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The Blessing of Cash

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Abstract
This study investigates the benefits of cash in a general context. First, we explicitly address the arguments of cash critics, who are calling for cash to be abolished altogether. Second, we show that cash plays a crucial role in the current two-tier banking system. Third, we are discussing a number of selected benefits of cash, inter alia its use in financial crisis and the provision of privacy. We conclude that the abolition of cash would have major drawbacks and could entail undesirable consequences.

Key words: cash, payments, cash abolition, monetary policy

JEL: D12, D61, E41, G21, O33

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1. Introduction

Since MasterCard declared "war on cash" in 2005 (Adams, 2006), propositions have been repeatedly put forward in favour of a cashless society or at least to limit or impede the use of cash. These calls were voiced not just by card companies but also by banks and, more recently, increasingly by academics, especially from the United States. The US economist Kenneth Rogoff and others propose doing away with cash completely or making it much less attractive (see Rogoff, 2014, 2016, and, representative of other authors, Agarwal & Kimball, 2015; Buiter, 2009; Goodfriend, 2000).[1] In 2010, the European Commission initially published a recommendation that there should be no restrictions on the use of euro banknotes and coins as legal tender within the euro area. The retail trade sector should, as a rule, accept cash payments and not apply surcharges for payments in cash (European Commission, 2010). However, in January 2017, the European Commission changed tack and put forward a proposal for an initiative to restrict cash payments at EU level (European Commission, 2017).

However, the focus here is not on legal issues but on providing an economic analysis of the proposals put forward by those in favour of abolishing cash. On a meta level, one could argue that in a competitive environment, the choice of payment medium should be left up to market forces. As long as cash is in use, this indicates that cash offers efficiency gains and that there is no need for government intervention in this regard (Berentsen & Schär, 2016, 14; Krueger, 2016; National Forum on the Payment System, 2015, 1). However, there are others who claim that competition between cash and cashless payment instruments does not function properly and that there is market failure. The following section takes a detailed and critical look at all these arguments. Subsequently, we show that cash has a crucial role in a 2-tier banking system and that abolishing cash is not just about changing a detail in the payment system. Finally, we are discussing selected benefits of cash: use of cash in financial crisis, data protection and privacy, the role of cash in the retail payment market. [2]

[1] A less radical proposition is to abolish high denomination banknotes (see Rogoff, 1998; Sands, 2016; van Hove, 2007).
[2] See Krueger & Seitz (2017) for a more comprehensive treatment of these issues.

2. Arguments against cash

2.1 The shadow economy argument

One criticism repeatedly levelled at cash for quite some time and which still echoes today is that it is used for illegal activities in the shadow economy and encourages moonlighting and money laundering, in particular. In order to limit these activities, some claim that it would be best to abolish cash altogether (see, for instance, Bussmann, 2015; Rogoff, 2016, Part 1) or to restrict the use of cash (see, for instance, Sands, 2016; Sands et al., 2017). The negative effects associated with activities in the shadow economy include distortions to the production structure, tax shortfalls, lower employment in legal sectors and incitement to commit criminal offences (including terrorism). There is no doubt that cash plays an important role in criminal activities as a means of payment – and possibly also as a store of value – for instance, in drug dealing. Yet, whether abolishing cash (or high denomination banknotes) would actually make a significant contribution to reducing crime is at least questionable.

The first argument against doing away with cash in order to limit shadow economy activities is that the effect would be extremely limited if only one currency area took such a step. The shadow economy would instead increasingly turn to other currencies, such as the US dollar, Swiss franc, Japanese yen or British pound sterling. While it is true that the absence of cash would make tax evasion and the funding of illegal activities more difficult, there is no a priori guarantee that this would actually give tax revenue the anticipated boost. Shadow economy activities are in no way caused by the existence of cash. The reason has rather to do with high taxes and social security contributions, excessive regulation and high unemployment. In this respect, the shadow economy can also be seen as an indicator for excessive government regulation and a defence mechanism on the part of citizens. The shadow economy acts as a "regulatory safety valve" (Schneider & Enste, 2000, 88-90). In such cases, the shadow economy enables a relatively high output level despite excessive taxes and regulations.

It should not be forgotten that the majority of transactions settled in cash are legal. Moreover, especially large-scale crime that involves huge sums of money often prefers cashless means of payment (Mai, 2016). By using complicated and convoluted cross-border chains of transactions, criminals are remarkably adept at concealing the origin of their funds.[3] Empirical studies which conclude that only a small share of cash is used for (legal)

[3] There are very few academic studies and analyses on this point. However, in this regard it is telling that anti-money laundering measures and anti-terror financing regulations refer mainly to cashless payment instruments. For further information, see the proposals by the Financial Action Task Force "FATF", www.fatf-gafi.org.

transactions are interpreted as meaning that the remainder of cash is used for criminal purposes alone. For instance, Buiter (2009, 23) claims: "The only domestic beneficiaries from the existence of anonymity-providing currency are the underground economy – the criminal community".[4] However, this neglects the fact that cash is also hoarded (used as a store of value) and is in demand from other currency areas (see, for instance, Bartzsch et al, 2011a, b). And if the characteristics of cash make legal transactions easier, it then follows that restricting said characteristics will also lower the number of these transactions. Introducing a cash limit has a similar effect, as can be seen, for instance, in the automotive industry.

Abolishing cash would also trigger the search for alternatives with similar features. These may take the form of private (un)official means of payment such as bitcoins, vouchers, regional currencies (eg the "Chiemgauer" in Germany), trade bills or cheques. This could give rise to entirely new business models.

Current estimates on the scope of shadow economic activities, too, show that there is apparently no correlation between the intensity of cash use and the size of the shadow economy. According to estimates by Schneider & Boockmann (2016), in Germany the size of the shadow economy was equal to 11% of GDP in 2015. This amounts to approximately €340 billion. Assuming a velocity of circulation of 10 implies that the shadow economy's stock of cash amounts to €34 billion.[5] Given that the Bundesbank's cumulated net issuance alone stood at over €550 billion at the end of 2015, only 6% of that would be attributable to shadow economy activities. With regard to high denominations, it must be noted that these are also used abroad and as a store of value. In addition, the scope of the shadow economy in countries which do not have large denominations (eg the United Kingdom or the United States) is not necessarily any smaller. On the other hand, the Swiss CHF 1,000 banknote has the highest nominal value of advanced economies, compared to which Switzerland's shadow economy activities are exceptionally low by international standards. By contrast, Sweden – which comes closest to a cashless society – has a much larger shadow economy than Germany (Schneider & Boockmann, 2016).

