

Birchler, Urs W. (Ed.); Gnan, Ernest (Ed.); Hedrich, Carl-Christoph (Ed.); Ulbrich, Jens (Ed.)

Proceedings

Cash on trial, mk II: Economics, technology and institutions

SUERF Conference Proceedings, No. 2019/1

Provided in Cooperation with:

SUERF – The European Money and Finance Forum, Vienna

Suggested Citation: Birchler, Urs W. (Ed.); Gnan, Ernest (Ed.); Hedrich, Carl-Christoph (Ed.); Ulbrich, Jens (Ed.) (2019) : Cash on trial, mk II: Economics, technology and institutions, SUERF Conference Proceedings, No. 2019/1, ISBN 978-3-902109-88-0, SUERF - The European Money and Finance Forum, Vienna

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Cash on Trial, mk II

Economics, Technology and Institutions

Edited and Introduced by

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Hedrich and Jens Ulbrich*

Contributions by

*Katrin Assenmacher • Morten Bech • Heike
Mai • Cecilia Skingsley • Doris Schneeberger
• Friedrich Schneider • Niels Riedel • Amber
Wadsworth • Beat Weber • Fritz Zurbrügg*

*A joint publication with the Deutsche Bundesbank
and Foundation Geld und Währung*

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SUERF – The European Money and Finance Forum

Vienna & Frankfurt 2019

SUERF Conference Proceedings 2019/1



CIP

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Editors: Urs Birchler, Ernest Gnan, Carl-Christoph Hedrich and Jens Ulbrich

Authors: Katrin Assenmacher, Morten Bech, Heike Mai, Cecilia Skingsley, Doris Schneeberger, Friedrich Schneider, Niels Riedel, Amber Wadsworth, Beat Weber, Fritz Zurbrugg

Keywords: cash, central bank digital currencies, cash limit, crime, corruption, financial proceeds, money laundering, money, monetary theory, zero lower bound

JEL-codes: C80, C82, E02, E42, E50, H56, K42, O17, Y1

Vienna & Frankfurt: SUERF (SUERF *Conference Proceedings* 2019/1) – September 2019

ISBN: 978-3-902109-88-0

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1. CASH ON TRIAL, MKII

Urs W. Birchler, Ernest Gnan, Carl-Christoph Hedrich and Jens Ulbrich¹

On 20 May 2019, SUERF, the Deutsche Bundesbank and Stiftung Geld und Wahrung, supported by Commerzbank AG, took up an event concept first ventured by SUERF in November 2015 in Zurich, namely to discuss the future of cash (i.e. physical banknotes and coins) in a structured, systematic way, by juxtaposing pros and cons of cash in the shape of a “court trial”.² Why repeat such an event after only three and a half years? There were two motivations.

First, the location of the event. The first cash on trial conference took place in Zurich, while the second vintage took place in Frankfurt. Given the continued high preference for cash payments in Germany, and given that Frankfurt is both Germany’s and the euro area’s “monetary capital”, it seemed relevant to discuss the topic there.

Second, and more importantly, the discussion and technological developments are moving very fast in the area of money and payment systems, calling for an update in the light of new circumstances. The various arguments for and against cash, which dominated in 2015, were structured in SUERF Policy Note No. 3 “Cash without a future? Future without cash? A wider view” (Beer, Birchler and Gnan, 2015) and documented in detail in SUERF Conference Proceedings 2016/1 “Cash on trial” (Beer, Gnan and Birchler, 2016). To summarize, the discussion on the future of cash in 2015, as reflected in the Zurich conference, focused on:

- Cash as a foundation of a liberal society (data protection, citizens’ rights, protection from excessive control of individuals by the state);
- The relative costs and efficiency of cash versus electronic payment services;
- The consumer protection perspective in the sense that cash acts as an immediate individual spending control device;
- The zero lower bound on interest rates arising from the option of holding physical cash rather than bank deposits, thus effectively constraining monetary policy space;
- The role of cash in facilitating tax evasion and crime;
- Bitcoin, including its underlying technology and its properties in terms of payments device and money.

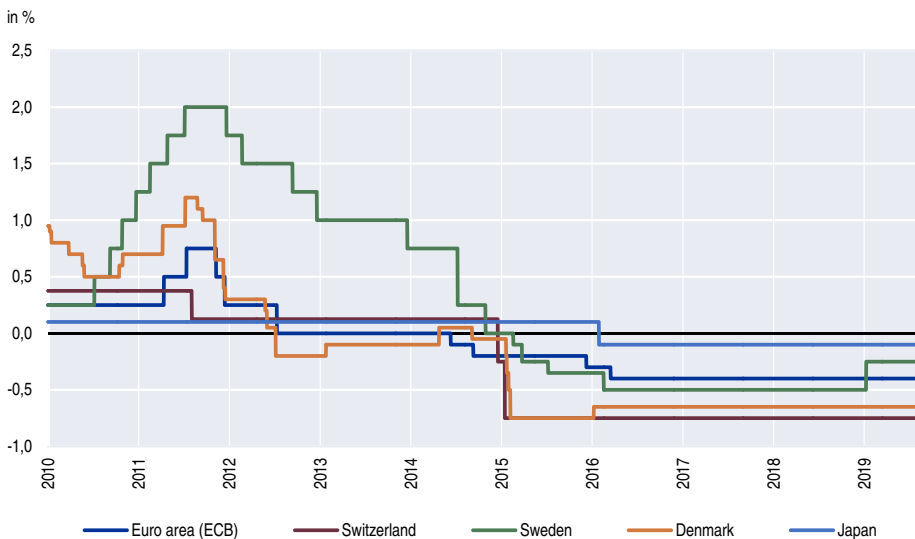
¹ All SUERF, and University of Zurich, Oesterreichische Nationalbank, Commerzbank and Deutsche Bundesbank, respectively. The views expressed in this article are the authors’ only and do not necessarily reflect the official views of their respective institutions.

² For video selections from the conference see here: <https://www.suerf.org/cashontrial2019>.

Since then, the discussion on the future of cash and payments has considerably shifted focus. What were the new developments?

- It has become established among most of the central banking community that central banks can keep policy rates somewhat below zero for quite a while. Several central banks have over the past years proven this (Chart 1). The approximate figure for the effective lower bound on official rates is meanwhile considered to be around $-0,75\%$. At the same time, the global economy experienced a period of robust growth, and the Federal Reserve normalized policy rates considerably (the federal funds rate had reached 2.5% by mid-2019), thus creating leeway for rate cuts in a downturn (as happened on 31 July 2019). In addition, the Fed had embarked on scaling back its Treasury holdings from 2017. Together, these developments removed pressure against cash based on the argument that cash stood in the way of more expansionary monetary policy.

