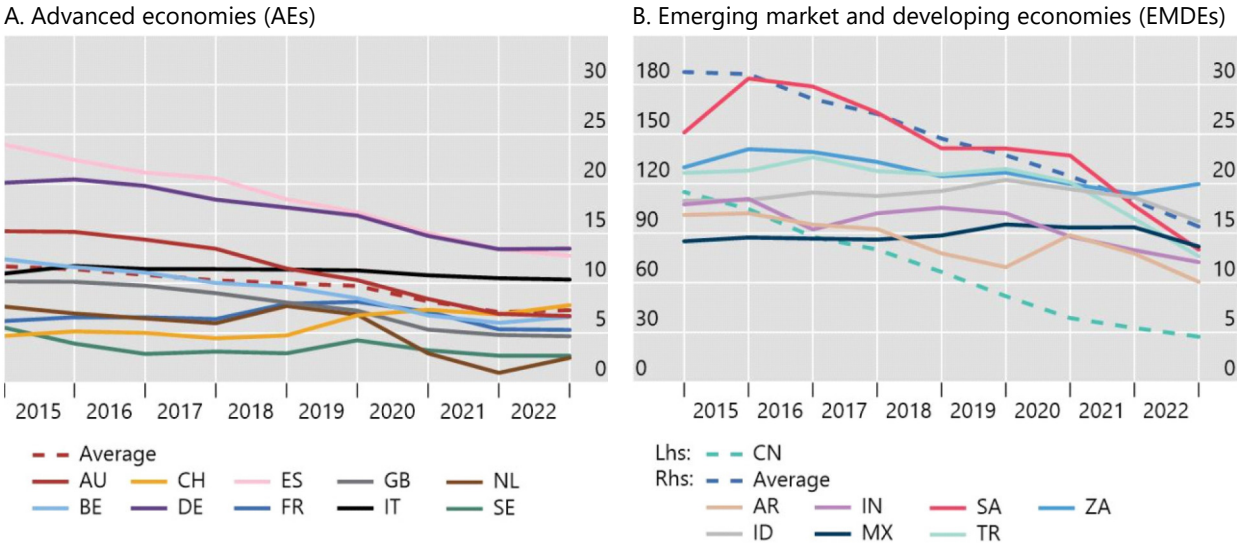
⑤ See Baldo et al (2021), Zamora-Pérez (2021), Claussen et al (2023), Shy (2023).

⑥ See Drehmann et al (2002), Arango-Arango and Suárez-Ariza (2020), Baldo et al (2021).

Demand for banknotes and coins declined globally and most strongly in EMDEs. In addition to the declining average transaction values of cashless payments, the global trends in cash withdrawals also hint at a decline in the use of cash as a means of payment.[9] In 2022, the average ratio of the value of cash withdrawals to GDP in AEs was 7% (Graph 3.A) and 16% in EMDEs (Graph 3.B). Differences between the two groups have narrowed over time as cash withdrawals continued to fall in EMDEs while they stabilised in AEs. Nevertheless, the ratio of cash withdrawals to GDP varies significantly across CPMI jurisdictions, ranging from 2% in the Netherlands and 3% in Sweden, to 20% in South Africa and 27% in China.[10]

The demand for cash withdrawals is converging globally[1]

As a percentage of GDP — Graph 3



[1] The graph only includes jurisdictions for which we have data covering the entire period between 2014 and 2022. Therefore, BR, CA, EA, HK, JP, KR, SG and US are not represented.

Sources: CPMI Red Book statistics; authors' calculations.

After the strong growth observed during the pandemic,[11] total cash in circulation also continued to normalise in most jurisdictions in 2022 (Graph 4.A).[12, 13] The composition of total cash in circulation is often used as another indicator of the use of cash in an economy, with the lowest (highest) denomination banknotes and coins typically being held as a means of payment (store of value).[14] Low-denomination

9 See Khiaonarong and Humphrey (2022b).

10 These differences are in line with differences in cash usage across jurisdictions. Eg, as reported in ECB (2022), the share of cash in the total value of retail payments was 15% in the NL, 35% in FR, 38% in DE and around 50% in both IT and ES in 2022.

11 See Kosse and Szemere (2021).

12 The decline was especially pronounced in AR and TR. This is likely driven by their high policy rates (see Graph A1 in Appendix), which increased the opportunity cost of cash holdings, and the high degree of dollarisation (see IMF (2022) and IMF (2023)).

