

Past and future development of euro cash in Austria – resilience in light of technological change and economic crises

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In this analysis, we discuss how the demand for and the use of cash has changed in Austria since euro banknotes and coins were introduced in January 2002. Cash use for payments has decreased over the past 20 years, which is not surprising given the enormous technological advances. Despite this decline, cash remains the prevalent means of payment at the point of sale (POS) in Austria. Somewhat contrary to the downward trend in the use of cash for payments, the overall circulation of euro cash has increased over the past 20 years. In international comparison, Austrians are among the more cash-affine Europeans; however, there are several other European countries with comparable levels of cash use. We examine how cash use has developed among different sociodemographic groups and how Austrians view cash and noncash payment means.

With regard to the likely development in the near future, we discuss the critical factors which will contribute to a reduction of cash use and those which will contribute to maintaining a strong role of cash. We argue that cash has important features that are of value for society, such that it should be in the public's interest to safeguard cash as a key means of payment. This requires maintaining adequate access to cash for consumers and to cash deposit facilities for merchants. Also, paying in cash at any POS should remain possible, and measures should be taken to ensure cost efficiency along the supply chain of cash.

JEL classification: E41, E50, D10, G11

Keywords: cash demand, euro currency in circulation, hoarding, payments, financial innovation

On the occasion of the 20th anniversary of the introduction of euro cash, we analyze how the importance of cash has changed and how it might change in the coming years. Any discussion of the development of cash over the past 20 years as well as deliberations about its future need to account for two major developments:

- Technological innovations have increased convenience of electronic payments at a breath-taking speed: Smart phones are now ubiquitous², and the technical capabilities of these devices make them ideal for deploying payment solutions. The rollout of the NFC technology, on cards and on mobile devices, has been considered a game changer in retail payments with the potential of challenging the dominance of cash for small-value transactions.
- However, those innovations were superseded by a series of economic shocks. First, the global financial crisis of 2007/2008, which has eroded trust in banks and in the financial system; second, the sovereign debt crisis in the European

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² ©Apple Inc.'s iPhone was presented in 2007.

Economic and Monetary Union (EMU) of 2012; third, a regime of low interest rates in developed economies, in general, and in the EMU, in particular; fourth, the outbreak of the COVID-19 pandemic and lately the war in the Ukraine. All these shocks have had repercussions on the demand and use of cash – e.g. cash demand is higher in times of uncertainty and when interest rates are low – and they might have repercussions on its future.

Where did we start 20 years ago and where do we stand now with respect to Austrians' demand for and use of cash? In section 1, we present evidence about changes in the use of cash for payments and for nontransactional demand (i.e. hoarding). The main finding is that, overall, euro cash circulation has increased considerably over the past 20 years like it has done in many other countries. This development is in line with the fact that cash demand increases during times of heightened economic uncertainty and low interest rates, as it is a highly liquid safe asset that provides stability (with respect to the nominal value).

Detrimental to overall demand, cash use for payments has declined markedly mainly because of an increased take-up of financial innovations. As a case in point, only 66% of Austrian residents possessed a debit card in the first quarter of 2002. Currently, debit card ownership is close to 100%. Back in 2002, 87% of Austrian survey respondents said that they had not shopped online yet. In the meantime, the respective share has plummeted to only 27% in 2020. In addition to these developments, the COVID-19 pandemic has had an adverse effect on the use of cash. However, despite these changes, cash continues to be the most important payment instrument in Austria.

But is Austria's case an exception? An international comparison shows that it is not; however, among the highly developed economies, it is one of the more cash-intensive ones.

In section 2, we take a closer look at how Austrians use and see cash, and how their behavior and opinion regarding cash have changed over time. A key finding of this analysis is a growing gap within society. 20 years ago, cash was used for payments relatively homogeneously across sociodemographic groups. However, the ubiquitous availability of electronic payments has had a differential impact on society: while a growing share of the population has been taking up cashless payments, a considerable share of the population is still preferring cash. We expect this heterogeneity to further proliferate in the near future. This begs the question whether less and less Austrians will be using cash for payments.

In section 3, we discuss some of the main pros and cons of a declining cash use. After evaluating the arguments, we formulate what we expect for the next 10 years. A lot depends on how the payment infrastructure and hence relative costs of payment instruments will develop. Whether cash will continue to be easily accessible is central for the future development of cash as well. Moreover, there are unknowns (new technologies, economic and political instabilities) that need to be considered. Overall, we argue that there is a strong case for economic policy to maintain a level playing field across payment instruments and that consumers will still have the freedom of choosing between cash and different payment instruments. Section 4 concludes.

1 Cash developments over the past 20 years

1.1 Strong increase of euro currency in circulation

At the end of 2021, the total value of euro banknotes circulating outside the vaults of central banks was at EUR 1,544 billion. This compares with an overall value of EUR 358 billion at the end of 2002, the year of the euro introduction. At the end of 2004, euro banknotes in circulation amounted to EUR 508 billion, which probably serves as a better comparison due to cash changeover effects.

Chart 1 relates the development of currency in circulation to income (i.e. nominal gross domestic product), accounting for the fact that prices and income have also increased over the past 20 years. The resulting time series may be a reflection of the public's desire to hold cash, given that they are free to choose cash over bank deposits (or other financial assets) and that central banks accommodate any demand for banknotes.

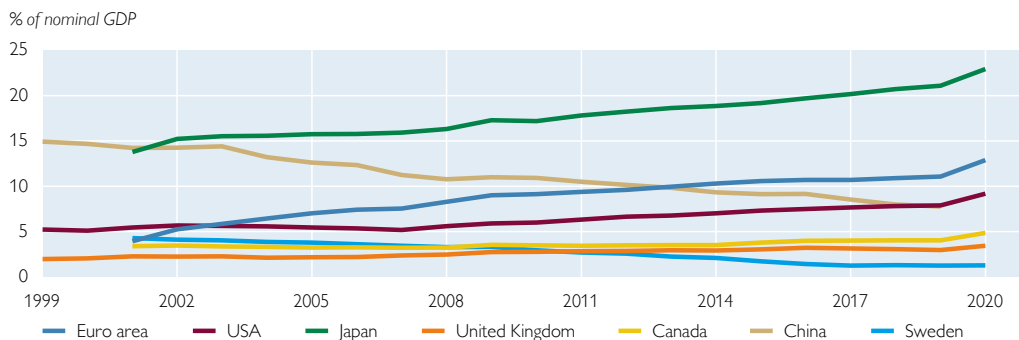
In the euro area, the currency (to nominal GDP) ratio increased from about 4% at the end of 2001 to about 13% at the end of 2021 – meaning it tripled. Its development in the early years of euro cash was influenced by the cash changeover in 2002 and the growing role of the euro as an international currency. As argued by Jobst and Stix (2017), the currency ratio may have risen until 2006 to catch up with the value that the German mark used to have, with the euro taking over the role of the German mark as an international currency.

Despite this peculiarity of the euro area time series, the underlying trend increase can also be observed in other large economies like the United States or Japan (see chart 1). In addition, in many other economies the currency ratio has remained stable or has grown slightly after 2008, for instance in Great Britain or Canada.³ As shown by Jobst and Stix (2017), only a minority of economies has a downward trending currency ratio, e.g. Sweden, Norway or China.

The takeaway from this analysis is that cash is still being heavily demanded, not only in the euro area but also in many other economies. As discussed by Jobst and Stix (2017), this is related to (i) very low interest rates after the global economic and financial crisis, (ii) increased domestic hoarding, presumably to some extent

Chart 1

Currency in circulation in various economies



Source: IMF, ECB, FRED, authors' calculations.

³ The strong increase in 2020 is mainly due to the sharp drop of GDP in course of the COVID-19 pandemic.

as a consequence of increased economic uncertainty and (iii) increased foreign demand for euro cash (see also Rösl and Seitz, 2021).⁴

The relative importance of the different uses of cash – most importantly for domestic transactions, for domestic hoarding or for nondomestic circulation – can only be assessed indirectly, though, given the anonymity of cash. According to Lalouette et al. (2021), between 30% and 50% of the value of euro banknotes was circulating abroad in 2019. Lalouette and Esselink (2018) as well as Zamora-Pérez (2021) estimate that roughly 20% of the total value in circulation is used for day-to-day transactions within the euro area and that about 7% are held in bank vaults. The remaining share is either hoarded domestically or, to a much lesser extent, lost. For Australia, Finlay et al. (2018) estimate that about 7.5% of banknotes are lost. All these estimates suggest that about 20% to 40% could have been held as a store of value within the euro area. However, these estimates refer to pre-pandemic times, and it is not clear how the different ways of using cash have since changed.