Chart 1: Countries with negative key interest rates

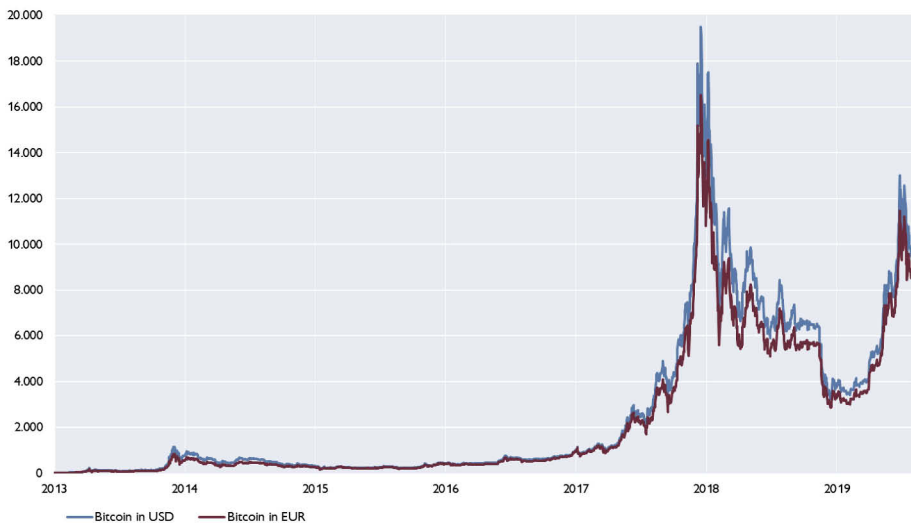


Source: Macrobond

- Regarding Bitcoin, the crypto-asset experienced an extraordinary price boom (from around EUR 355 at the time of the Zurich conference on 5 November 2015) to a peak on 16 December 2017 (at around EUR 16,500). This price explosion was considered a bubble by many observers, prompting central banks and supervisors to warn of financial risks and to emphasize that Bitcoin was not a currency but only a speculative asset. Since then, as reflected also in a strong price correction, the craze around Bitcoin cooled

down considerably. But in the second quarter of 2019, the price recovered again, from its post-peak low of below EUR 2,900 to above EUR 11,000 by end-June 2019 (Chart 2). Regarding the weaknesses of existing crypto-assets, at a panel on Fintech and Crypto-currencies during the SUERF-Columbia-SIPA-EIB-Société Générale conference in New York in September 2018, one speaker predicted that „within 10 years” a new generation of global, private crypto-currencies would be developed, which would seriously challenge „central banks’ old, outdated and flawed technology of central banking”, which underlies official money (see Gnan et al. 2018).

Chart 2: Price of Bitcoin



Source: Macrobond

- Probably in response to the rise in unregulated private digital currencies, the idea of digital currencies issued by central banks (**Central Bank Digital Currencies – CBDC**) gained attention among central banking circles and in academia. SUERF recognized this trend early on and organized a joint conference with the Baffi Centre of Bocconi University, on the topic “Do we need central bank digital currency? Economics, Technology and Institutions” in June 2018. Key findings were summarized in a conference report (Gnan/Masciandaro 2018a) and documented in detail in SUERF Conference Proceedings 2018/2 (Gnan/Masciandaro, 2018b). Among many other contributions, at this conference, two central banks, the Bank of Uruguay and Sveriges Riksbank presented their pilot project of an e-peso (Uruguay) and the feasibility study of an e-krona (Riksbank). The conference also made clear that the consequences from CBDC crucially

depend on how a CBDC is designed. Recently, the discussion has focused on the notion that CBDC might question traditional banks' existing deposit-based business modes, might itself create financial stability risks (such as systemic "digital bank runs") and cannot be decided by central banks alone without thorough involvement by the public and Government and Parliament, since they may, depending on their design, fundamentally affect individual rights.

- The most recent development is a project announced in June 2019 (and thus actually roughly a month after the Frankfurt conference) by Facebook to issue a new global private means of payment, the **Libra**, which, due to its different institutional set-up and creation process, is supposed to overcome the weaknesses of previous private digital assets. However, many open issues remain and in the weeks after its public announcement, the Libra project faced a wave of criticism from G7 governments, central banks and supervisors, but also by the private interest community. This even prompted Facebook at the end of July 2019 to warn Libra investors of the risk that the project might fail. A summary description and first assessment of Libra is also included in this volume (see Beat Weber, p. 71).

The content of the Frankfurt Cash on Trial conference reflected these developments, while at the same time confirming many of the older arguments.

In the "Court trial", the "prosecution" focused on three arguments:

- Cash is an inefficient and outdated means of payment (see presentation slides by *Niederhorn, McKinsey*; no contribution in this volume);
- Cash facilitates criminal transactions (see presentation slides by *Riondet, Europol*; no contribution in this volume);
- Cash hinders monetary policy when interest rates are at the zero lower bound (see *Assenmacher, ECB*, in this volume as well as her presentation slides).

The "defense" of cash countered:

- Cash is central to trust, data protection and personal freedom (see *Mai, Deutsche Bank Research*, in this volume as well as her conference slides);
- Abolishing cash would help little in fighting the shadow economy, crime and terrorism (see *Schneider, Johannes Kepler University Linz*, in this volume as well as his conference slides);
- Cash is not an impediment to a stability-oriented monetary policy (see *Zurbrügg, Schweizerische Nationalbank*, in this volume).

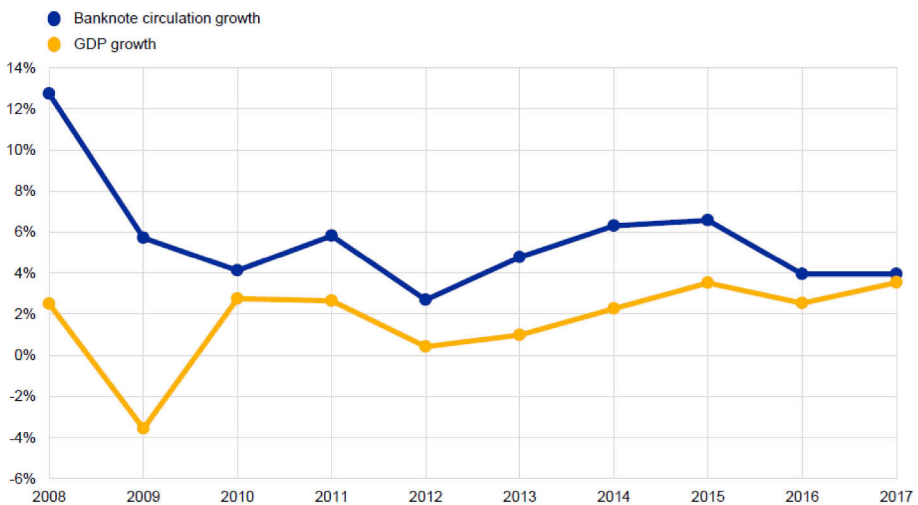
Besides these arguments and counter-arguments, the discussion about the future of cash and its possible partial or full replacement by private and/or public digital

currencies has revived interest in the functions and possible forms of (digital) money. This is exemplified by the BIS's "money flower" (see *Bech and Wadsworth, BIS*, in this volume as well as their conference slides).³ These authors also provide an overview of central banks' thinking and work on CBDC.

One of the pioneering central banks in the world in terms of exploring the viability of a CBDC is Sveriges Riksbank. Their e-krona project involves a careful weighing of pros and cons, of risks and opportunities, against the background of fast and unstoppable technological progress, also in the area of money and payments, as *Skingsley, Riksbank*, argues in her contribution to this volume.

Despite the fast spreading of electronic payments, in the euro area cash in circulation has actually grown faster than nominal GDP since the global financial crisis. While this was particularly the case during the peak of the crisis, it held true also thereafter and in every single year up to 2017, the last observation (Chart 3). In the end, the future of cash will be determined by its users: consumers and businesses. *Schneeberger, ECB*, provided a detailed analysis of the use of various payments instruments including cash at the conference (see her contribution to this volume as well as her conference slides). She finds that demand for cash in the euro area so far has been resilient, there are multiple motives for holding cash, it continues to be the preferred means of payment at the point of sale, and retailers regard cash as a reliable payment instrument.

Chart 3: Euro banknote circulation and nominal GDP growth



Source: Schneeberger (2019)

³ A useful and up-to-date categorization of different forms of digital money is provided in the form of the "money tree" in Adrian and Mancini-Griffoli, 2019.