[4] It is sometimes noted that many banknotes are found to have traces of cocaine. However, according to information from the police, this has a simple explanation. Banknotes are processed using machines. If cocaine is found on individual banknotes, this is transferred to other notes during machine processing (Drexler, 2003).

[5] It is often assumed that the velocity of circulation is identical in the official and the shadow economy (see, eg, Thiessen, 2011). If we assume that the stock of cash in Germany makes up around 35% of German net issuance (see Bartzsch et al, 2013), we obtain an amount of €194 billion. Consequently, the velocity of circulation with respect to nominal private consumption would come to around 8, while that with respect to nominal GDP would be 15.

All in all, it can therefore be concluded that cash is probably used to a smaller extent in the context of criminal activities than is often suspected and that abolishing or limiting cash would not be as effective as desired in curbing crime (Mai, 2016; Schneider, 2016; Schneider & Linsbauer, 2016). Besides, an electronic payment instrument which has all the features of cash would be a dream come true for everyone operating in the shadow economy, as well as for terrorists. Initial indications of such a development have already been observed in connection with bitcoins and ransomware.

2.2 The monetary policy argument

The existence of cash automatically entails an effective lower bound for the risk-free nominal interest rate.[6] It has become apparent over the past few years that this lower bound is not necessarily zero due to storage, insurance and risk costs ("carry costs"). Assuming that the marginal costs of holding funds in a bank account are zero, the nominal interest rate cannot fall below the negative rate for the carry costs of cash. Therefore, the nominal interest rate will dip only slightly into negative territory and this negative territory is also likely to be different depending on the country and type of bank, especially depending on the depositor and investor structures in place (see the situation in Switzerland compared with the euro area). Yet an extremely negative macroeconomic development may, under certain circumstances, require lower nominal negative interest rates. Buiter & Rahbari (2015), for instance, assume that central banks would occasionally be forced to lower interest rates to between -5% and -10% (see also Rogoff, 2016, ch. 8). The existence of cash would erase this option, as there would always be the alternative of falling back on this interest-free medium. However, this would not be an abrupt process, as the expectations regarding the duration of negative interest rates and the costs of holding cash are distributed heterogeneously across economic agents. Nevertheless, the use of cash as store of value would limit the scope for interest rate cuts. Following this line of argumentation, abolishing cash would certainly expand the scope of monetary policy. Abolishing only large denominations like the €500 banknote would achieve this, too, as the smaller denominations are associated with higher transport and storage costs.

Thus, the expansionary monetary policy stance at the zero lower bound should be made more effective and achieve an even greater impact if governments were to abolish cash. However, this is also the medium with which people can ultimately "defend" themselves against this policy. Mersch (2016) referred to those who hold this view as "alchemists" as

[6] That is unless cash exists in the form of stamped currency ("Schwundgeld") or a fee is charged for using cash. See Goodfriend (2000) and Agarwal & Kimball (2015).

they seem to believe that every macroeconomic crisis could be tackled if the interest rate could just be lowered sufficiently.

In any case, the impact would be relatively minor, not least because there would be considerable evasive shifts towards other currencies whenever cash was abolished in one currency area only. Moreover, the public would attempt to use alternative transaction mediums and stores of value which are not subject to negative interest rates. For example, there is always the option to switch to vouchers, use cheques without depositing them immediately, make advance tax payments or early repayments of loans (McAndrews, 2015). Furthermore, it is not implausible that the demand for gold and other precious metals would rise considerably. Real estate, too, would probably be in high demand. These markets might experience significant price bubbles, resulting in financial instabilities and imbalances. To circumvent the restrictions, behavioural changes and arbitrage activities would result. They would also create incentives for "financial innovation" to guarantee an interest rate of at least zero. These incentives would be greater, the longer the negative interest period lasts and the more pronounced it was. This is consistent with Bech & Malkhozov (2016) who argue that if rates were to remain negative for a prolonged period, at some point the effective lower bound would increase as economic agents adapt to the new environment and as innovations will prevail, which reduce the costs associated with holding cash. This is supported by the fact that most of the costs of cash holdings are of a fixed nature. Ultimately, the level of the lower bound on interest rates would depend on whether and how banks succeed in pushing deposit rates, too, into negative territory (Alsterlind et al, 2015).

The monetary policy argument seeks to strip the public of the freedom to choose between different forms of money, as a result of which deposits can be subjected to (unlimited) negative interest rates to the effect that saving is discouraged, consumption increased and investment encouraged.[7] Proponents of this argument believe that economic activity would be stimulated in a sustainable manner. However, this raises the issue of whether the measure is commensurate to the problem, particularly in the euro area, and what side effects it might have (Borio & Zabai, 2016; Jobst & Lin, 2016).[8] For instance, the problems in the euro area appear to be of a structural, rather than a cyclical, nature. In addition, there are alternative transmission channels at work around the lower bound on interest rates. What comes to mind in this context are the signalling, exchange rate, trust and portfolio channels (Ulbrich, 2016).

[7] However, the relationship between interest rate cuts and savings is ambiguous, even in theory, because the income effect may outweigh the substitution effect.
[8] Following this line of thought, cash would help to defend against policy errors.

Using a New-Keynesian macro model, Rognlie (2015) points out that optimal monetary policy must weigh the distorting effects of negative interest rates against the potential positive business cycle effects. The interest rate elasticity of cash demand plays a key role in this context. Abolishing cash only makes sense under extreme assumptions.

A policy of negative interest rates might also be criticized from a more general perspective. Rösl & Tödter (2015) calculate the welfare effects in the form of excess burdens and show how damaging it is to place tax-like negative interest rates on money holders and savers. Moreover, Schreft & Smith (2000) analyse a zero interest rate monetary policy without government intervention (eg in the form of a ban on cash payments). They present evidence that the demand for cash will remain high in such a situation (or increase very sharply) even if the transactions demand for cash continues to decline over time for fundamental reasons. The zero interest rate monetary policy is therefore (empirically) inconsistent with a secular decrease in transaction balances.

Finally and under the realistic assumption that the zero or negative interest rate policy is but a temporary phenomenon in exceptional situations and with ambivalent effects, the response to it ought not to be an absolute and, in principle, irreversible measure in the form of a permanent abolition of cash.

2.3 The speed argument and security aspects

A further argument which is brought forward by critics of cash is that the use of cash at the point of sale stretches out the payment process (eg Der Spiegel, 2015). An increase in cashless payments could thus save time and, by extension, costs and resources. Surely, all of us will have had our own experience in this regard.