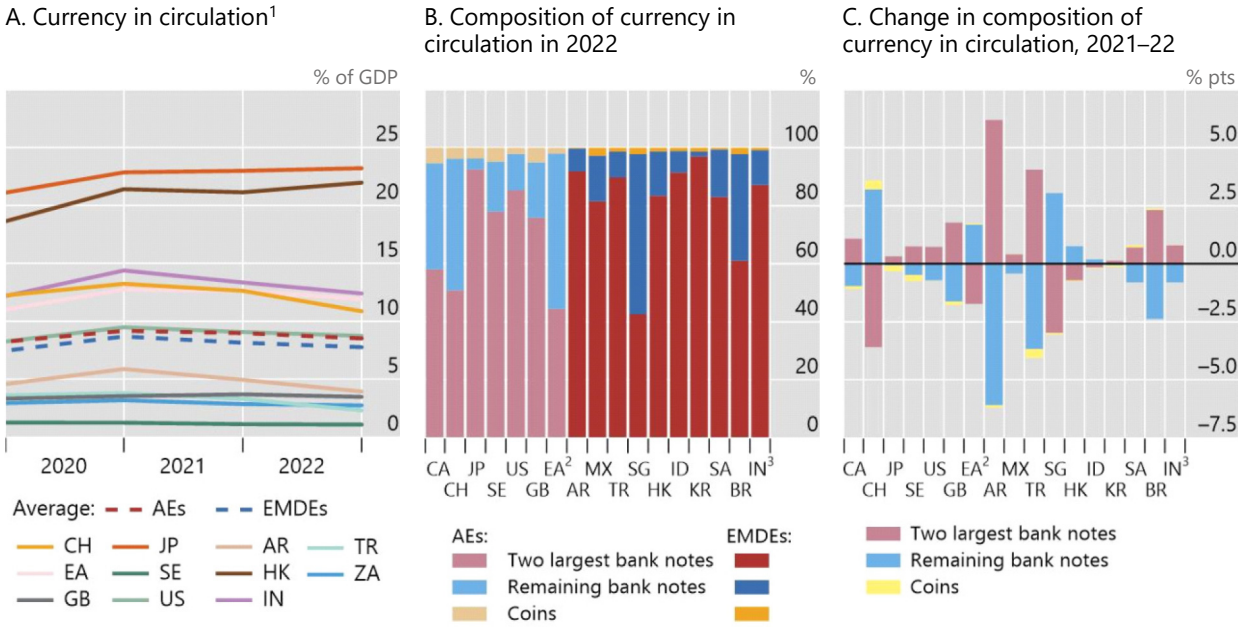
13 Hong Kong and Japan stand out as notable exceptions to the general declining trend. In these jurisdictions, the amount of cash in circulation was already more than double that of the AE and EMDE averages in 2021, and it rose even further in 2022.

14 See Shy (2023) and the references therein.

banknotes and coins account for a small proportion of the total value of outstanding cash in circulation and witnessed a further decrease in 2022 in most jurisdictions (Graph 4.B and Graph 4.C). [15, 16]

Currency in circulation has fallen since the pandemic, particularly small denominations

Graph 4



[1] For readability, only a selection of individual jurisdictions is shown. However, the averages of AEs and EMDEs are calculated based on all jurisdictions for which we have data available. [2] EA: €500, €200 and €100 notes are included in the two largest denominations because €500 notes are no longer issued. [3] IN: the second largest denomination is excluded because this is a commemorative banknote.

Sources: CPMI Red Book statistics; authors' calculations.

Fast payments are a prominent driver of payment digitalisation

Over the past few years, many jurisdictions have introduced fast payments as an alternative to cash or card payments, to foster financial inclusion, lower transaction costs and increase competition for retail payments.[17] Fast payments, sometimes referred to as instant, real-time, immediate or rapid payments, are typically small-value payments in which the funds are made available to the payee in real time or near real time and as near as possible to 24 hours a day and seven days a week. While to date, fast payments are mainly used for domestic payments, they also have the potential to improve cross-border payments. The CPMI has identified interlinking fast payment systems as one of the most promising solutions for making cross-border payments cheaper, faster, more accessible and more transparent. In fact, interlinking fast

15 See Glowka et al (2023) for an analysis of the development of the composition of cash in circulation over time.

16 AR and TR are notable outliers, where the share of the highest denomination banknotes sharply increased in 2022. This is likely the direct result of their high inflation environments, due to which even the highest denominations were used in payments.