The diverse backgrounds among the audience and the vivid discussions at the conference testified that money and payments, and its economic, institutional and legal properties, clearly transcend the realm of central bankers or even economic policy makers; they touch upon fundamental questions, including data privacy and financial inclusion, which need to be discussed by parliaments and by society at large, as philosopher *Gaspard Koenig*, *GenerationLibre*, elaborated at the conference.

In the end, the “jury”, that consisted of volunteers from the audience, decided unanimously in favour of cash, so that the jury’s “verdict” was “not guilty” – but only for the time being. The presumably unstoppable character of digitization will continue to also promote digital money and payments solutions. It seems very well possible, however, that cash and electronic forms of money and payments may exist in parallel in the future.

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2. CASH ON TRIAL: WELCOME REMARKS

*Jens Ulbrich*¹

Dear Members of SUERF, dear colleagues from the Foundation “Geld und Währung”, dear guests,

It is a great pleasure to welcome you on behalf of the organisers to today’s conference.

I guess that this is the first time that the Bundesbank has ever organised a conference in a Frankfurt theatre. And it is definitely the first time that we have organised a conference as a trial. Thus, I am very curious to see how the six Acts of our screenplay are going to play out on these stages.

Johnny Cash, the US folk singer, was certainly somewhat more used to fill a stage than I am. But he once remarked: Sometimes I am two persons: Johnny is the nice one. Cash causes all the trouble.

Overlooking the current debate about cash, now in the central bankers’ meaning of the word, one could come to the same conclusion: Cash seems to be causing all the trouble.

By some it is merely regarded as an inefficient and outdated means of payment. Others, more critical, see it as an essential part of many criminal activities. Finally, given the experience of the effective lower bound of interest rates made by many central banks in the advanced economies since the Great Financial Crisis, cash is criticised for creating a barrier to lower interest rates more into the negative than central banks have done.

And these accusations are exactly those who will be decided upon today at our Trial: Cash as an inefficient tool, cash as a crime financing tool, cash as a blockade tool preventing optimal monetary policy.

Of course, I will not anticipate the verdict of our esteemed judge, David Lwellyn, or those arguments of prosecutors and defence. But just taking the developments in the euro area into account, one must wonder, how popular the perceived trouble shooter cash is. And by how much his popularity has risen over the last years: In 2002 the value of banknotes put into circulation by the eurosystem was 220 billion. End of March 2019 we have reached 1216 billion. During last year the demand for euro banknotes rose by 60 bn alone, an increase of 5 per cent annually.

¹ Deutsche Bundesbank.

The Bundesbank issues more than 50 per cent of all euro area banknotes in circulation. 70 per cent of that is circulating outside Germany, a large part in other euro area countries. But a significant part also outside the euro area. This reflects the status of the euro as one of the leading global currencies.

It is noteworthy, that other major central banks, like the Federal Reserve or the Bank of Japan have also seen an increasing demand for cash.

Coming back to Germany: Contrary to some other European economies who have witnessed a strong decline in cash payments over the past years, this is not the case in Germany. Cash is – in terms of turnover – with nearly every second transaction at the point of sale still the dominant means of payments in this country. The share of debit cards mounts up to 35%. If you take the pure number of transactions the use of cash is even more popular with 75% in 2017.

German customers when asked whether they would like to pay in cash in the future respond positively nearly nine out of ten. And Germany is not unique in that sense. There are other European countries where cash is even more popular.

Thus, it seems that critics of cash will have a tough stand to defend their accusations. But *vox populi* may not always get it right. What are the foundations of the three lines of criticism we have heard? This is to be debated today during six Acts and with highly qualified people to assess the case.

We have brought a judge from the UK across the channel. The other reason than his economic and legal expertise is, of course, that our UK colleagues in the political arena have proven – and still do so – nearly on a daily base that they have a deep sense of drama (and also of farce, hopefully not of tragedy).

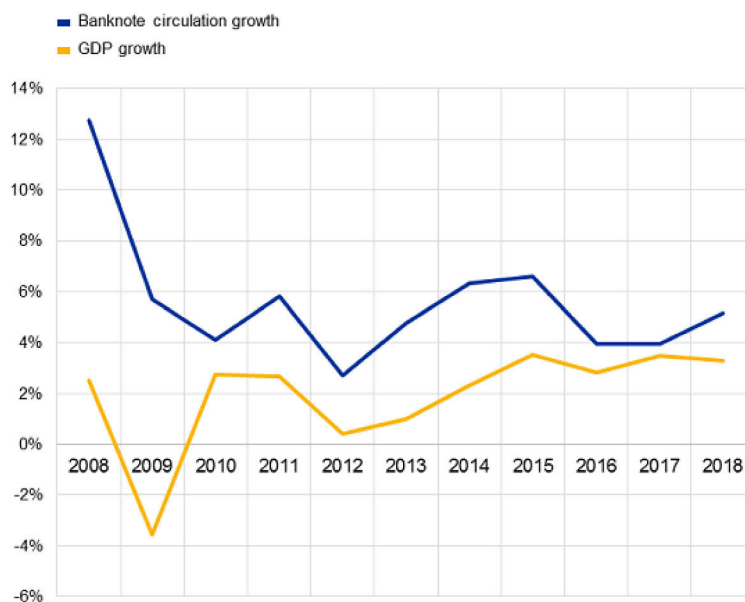
3. CASH PAYMENTS AND PAYMENT BEHAVIOUR IN THE EURO AREA

Doris Schneeberger¹ and Niels Riedel²

3.1. DEVELOPMENTS OF EURO BANKNOTES IN CIRCULATION

Despite the increasing use of electronic means of payments, demand for euro banknotes remains robust and the circulation of all denominations, from €5 to €200, grows lastingly. The ratio of banknotes in circulation to nominal gross domestic product (GDP) has increased from 7.9% to 10.6% over the years 2008 to 2018, indicating that, while in line with the GDP growth trend, the value of euro banknotes in circulation has been growing faster than the overall economy and that other factors have therefore been contributing to this increase. This pronounced circulation growth may be explained, at least to some extent, by higher cash holdings, e.g. for saving purposes or precautionary holdings, and increased banknote demand from outside the euro area.

Chart 1: Euro banknote circulation and GDP (euro area)

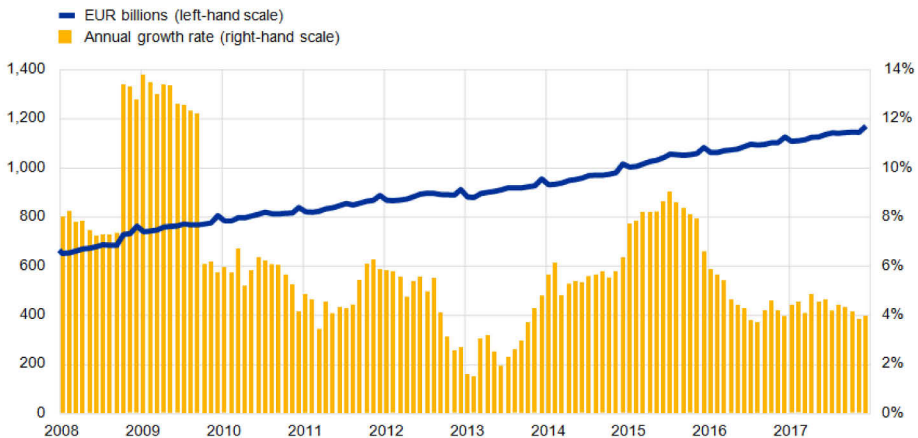


¹ Head of Division Currency Management.

² Principal Expert, Currency Management Division.