In the Bundesbank's first payment behaviour study for 2008, 90% of the respondents indicated that they perceived cash to be a convenient and quick medium of payment (Deutsche Bundesbank, 2009b). In the last study of this kind for Germany (Deutsche Bundesbank, 2015), a distinction was made between exclusive cash payers and exclusive card payers. Of the former group, 33% perceived cash as a safe and 29% as a quick medium of payment. The corresponding figures for the card payers stood at 26% and 27%, respectively, ie at an only marginally lower level. According to the EHI Retail Institute (Siedenbiedel, 2016), in Germany payment at the point of sale by cash is still much quicker than by card (see also Fung, 2015, for Canada, and Jonker, 2016, 39, for the Netherlands).[9] In Danmarks Nationalbank's cost of payments survey (2012, 50) it was found that the difference in

[9] Data for 2004 can be found in Rüter (2004).

payment time for cash and card payments is almost insignificant, although the time can vary considerably from retailer to retailer.

Schuh & Stavins (2015) subdivide the speed aspect (without explicitly considering cash) into several dimensions and find that only certain aspects significantly affect the choice of payment medium in a statistically significant way. Yet the settlement speed of a payment at the point of sale is a decisive factor. Nevertheless, a faster payment process does not necessarily reduce the overall time at the cash desk. For instance, this is the case if the goods were scanned even faster. Consequently, the packaging of the goods still counts towards the overall time taken regardless of whether it occurs post-payment or during a (longer) payment process.

Overall, no general conclusions can be drawn with regard to the argument of speed. Nevertheless, it does not appear that cash payments are slower or that consumers perceive them as such.

Besides speed, however, the security of the payment or of the payment instrument, too, plays an important role. The perception of security affects payment behaviour, with consumers reacting very sensitively to a change in this perception and even reports in the media, eg of card fraud (Kosse, 2013). The security issues that a transition to a cashless world would entail are often underestimated (Krueger & Seitz, 2015). We only need to think of how intensively and how diversely cash is still used to see what a nation-wide introduction of electronic payment systems would imply. Above all, everyone would need to be able to make and receive payments in such a system – "everyone" including persons with limited cognitive abilities as well as criminals. If cash no longer existed, each and every one of us – except for small children and legally incapable persons – would have to be able to send and receive cashless payments. In order for everyone to be able to access such a system, it must be very easy to use. And to ensure a smooth settlement of payments, the system ought to work offline as well, ie without being connected to a bank or any other payment service provider. The offline functionality is urgently needed, on the one hand, as a fall-back solution for when communication networks are down and, on the other, because a system based 100% on online authorization would probably be extremely costly. To date, the only medium able to combine ease of use, offline availability, anonymity and convenience is cash. There have been repeated attempts to provide systems of this kind, but accomplishing the above-mentioned combination has shown only limited success. Bitcoins, for example, are neither particularly easy to use nor are they convenient (the payee must wait several minutes until the authenticity of the bitcoins

is confirmed). In addition, doubts have been raised over whether it is, indeed, impossible to trace who carried out a bitcoin payment (see Koshy et al, 2014).

With bitcoins, it has already crystallized that not only technological security but also protection from theft is key in this context. Bitcoin owners must trust their own hardware (PC, notebook, tablet, smartphone and the software installed on the respective device) and/or service providers that "store" and manage bitcoins. Of course, security problems may be remedied over time through innovation, but it would be a mistake to believe that payment systems will eventually outgrow the security-related challenges. As soon as a system grows, so too do the incentives for fraud. ECB data (2015, 20) show that card fraud is relatively high in the two largest European card markets, the UK and France, which recorded 201 and 143 card payments per capita in 2014. At just over 0.06% and 0.07% of the payment volume, respectively, damages in both countries are much higher than in Germany or Italy, for instance (damages of just over 0.02%), where cards are not used as intensively (per capita card payments in 2014: 40 and 33, respectively). Moreover, Sweden, the country which has progressed the farthest towards becoming a cashless society, has realized that the number of card frauds (and money laundering activities) has risen significantly over the past few years (Mai, 2016, 11f). It is therefore a justified fear that a general electronic payment instrument that becomes established as a substitute for cash would be particularly vulnerable to criminal attacks. Such a system would be highly attractive to fraudsters because they cannot simply be excluded from using it. Once cash were abolished, access to electronic payment systems would become something of a basic right.

2.4 Cash as beneficiary of inefficient pricing?

Many economists argue that cash is treated more favourably through inefficient pricing. The core of the argument is as follows. The use of cash is free of charge. As a result, cash is used too intensively, comparable to the "tragedy of the commons" (Van Hove, 2007, 29). "Free of charge" means that cash withdrawals at ATMs tend not to cost anything, that cash payments do not entail a transaction fee and that there is often not even a charge for cash deposits to accounts. However, the argument claims that providing this service does, in fact, entail costs which are not or only insufficiently taken into account in the selection of payment instrument. Cash users are the ones who decide how much cash is withdrawn and which instrument is used for retail payments. But because they are not confronted with these costs,

they have no incentive to take them into consideration. This leads to inefficient decisions and an inefficient use of payment instruments, in particular.[10]

Regulators are therefore called upon to intervene and introduce cost-based prices. Initially, this argument sounds plausible – like the direct application of results from a standard economics textbook. What it does not take into account, however, is that the payment market is a two-sided market (Baxter, 1983; Rochet & Tirole, 2003). In such markets, the standardized regulatory approach can lead to inefficient results (Wright, 2004). For example, cost-based pricing in two-sided markets is not necessarily efficient (Krueger, 2009; Wright, 2004).[11] If the costs entailed by card issuers are very high, for instance, cost-based prices could lead to only a small number of consumers wishing to own a payment card. As a consequence, hardly any card payments would be made. At the same time, it is possible that the benefit of card payments for retailers and consumers together is greater than the overall cost. In this vein, card payments would actually yield a net benefit, which cost-based prices would prevent in such a case.

Interestingly, it can be observed on a number of two-sided markets that prices are mainly or even exclusively levied on one side of the market. A classic example is telecommunications, with the dominant model in many countries being that the caller pays. A similar asymmetry in pricing can be seen with many other payment instruments besides cash. With card payments, too, transaction fees are generally only paid by the payee (ie the retailer). From that perspective, cash is not the only medium which customers do not pay to use. Nevertheless, it cannot be ruled out that the price of zero might be inefficient and that the frequency at which consumers select cash is less than optimal. If this were the case, there would also be disadvantaged parties – ie retailers and/or banks. But it is up to them to counter a potential "overuse" of cash through their pricing policy. Banks could introduce a fee for withdrawing cash or – if the legal situation prevents them from doing so[12] – reduce the supply of this service (see, for example, the situation in Sweden). Retailers could levy a surcharge on

[10] The costs of cash payments and card payments will be the focus of module 3.