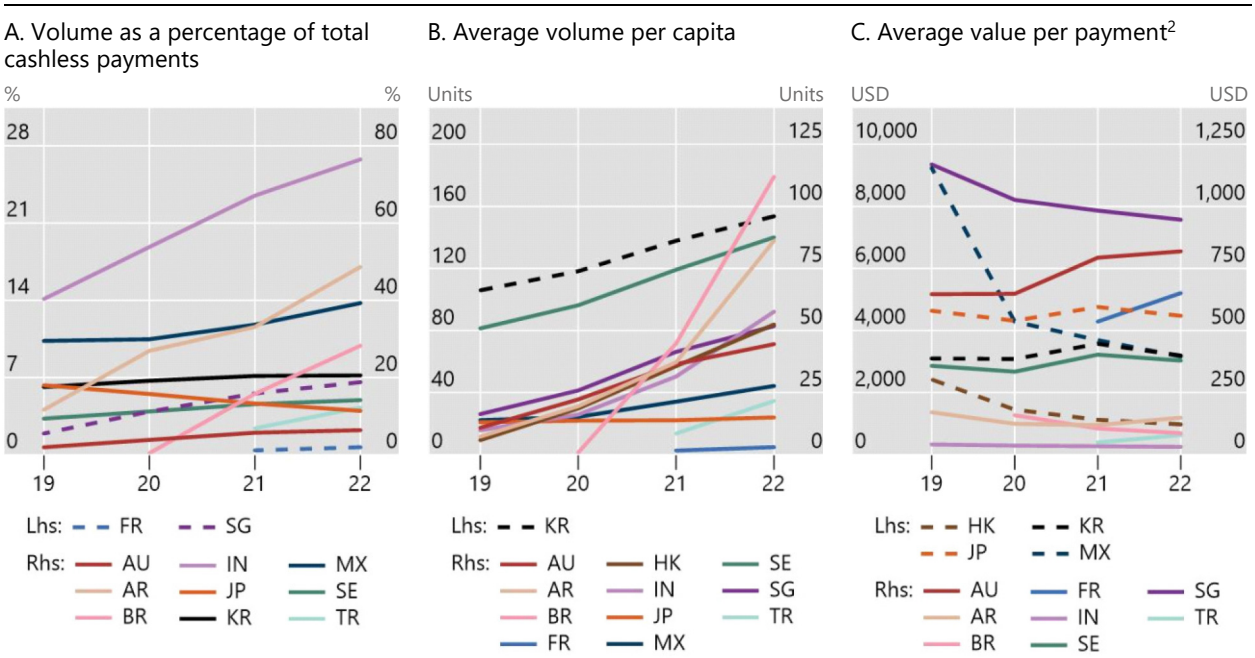
17 See Bolzani (2022) and Khiaonarong and Humphrey (2022a).

payment systems is one of the CPMI's priority actions to help achieve the G20 targets for cross-border retail payments and remittances by 2027.[18]

Most CPMI jurisdictions have at least one fast payment system, operated either by the central bank or the private sector.[19] The share of fast payments in total cashless payments continued to grow in 2022 in most jurisdictions for which we have data (Graph 5.A).[20] In terms of number of transactions, this share was largest in India (76%), Argentina (49%), Mexico (39%) and Brazil (28%). In terms of payments per capita, it was highest in Korea (154), followed by Brazil (112) and Sweden (88) (Graph 5.B). Due to an unprecedented rapid growth in 2022, the number of fast payments per capita in Argentina (86) is now almost the same as in Sweden.

The development of average transaction values varies greatly between jurisdictions. In some countries the average size of a fast payment has grown over time, while in others, fast payments are increasingly used for small transactions (Graph 5.C). These differences may reflect differences in use cases, both between countries and over time. For example, in Türkiye, fast payments are used mainly for person-to-person and person-to-business payments, while in other jurisdictions, fast payments are also (increasingly) used for government payments and transactions between businesses, which are often higher in value.[21] Moreover, trends in average transaction values may reflect changes in transaction limits, imposed by either the fast payment system or the financial institutions offering these services to their clients.