Over the past 10 years, the value of euro banknotes in circulation grew continuously; between April 2009 and April 2019 the average annual growth rate amounted to 5.3%. At the end of April 2019, the total value of the 22.5 billion euro banknotes in circulation was 1,229 billion euro. Seasonal patterns in circulation can be observed especially during the Christmas period and, to a minor extent, during summer holidays, providing evidence that banknotes are still actively used for transaction purposes.

Chart 2: Euro banknote circulation
(annual percentage change, monthly data, EUR billions)

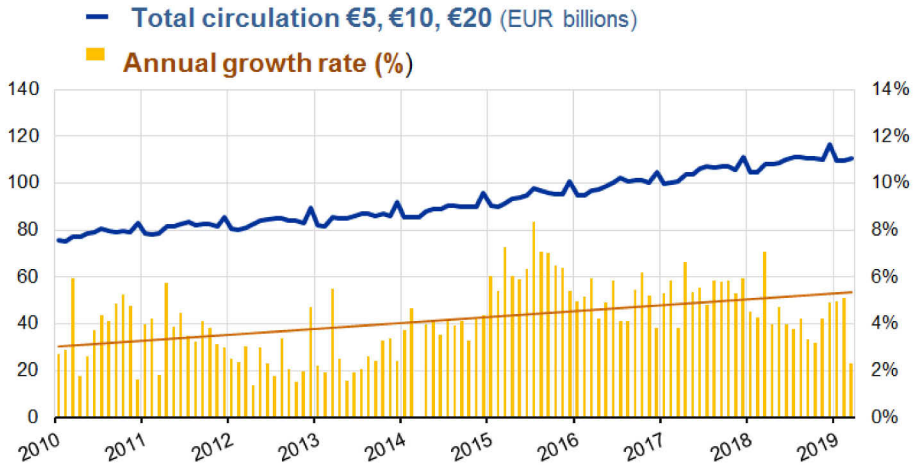


In view of the manifold factors determining the demand for cash and the various distribution channels and cash flows in an open economy, it is difficult to analyse for which purposes cash is actually used. A striking development is, nonetheless, that over the current decade also the circulation growth of the three lowest denominations (€5, €10 and €20), i.e. those banknotes which are most likely merely used for payment purposes, has accelerated. This suggests that the uninterrupted high demand for banknotes is not only caused by higher demand for saving purposes (commonly referred to as “hoarding”), but also the consequence of a growth in the actual number of payment transactions (e.g. due to economic growth).

A reliable decomposition of the overall amount of banknotes in circulation into those stocks used for payments and those used for hoarding purposes, both within the euro area and abroad, is difficult. From euro area wide statistics on registered banknote shipments it can be derived that, in terms of value, approximately 30% of the total amount of banknotes in circulation is held outside the euro area (some EUR 370 billion at end-2018). As to the stock of banknotes held within the euro area (i.e. some EUR 860 at end-2018), analyses have shown that

the around 64% are essentially held for savings purposes (approx. EUR 551 billion) and 36% for transactional purposes (approx. EUR 310 billion).

Chart 3: Circulation of small denominations



3.2. EUROSISTEM'S STUDIES ON THE USE OF CASH BY HOUSEHOLDS

3.2.1. Survey on the use of cash by households

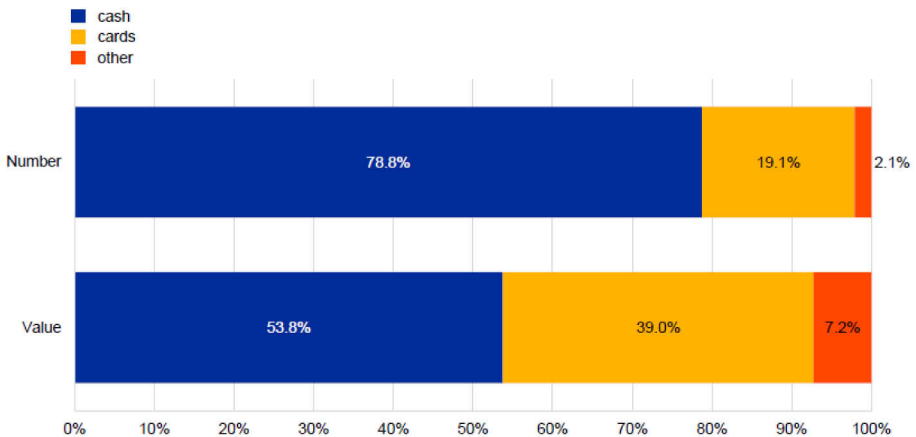
To deepen the Eurosystem's understanding on the use of cash by consumers (private households) at the point of sales (POS), the so-called SUCH study (Survey on the Use of Cash by Households) was conducted between October 2015 and July 2016³. The survey involved 65,281 respondents (aged 18+, except for NL (12+)) and also encompassed payments between individuals, charity donations and for home services. Respondents kept a diary to write down all the payments and cash withdrawals or cash replenishments that they carried out during the course of a single day. In the specific case of Cyprus and Malta, respondents used three-day diaries. A total of 128,677 payments were reported. A subset of 28,099 respondents was also invited to complete a questionnaire in order to collect information on consumers' access to payment instruments and their payment behaviour; these results were analysed together with the reported payments transactions. The

³ It was conducted in all euro area countries, except in Germany and the Netherlands, where the central banks have been carrying out similar payment diary surveys since 2008 and 2007, respectively. The latest available survey results from these countries are from 2014 for Germany and 2016 for the Netherlands. Even though the methodology used in the SUCH survey is similar to the methodologies used by the central banks of Germany and the Netherlands, the central banks in those countries preferred to continue using their own methodology in order to avoid deviating from their historical results. Nevertheless, to the extent possible, the results of those countries have been integrated to present the results for the whole euro area.

total number of survey participants for the whole euro area, including Germany and the Netherlands, was 92,080, reporting a total of 198,600 payments.

Survey results showed that cash was dominant at the point-of-sales (POS). In terms of number of transactions, 78.8% of purchases at the POS were paid in cash, 19.1% by using cards and the remaining 2.1% was paid by using various other payment instruments (see Chart 4). In terms of value, cash payments accounted for 53.8% of all POS payments, cards for 39.0% and other means of payment accounted for the remaining 7.2%.

Chart 4: Market share of payment instruments at points of sale



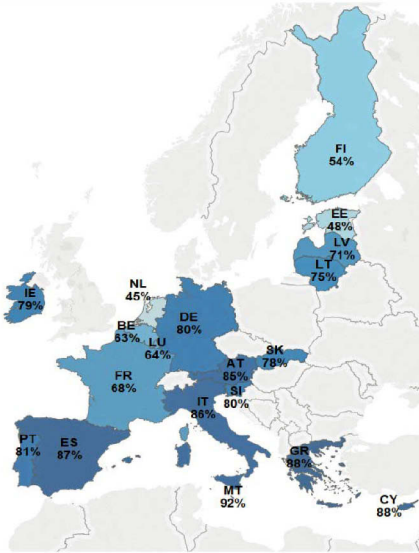
Sources: ECB, Deutsche Bundesbank and De Nederlandsche Bank

Notes: Euro area results, adjusted for country size

Comparing the use of cash per country, cash was used most in southern euro area countries, as well as in Germany, Austria and Slovenia (resulting in country shares of 80% or above for all POS transactions; see Chart 7). The market share of cash was lower in Latvia, Lithuania, Slovakia and Ireland, ranging from 71% to 79%. Belgium, Luxembourg and France follow with a cash share ranging between 63% and 68%. The Netherlands, Estonia and Finland had the lowest shares, ranging between 45% and 54% of all payments at POS.