Chart 2 visualizes the relative share of each denomination in the total value of euro banknotes in circulation in the euro area over time (with the relative shares summing to 100% for each observation). The relative demand for each denomination has not been constant over time. In particular, the demand for EUR 50 banknotes has increased considerably (from 33% in 2004 to 44% of total banknotes in circulation at the end of 2021). The relative importance of the EUR 500 bill, which is assumed to be the banknote that is used most for hoarding, has been decreasing after its peak in 2009 (shortly after the global economic and financial crisis). The ECB Governing Council's decision from May 4, 2016, to discontinue production of the EUR 500 banknote has induced a decrease of its circulation.⁵ In turn, the relative importance of EUR 50, EUR 100 and EUR 200 banknotes has increased.

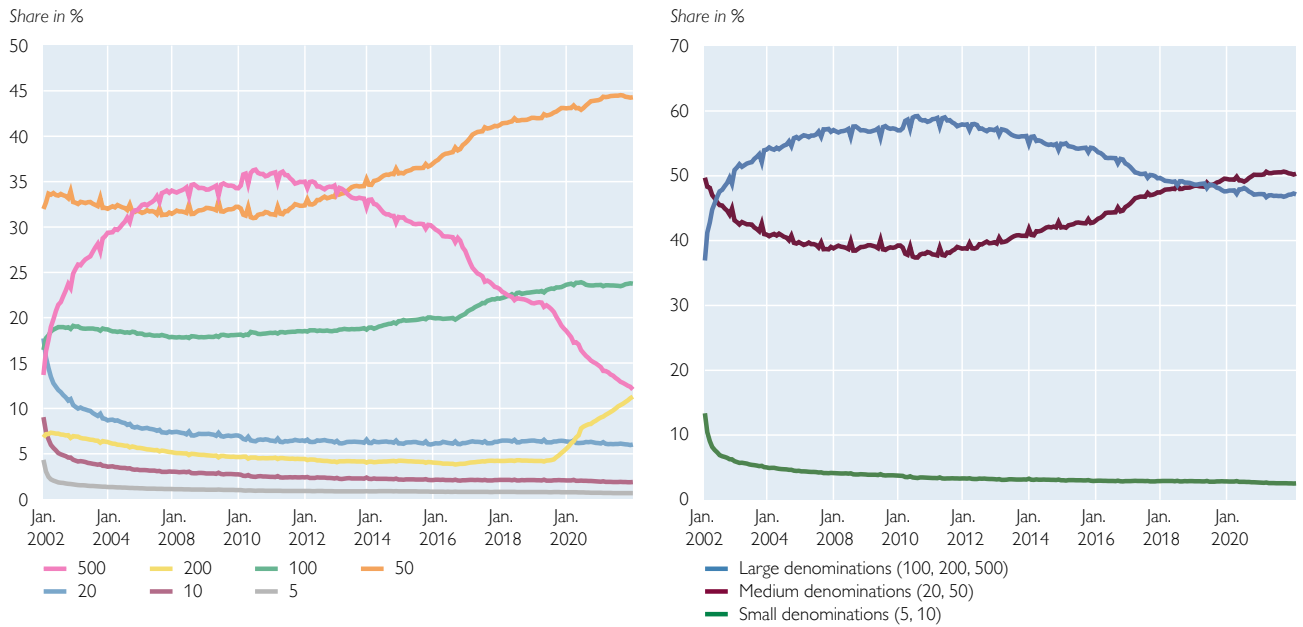
The right panel of chart 2 illustrates the relative share of banknotes grouped by small, medium and large denominations. It shows that the share of small denominations declined from 5% in December 2004 to about 3% in 2021 – these banknotes are mostly used for payments, and their decline likely reflects the increased use of cashless payments. Furthermore, the share of medium denomination banknotes has considerably increased after 2008 and is now higher than the share of high denomination banknotes. We presume that EUR 20 banknotes are mostly used for transactions and that EUR 50 banknotes are both used for transactions and for hoarding.

⁴ Typically, a distinction is made between transactional demand and nontransactional demand for cash. The latter arises from various sources, e.g. foreign demand, hoarding, precautionary demand, demand for shadow economy transactions, demand due to uncertainty, etc. As these two concepts overlap, we prefer to distinguish between domestic transactional demand, foreign demand and domestic hoarding (with hoarding being the residual demand that does not arise from the desire to conduct transactions and that does not arise from abroad). However, this does not solve the problem that the separation between transaction demand and domestic hoarding is difficult conceptually, e.g. if people save in cash for later purchases.

⁵ The issuance of the EUR 500 banknote was stopped across the euro area at the end of January 2019 with the exception of Germany and Austria, where such bills were issued until the end of April 2019. The EUR 500 banknote remains legal tender, though, and can be exchanged at cash desks of Eurosystem central banks for an unlimited period of time. The decision to discontinue the production and issuance of the EUR 500 banknotes was based on the assumption that they are (also) used for illicit activities (e.g. money laundering, terrorist financing). However, it is difficult to substantiate this assumption or the effectiveness of this measure against illicit activities. See Rogoff (2016) for arguments in favor of the discontinuance and McAndrews (2020) for counter-arguments.

Chart 2

Share of denominations in the total value of euro banknotes in circulation



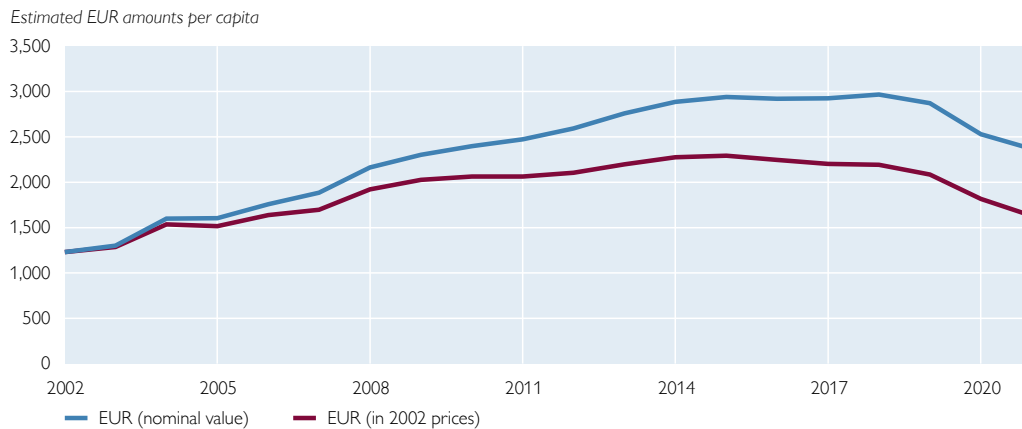
Source: ECB.

Note: This chart shows the relative share of each banknote denomination in the overall value of banknotes in circulation in the euro area. These shares sum to 100% for each observation.

What about cash circulation in Austria? With euro cash moving freely within the euro area, it is no longer possible to measure the amount of euro cash that is circulating in Austria. Instead, the Oesterreichische Nationalbank (OeNB) computes an approximate estimate of the amount of euro cash that is circulating within Austria, using banknote shipment data and return frequencies of banknote

Chart 3

Euro currency in circulation in Austria



Source: OeNB, Statistics Austria, authors' calculations.

Note: This chart shows estimated amounts of euro currency in circulation in Austria excluding cash held in bank vaults. Population of the year 2021 is based on a forecast.

denominations (see chart 3).⁶ Despite the cautious interpretation of the resulting estimates, two observations are evident: First, demand for euro cash went up in Austria as well, both in nominal and in real terms until the end of 2018, and declined somewhat thereafter. Second, the absolute amounts circulating per capita in Austria are relatively high. At the end of 2021, the amounts held by consumers, merchants and companies totaled about EUR 2,400 per Austrian resident. This compares with a euro area average of about EUR 2,100 (EUR 4,200 minus an assumed foreign circulation of 50%).

The reasons for the decline in cash circulation in Austria, in particular during 2020 and 2021, are not entirely clear. We suspect that the decrease is partly related to the pandemic-induced sharp drop in tourist visits to Austria. In 2021, it could also be linked to the increase in inflation rates. Furthermore, we presume that the population and the companies were de-hoarding due to short-time work, unemployment or loss of sales. The “normalization” after the COVID-19 pandemic will show whether the drop was related to the pandemic or whether it reflects a more persistent development.