The use of fast payments continued to grow[1] Graph 5



[1] Jurisdictions represented in the above graphs are those that have data available for at least two consecutive years during the period 2019–22. [2] To remove the effect of the variability of the exchange rates over time, we used the average exchange rates over those time periods that the jurisdictions had data available to convert values expressed in domestic currency to US dollars.

Sources: CPMI Red Book statistics; authors' calculations.

[18] See CPMI (2023).

[19] See CPMI (2021).

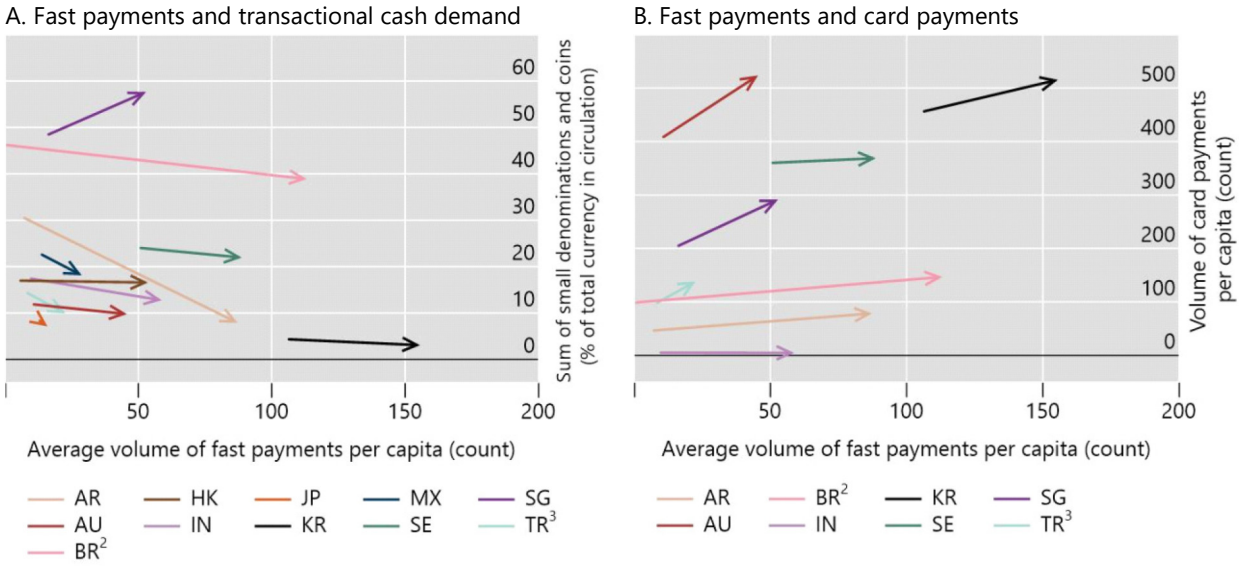
[20] The share of fast payments in the total value of cashless payments also continued to increase in most jurisdictions. For data on the value of fast payments, see Tables T6 and CT8G of the Red Book statistics in the BIS Data Portal.

[21] See CPMI (2021).

In nearly all jurisdictions, the volume of fast payments increased while demand for small-denomination banknotes declined (Graph 6.A). At the same time, the volume of fast payments went hand in hand with an increase in the number of card payments (Graph 6.B). This suggests that fast payments are a prominent driver of the general digitalisation of countries' payment ecosystems.

Fast payments rose as demand for small-denomination banknotes and coins declined[1]

Graph 6



[1] Changes in 2019–22 for AR, AU, HK, IN, JP, KR, MX, SE and SG, for which the start/end of an arrow represents 2019/2022. [2] Changes in 2020–22 for BR, for which the start/end of an arrow represents 2020/2022. [3] Changes in 2021–22 for TR, for which the start/end of an arrow represents 2021/2022.

Sources: CPMI Red Book statistics; authors' calculations.

From domestic to cross-border: the use of cards abroad surged in 2022, both for payments and cash withdrawals

Over the past few decades, increased international mobility of goods and services, capital and people has made cross-border payments more economically important (CPMI (2020)). The 2022 Red Book statistics shed some light on how consumers pay for their purchases abroad.