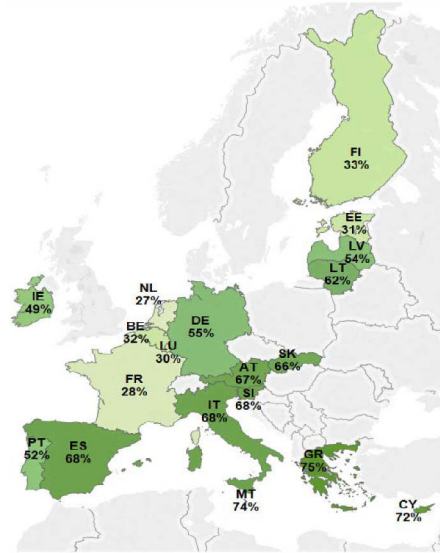
In terms of value of payments made at POS, in all countries the share of cash was much lower than in terms of number of payments. In Cyprus, Malta and Greece the share of cash in value of payments was the highest, ranging from 72% to 75%. In Lithuania, Slovakia, Austria, Spain, Italy and Slovenia the share ranged from 62% to 68%. In Ireland, Portugal, Latvia and Germany the share of cash in value of payments was between 49% and 55%, while in the Benelux countries, France, Estonia and Finland the share ranged from 27% to 33%.

Chart 5a: Share of cash transactions per country at points of sale (number of transactions)



Sources: ECB, Deutsche Bundesbank and De Nederlandsche Bank

Chart 5b: Share of cash transactions per country at points of sale (value of transactions)

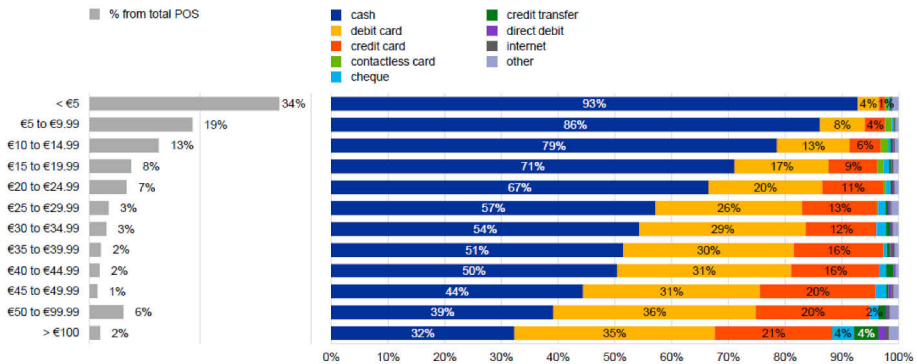


Sources: ECB, Deutsche Bundesbank and De Nederlandsche Bank

Looking at the way consumers paid according to payment instrument and amount, cash was used by the majority for purchases under €45, which accounted for 91% of all POS payments. Cards, on the other hand, were the most frequently used payment instrument for purchases above €45, which accounted for 9% of all POS payments. As can be expected, the higher the amount to be paid at the POS, the more likely it is that a consumer pays by card (see Chart 6). Interestingly, cash was also used in 32% of purchases above EUR 100.

Although on average euro area consumers paid in 2016 for almost 79% of their transactions using cash, this varied depending on the place of purchase. Cash was the most dominant payment instrument in a large majority of POS. It held a market share of payments of above 50% in all sectors, except in the accommodation sector (hotels, guesthouses and camping sites), where payment cards and other non-cash payment instruments were largely used. As shown in Chart 7, the share of cash usage was the highest at (i) street or market vendors and in restaurants and bars (both 90%), (ii) vending or ticketing machines (84%), (iii) in the entertainment and recreation sector (83%), and (iv) in shops for day-to-day items, such as supermarket or bakeries (80%). Cards were the second most frequently used payment instrument after cash. From all sectors, cards were most frequently used in shops for durable goods, petrol stations and in the accommo-

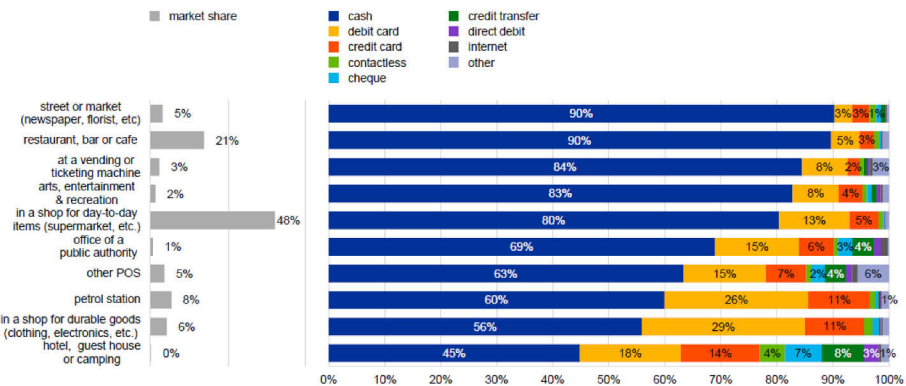
Chart 6: Use of payment instruments at POS, by value range (number of transactions)



Sources: ECB, Deutsche Bundesbank and De Nederlandsche Bank

dation sector where 41%, 38% and 37% of all payments were made by card, respectively. It may be surprising that 60% of payments in petrol stations were made in cash. However, it should be taken into account that people also buy cigarettes, newspapers, flowers and snacks at petrol stations, which are generally more-frequent, smaller-value payments.

Chart 7: Market share of the main payment instruments (number of transactions)



Sources: ECB, Deutsche Bundesbank and De Nederlandsche Bank

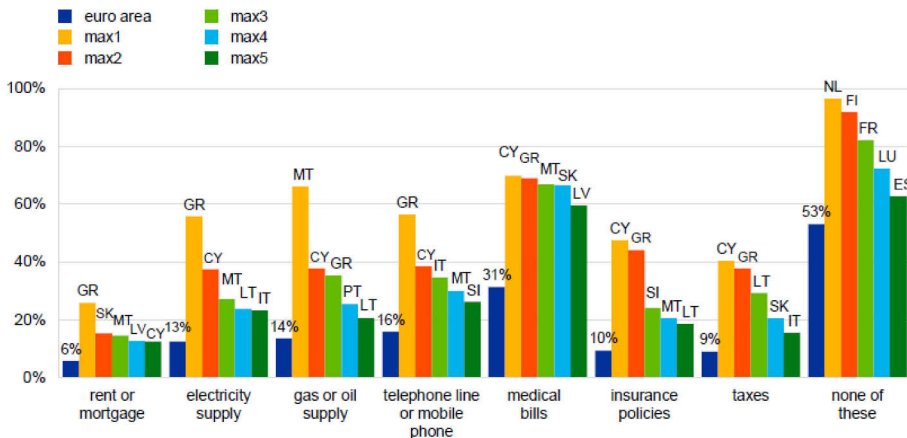
In some countries it is not unusual to pay recurrent expenses, such as rent, utilities, telephone subscriptions and insurance, in cash. On average, in the euro area (excluding Germany) 6% of the rent was said to be paid in cash, with 26% of all rent in Greece said to be paid in cash, and around 15% in Slovakia and Malta. In addition, utility bills were frequently paid in cash in several countries. For example, 56% of the respondents in Greece and nearly 25% of those in Italy

said they paid their electricity bill in cash. Also, 9% of respondents indicated that they paid their taxes mainly in cash and 10% stated that they paid their insurance mainly in cash. However, there are large differences in payment behaviour, since in many other countries hardly any of these recurrent payments, or payments for medical services, were said to be paid in cash.

Chart 8: Use of cash for recurrent payments (number of respondents)

Question: which of the following expenses do you mainly pay in cash?