[11] Often, it is not even clear what "cost-based" really means. The processing of a payment is a service that is rendered for two parties at the same time. As such, any division of costs is random to a certain extent. To name an example, when a payment terminal reads the card data and sends them to the card issuer to be authorized, does the authorization represent a service for the retailer or the card holder? And who should bear the costs?

[12] The Federal Court of Justice issued a ruling in 1983 limiting any possibility of German banks introducing charges for withdrawing cash.

those payment instruments that are costly to them or offer a markdown on those payment instruments that are less cost-intensive by comparison.[13]

Some argue that the heavy use of cash rests on the central bank's issuing of and their involvement in processing cash. Some authors believe that cash is somehow "subsidized" (ten Raa & Shestalova, 2001).[14] However, it is difficult to see just how that might be. The whole argument appears to be based on a misconception of the cash-issuing business. Issuing cash generates income in the form of seigniorage, which accrues in its entirety to central banks. This income can be seen as an implicit fee for users of cash. Central banks use this income to cover the costs of producing and processing cash. However, as a rule, these costs are only a small fraction of this income, meaning that issuing cash is generally a very lucrative business for central banks (and thus, ultimately, for governments and economies).[15] Commercial banks (private banks, savings banks, cooperative banks) assume the major part of costs for distributing cash. They provide customers with access to cash and accept it again from them. In return, direct compensation for such services is relatively low. This is probably due to legal restrictions on fees for cash services.

However, commercial banks can charge customers a fee for depositing cash and they do receive a type of implicit fee in the form of interest foregone on transferable deposits. It is, not least, by giving customers largely free access to cash that enables banks not to pay interest on current accounts.

Still, because it is central banks that earn seigniorage on cash and banks are allowed to levy only few direct charges on cash services, commercial banks have an incentive to promote cash substitutes on the market. In this respect, the current fee structure in payment transactions works against cash.

Therefore, it is not surprising that banks and card issuers spend huge sums promoting payment cards (for instance, Visa and MasterCard regularly sponsor the World Cup and the Olympic Games). However, there is no such thing as marketing for cash.

Given these incentives, the Leinonen (2016) argument that having no fees for cash leads to an "overuse" of cash (and an underuse of cards) is flawed. The reverse is true. To the extent

[13] In the United Kingdom, the Consumer Rights (Payment Surcharges) Regulations 2012 cap such surcharges. The Reserve Bank of Australia has also introduced similar regulations; see Reserve Bank of Australia (2016).
[14] Leinonen (2016) follows a similar line, arguing that the prices charged by central banks for processing low-value banknotes probably do not cover the cost thereof.
[15] Van Hove (2007) criticizes that this constitutes a conflict of interests. As issuers of cash, central banks are a market player yet, on the other hand, they also regulate the payment system.

that banks would like to charge a fee for cash services but are not allowed to, the pricing system works against cash – at least in the long run.

3. Consequences for a two-tier banking system ("A bank is where the money is")

Doing away with cash would very probably lead to major changes in the existing two-tier banking system, cash being the only instrument that allows banks in this system to convert their liabilities vis-à-vis non-banks into central bank money. If cash ceased to exist, private non-banks would no longer have access to central bank money, effectively rendering them "captive" in the commercial banking system. If, say, the private non-banks were to lose confidence in the commercial banks, this conversion of deposits into cash would no longer be possible. Deposits could then only be scaled back by reducing debt vis-à-vis the banks and converting bank deposits into other assets. In the euro area, any loss of confidence in the banks of a single member state could also be countered by transferring deposits to other euro-area countries.

Withdrawing cash is the only direct way for non-banks to withdraw funds from the banking system. The special role of cash lies in the fact that it constitutes a broadly accepted means of redeeming banks' liabilities vis-à-vis non-banks. While the reduction of debt vis-à-vis the banks indeed reduces bank deposits, it is not a viable alternative for non-banks without any debt. Buying assets from banks assumes that banks are also keen to sell assets and that they have sellable assets at their disposal. Since liquid assets are needed as collateral for refinancing and since loans make up the lion's share of assets, this option is not likely to be of much use to non-banks. To a certain extent, the option to transfer deposits to banks in other countries constitutes a special case that can arise in currency unions. Greek investors made great use of this option (Krueger, 2013). However, it rests on the assumption that banks retain the confidence of foreign investors.[16] Moreover, those banks that lose deposits need to have access to alternative sources of funding, because a bank that loses deposits on a vast scale is frequently also no longer able to secure funding from the money market. The Greek banks were, for instance, forced to rely on ELA funding from the Bank of Greece which, in turn, was sourced from TARGET loans within the Eurosystem. Both types of funding (ELA operations and TARGET loans) enabled Greek investors to transfer deposits to other euro-area countries abroad.

[16] With regard to those German investors who lost faith in Germany's banks in 2008, the question arises as to which euro-area banks they ought to have trusted with their money.

If doing away with cash were to make it impossible to convert deposits at commercial bank into central bank money, there would be mounting pressure to consider the options listed below.

- Bank deposits wholly covered by central bank money ("narrow banking").
- Deposits in central bank accounts available to everyone.
- Digital central bank money (e-euro).

In the case of a narrow banking solution, certain bank deposits would have to be wholly covered by central bank money,[17] with the banking system divided into "deposit-taking or payment transaction banks" and "investment or commercial banks". Narrow banking systems have been proposed on repeated occasions (Bossone, 2001).

Rather than establishing a narrow banking system that affords non-banks an indirect access to central bank money, non-banks could also be allowed to maintain deposits of their own at the central bank. In this way, central banks would enter into direct competition with commercial banks.

Lastly, it is also conceivable that central banks would issue electronic cash (central bank e-money) in place of physical cash, in which case the two-stage banking system could, in principle, continue to exist more or less unchanged. Instead of banknotes, non-banks would stock a certain volume of central bank e-money, though payment transactions would continue to be effected mainly via giro accounts held at the commercial banks, which would undertake to convert overnight deposits into central bank e-money "upon request".

As things stand, no experience has been gathered with any of the three systems that would be helpful in assessing their functional viability. Even so, each system has its advocates, due to the following factors:

- the loss of confidence suffered by commercial banks after 2008,
- the dwindling use of cash,
- diminishing access to cash in countries such as Sweden,
- technological advances (Bitcoin etc).