Box 1

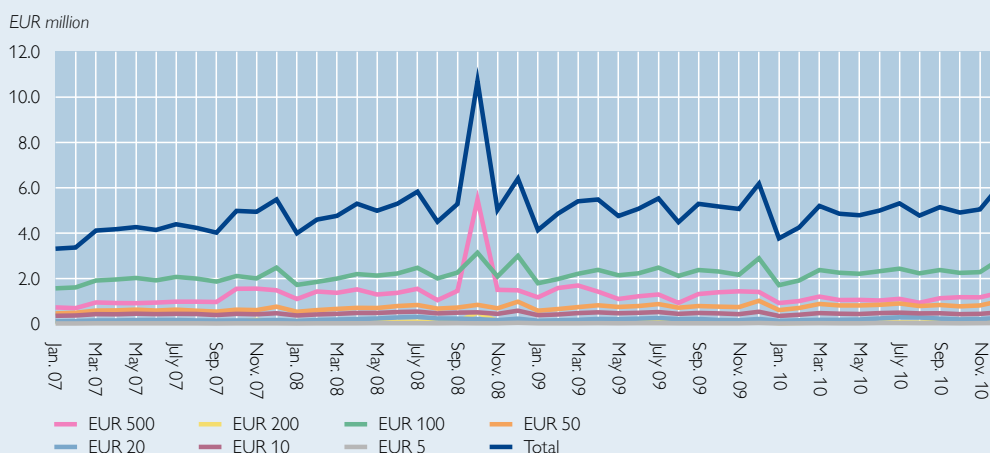
Euro cash: a safe haven asset in uncertain times

Cash is the only form of central bank money available to the public. While the nominal return on cash is zero, it offers immediate liquidity and stability with regard to its nominal value. The mere feature of cash being a tangible asset which remains in the possession of the owner and which does not involve a third party (e.g. a bank) might also provide a feeling of security. This is particularly true in times of crises when asset prices fluctuate considerably or when trust in banks is low.

During the last 20 years, we have faced several situations of turmoil in Europe, e.g. the global financial crisis (2007/2008), the EU sovereign debt crisis (2012) and, most recently, the COVID-19 pandemic. Following the hypothesis that cash demand grows during crisis situations, the impact should be visible in the books of the central banks. We exemplify this by showing

Chart B1 1

Gross issuance of euro banknotes in Austria



Source: OeNB.

⁶ Cross-border flows (e.g. via banknote wholesale traders) are largely excluded.

the temporal development of gross issuance figures, i.e. the value of banknotes brought into circulation in Austria (consisting of the ordinary issuance for transaction and store of value purposes as well as for the replacement of cash unfit for circulation).

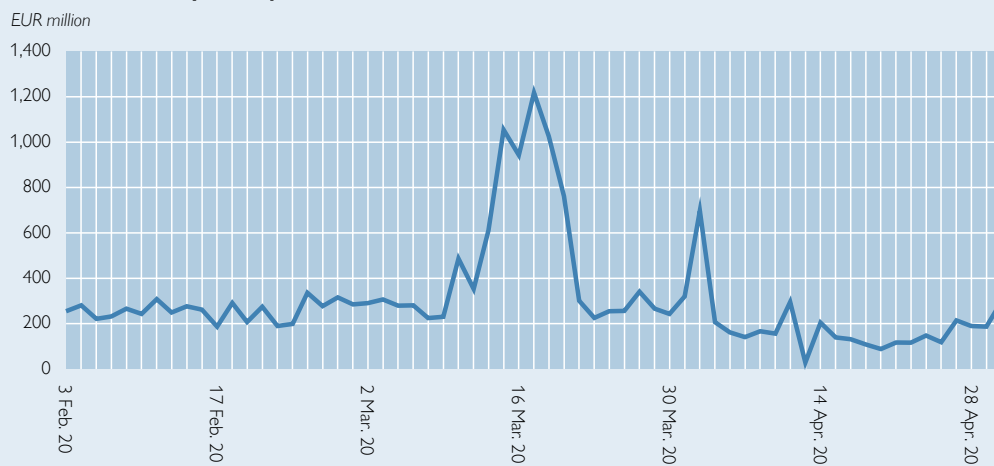
When looking at the banknote gross issuance in Austria between January 2007 and December 2010, the figures show a striking increase of the issuance of the EUR 500 (pink line) and to some extent also of the EUR 100 (green line) banknotes. This rise was limited to September 2008 (bankruptcy of Lehman Brothers), when financial markets became extremely volatile and trust in banks eroded (Knell and Stix, 2015). In turn, asset holders switched to a low risk, stable and highly liquid asset: cash. In ordinary circumstances, gross issuance of the EUR 500 banknote in Austria was oscillating around EUR 1.5 billion per month. In September 2008, it peaked, reaching almost EUR 5.5 billion, which was four times the usual level at that time.

Another example of cash being the payment instrument of choice during times of crises is the beginning of the COVID-19-pandemic. Between January and the first half of March 2020, the OeNB issued on average euro banknotes with a total face value of EUR 200 to 300 million per day. Furthermore, right after the announcement of Austria's federal government to impose a lockdown, people responded with excessive demand for essential products like food and care products – as well as for cash: From March 12 to March 18, 2020, issuance increased sharply. On March 17, the OeNB's cash issuance reached more than EUR 1.2 billion, which is five times the usual level.

Chart B1 2

Daily banknote issuance in Austria

Between February and April 2020



Source: OeNB.

1.2 Cash use for transactions has declined

How has the use of cash for payments changed over the past 20 years? For its anonymity, cash use for payments can only be estimated. One possibility to do so is to conduct payment diary studies, i.e. large scale surveys among Austrian residents in which the participants record all transactions over a one-week period (excluding recurring payments such as rents, insurance premia, etc.). The OeNB has one of the longest histories of consecutive payment diary studies, with the first conducted in 1996 (Mooslechner and Wehinger, 1997). Later studies were conducted in 2000, 2005, 2011, 2016 and 2020/2021 (Mooslechner et al., 2002, 2006 and

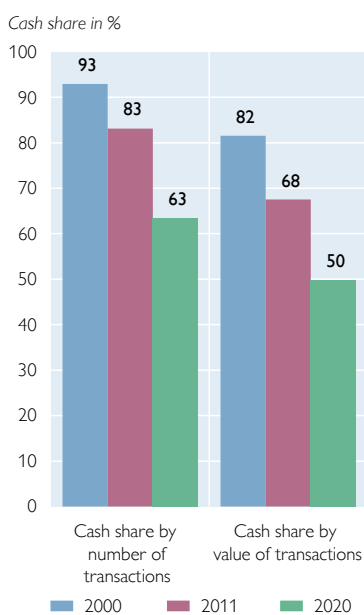
2012; Höpperger and Rusu, 2022). In the following, we will compare results from the studies of 2000, 2011 and 2020.⁷

Chart 4 shows the cash share of payments in terms of the number of transactions and in terms of the value of transactions. Transactions refer to point of sale (POS), remote (e.g. internet purchases) and person-to-person (P2P) transactions. For the sake of temporal comparability, we exclude all transactions that were paid via bank transfers in the studies of 2011 and 2020 (the share of these payments is relatively small).

In the year 2000, 93% of all payment transactions were conducted in cash (7% with cards and cheques). This share declined to 63% at the end of 2020. A similar drop can be observed for the value of recorded transactions. In 2020, about half of the value of all payments was conducted in cash.

Chart 4

Share of cash payments in Austria



Source: OeNB payment diary surveys, authors' calculations.

Note: Cash shares derived from three Austrian payment diary survey studies. For comparability, bank transfers from the years 2011 and 2020 were excluded. Therefore, the shares might deviate from other publications.

There are three main takeaways from these results:

- First, cash use has declined significantly. Over the 20 years from 2000 to 2020, the average annual decrease was 1.5 percentage points (pp) per year for the cash share in value terms.
- Second, despite this drop, cash is still of significant importance for everyday payments. In terms of the number of transactions, it is still the most frequently used payment instrument in Austria.
- Third, the decline was not linear, as chart 4 might suggest. In particular, we think that the share of cash payments changed relatively slowly between 2011 and 2019. The COVID-19 pandemic, however, brought about a sudden and significant drop in the use of cash for payments. Box 1 provides an overview of the development from 2019 to 2021.

⁷ For the study in 2016, a different sampling procedure was adopted. Therefore, its results cannot easily be compared with the previous studies. Most survey interviews for the study of 2020/2021 were conducted in fall 2020 and a smaller share in 2021. We will henceforth denote this study as referring to 2020.

Looking at table 1, two major changes in cash use become evident:

- First, consumers are using payment cards gradually more for smaller purchases. This can be seen in table 1, as the average card payment amount declined from EUR 73 in 2000 to EUR 43 in 2020. In turn, the average amount of cash payment went from EUR 29 in 2000 to EUR 18 in 2020.⁸
- Second, the share of consumers who use payment cards has grown substantially, which becomes apparent when looking at the share of cash-only consumers, i.e. consumers who recorded zero noncash payments in the respective 7-day payment diary study, which decreased from 67% in 2000 to 30% in 2020. In turn, the share of consumers who used noncash payment means for more than half of their transactions increased from 2% to 26%.

The changing demand for noncash payments is also driven by the supply of card accepting payment terminals and vice versa. The number of POS terminals increased from about 40,000 in 2000 to about 134,000 at the end of 2020.⁹

The literature has shown that cash use and cash demand are closely related – a declining share of cash transactions implies that consumers carry less cash in their wallets. We find that the median amount that survey respondents carried with them was EUR 107 in 2011.¹⁰ This value decreased to EUR 81 in 2020. In countries where the cash share of payments is significantly lower than in Austria, e.g. Sweden, Denmark, Canada or Australia, a high share of consumers makes almost all payments by card and carries just small amounts of cash for precautionary reasons. To see whether this behavior is observable in Austria as well, we have computed the share of consumers holding less than EUR 50 in their wallets. This share was 25% in 2011 and increased to 31% in 2020. Thus, holding only small amounts of cash for precautionary reasons is not (yet) a predominant behavior in Austria.