(based on 30,871 respondents from the euro area)



Sources: ECB and De Nederlandsche Bank

Notes: Label max 1 tot 5 indicate the top 5 countries holding the highest shares of responses per sector category

Comparing the SUCH results with available studies from other countries, e.g. Sweden, Germany and The Netherlands, shows that the share of cash transaction over all POS transactions is slowly decreasing. However, it remains open to which extent this decrease is compensated by an increase in the actual number of payments.

3.2.2. Outlook – the Eurosystem’s 2019 study on the use of cash by households

To closely follow the evolution of the payment trends by private households, the ECB has started a new survey in 2019 which, compared to the SUCH survey, has a broader scope. The new study (called SPACE) is based on a data collection via a payment diary, and it consists not only of a module to capture data on POS payments, but also of a new module to collect data on remote payments, such as online shopping (e.g. purchases made via web shops by using computer, smart-

phone, etc.) recurrent bill payments (e.g. rent, utilities, insurances, etc.). The survey will be complemented by a questionnaire with general questions on payment behaviour. As remote payments are predominately effected by non-cash payments, this survey, for obvious reasons, will lead to a lower share of cash payments⁴.

3.3. SOME INSIGHTS INTO THE RESULTS OF THE EUROSISTEM'S QUALITATIVE SURVEY ON CASH SUPPLY

Besides analysing the payment behaviour of the euro area citizens, the ECB has also a genuine interest in better understanding how companies and retailers rate cash as a means of payment. In 2018, in the course of a qualitative, questionnaire-based survey on the efficiency of the cash supply chain, the 19 euro area NCBs surveyed – in addition to a total of 87 credit institutions and 65 professional cash management companies/cash-in-transit companies – also a wide range of retailers, shops, restaurants and other service providers. In sum, 157 retail companies of different sizes from various sectors were interviewed by NCBs. Overall, retailers rated reliability of payment transactions and customers' settlement preference as the most relevant criteria when assessing payment instruments. Of secondary importance were transaction speed and total costs associated with payments, followed by security aspects (theft and fraud). According to these six criteria, cash scored well, especially among smaller retailers, whose internal cash-handling costs are generally lower than the fees for electronic payments, and in countries where banks charge low fees, or none at all, for their cash services. The results for the main payment instruments are contemplated in Chart 9.

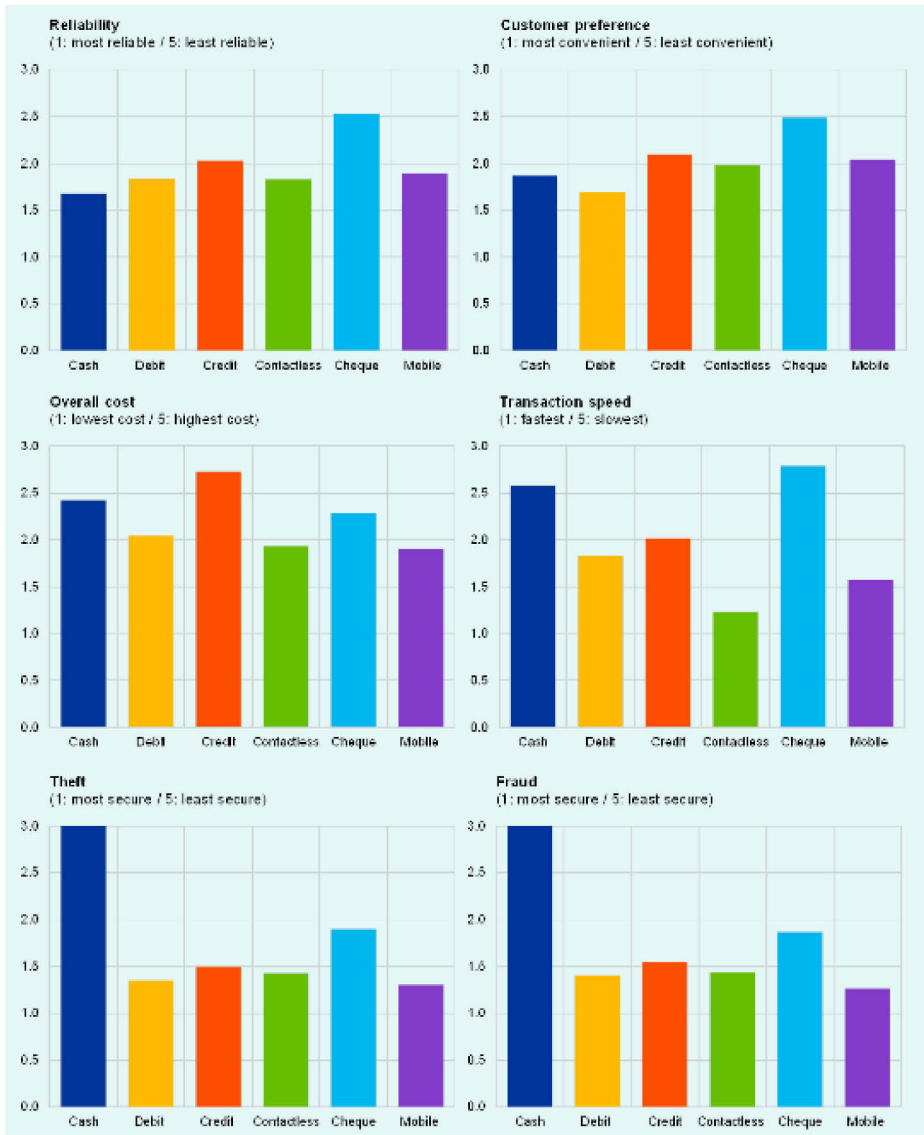
3.4. CONCLUSION

Pronounced demand for the medium but also for the low-value banknote denominations shows that the growth of banknotes in circulation cannot only be explained by increased banknote demand for saving/hoarding purposes. This observed resilient circulation growth suggests that cash still represents a popular means of payment. However, there are distinct national differences when comparing the payment behaviour among the individual euro area countries.

Also the study on the use of cash by consumers confirms that cash is still a predominant payment instrument at the point of sales, whereby the share of no-cash payments in day-to-day payments is growing.

⁴ The SPACE survey will be executed in three waves between April 2019 and January 2020; publication of the results is expected for HY1/2020.

Chart 9: Retailers' criteria for accepting various different means of payment



Source: 2018 survey of retailers by Eurosystem NCBS

Note: The chart shows average ratings from 1 (best score) to 5 (worst score)

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ECB Economic Bulletin, Issue 6/2018; Trends and developments in the use of euro cash over the past ten years.

ECB Annual Report 2018.

4. WHAT IS MONEY? COMPARING CASH AND CENTRAL BANK DIGITAL CURRENCIES

Morten Bech and Amber Wadsworth^{1 2}

4.1. INTRODUCTION

In the case for or against cash, we must first understand what money is, how people use it, and what makes cash unique.

People in every country still use cash. Measures of cash in circulation show that cash demand is growing in almost every economy.³ At the same time, electronic payments are increasing and appear to be replacing cash in transactions. In Denmark, churches and street performers now accept mobile payments. In China, fast food can be bought using “smile to pay” facial recognition technology. And in the United States, college students pay for pizza and beers using apps that broadcast the purchases to their social media friends.

Globally, the trends in cash and electronic payments raise the question of whether we are moving towards cashless societies or simply societies with less cash. This paper contributes an expert witness (*amicus curiae*) to the “trial of cash” by summarising the role of money, the features that make cash unique, and whether a central bank digital currency (CBDC) could replicate, and replace, cash.

4.2. THE EVOLUTION OF MONEY: FROM PAPER TO DIGITAL

Money has performed a crucial function in human civilisation, and will continue to do so. In philosophical terms, money is memory – it keeps a record of the value of all goods and services that have been exchanged and enables sellers to exchange that value to obtain other goods and services in the future. In another sense, money is a special IOU between parties because it derives its value from the trust that everyone in an economy places in its ability to be exchange for other goods and services at a later date.⁴

¹ Any views expressed in this paper are those of the authors and not necessarily those of the BIS.