In some countries, enterprises and households have already voiced their demand for a fundamental change to the system. For instance, Talanx Insurance tried (in vain) to secure the right to hold a Bundesbank account by taking the matter to court (Süddeutsche.de, 2010). In

[17] It has also been suggested that it should be permitted to keep other assets, such as government bonds, at the central bank, instead of reserves (Bossone, 2001, 8).

Switzerland, a narrow banking initiative has been set up, its aim being to amend the Swiss constitution so as to make it mandatory for overnight money held at banks to be wholly covered by central bank money.[18]

But central banks, themselves, are likewise turning their attention to this matter. In the light of the dwindling use of cash, the Swedish Riksbank is already considering whether it should start issuing electronic money (e-krona) (Skingsley, 2016). Meanwhile, the Bank of England, too, has been intensely involved with this topic (Broadbent, 2016; Bank of England, 2015).[19]

At this juncture, it is difficult to foresee where these deliberations will lead, not least because cash is still used intensively and concrete plans to actually abolish it are not on anyone's agenda at present. The Swedish Riksbank is keen to emphasize that e-krona should not be viewed as a substitute for cash but as a complement (Skingsley, 2016). The same goes for the Bank of England. Governor Carney has stressed that there are no plans to do away with cash (Broadbent, 2016).

Nevertheless, it is possible in this context to assess the consequences of a drastic decline in the use of cash, and perhaps its complete abolition. Astonishingly, central banks' importance would not necessarily decrease but, under certain circumstances, actually increase. This applies irrespective of which "replacement products" might be offered in the event of cash being abolished, be it deposits in narrow banks, deposits in central bank accounts for everyone or digital central bank money.

It is reasonable to assume that the size of the central bank's balance sheet would increase significantly in all three scenarios (Kooths, 2016). If sovereign money were chosen as the solution, banks' reserves would increase sharply. If central bank accounts were also made accessible to non-banks, then deposits held at the central bank would compete with deposits at commercial banks. Especially in times of uncertainty, non-banks would undoubtedly make extensive use of the option of keeping their money safe at the central bank. If e-euro were offered by central banks, then cash would be replaced by central bank e-money, though probably not on a one-to-one basis. Central bank e-money might therefore compete with cash and commercial banks' overnight deposits as well (Broadbent, 2016).

The exact strength of such competition would depend heavily on the specific design of the new central bank products. Depending on the design of the new system (ie its conditions,

[18] For more information on this, please consult www.vollgeld-initiative.ch/ The Swiss Federal Council spoke out against this initiative in 2016. As regards the standpoint of the Swiss National Bank, see Jordan (2016).
[19] The success of Bitcoin has ultimately prompted many economists to consider digital central bank money.

including the interest rates applied and its ease and scope of use), it could lead to a wide-scale substitution of bank deposits. It is even conceivable that the ability of the commercial banking system to create credit would be seriously impeded (Broadbent, 2016; Skingsley, 2016; Tolle, 2016).

It is hard to gauge the extent to which non-banks would make use of this facility. Supposing overnight deposits in the euro area were subject to the 100% reserve rule, this would oblige the banks to hold reserves of €5.6 trillion, based on today's volumes. To achieve this, banks would have to sell assets in this amount, while the Eurosystem would be obliged to purchase assets. Alternatively, the Eurosystem could furnish the banks with loans. The magnitude of these transactions would be equivalent to the value of about one half of the assets held by the commercial banks. Such effects could also be incurred if the non-banks were to decide in favour of central bank accounts or central bank e-money.

Abolishing cash could therefore ultimately mean that the Eurosystem's balance sheet (2016 balance sheet total approximately €3.5 billion) would once again enlarge considerably.[20] The question of how the assets side of the balance sheet is to be arranged would then be of enormous macroeconomic importance. Consequently, it is not by chance that the President of the Swiss National Bank, in the event that the narrow banking resolution is passed, warned of a looming "politicization of monetary policy" (Jordan, 2016, 7). The same may be said regarding the other two options (central bank accounts for non-banks, digital central bank money).

The consequences for the commercial banking sector would be just as serious. The commercial banks' balance sheets would possibly contract massively and the ability to generate credit would be limited – in the worst case scenario, it would disappear entirely. This could have painful ramifications for the real economy. The central banks concerned with digital central bank money or opening up central bank accounts to non-banks therefore see a need for considerably more research and clarification (Bank of England, 2015; Skingsley, 2016).

Even if the balance sheets of commercial banks were to suffer less, there is still another reason why abolishing cash could have wide-ranging consequences for the banking system. Banks frequently view cash as a burden because issuing and collecting cash is associated with considerable costs and the process only generates minimal directly attributable income.

[20] There has already been an initial balance sheet extension, which took place in the aftermath of the financial market and sovereign debt crises.

However, it is frequently overlooked that the role of banks in the cash cycle is one of the essential features that sets banks apart from other financial service providers in the eyes of their customers. The infamous US bank robber Willie Sutton expressed this fact pithily when he said,

"A bank is where the money is." (Sutton's law) (Wikipedia, 2015).

For him, "money" means "cash". He is not alone in equating money and cash; most people think of cash when they speak about "money".[21] If cash were actually abolished, there would not be any "money" in the bank any more. This raises the question:

"If there is no more money in the bank, is the 'bank' still a bank?"

In this case, what would become of the nice business model of issuing non-interest-bearing liabilities ("sight deposits")? Competition would increase on the liability side of a bank's business. From the customer's perspective, branch banks, direct banks and other intermediaries would be offering investment products that differ little from each other.

4. Selected benefits of cash

4.1 Role of cash in financial crises

One aspect that is sometimes overlooked is the role played by cash in times of crisis. As a general rule, the demand for cash rises in the wake of a financial crisis (see the situation following the collapse of Lehman Brothers, or events in Greece in 2015). Such a run on banks is usually viewed as a threat to the financial system. Conversely, however, it is also true that bank customers are greatly relieved to recognize that they actually can access "their money" (Negueruela, 2014).[22] In a system in which only electronic money exists, it would be virtually impossible for non-banks to withdraw funds from the banking system on a broad basis in the event of a crisis of confidence. Some people could of course reduce their bank deposits by acquiring assets from other economic agents. However, this would push up the level of bank deposits held by the sellers, thus confronting them with the problem of having to acquire assets with these increased bank deposits ("hot potato effect"). This could, in turn, result in sharp fluctuations in financial market prices, which would probably exacerbate the crisis. What is more, in case electronic payments were to be interrupted (due to technical

[21] The "Hofgarten" beer garden in Aschaffenburg is a good example. Until recently, the menu stated: "We only accept money payments – no plastic!"