Table 1

Payment behavior over time

	2000	2011	2020
Average cash payment amount (EUR)	29	23	18
Average debit card payment amount (EUR)	73	53	43
Share of cash-only consumers (%)	67	47	30
Share of consumers with more than 50% of noncash transactions (%)	2	7	26
Cash holdings in wallet (mean, EUR)	-	142	123
Cash holdings in wallet (median, EUR)	-	107	81
Share of consumers holding less than EUR 50 (%)	-	25	31

Source: OeNB payment diary surveys, authors' calculations.

Note: Average cash and debit card payment amounts and cash holdings in wallet amounts from 2000 and 2011 were inflated to prices from October 2020.

⁸ Transaction values from 2000 and 2011 were inflated with the consumer price inflation index to the respective value of fall 2020 to make the nominal values comparable over time.

⁹ Source: ECB, "Number of POS EFTPOS terminals - provided by resident PSPs - located in the reporting country - from Austria" (PSS.A.AT.S102.100.I210.NT.U6.20.ZOZ.Z). This series is only available from 2014. Data for 2000 are taken from "Number of POS terminals - provided by resident PSPs - from Austria" (PSS.A.AT.S102.100.I200.NT.X0.20.ZOZ.Z), which includes terminals provided by resident payment services providers abroad. Both series omit terminals by nonresident payment services providers in Austria.

¹⁰ This means that 50% of survey respondents carried less than EUR 107 with them. The average amount was EUR 142.

COVID-19 pandemic: sudden and strong decline in the use of cash that rebounded after easing of lockdown measures

An alternative method to measuring the use of cash for payments via survey data is to refer to payment card transaction data and to cash shipment data. The salient advantage of this approach is that it provides estimates at a high (in our case weekly) frequency. The disadvantage is that it rests on strong assumptions regarding velocity, hoarding and touristic cash flows, which is why a reliable longer time series cannot be constructed. However, with the outbreak of the COVID-19 pandemic, this approach was adopted to monitor the state of the economy, or rather private consumption (for further details, see Fenz and Stix, 2021). As a by-product, these estimates can be used to compute the implicit cash share (in value terms) for POS transactions.

Chart B2 1 shows our weekly estimates of how the cash share developed in 2019, 2020 and 2021. All values are smoothed (4 week moving average) and indexed by the mean cash shares in calendar weeks 5 to 12 of 2019. Although it should be noted that the uncertainty associated with these estimates is high and that the resulting numbers should only be seen as approximations, the temporal development is informative about the use of cash for POS transactions.

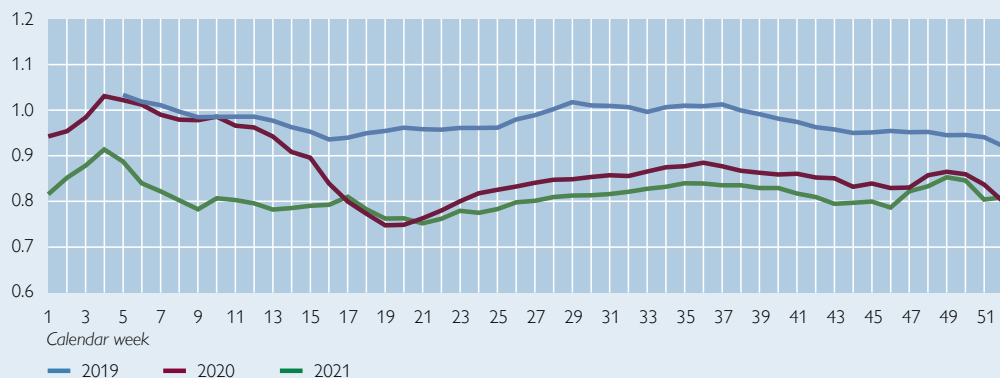
The share of cash in payment transactions (in value terms) declined strongly by about 25%, after the lockdown measures were imposed in Austria in spring 2020 (red line in comparison to blue line). The increase in card spending was driven by debit cards, and by contactless debit card payments in particular. For the latter, the limit for payments not requiring a PIN was raised from EUR 25 to EUR 50. Until the end of summer 2020, when lockdown measures were eased, cash use recovered somewhat in line with a “normalization” of consumption patterns (services, restaurants, travel). During the second and third lockdown at the end of 2020 and in the early months of 2021, the cash share dropped again. Overall, after the strong decrease in 2020, the cash share stabilized in 2021 relative to 2020. For example, in summer 2021, when no strong COVID-19 restrictions were in place, the cash share was somewhat lower but close to the respective value in summer 2020 (green line in comparison to red line).

The basic pattern that cash use first declined after March 2020 and then rebounded during summer 2020, but not to the same level that had prevailed before March 2020, could also be observed in other countries, e.g. in the Netherlands (Jonker et al., 2020), Italy (Ardizzi et al., 2020) and Canada (Chen et al., 2021a).

Chart B2 1

Estimated share of cash at POS (moving averages)

Index (calendar weeks 5 to 12 of 2019 = 1)



Source: Payment card issuers, OeNB.

Note: The chart shows an estimate of how the value share of cash for POS transactions in Austria conducted with cash, debit or credit cards has changed. The payment cards comprise only domestically issued cards. The values are indexed with the average of calendar weeks 5 to 12 of 2019 defined as 1. The indexation is based on 4 week moving averages.

1.3 A country of cash use – is Austria exceptional?

The evidence presented so far shows that cash is still playing a very important role in Austria – both as a store of value as well as a means of payment. This raises the question: how does Austria compare to other countries?

In 2019, the European Central Bank (ECB) conducted a payment diary survey study in (almost) all member countries of the euro area (ECB, 2020). It allows us to provide a harmonized cross-country comparison. Since this study differs in several important dimensions from the OeNB payment diary studies, we stress that the resulting cash shares cannot directly be compared with the cash shares presented earlier.

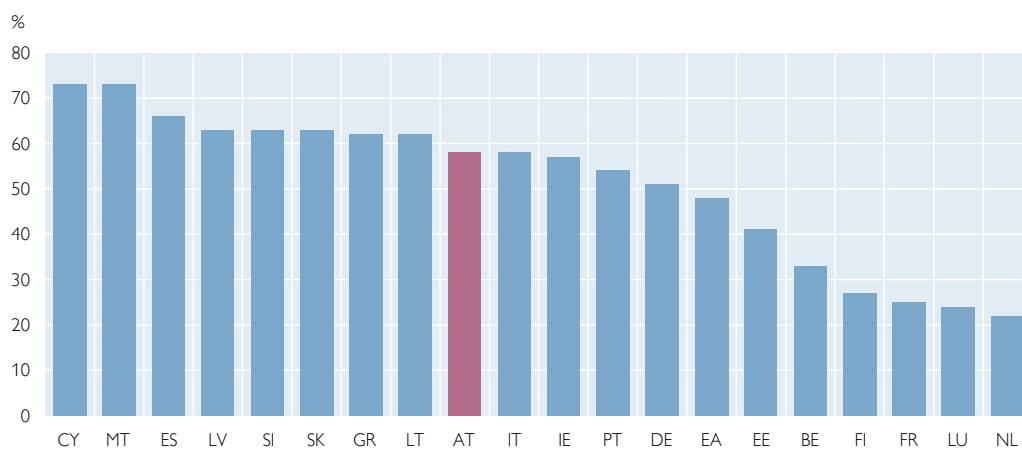
Chart 5 shows that the respective cash share found for Austria (58%) is somewhere in the middle range of all euro area economies but markedly above the euro area average (48%). Cash use in Austria is close to cash use in southern European countries like Italy, Greece, and Portugal but somewhat higher than in Germany (51%). The gist of chart 5 is that Austria is not exceptional regarding the use of cash for payments.

While the figures from the ECB (2020) refer to the pre-pandemic payment behavior, two studies provide insights about the change in payment behavior during the years of the COVID-19 pandemic for Switzerland and Germany (SNB, 2021 and Deutsche Bundesbank, 2021; in both studies, interviews were conducted in fall 2020). These two country results are interesting, as the cash share was rather similar in Switzerland, Germany and Austria before the pandemic.

The Swiss National Bank (SNB) (2021) reported that the cash share (in terms of the number of transactions) had fallen from 70% in 2017 to 42% in 2020. Deutsche Bundesbank (2021) recorded that the cash share had dropped from 74% in 2017 to 60% in 2020. A comparison of the results from the ECB payment diary study from 2019 (ECB, 2020) with the OeNB payment diary study from 2020 for

Chart 5

Share of cash at POS and P2P (by value)



Source: ECB (2020) figure 1 and chart 1; sources cited therein: ECB (2019), De Nederlandsche Bank and the Dutch Payments Association (2020), Deutsche Bundesbank (2017).