During the Covid-19 pandemic, many jurisdictions restricted cross-border travel, which resulted in a decline in cross-border cash withdrawals in 2020 (Graph 7.A and 7.C). While the value of cross-border card and e-money payments also fell for many jurisdictions (Graph 7.D), their number remained rather stable through 2020 (Graph 7.B).[22] This might be explained by the sharp increase in e-commerce during the pandemic, where card payments play an important role. This could have partly or in some jurisdictions fully compensated for the drop in in-person card payments abroad.[23]

[22] Conform the Methodology of the Red Book statistics, cross-border card and e-money payments refer to card and e-money payments made with cards that are domestically issued and used abroad.

[23] FSB (2022), Alfonso et al (2021).

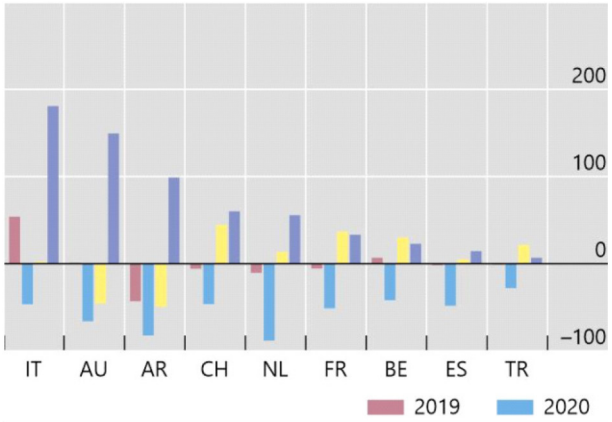
The decline in cross-border cash withdrawals and card payments in 2020 was only temporary: as cross-border travel picked up again, cross-border cash withdrawals and the use of cards and e-money for payments abroad increased sharply in 2021 and even more so in 2022. Without exception, in 2022, the number of cross-border cash withdrawals as well as card and e-money payments surged in all countries for which we have data (Graph 7.A and Graph 7.B).

Cross-border payments and cash withdrawals surged[1]

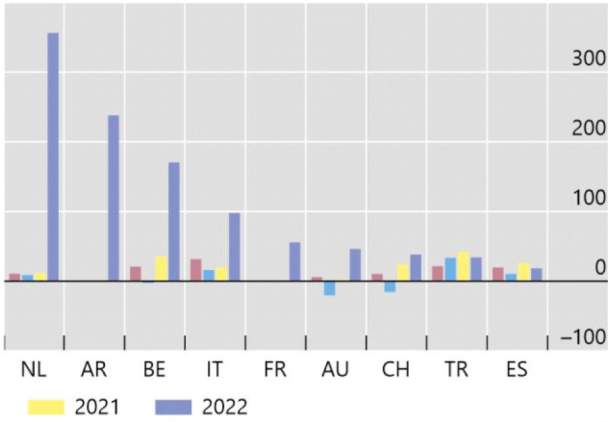
In per cent

Graph 7

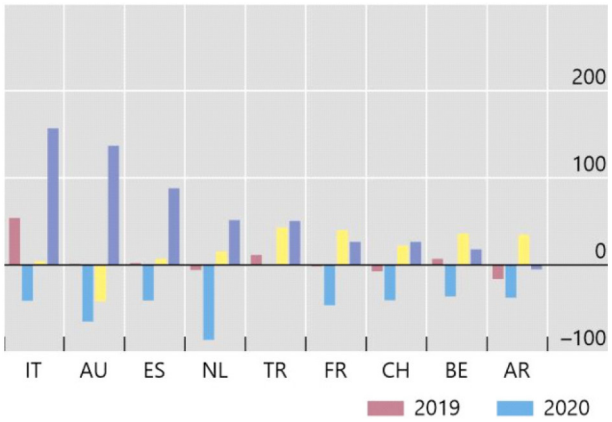
A. Growth of volume of cash withdrawals outside the jurisdiction



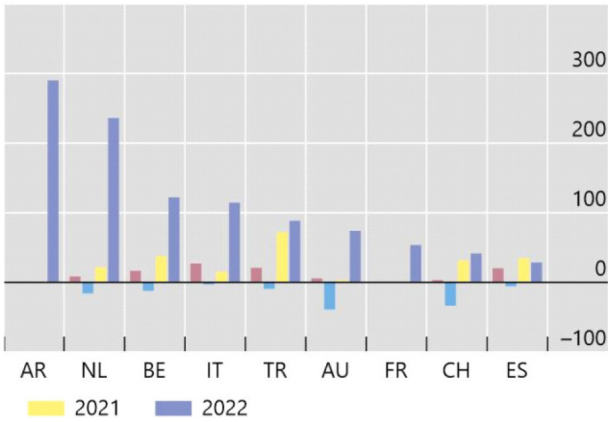
B. Growth of volume of cross-border card and e-money payments[2]



C. Growth of value of cash withdrawals outside the jurisdiction



D. Growth of value of cross-border card and e-money payments[2]



[1] Only those jurisdictions for which data are available for all indicators are represented. [2] Cross-border card and e-money payments refer to card and e-money payments made with cards that are domestically issued and used abroad.