² Head of Secretariat, CPMI and Visiting Member of Secretariat, CPMI.

³ See M Bech, C Picillo, F Ougaard and U Faruqi, “Payments are a-changin’ but cash still rules”, *BIS Quarterly Review*, March 2018, pp 67-80.

⁴ See A Carstens, “Money in the digital age: what role for central banks?”, speech at the House of Finance, Goethe University, Frankfurt am Main, 6 February 2018.

In practical terms, money serves us in three ways:

- (i) as a store of value to maintain purchasing power over time;
- (ii) as a unit of account to measure the value for goods, services and other transactions; and
- (iii) as a medium of exchange that is widely accepted to trade or buy any goods and services.⁵

Initially, rudimentary tokens such as shells, beads and wool were used as a medium of exchange, unit of account and store of value. Later, precious metals such as gold and silver were employed, before paper money was introduced first (albeit briefly) in China in the 12th century and then in Sweden in the 17th century by that country's first bank, Stockholms Banco. Paper money was originally issued by the private sector in the form of banknotes and represented a claim on the issuer. However, overissuance was a perennial temptation, leading to many a banking crisis. Eventually, governments established public banks to issue banknotes and coins to stabilise their banking system. Sveriges Riksbank was the first central bank to be established, in 1668 after the Stockholms Banco crisis.⁶

Today most economies use both paper and digital forms of money. Digital or electronic monies outperform cash as a means of payment in terms of their (i) durability, ie ability to withstand repeated uses; (ii) portability, ie ability to be practically carried and transferred; and (iii) divisibility, ie ability to be divided into smaller units; and (iv) traceability, ie ability to be monitored. Further, electronic payments have been, and continue to be, the subject of many innovations.

Nonetheless, the demand for cash also continues to increase (Graph 1). Cash in circulation as a share of nominal GDP is our best proxy of cash demand across economies. Since 2000, cash in circulation has increased by 2 percentage points to 9% on average in the countries in our sample. This measure includes the demand for cash as a means of payment and as a store of value.

4.3. WHAT MAKES CASH UNIQUE? THE LOWER RISK, PRIVACY AND ANONYMITY OF CASH

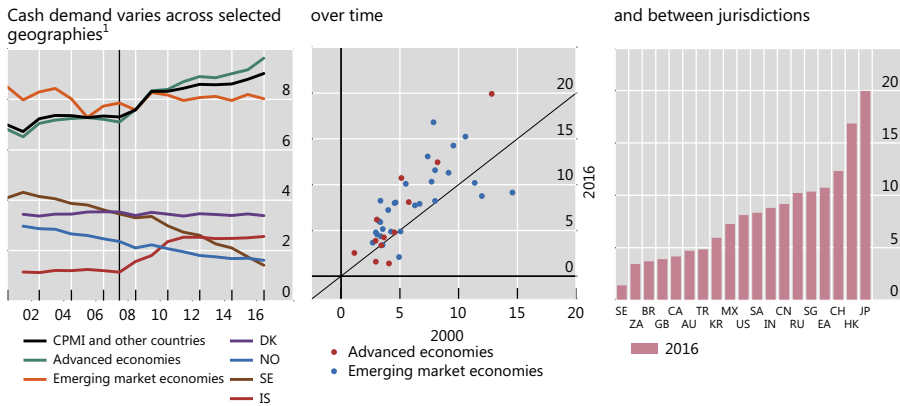
Today cash has become synonymous with central-bank issued money. The usefulness of cash as a unit of account, medium of exchange and store of value partially stems from the fact that it is issued by governments via the central bank.

⁵ See C Borio, "On money, debt, trust and central banking", speech at the Cato Institute, 36th Annual Monetary Conference, Washington DC, 15 November 2018.

⁶ See U Bindseil, "Some pre-1800 French and German central bank charters and regulations", 27 April 2019, available at SSRN, <https://ssrn.com/abstract=3177810>. See also J Nicolaisen, "What should the future form of our money be?", speech at the Norwegian Academy of Science and Letters, Oslo, 25 April 2017.

People trust cash to the extent that they trust their government and the stability of the underlying economy. In contrast, most forms of electronic money held by members of the public are issued by private banks, for example, deposits in accounts at banks. These electronic money balances typically have a par value with cash, but also carry a risk in the event of the issuing bank defaulting.⁷

Graph 1: Cash demand varies across countries
As a percentage of GDP



¹ Includes CPMI and other countries (AE, BG, CL, CO, CZ, DK, HR, HU, ID, IL, IS, KW, MY, NG, NO, PH, PL, RO, RS, TH, UA and UY). Data start in 2002 for India; 2004 for Mexico, South Africa and Turkey; and 2005 for Russia. The vertical line is at 2007 and indicates the start of the Global Financial Crisis. ² For countries with no data available in 2000, the first data point available is used for the horizontal axis value. For the euro area, data for 2002 are used. ³ Data for China are from the People’s Bank of China webpage; data for 2015 are used. Data for Russia include banknotes and coins in the vaults of the Central Bank of the Russian Federation. Data for Singapore include Brunei notes and coins held at banks.

Sources: Committee on Payment and Market Infrastructures, *Statistics on payment, clearing and settlement systems in the CPMI countries – figures for 2016*, December 2017; IMF, *International Financial Statistics*; authors’ calculations

Cash is also unique because it is a tangible form of money. This means that no electronic transaction record is automatically generated when cash is used for payments. For example, no record is generated in peer-to-peer cash transactions. This offers users of cash a high degree of privacy and anonymity: cash payments and holdings cannot be traced back to a person, and transaction details such as the items bought and for what amount remain unknown.⁸

The tangible nature of cash also provides access to the financial system for members of society who are unbanked or digitally excluded due to disability, lack of skills, poor internet coverage or low socioeconomic status.⁹

⁷ A Wadsworth, “What is digital money”, *Reserve Bank of New Zealand Bulletin*, no 3, April 2018.
⁸ It is, however, possible to build banknote serial number tracing technology into cash registers and other cash infrastructure to monitor banknote flows.
⁹ See Reserve Bank of New Zealand, “The future of cash use – Te whakamahinga moni anamata”, *Issues Paper*, 2019.

In addition, the tangible nature of cash contributes to the liberty and autonomy of members of society by enabling them to:

1. secure autonomy over their finances – cash holdings and payment are less easily monitored and controlled by other individuals, banks or governments;
2. separate savings from the banking system and to avoid certain government interventions (such as negative interest rates);
3. reduce exposure to cyber crime or identify theft on a personal and societal level; and
4. live off the grid – payment data can say a lot about a person’s whereabouts, associations and lifestyle.¹⁰

However, the privacy and anonymity of cash can also facilitate illegitimate activities:

1. Tax avoidance – households and businesses can use cash payments to hide or reduce the number of records of taxable activities.
2. Crime – people conduct illegal transactions in cash to avoid leaving an electronic record.

International comparisons show a clear correlation between cash usage in the economy and the size of the shadow economy.¹¹

In contrast, there are no fully anonymous forms of electronic money. Money in bank accounts or spent via debit and credit cards or mobile wallets must be linked to a personal identity. Cryptocurrency transactions are also recorded and linked to certain unique identifiers. The lack of full anonymity in electronic transactions presents users with data protection and cyber risk challenges.