[22] In Germany, other factors played a role, too. This was demonstrated, for instance, in 2008 when the Federal Government declared bank deposits as safe, which the general public interpreted as a government guarantee.

disruptions, strikes, etc), cash could still be used to execute certain payments. In a purely electronic system, it is possible that no payments could be made at all. During such periods of crisis, cash would serve as a transaction medium, a medium of exchange and store of value of last resort. In the case of a currency for which there is also an international demand, such as the euro or the US dollar, this function of cash applies to both domestic and foreign demand. Its status as legal tender and the fact that it is issued exclusively by the central bank are also helpful factors, as they promote general acceptance and confidence among users.

The situation in Germany following the collapse of Lehman Brothers on 15 September 2008 is a good case in point here.

As already mentioned, cash in circulation in the course of a week, month or year follows a regular seasonal pattern. However, the standard pattern for cash demand in 2008 changed considerably as a result of the financial market crisis. The end of September and early October 2008 saw an increase in demand for cash compared with the previous year and a change in the weekly pattern of daily in-payments and out-payments (Deutsche Bundesbank, 2009a, 56f). Demand for cash did not return to normal again until 24 October 2008, which was the first time that the out-payment balance was smaller than that for the same period one year earlier. Daily out-payments in October 2008 were largely at a level comparable to the high demand for cash in the period before Christmas. However, it was striking that the sharp increase in out-payments was not offset by a higher number of in-payments, as is usual in the month of December. For example, on 10 October 2008 – the day with the highest volume of out-payments during the financial crisis (€4.2 billion) – recorded in-payments stood merely at €1.5 billion.

The most marked increase was in the number of large denominations, which are particularly well suited as a store of value. Even before the onset of the crisis, a slight upturn in the year-on-year demand for €500 banknotes was detectable in the period up to September 2008. Between September and October 2008, this demand grew at a much faster pace than it had done one year earlier. Net out-payments of €500 banknotes amounted to €11.4 billion in October 2008 alone (Deutsche Bundesbank, 2016, 34f). By comparison, net cumulated out-payments of this denomination throughout 2008, excluding October, amounted to €10.3 billion. Between October 2007 and October 2008, the volume of €500 banknotes in circulation in Germany went up by around €21 billion (€40 billion in the euro area as a whole). The demand for €100 banknotes likewise rose by a considerable margin in October 2008. Outflows of banknotes in October did not find their way back to the Bundesbank by the

end of the year. In the case of €500 banknotes, this did not occur until the end of 2010 (see Bartzsch et al, 2015, FN 28). Unlike the high-denomination banknotes, net out-payments of small denominations (ie notes worth €5 to €50) – which primarily enter circulation through withdrawals from ATMs – stayed close to the previous year's level in 2008.[23] All in all, net issuance of notes in Germany went up by just under €20 billion in October 2008, while the Eurosystem as a whole posted an increase of around €44 billion.

The higher demand for small denominations observed in October 2008 and its subsequent decline to a level similar to that recorded prior to the financial market crisis suggest that this was basically a temporary effect. At the very least, these denominations were not hoarded in large quantities, and flowed back to the Bundesbank relatively quickly. The augmented cash balances in the vaults of the credit institutions that are chiefly maintained for making regular outpayments also went back down in November 2008. Nevertheless, during the crisis, a string of individual banks had to contend with a greatly increased demand for cash, above that experienced by other banks. This can hardly be explained by the domestic hoarding and transaction motive alone. Hence, there is good reason to believe that the demand from abroad for banknotes (ie from outside the euro area) also increased. One indication of this is the fact that the share of €500 banknotes in cash outflows in the international wholesale banknote market is generally very high.

To examine this assertion more precisely, the movements on accounts held by foreign banks at the Bundesbank and banks engaging in foreign business were analysed; a considerable percentage of these account movements were used to supply foreign credit institutions with cash (Deutsche Bundesbank, 2009a, 57). These account movements probably reflect the demand from abroad that is transmitted via this official channel. According to this indicator, in October 2008, the entire volume of out-payments of banknotes by the Bundesbank was distributed fairly evenly between domestic and foreign withdrawals. The rising demand for euro banknotes for the purpose of storing value induced by uncertainty and precautionary motives in the wake of the financial crisis was consequently equally driven by domestic and foreign demand.

4.2 Data protection and privacy

Data privacy is a valuable commodity. This was confirmed in Germany at the supreme court level when the Federal Constitutional Court issued its ruling on the 1983 census – if not

[23] Structural banknote demand models therefore need to incorporate an impulse dummy for the fourth quarter of 2008 (Bartzsch et al, 2015, section 5.2). In RegARIMA time series models, the financial crisis has to be captured using several dummy variables (Bartzsch et al, 2015, section 5.3).

before (Federal Constitutional Court, 1983). Since cash is a means of protecting privacy – Kahn et al (2005) argue that "cash is privacy" – there could thus be legal barriers to abolishing cash. Whether and to what extent the abolition of cash is legally permissible, however, is beyond the scope of this study.[24] In addition to the legal considerations, however, there are also a number of economic issues linked to abolishing cash.

a. Given the current flood of personal data, does it actually make a difference whether or not cash exists?
b. To what extent does cash allow us to protect our personal data?
c. Is the highest level of data protection always in our own interest?
d. What are the consequences of not keeping data anonymous?
e. Could there be an electronic replacement for cash?

This section will examine these five questions in closer detail.

a. Does it actually make a difference whether or not cash exists?

In modern, connected and digitalized societies, citizens can already be monitored to a large extent – through internet activities, closed-circuit TV in public areas, use of mobile phones, and use of a variety of electronic payment methods.[25] It could therefore be argued that recording a small amount of additional payment data would make no difference. However, this is not a compelling point of view, since, to date, the recording of payment data has been far from comprehensive. Ultimately, most payments in Germany are still made in cash and therefore cannot be traced by third parties. Krueger & Seitz (2014, 27) estimate that 32 billion cash transactions took place in Germany in 2011. As a statistical average, this would mean no less than 400 cash transactions[26] per German citizen, although this estimate is somewhat on the conservative side. If all these transactions were processed electronically, and were therefore potentially open to monitoring, citizens would become "transparent". Privacy in the stricter sense would cease to exist.

b. To what extent does cash allow us to protect our personal data?

Because paying in cash means there is no need to involve a third party, both parties can keep the payment secret – and sometimes the underlying transaction, too. This is known as "payment anonymity".