Note: Cash share in terms of the value of transactions for POS and P2P payments. EA = euro area average.

Austria reveals a decline of cash share from 79% in 2019 to 63% in 2020. However, this comparison should be considered with precaution, as stated before.¹¹

Thus, the cash share fell strongly in all three economies, and contactless card payments were the key force in this development. In Austria and Germany, the decline was quite similar, while in Switzerland, it was considerably stronger. We are unaware of studies that analyze the causes of this divergent development. However, it would be interesting to pursue the question whether the stronger decrease in Switzerland was caused by a higher willingness of Swiss residents to take up payment innovations, by a differential change in consumption behavior during the pandemic or by external circumstances (e.g. whether merchants in Switzerland steered customers away from cash stronger than in the other countries; see Höpperger and Rusu, 2022).

In a broader, international comparison, many English-speaking countries have a considerably lower cash use than the average of European countries (Bagnall et al., 2016). For example, in Australia the cash share (by transactions) decreased from 62% in 2010 to 27% in 2019 (Caddy et al., 2020). In Canada, it declined from 54% in 2009 to 22% in 2020 (Chen et al., 2021b). The USA saw a decrease from 40% in 2012 to 26% in 2019, followed by 19% in 2020 (Greene and Stavins, 2021).

In Europe, several countries have lower cash use than Austria. In the Netherlands, the cash share decreased from 65% in 2010 to 32% in 2019 and further to 21% in 2020 (De Nederlandsche Bank and Dutch Payments Association, n.d.). The Nordic countries are often considered the forerunners of cashlessness. In surveys, Swedish respondents were asked how they had settled their last purchase (before the interview). In 2010, 39% of respondents stated that they had paid in cash; this share dropped to 9% in 2020 (Sveriges Riksbank, 2020).¹²

Regardless of the pre-pandemic level of cash use, these numbers show that the use of cash for payments declined in all said countries shortly after the onset of the COVID-19 pandemic.

In general, economists have identified the main reasons why consumers use and hold cash (Shy, 2022). However, knowledge about and understanding of cross-country differences are much less profound. For instance, the argument that inhabitants of country X use less cash because they are more tech-affine remains a claim unless researchers provide convincing, causal analyses. We presume that a multitude of factors influences how cash-affine a country's population is, including the institutional environment (costs of payment instruments for merchants and consumers, costs of acquiring and depositing cash, density of card terminal network), culture, perceived security (risk of burglary), history, the size of their shadow economy, etc.

¹¹ We note that results cannot easily be compared across countries, as the basis upon which the share is computed might differ across countries. Moreover, methodological changes in the interviewing mode (e.g. for Germany) can impede a comparison. In the case of Austria, the ECB study has a different sampling and interviewing mode than the OeNB payment diary study from 2020, making the results barely comparable. Thus, we stress that these results are just indicative and that readers should only consider the broad trend.

¹² The basis for this international comparison is taken from figure 2 in Caddy et al. (2020). We thank J. Caddy, L. Delaney and C. Fisher for providing the underlying numbers. We have updated the respective values for 2020 and 2021.

2 How do Austrians use and view cash?

2.1 Cash use in socioeconomic groups

Has the decline in the use of cash been homogeneous across socioeconomic groups? To answer this question, chart 6 shows cash shares (in value terms) in 2000, 2011 and 2020 by education, income, age and municipality size.

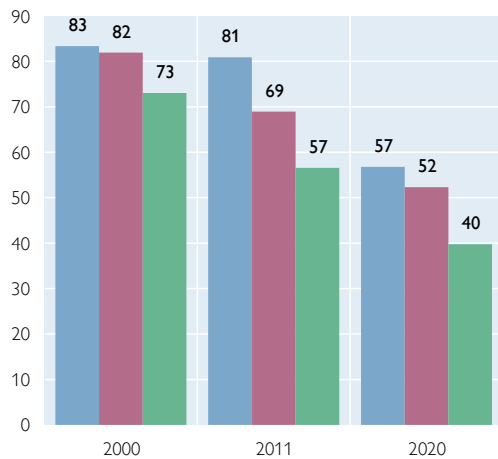
In Austria, income and/or education are strongly correlated with cash use, conforming to evidence from other countries (Bagnall et al., 2016 and Shy, 2022). For example, in 2020 the cash ratio was at 40% for persons with high income,

Chart 6

Share of cash payments by sociodemographics

Education

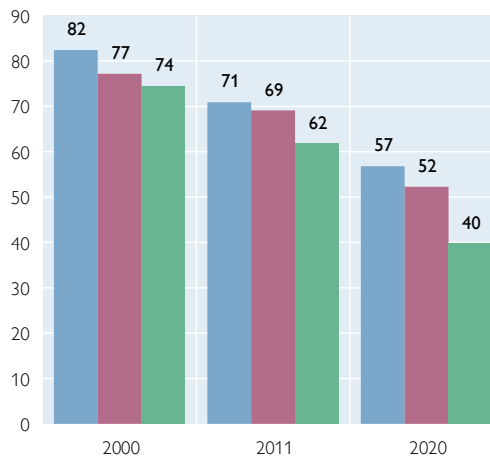
Cash share by value (%)



■ Low education level
■ Medium education level
■ High education level

Income

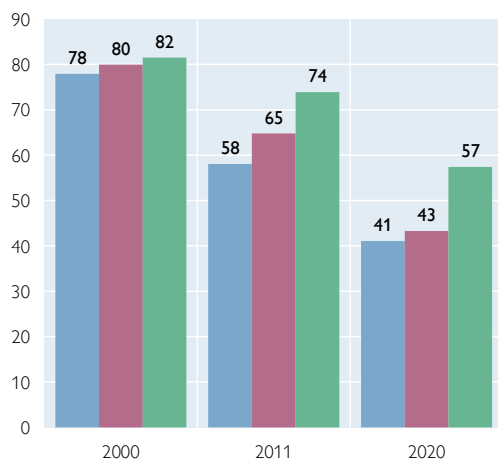
Cash share by value (%)



■ Low income (tercile 1)
■ Middle income (tercile 2)
■ High income (tercile 3)

Age

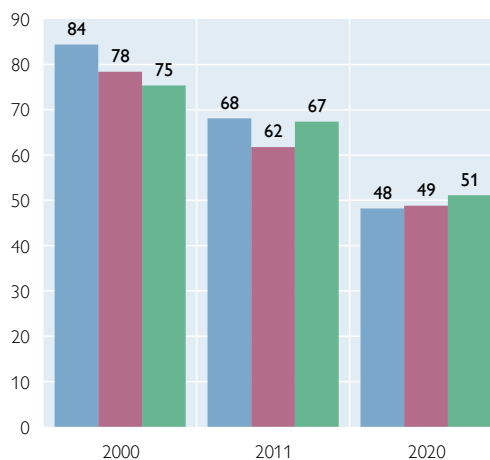
Cash share by value (%)



■ Aged 15 to 34
■ Aged 35 to 54
■ Aged 55 or more

Municipality size

Cash share by value (%)



■ Up to 5,000 inhabitants
■ 5,000 to 20,000 inhabitants
■ More than 20,000 inhabitants

Source: OeNB payment diary surveys, Mooslechner et al. (2012), Dorfmeister et al. (2021).

Note: For comparability, bank transfers are excluded in 2011 and in 2020. Therefore, the shares might deviate from other publications.

and 57% for persons with low income.¹³ In terms of temporal changes, the cash ratio declined from 2000 to 2020 by 34 pp for persons with high income and by 25 pp for persons with low income.

The chart also shows that cash use in 2020 was rather similar in rural and in urban areas. However, the cash share declined significantly stronger in municipalities with up to 5,000 inhabitants (–36 pp) than in municipalities with more than 20,000 inhabitants (–24 pp). Most likely, this reflects a growing acceptance of payment cards in rural areas.¹⁴

Cash use differs substantially by age groups. In 2020, the cash share was 57% for persons aged 55 years or older and 41% for persons aged between 15 and 34 years of age. Regarding the former, the cash share had dropped by 25 pp since 2000, and regarding the latter, the decrease was 37 pp. Interestingly, differences between age groups were rather small in 2000 (owing to a lack of alternatives to cash). However, in light of the quicker take-up of new technologies by younger persons, it is remarkable that the cash share is still 41% for persons under the age of 35 years.