Sources: CPMI Red Book statistics; authors' calculations.

Cross-border payment habits differ notably across jurisdictions in terms of value (Graph 7.C and Graph 7.D). For example, the increase in cash withdrawals made abroad with cards issued in Italy was significantly higher than the growth in respective cross-border card and e-money payments. By contrast, in the Netherlands, the number and value of cross-border card and e-money payments grew much faster than the increase in cross-border cash withdrawals. With Italy being a country with a relatively high domestic cash usage, and the Netherlands having a relatively high domestic card usage, these differences might

suggest that consumers hold on to their domestic payment habits when being abroad.[24] However, more granular data are needed on the breakdown of cross-border payments to confirm this assumption.

Conclusion

The 2022 Red Book statistics demonstrate that the use of digital payment methods continued to grow in 2022 and that the use of fast payments reached new heights. Consumers and businesses to date mainly use fast payments for domestic payments. However, the proliferation of fast payment systems globally also provides opportunities to foster interlinkages between them to enhance cross-border payments. Interlinking fast payment systems is one of the priorities for meeting the G20 targets of cheaper, faster, more accessible and more transparent cross-border payments, while maintaining their safety.

Alongside the rapid rise of digital payments, cash withdrawals and small-denomination banknotes in circulation declined in 2022. Nevertheless, existing research shows that there is still a considerable demand for cash, also for making payments. While consumers increasingly choose to pay digital, cash is still the preferred means of payment for certain segments of the population, such as older people or persons who would like to control their budget.[25] Moreover, the 2022 Red Book statistics show that consumers still withdraw cash when being abroad.

One of the key tasks of central banks is to ensure that consumers and businesses can make and receive payments in an efficient, safe and smooth way. For many central banks this includes ensuring that cash is easily accessible and widely accepted as long as people want to use it for payments. Various jurisdictions have explicit access-to-cash policies. For instance, the Bank of Korea plans to work with the government and banks to improve the services and usability of ATMs, in Sweden, certain major banks are obliged by law to provide cash services, the UK has put in place new regulation to ensure that people do not have to travel beyond a reasonable distance to withdraw or deposit cash, and in the US, retailers are required to accept cash as a means of payment for purchases less than 2,000 US dollar.[26]

Continued focus on data collection, consistency and monitoring are paramount to better understanding the use of payment methods and the factors driving the uptake of payment innovations. Data on retail payment trends also shed light on the potential use cases for fast payments and retail central bank digital currencies (CBDCs) that many central banks are currently exploring.[27] The annual Red Book statistics are collected in a standardised and harmonised way from jurisdictions representing about 60% of the world's population and 75% of global GDP. They are a unique source of jurisdictional-level data that allow for a cross-country comparison of the key payment trends over time. However, as payment methods are evolving and user preferences are changing, there is a need to continuously revisit the quality, relevance and completeness of data sources. For example, challenges exist in the area of quantifying actual cash usage, the use of emerging payment technologies and cross-border payments. One way to address these is to complement existing data sources with multi-jurisdictional or global payment surveys.[28] International cooperation between central banks and related authorities will be indispensable to keep abreast of the latest developments in payments.

[24] For payment habits in Italy and the Netherlands, see Bank of Italy (2023) and ECB (2022). In addition, Kosse and Jansen (2013) show that foreign backgrounds influence payment behaviour after migration, with migrants coming from cash-oriented countries being more likely to use cash instead of cards in their host jurisdiction.

[25] See for example BoE (2022), Cubides and O'Brian (2022), ECB (2022), Shy (2023), and UK Finance (2023).

[26] See BoK (2021), Riksbank (2022), BoE (2022) and Heinbuch (2022).

[27] Kosse and Mattei (2023).

[28] See for example Bagnall et al (2016), ECB (2022).