[24] For more information, see Hirdina (2016), Papier (2016) and Siekmann (2017).
[25] Birch (2014, 43) suggests that, in future, although it will be possible to protect one's privacy online, it will not be possible to do so in the real world.
[26] This was in contrast to just 36 card payments per German citizen in 2011. By the end of 2014, this figure had risen to 40.

Nor do the payer and the payee need to know anything about each other. The payment can therefore be made with both sides remaining anonymous (anonymity of participants). However, the degree to which anonymity can be maintained also depends on the transaction in question. If a customer buys a used iron at a flea market, both the seller and the buyer can remain anonymous (bilateral anonymity). If a consumer buys an umbrella from a retailer, he can remain anonymous to the retailer (unilateral anonymity). The retailer's identity, on the other hand, is known. If a customer buys a cupboard and has it delivered to his house, he is no longer anonymous either. There are therefore many situations in which it is not possible for both parties to remain anonymous. In these cases, paying in cash can at most ensure payment anonymity. So cash payment alone does not guarantee complete anonymity for those involved.

Payment anonymity is particularly important. Admittedly, it also plays an important role for criminals. But payment anonymity also plays a key role in the relationship between citizen and state. It is with good reason that Dostoyevsky, who said that "money is minted freedom", is often quoted in this context. Otmar Issing adapted this saying, emphasising that "*cash* is minted freedom" (Issing, 2014). The fierceness of the current debate and the strong opposition to abolishing cash in many countries – they are by no means confined to Germany – probably stems from people's fear of ever-increasing government control.

c. Is the highest level of data protection always in our own interest?

Data protection and anonymity may be useful in certain situations, but it is by no means true that anonymity is always an advantage. In many cases, the person making a payment wants to have a record of this payment, either for themselves or as proof of purchase which they can present to the other party or to third parties. There are also situations – distance selling, for example – in which the ability to contest a payment can be useful. Anonymity and the subsequent lack of proof of payment and ways of lodging a complaint are a disadvantage in these instances. It is also often beneficial for payers or payees to have a "payment history". This allows them easier access to credit, for example (Roberds & Schreft, 2009).

Therefore, it does not always make sense to strive for the highest possible degree of anonymity. Instead, it is more important to ask whether, in principle, people should have the option of using an anonymous payment method that delivers "efficient confidentiality of personal data" (Roberds & Schreft, 2009). Of course, from a macroeconomic perspective, the efficient level of anoymity is likely to be nearer 100% than 0%.

d. What are the consequences of not keeping data anonymous?

As outlined above, anonymity is only important for a limited range of transactions. However, people's behaviour would change if anonymity were no longer given. It is often assumed that anonymous transactions are almost exclusively of the illegal kind (Buiter, 2009; Sands, 2016), but there is no empirical evidence to back this hypothesis. In the debate about withdrawing the €500 banknote from circulation, ECB Executive Board Member Yves Mersch said: "European Central Bank officials want to see evidence that high-denomination euro banknotes facilitate criminal activity rather than relying on unproven assertions" (Schneeweiss, 2016). The head of the ECB's Currency Management Division also stated that there is no statistically proven link between criminal activity and the use of cash, or, in fact, between the size of the shadow economy and cash (FAZ, 2016).

In 2002, Drehmann et al (2002) wrote: "There are many reasons why people may prefer anonymity – many of which are connected with "bad" behaviour." But "bad" does not always mean "illegal". It can also include the small human weaknesses we are prone to. Economic agents do not necessarily want these documented in full in the form of proof of payment. Ultimately, it should not be forgotten that governments, too, can behave "badly" and that cash provides a certain amount of protection against this (see also Berentsen & Schär, 2016).

Because anonymity is often asymmetrical – the buyer remains anonymous while the seller does not – doing away with anonymous payment options would put buyers, in particular, at a disadvantage. As a result, fewer (legal) transactions would be carried out and evasive action would be taken (Kahn et al, 2005). This would lead to a loss of efficiency and additional burdens (deadweight losses) that extend beyond the pure abolition of cash. These have a similar effect to distortionary taxes. In any case, fewer transactions would take place without cash. This is also indicated by the fact that cash even has a certain role to play in distance selling.[27] The "click and collect" method of online shopping (including an alternative for paying with cash) is becoming increasingly popular. Even Amazon is planning to open stores,[28] and initiatives such as www.barzahlen.de are offering new cash payment options in the field of e-commerce. This can be theoretically substantiated using a search model according to the New Monetarist Economics school of thought (for details, see the overview in Schmidt & Seitz, 2014, Section 4).

[27] In this context, of course, the aim of using cash is also to increase security and control.
[28] See Spiegelonline (2016).

4.3 Independence of foreign card providers

Payment systems are part of a country's basic infrastructure, and it is essential that they operate smoothly if the economy of a currency area is to function. Payment systems currently comprise credit transfers, direct debits, cash, payment cards as well as online payment systems. The retail trade sector chiefly uses cash or cards. To date, national debit card systems dominate card payments in most European countries. However, the Europeanisation of payment transactions (keyword "SEPA") has led to national systems in some countries being replaced by the international card schemes MasterCard and Visa; for example Luottokunta in Finland and PIN in the Netherlands. Although not necessarily politically desired, it is possible that MasterCard and Visa will take an extremely strong hold of the European payments area (see also Judt & Krueger, 2013).

As long as cash continues to play a key role in payment transactions, competition in the card market is important, but only to a limited extent as both payers and payees (in the retail trade sector in particular) have the option of using cash instead. Yet if cash were to disappear, payers would be reliant on using cards. On the one hand, this would inflate card providers' market power (Lepecq, 2015) and, on the other hand, in the case of international systems, give rise to dependence on foreign governments. The abuse of market power can be kept in check by European competition authorities. However, European governments have no direct influence on interventions by US supervisory authorities into MasterCard and Visa's card transactions. The following are examples of such interventions that have already taken place.

- In 2014, the United States of America issued sanctions against Russia. As a result of these sanctions, Visa and MasterCard blocked credit cards issued by four Russian banks for several days. During this time, cardholders were unable to carry out payment transactions both in Russia and abroad (PaySys, 2014).[29]
- The United States' Cuba embargo also had an impact on payment transactions in Europe (PaySys, 2011). Following pressure from the US government, PayPal threatened to close the accounts of any European customers selling Cuban products (Fuest, 2011). Online retailers (outside of the US, too) were not only required to ensure that PayPal could not be used to pay for Cuban products; they were also required to remove all Cuban products from their virtual shelves. This understandably met with some resistance on the part of retailers.