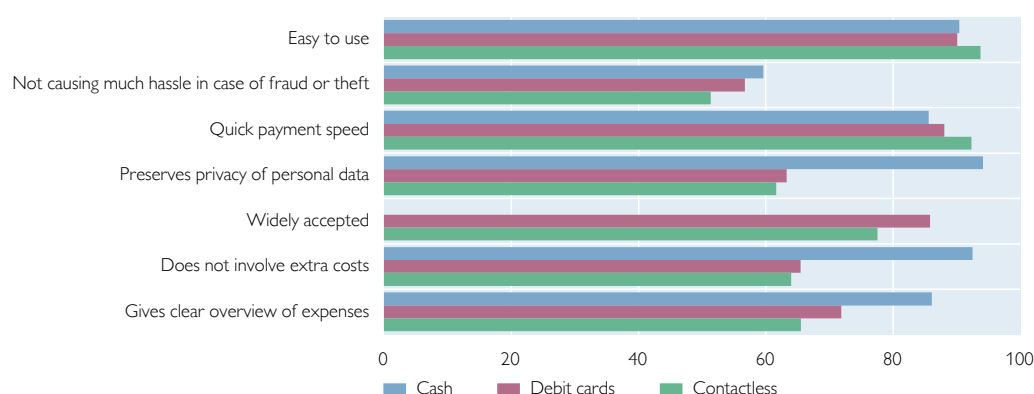
2.2 How do Austrians view and rate cash?

Why do Austrians use cash for their payments? The OeNB payment diary study of 2021 elicited the features of payment instruments that are perceived as most important by survey respondents. These features are ranked by their importance in chart 7 (from top to bottom). Subsequently, respondents were asked how cash, debit card payments with PIN code and contactless debit card payments without a PIN code (NFC) fulfilled each of these features in their opinion.

Chart 7

How consumers rate cash, debit cards and contactless card payments

%, share of respondents who considered the respective feature as “very much” or “much fulfilled”



Source: OeNB payment diary study 2021.

Note: The chart shows how consumers rate cash, debit cards and contactless cards regarding the seven most important properties of a payment instrument. The properties are ranked by importance from top to bottom. Don't know answers were coded as missing, which implies that survey respondents know each payment instrument well enough to provide a rating.

¹³ Income groups are defined by terciles, meaning that, e.g., high income respondents represent 33.3% of the population and are defined as the third tercile group with the highest income.

¹⁴ Presumably, card acceptance was lower in 2000 in rural areas than in urban areas. This has changed with a now high share of POS (merchants, restaurants, etc.) accepting card payments in smaller villages as well.

Chart 7 shows that Austrians view cash very positively with respect to the seven most important attributes. As regards ease of use, the most important feature, cash and debit cards are rated equally well, though, contactless payments are viewed slightly more favorably; payment speed yielded a similar result. A higher share of Austrians rated cash better than debit cards and contactless payments regarding the following, three attributes: “does not involve extra costs,” “preserves privacy of personal data” or “gives clear overview of expenses.”

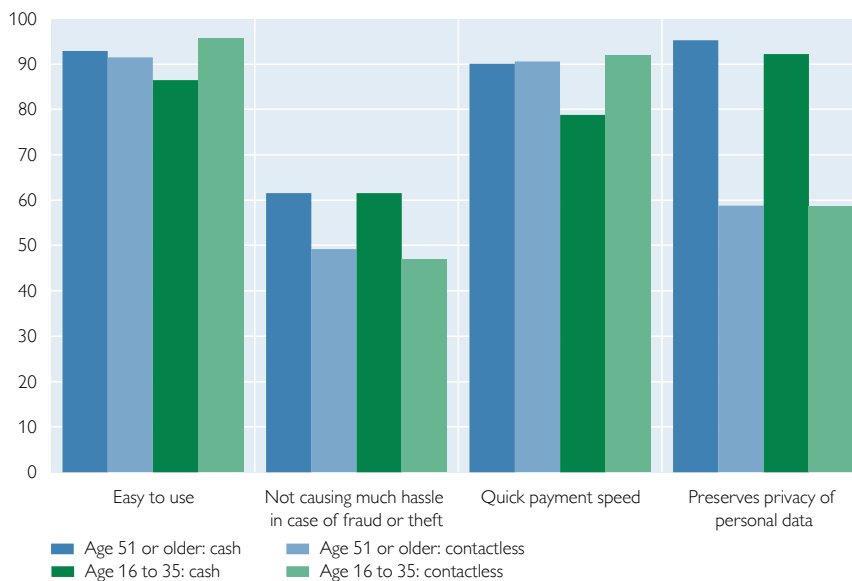
Regarding the results for 2021, readers should note the following: First, the survey in 2011 asked the same set of questions, but back then cash received a more positive rating than debit cards on all features (contactless payments did not exist yet). Thus, the share of people who view cards more positively has considerably increased over time. Second, the fact that don’t know answers were treated as missing means that only responses with a rating were considered for the results. This might seem like a technicality but does affect the results, as, e.g., respondents who do not know/use contactless payments would usually not give a rating for an attribute. Therefore, the results are biased towards the view of card users. If don’t know answers were not ignored, cash would rank first for all features, with the exception of payment speed.

Moreover, chart 7 represents the *average* rating of payment instruments across the population. It is evident that persons with a cash preference view the various features very differently than persons who prefer payment cards. As these preferences are correlated with age, chart 8 compares the rating of cash and contactless cards for persons aged 51 or older and for persons below the age of 35. We chose to compare cash with contactless card payments, as the latter have grown in importance. Older persons rate cash and contactless card payments almost identical with

Chart 8

How younger and older consumers rate cash and contactless card payments

%, share of respondents who considered the respective feature as “very much” or “much fulfilled”



Source: OeNB payment diary study 2021.

respect to ease of use and payment speed. Younger persons rate contactless card payments higher than cash regarding these two attributes, which is consistent with the lower cash use of younger persons. With respect to the hassle in case of fraud and theft and the privacy of personal data, both younger and older respondents ranked cash better than contactless card payments.¹⁵

3 Factors determining the future of cash: a cautious look ahead

We have seen a decline of cash use in Austria over the past 20 years, which is in line with an apparent international trend. Whereas the trend in cash use in Austria is comparable to other advanced economies, in particular Germany, the decrease was significantly smaller than in other economies, e.g. the Netherlands, Sweden or the English-speaking countries. This raises the question: will Austria move towards substantially more cashlessness, following those countries that are already farther down the road?

We have mentioned that the reasons for these diverging country trends have not been understood comprehensively, and we will also not be able to provide new insights. However, we can elaborate the factors that we perceive as critical for the future development of cash. Based on these factors, we then formulate what we expect for the next 10 years – albeit this outlook is a very cautious attempt: A lot depends on how the payment infrastructure and hence relative costs of payment instruments will develop. Also, the question whether cash will continue to be easily accessible and universally accepted by merchants is central for its future as well. Moreover, there are many unknowns like new technologies, economic instabilities, administrative limits on cash use, how access to cash and privacy preferences will change, etc. Lastly, the inherent difficulty of predicting our future payment behavior is manifested by previous predictions about the demise of cash – which often were quite wrong.

3.1 Factors supporting a future decrease in the use of cash

3.1.1 Demographic forces

Younger persons are faster in adopting and using new payment technologies than older persons (e.g. Brown et al., 2021). Chart 9 illustrates how age affects cash use, or more precisely, how payment behavior has changed by birth cohorts since 1996, allowing for a comparison of, e.g., persons who were born in the 1950s with persons who were born in the 1970s. It shows that cash use has decreased for all birth cohorts. However, the decline is stronger among the younger birth cohorts and the weakest among older cohorts.¹⁶ In addition, we have mentioned before that younger consumers rate card payments as more convenient and faster than cash payments. Now, it seems that older persons too see cash and cards as equally convenient.

Overall, these findings suggest that cash use will continue to decline, as the share of younger birth cohorts will grow in the population. Moreover, we expect that the older cohorts too will continue to increasingly shift to noncash payment means, as they will become more comfortable with new payment technologies. A case in point are countries like Denmark, Australia or Canada, where older persons

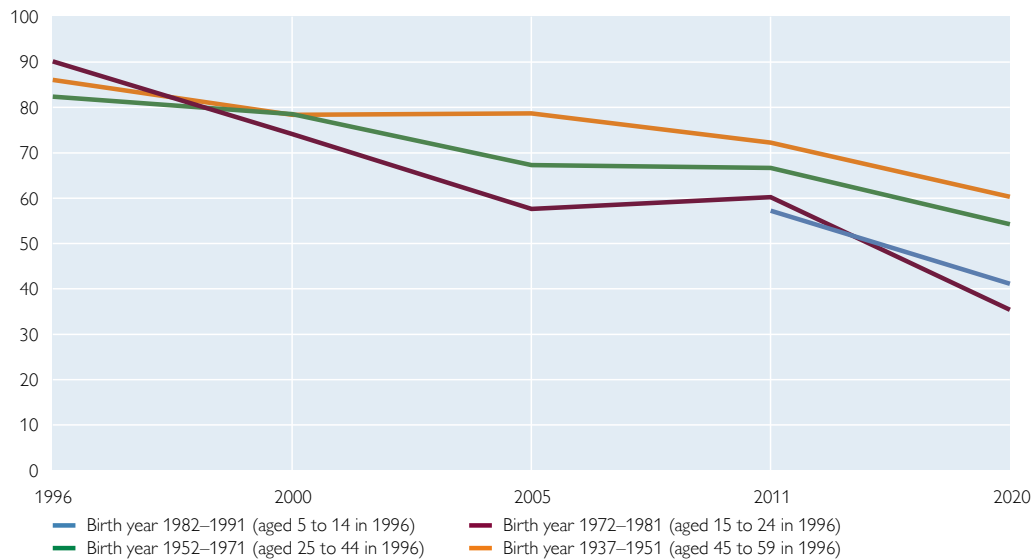
¹⁵ Chart 8 does not include all features shown in chart 7. The results of the excluded features roughly resemble those of “privacy of personal data”.