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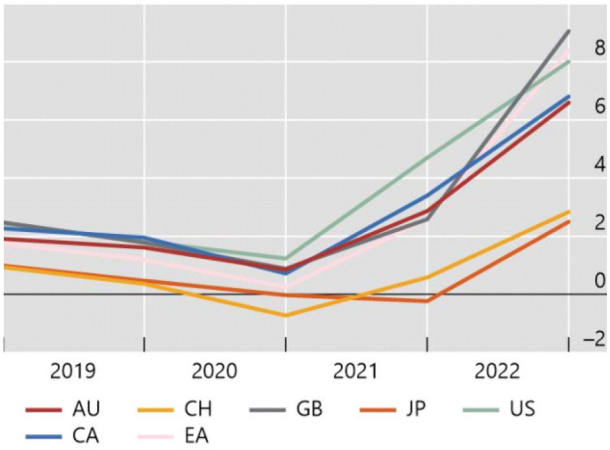
Appendix

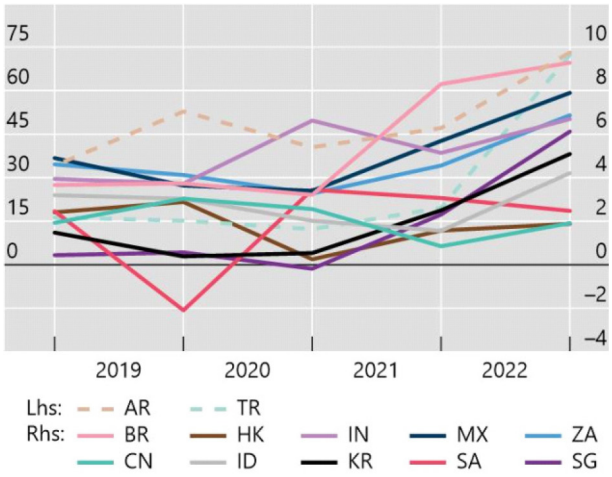
Consumer price index and policy rate, 2019–22

Change on previous year, in per cent — Graph A1

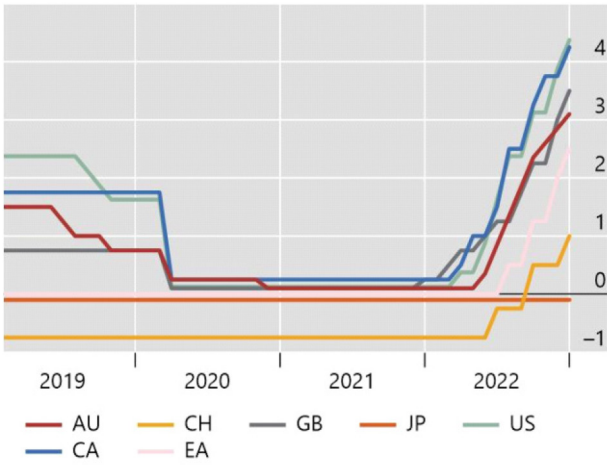
A. Consumer price index in AEs



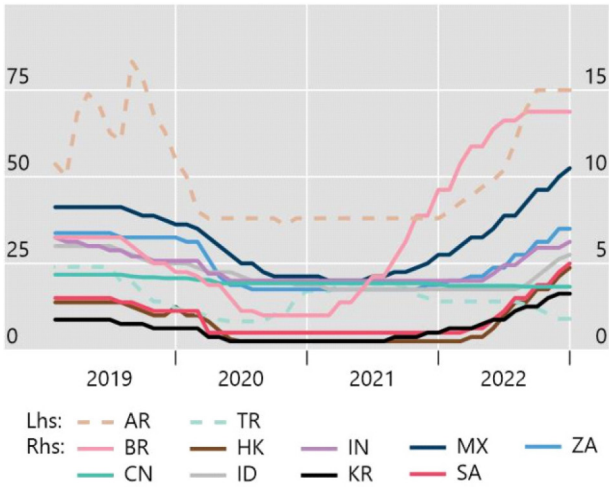
B. Consumer price index in EMDEs



C. Policy rates in AEs



D. Policy rates in EMDEs[1]



[1] SG is not represented because monetary policy in this jurisdiction is not conducted through policy rates.

Sources: BIS consumer prices statistics; BIS policy rates statistics.

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