[29] This episode prompted Russia to set up its own card payment system (PaySys, 2014).

These examples show just how important it is for the settlement of card payments to be subject to national law. Otherwise, there is a danger of payment systems being shut down in part or entirely due to political decisions abroad.

Abolishing cash would amplify the trend towards international systems. If cash no longer existed, foreign visitors would still need to pay for goods and services. This could take place in two ways.

1. Foreigners could be granted fast and easy access to a domestic payment instrument.
2. The acceptance of international payment instruments could be extended across borders.

Option 1 may be feasible, but doubts still abound. A number of factors (ever stricter "know your customer" regulations, the refugee problem, a large number of short-term visitors, etc) would impinge an even half-way satisfactory implementation of this option. This leaves only option 2, where international systems would have to extend their acceptance across borders. Through the regulation of interchange fees for payment cards, international cards have already become more attractive than national procedures – including the German "Girocard" system. If international cards obtain the same level of acceptance as national ones, customers may well ask why they actually need two cards. Should they come to the conclusion that one is sufficient, it is fairly safe to say that they would opt for the international card as it can also be used abroad.

European politicians are currently trying to prevent such a response. Their aim is to have at least one European card system alongside MasterCard and Visa. Yet both payments regulations and competition policy have actually resulted in the opposite (Judt & Krueger, 2013). A duopoly of the two large international card systems seems more and more likely. This thus makes the question of whether cash will remain a competitor of cards even more important.

4.4 Alternative to a narrow oligopoly

Although today's retail customers can choose from a wide range of brands of payment systems, the principle choice is: cash or card?[30] If cash is not an option, in most cases the customer can use only a card to make a payment. At first glance, this may not appear critical as far as competition is concerned; after all, the number of card payment systems on offer has risen sharply over the past few years. Even at a discount store, customers in Germany have

[30] In some countries, such as France, the cheque is still a widely used alternative.

the option of paying with the mainly domestic "Girocard" card, Maestro and MasterCard cards (both MasterCard brands) and V Pay and Visa cards (both Visa brands). Sometimes it is possible to use American Express as well. In addition, many retailers also use electronic direct debits (ELV). One could therefore claim that competition is sufficient even without cash. However, two factors restrict the validity of this claim.

a. The European market is currently undergoing a phase of consolidation and it is possible that only a few card payment systems will survive. Some countries have already lost their domestic card systems (for instance, the Netherlands and Finland).

b. The card market is two-sided. In such a market, competition does not necessarily produce the result intended by competition policy. For instance, it has been observed on many an occasion that competition between card systems has actually led to higher fees for retailers.[31] If cash ceased to exist, in such situations retailers would no longer have the option of refusing to accept cards (or at least threatening to do so).

If cash were abolished, the options available to payment service users (in particular, customers and retailers) would be greatly limited. This would likely have grave consequences for the functioning of competition in the retail payment market.

5. Summary, conclusions

It seems that paper money no longer really fits into today's digital age. As early as 20 years ago, James Gleick (1996) claimed that, "Cash is dirty … Cash is heavy … Cash is inequitable … Cash is quaint, technologically speaking … Cash is expensive … Cash is obsolete."

Despite this, cash as a product has held its own surprisingly well. Admittedly, the share of cash in total payments is falling. Even so, the demand for cash continues to rise unabated in many countries (see, eg, Jobst & Stix, 2017; Ashworth, 2017). There is therefore no sign of cash meeting an imminent demise. The reasons for this lie in the many advantages that cash offers, which are related to its unique features. Cash can be used anonymously; it can be used without any further involvement of service providers; the payer and recipient do not need to be "online" in any form; it can be used for both small and large amounts; payment is simple, convenient and quick; payment is definitive (it cannot be cancelled); and cash is relatively

[31] MacFarlane (2005) complains that increasing competition in the card market has continuously pushed up interchange fees. Guthrie & Wright (2007) show that competition between card systems can lead to highly asymmetrical prices. This argument applies to two-sided markets in general (Wright, 2004).

counterfeit-proof. At present, there are no electronic payment instruments which offer all of these advantages.

Recently, however, some have been emphasising the disadvantages of cash and calling to restrict – or even abolish – its use. Critics point out that cash is very useful in conducting illegal transactions and laundering the proceeds of crime. They also complain that the "zero interest rate" on cash makes it difficult for monetary policy makers to push the policy rate very far into negative territory.

All in all, however, three points are clear. First, a policy aimed at abolishing cash is dangerous and risky as it would not remedy the problems mentioned above. Second, such a policy is impracticable as cash would need to be abolished more or less across the world. Third, the idea cannot be implemented until the issue of security has been resolved. Should cash be abolished in spite of these problems, we can expect alternative, non-electronic payment instruments to be used instead. Inefficiencies are also likely to arise as part of this process. "Given the desire to hold assets outside of the financial system and the potentially disciplining effects of the existence of such instruments, it would be clearly welfare-reducing to outlaw cash." (Berentsen & Schär, 2016, 17). Prescribing the means of payment that the general public should use would seem to be at odds with the principles of a free market economy. In this vein, cash alone can truly be considered "coined liberty". The best form of protection from both state and private sector abuse of market power is competition. This also applies to currencies and means of payment (Rösl & Seitz, 2015). It is difficult to shake off the impression that, for some market participants and politicians, the proposal to abolish cash is a welcome distraction from the true causes of the problems it is ostensibly designed to solve (shadow economy, zero interest rate policy, lack of structural reforms). In general, it would seem that the intention is to do away with a long-established institution that has proven successful over many centuries without giving the matter much forethought. Before taking such a step, it is important to consider whether there are other and better solutions.

The current idea of "simply" getting rid of cash just because there are theoretical models which show that the world would work better without it brings to mind Hayek's criticism of constructivism, in which he speaks of "the innocent sounding formula that, since man has himself created the institutions of society and civilisation, he must also be able to alter them at will so as to satisfy his desires and wishes" (Hayek, 1978, 3). Hayek was extremely sceptical of this point of view, as he saw the institutions that make it easier for humans to live together as being the products "of human action but not human design" (Hayek, 1978, 5).

Finally, in this context, we should also make mention of the sociological and psychological research which shows that using cash triggers a surge of happiness or positive emotions (Ruberton et al, 2016; van der Horst & Matthijsen, 2014) and that a unique "sociology of cash" exists (Llewellyn, 2015). It may be that the intensive use of cash simply reflects the public's preferences (see also Wakamori & Welte, 2017).

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