¹⁶ Please note that chart 9 visually exaggerates the decline between 2011 and 2020.

Chart 9

Share of cash payments in Austria by age cohorts

Cash share in % (in value terms)



Source: OeNB.

Note: Cash share in value terms derived from five Austrian payment diaries. Payments exclude bank transfers.

substantially reduced their use of cash, albeit they continue to be less willing to take up new payment technologies than younger persons (e.g. Caddy et al., 2020; Chen et al., 2021b; Danmarks Nationalbank, 2022).

3.1.2 Growing importance of new payment technologies

The pace of technological progress in the field of retail payments over the past 20 years has been indeed astonishing, and it is evident that this development has reduced cash use. In particular, the contactless NFC technology, which allows for fast and convenient payments, will further challenge the role of cash for small value payments.

But how big is the impact of new technologies? It is an empirical challenge to separate the causal effect of a new technology like contactless payments from a general trend that is prevailing regardless of this new technology.¹⁷ Brown et al. (2021) use data from Switzerland to provide estimates of the causal effect of contactless payment cards in the early years of their introduction. They show that increasingly convenient card payments (contactless card payments versus PIN-based card payments) cause a sizable growth in the use of payment cards, which is stronger among younger than older consumers. Additionally, the rise in card use is much more pronounced among consumers who had already used payment cards before the new technology existed, whereas previous nonusers of payment cards are still not using cards.

¹⁷ A general trend towards a cash decline could be driven, for example, by a changing consumer behavior (caused by “comfort with technology effects”) or by more merchants offering POS terminals. Both circumstances would induce more card payments, irrespective of the new technology.

There are three broader conclusions that can be drawn from these results. First, the effect of a new payment technology depends on how convenient consumers assess new payment technologies vis-à-vis other payment instruments, in particular cash. As long as the consumers' perceived convenience of cash payments does not deteriorate much, we expect that the overall use of cash will continue to decline only gradually. Second, some consumers do not perceive new payment technologies as an enhancement and will continue to be cash-affine. Third, Brown et al. (2021) report that, overall, the causal effect that contactless cards had on cash use was relatively modest¹⁸ compared to the general trend away from cash, irrespective of contactless cards. Their estimates suggest that between 2016 and 2018 the annual trend decline in the Swiss cash ratio (in value terms) was around 2 percentage points.

A similar, general trend away from cash in Austria would imply that the cash share (in value terms) would decrease from 50% to 30% in ten years' time. However, the assessment of Brown et al. (2021) has to be put in perspective, as they refer to the pre-pandemic situation. The COVID-19 pandemic could have increased the perceived convenience of contactless cards relative to cash for concerns about hygiene or risk of infection and hence has had a detrimental effect on the use of cash (Alvarez and Argente, 2022; Höpferger and Rusu, 2022; Jonker et al., 2020). In addition, merchants motivated customers to use noncash payment instruments. Both of these circumstances led to a considerable reduction in the use of cash, which seems to have stabilized in 2021 (see box 2).

What can be expected for the coming years? One scenario is that the longer-term, pre-pandemic trend towards a decrease in cash use might not have changed much and will also prevail during the coming years. Another scenario is that the declining trend will be somewhat stronger after the pandemic, reflecting the growing importance of new payment technologies and "comfort with technology effects". On balance, we think that the latter is more likely to happen. But even then, cash will remain an important payment instrument in ten years' time, presuming that there are no strong shifts in how consumers assess the convenience of each payment instrument.

3.1.3 Increasing interest rates and inflation

The past years were marked by low interest rates and low inflation rates. During 2021, and much stronger in the first months of 2022, inflation has picked up, and a rise in interest rates cannot be excluded. As cash bears no interest rates, holding it increases opportunity costs¹⁹, thus lowering its attractiveness as a store of value. Hence, the amount of currency in circulation is rather likely to be adversely affected. As regards the use of cash as a payment instrument, the opportunity costs of holding cash for transactions arise from a comparison with the interest rate on transaction accounts. We think that increases in interest rates or inflation, as long as they do not surpass the levels observed during the past 20 years, will not have a large impact on the transactional demand for cash. First, cash balances held for transaction

¹⁸ *Of all the cash payments a consumer makes, only a relatively small fraction was replaced by contactless card payments. In addition, those replaced were small in value, thus limiting the impact on the overall cash share.*

¹⁹ *Opportunity costs are potential benefits that were missed out on because of choosing one alternative over another.*

purposes are not large (see table 1). Second, interest rates on transaction accounts used to be rather low. Third, part of the higher opportunity costs of cash could be cushioned by “optimizing” withdrawals, i.e. by increasing the frequency of cash withdrawals.

3.1.4 Possible introduction of digital currencies by central banks

Central banks worldwide are considering offering a digital alternative to physical cash, commonly referred to as central bank digital currencies (CBDCs) (Hermanky and Summer, 2022). The effect of a digital euro or US dollar on cash use, should it be introduced, depends to a large extent on its concrete design features and how cash-like it will be.

As these features are unknown as of now, it is highly speculative to assess how CBDCs would affect payments in general and the transactional demand for physical cash in particular. It is well conceivable that CBDCs would partly replace card payments and some cash payments as well, especially if they meet people’s demand for convenience, privacy, etc. (Huynh et al., 2020). We note that these possible developments are a priori neither positive nor negative; but they foreshadow that the form in which consumers will hold central bank money could change. However, by the very nature of digital money, it will not be possible to replicate all features of physical cash (Shy, 2022; Krueger and Seitz, 2018). We expect that there will always be some demand for cash due to its high degree of privacy (Garratt and Van Oordt, 2021; Kahn et al., 2005).

The effect of CBDCs on cash hoarding will depend on holding limits for CBDCs. Presumably, these could be relatively low such that cash demand for hoarding purposes will not completely vanish.

3.2 Factors preventing or slowing a future cash decrease

3.2.1 Dense withdrawal network and no direct withdrawal fees

From the perspective of consumers, the main costs of cash are shoe-leather costs, i.e. the time and effort to withdraw cash. Other matters of cost like the costs of holding cash for payments or the risk of theft can be considered to be relatively small (in Austria). The dense cash withdrawal and cash deposit network in Austria has contributed to the high share of cash payments.²⁰

To assess the current status of access to cash, the OeNB estimated travel (route) distances from main residences (i.e. from all populated 100x100 meter grid cells in Austria) to the nearest ATM (Stix, 2020). Results for 2020 show that 67% of Austrian residents have to travel less than 1 km to reach the closest ATM. For 83%, the distance is less than 2 km, and 97,2% have an ATM within 5 km. On average, these findings suggest that the majority of ATMs and bank branches lies within a rather reasonable travel distance. In addition, most ATMs do not charge any withdrawal fees, regardless of whether the ATM operator is associated with the client’s bank.

However, this situation could change, thus worsening access to cash, mainly in rural areas. Digitalization and cost pressure have led banks to close branches – a

²⁰ We presume that a worsening of access to cash will have detrimental effects on the convenience of cash (vis-à-vis cashless alternatives). Chen et al. (2021c) show that larger travel distances can also induce consumers to plan their withdrawals efficiently, e.g. withdrawing money during their errands.

trend that can also be observed in other countries. At the end of 2020, about 28% of Austrian municipalities did not have a bank branch, a rise from about 13% in 2002. Among smaller municipalities with less than 2,000 inhabitants, some 43% of municipalities had no bank branch at the end of 2020 (compared with 21% in 2002). Closing the last bank branch in a municipality could mean the removal of the last ATM as well.²¹

In light of this trend, the future development might involve complementary sources to access cash like “cashback” or “cash-in-shop” services²² via retailers (ERP, 2021). It remains to be seen how access to cash will change in the coming years. In any case, we consider a dense withdrawal and cash deposit network as vital for the convenience of cash.

3.2.2 Universal acceptance of cash

Cash incorporates a number of unique features and functions, both from a user perspective and a payment system perspective. It is inclusive, as it provides payment and savings options for people with limited or no access to digital payment methods. Payments can be made offline without electricity and a payment device, which is an important backup feature, enhancing resilience, e.g. when electronic means of payment are (temporarily) unavailable due to natural disasters, power failures, wars, etc. Moreover, cash allows for instant person-to-person payments and serves as a store of value. As people can keep or spend it without involving a third party for (electronic) verification, autonomy and privacy are favorable characteristics of cash.^{23,24} Also, cash provides immediate power to discharge from payment obligations without dependence on central verification. Furthermore, it is a claim on the central bank and therefore does not entail credit risks whereas noncash (digital) money is a claim on a private bank (private money). As public (cash) and private (noncash) money are always exchangeable at par, cash contributes to the public’s confidence in private money.

From a payment system perspective, banknotes are the only form of legal tender. This implies mandatory acceptance at full face value of banknotes and coins, unless payer and payee agree on a different payment method (freedom of contract), and the right to discharge payment obligations with cash.²⁵

²¹ It is important to note that the absence of an ATM in a given municipality does not necessarily imply that travel distances to the next ATMs are overly large, e.g. if an ATM is in a village nearby.

²² “[C]ashback: A cash withdrawal at the retailer’s checkout which is debited to the customer’s account and is made in conjunction with a purchase of goods or services. [...] [C]ash-in-shop: A cash withdrawal or deposit at the retailer’s checkout which is settled through the customer’s account and is not being linked to a purchase of goods or services.” (ERP, 2021, p. 41)

²³ It is evident that cash is also used for illicit activities due to its high level of privacy. A thorough analysis of the associated issues lies beyond the scope of this paper. For a further discussion, see e.g. Rogoff (2016), McAndrews (2020) and Shy (2022).

²⁴ Garratt and Van Oordt (2021) show that the privacy provided by cash payments improves welfare (see also Kahn et al., 2005).

²⁵ The banknotes issued by the European Central Bank and the national central banks shall be the only such notes to have the status of legal tender within the Union.” (Consolidated version of the Treaty on the Functioning of the European Union, Article 128) “Where a payment obligation exists, the legal tender of euro banknotes and coins should imply: (a) Mandatory acceptance: The creditor of a payment obligation cannot refuse euro banknotes and coins unless the parties have agreed on other means of payment. (b) Acceptance at full face value: The monetary value of euro banknotes and coins is equal to the amount indicated on the banknotes and coins. (c) Power to discharge from payment obligations: A debtor can discharge himself from a payment obligation by tendering euro banknotes and coins to the creditor. [Commission Recommendation of 22 March 2010 on the scope and effects of legal tender of euro banknotes and coins (2010/191/EU)]

Given the abovementioned unique features of cash, its legal tender status and the fact that cash infrastructure constitutes a public good, it must be in the interest of policymakers and decision-making bodies to ensure that cash continues to be universally accepted.²⁶ The product cash is per se not profit-oriented, contrary to all other forms of private monies, where different stakeholders compete against each other. Hence, said stakeholders may perceive cash as a competitor and could be interested in pushing back the use of cash. Therefore, the universal acceptance of cash in the future is not self-evident but needs to be supported by authorities – although this is currently of no urgent concern in Austria. This means ensuring availability of and access to cash as well as preventing disproportionate restrictions, cost inefficiencies or lack of infrastructure.

3.2.3 Valuable characteristics of cash

Cash is safe, simple to use, bears low costs, allows for fast payments, can be used for person-to-person payments, maintains payers' anonymity and might be helpful to control one's budget and prevent overspending. Many consumers – emphasizing many, meaning not all – might stick to using cash not out of habit but because they find the features of cash favorable. Therefore, a fraction of consumers will continue to use cash for its characteristics, though we can expect that card or mobile payers will grow relative to cash payers, as is evident from countries with a much lower cash share such as the Netherlands, Sweden, the UK or Canada.

3.2.4 Central banks should take an active role

Central banks take care of the distribution, the safety and the security (e.g. counterfeit resilience) of cash. Typically, they have a neutral stance toward the different means of payment, leaving it to consumers to decide freely which payment instrument they prefer.

Market participants offering noncash alternatives have an interest in expanding their market share among payment instruments. Varying from country to country, certain actions have put availability and acceptance of cash repeatedly under pressure: campaigns for the use of new (digital) means of payment, campaigns against the use of cash (due to the pandemic among others), legislative initiatives (cash payment limits), profitability aspects, etc. In recognition of the important role of cash, the Eurosystem has formulated its cash strategy consisting of four key strategic goals:

- Continue providing an efficient supply of cash;
- Ensure universal acceptance of cash and its broad availability;
- Provide innovative and secure euro banknotes; and
- Reduce the environmental impact of the cash cycle (regarding raw materials, transportation, production, etc.).

²⁶ *The Eurosystem Cash Strategy highlights the importance of universal acceptance of cash (https://www.ecb.europa.eu/euro/cash_strategy/html/index.en.html).*

In our view, there are additional supportive measures that central banks can undertake:

- Explain as well as promote the public value of cash and take a clear stance against negative branding;
- Cooperate with stakeholders in the cash cycle (banks, cash-in-transit companies, retailers) and encourage innovative ideas about the cash cycle for more efficiency and effectiveness;
- Monitor developments in the cash cycle (bank branch networks, ATM networks, cash lodgment facilities, cashback and cash-in-shop services, etc.) to facilitate policy decisions;
- Support initiatives (legislative or nonlegislative) for safeguarding access to and the universal acceptance of cash; and
- Support research activities to better inform policy decision-making regarding cash.

4 Conclusion

We have discussed the main developments regarding the demand for and the use of cash in Austria over the past 20 years. Our main finding is that the use of cash for payments has declined; nevertheless, cash has remained the single most important payment instrument. We have shown that cash is valued by consumers for its characteristics. In international comparison, Austrians are among the more cash-affine Europeans, however, comparable levels of cash use are observed in several other European countries. These facts are in stark contrast to claims about the nearing end of cash, that cash is outdated or that consumers continue to use cash just out of habit, reflecting a passive entrenched behavior.

Are Austrians just lagging the development in countries with lower cash use? In our view, no, because cash use depends on a multitude of influencing factors that differ substantially among countries, e.g. how relative costs change for consumers, merchants and banks. What we have learned through the COVID-19 pandemic is that cash use can decline abruptly. However, during pre-pandemic times the temporal changes were much more modest and gradual. Under predictable circumstances, cash use is likely to drop over the next 10 years, as new technologies will be taken up and used more. Yet, we expect cash to remain important in the near future, although to a varying extent across sociodemographic groups.

Cash is an easy to use, cheap, safe and inclusive means of payment and store of value. From the payment system perspective, there are several distinctive advantages of cash: its resilience to internet failures, power blackouts, cyberattacks as well as its possible functioning in times of natural disasters. Moreover, it is an inclusive means of payment, allowing for access to payments for people with limited or no access to digital payment methods. Cash is currently the only way to hold central bank money. Its convertibility with private money at par contributes to the public's confidence in private money.²⁷ Not least, it is a tangible representation of national sovereignty – and euro banknotes and coins are the most tangible representation of European Monetary Unification.

²⁷ See also the speech by Fabio Panetta, Member of the Executive Board of the ECB, “Central bank digital currencies: a monetary anchor for digital innovation”, from November 5, 2021: <https://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp211105~08781cb638.en.html#:~:text=By%20providing%20a%20monetary%20anchor,protecting%20the%20value%20of%20money.>

The production and distribution of cash involves considerable fixed costs. If cash use were to decline strongly, maintaining the cash infrastructure would drive up the per-transaction costs. In such a scenario, at a certain tipping point self-enforcing trends away from cash could set in, further accelerating the decline²⁸ – a development not as hypothetical as it may sound, with some low cash use countries being a case in point. In Sweden, regulatory measures have already been taken to maintain access to cash, and in the Netherlands, discussions about safeguarding an adequate cash payment infrastructure have been arising (Spaanderman, 2020).

As cash is of systemic importance and public value, its assessment cannot purely be based on a cost-benefit analysis and gives rise to active policymaking. A case in point: before the pandemic, critics advocated for a reduction of intensive care beds in Austria to cut costs – an assessment now revised. Bearing this example in mind, the relatively high cash intensity in Austria may prove advantageous. Therefore, adequate access to cash for consumers and to cash deposit facilities for merchants should be maintained. Also, paying in cash at any POS should remain possible, and measures should be taken to ensure cost efficiency along the supply chain of cash. Moreover, central banks can take a more active stance in highlighting the public value of cash. Actions like these may support an adequate level of cash use which, in turn, would ensure that consumers who prefer to pay in cash can continue to do so in the future.

²⁸ For example, if cash becomes too costly for some merchants, they could try to steer customers away from cash, which would lead to less consumers using and holding cash. If consumers hold less cash, they make fewer cash payments. If consumers make fewer cash payments, cash becomes more costly for some merchants and/or the number of ATMs will be reduced, etc. On the other hand, payment markets are characterized by considerable network effects that may slow down cash demand (Huynh et al., 2020; Huynh et al., 2022).

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