4.4. A CENTRAL BANK DIGITAL CURRENCY¹²

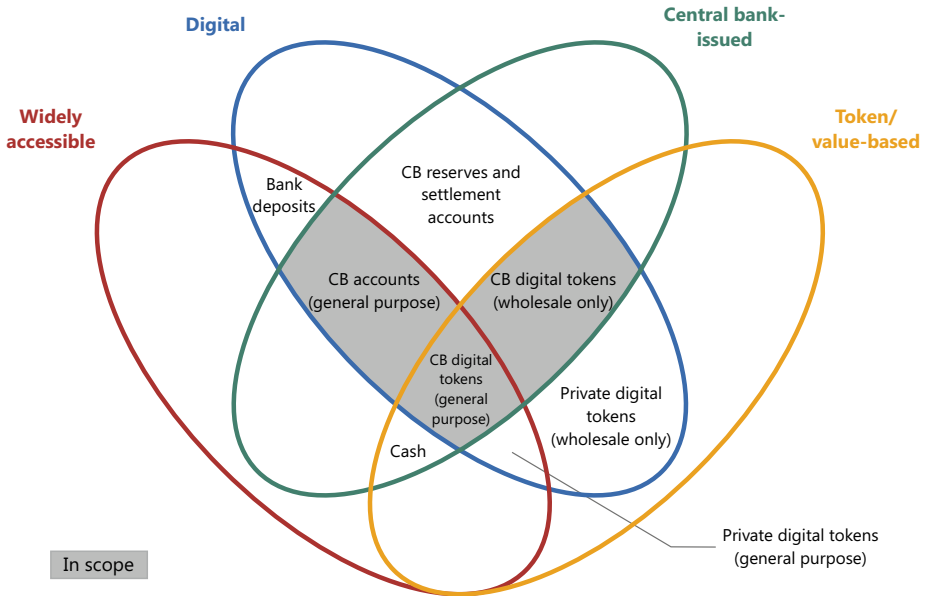
Central banks are exploring the possibilities of issuing their own digital currencies. Currently, central banks issue electronic money to certain commercial banks at the wholesale level to support payments settlement, distribute cash, implement monetary policy, and facilitate other central bank activities in their respective economies. However, central banks have not provided electronic accounts to members of the public.

¹⁰ See Reserve Bank of New Zealand, “The future of cash use – Te whakamahinga moni anamata”, Issues Paper, 2019.

¹¹ “Forging a path to payments digitization”, McKinsey on Payments, pp 3-10, March 2013.

¹² Committee on Payments and Market Infrastructure and Markets Committee, *Central bank digital currencies*, March 2018.

Graph 2: The money flower: a taxonomy of money



Source: Committee on Payments and Market Infrastructure and Markets Committee, *Central bank digital currencies*, March 2018.

A CBDC could be an account-based digital currency (similar to electronic money in a bank account) or a token-based cryptocurrency which could use a range of technologies (Graph 2, grey area). A CBDC could be issued to the general public or at a wholesale level. A wholesale CBDC would limit access to a predefined group of users, while the general purpose one would be widely accessible.¹³

Despite being issued by a central bank, a general purpose CBDC might not fully replicate the features of cash. A general purpose CBDC would provide a low risk (compared with privately issued money) and electronic form of money to the public, but it might not fully replicate the privacy and anonymity features of cash. The electronic nature of a CBDC means that all transactions carried out with the CBDC would be recorded by the central bank (although not necessarily monitored).

A token-based CBDC issued to the public could provide pseudo-anonymity if the identity of the payer and payee was not required to authorise and accept payments (as with a cryptocurrency). Payments with the token-based CBDC

¹³ There are various design choices for a CBDC, including: access (widely versus restricted); degree of anonymity (ranging from complete to none); operational availability (ranging from current opening hours to 24 hours a day, seven days a week); and interest-bearing characteristics (yes or no).

could be pseudo-anonymous, as a record of the transaction would be generated but the individual would not necessarily be linked to the transaction. However, an account-based CBDC (as with a bank account) would require the account to be linked to an individual and so would not provide any anonymity. The likelihood of a central bank choosing to issue a pseudo-anonymous digital currency would depend on its consideration of the social benefits of liberty and autonomy and the social costs of illegitimate activities.

Graph 3: Central bank CBDC work
Share of respondents



¹ Share of respondents conducting work on CBDCs, 2018 survey.

Source: Committee on Payments and Market Infrastructure and Markets Committee, *Central bank digital currencies*, March 2018.

Many central banks have begun researching CBDCs. In 2017, the CPMI surveyed 63 central banks (representing jurisdictions covering close to 80% of the world population) (Graph 3). All the central banks surveyed have begun theoretical and conceptual research on CBDCs, and half have moved on to experiments or more “hands-on” proof-of-concept activities.¹⁴

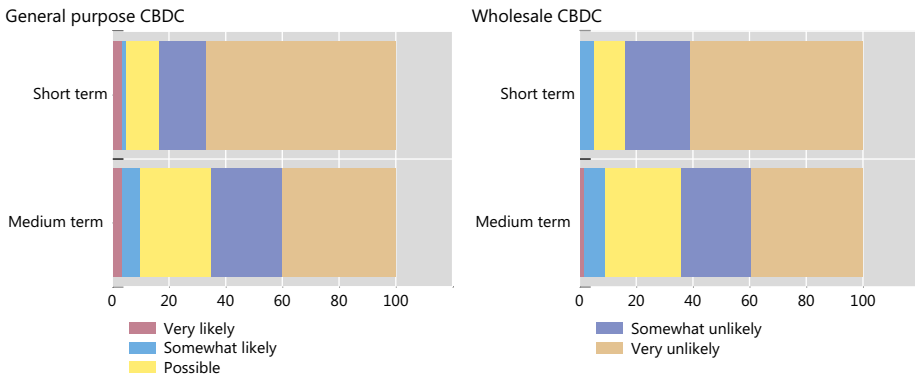
Sweden's central bank, the Riksbank is currently facing a decline in cash in circulation and consequently exploring the implications and design choices of issuing an e-Krona (a retail CBDC) that would give the public access to a low-risk form of money.¹⁵ Uruguay is also exploring whether an e-Peso could be issued to the public to improve financial inclusion, safety and monetary policy implementation and to reduce the costs of financial transaction. However, the focus of most

¹⁴ See C Barontini and H Holden, “Proceeding with caution – a survey on central bank digital currency”, *BIS Papers*, no 101, January 2019.

¹⁵ See Riksbank, “The Riksbank e-krona project: report 2”, 2018.

central bank engagement in CBDCs is very much at the wholesale level, with little bearing on the future of cash.¹⁶

Graph 4: Likelihood of issuing a CBDC in the short and medium term¹
Share of respondents



¹ Short term: one to three years. Medium term: one to six years.

Source: Committee on Payments and Market Infrastructure and Markets Committee, *Central bank digital currencies*, March 2018.

Although there is a lot of engagement in CBDC work, it is unlikely that many central banks will issue such a currency in the near future. The CPMI survey found that, in the next one to three years, over 85% of the central banks surveyed are somewhat unlikely or very unlikely to issue any type of CBDC and no central bank is very likely to issue a wholesale CBDC in the short term (ie one to three years). In the medium term (ie one to six years), only one central bank reported that it saw itself as very likely to issue a wholesale CBDC.

4.5. CONCLUSIONS

The technology of money has evolved as society has sought more reliable, convenient and trusted forms of money. Digital money provides greater durability, portability, divisibility and traceability than cash, but it does not replicate all of the unique features of cash. Importantly, cash carries low default risk (compared with commercial bank-issued money) and serves as a private and

¹⁶ For example, Project Jasper at the Bank of Canada, Project Ubin at the Monetary Authority of Singapore and Project Inthanon at the Bank of Thailand explored whether distributed ledger technologies can be used for wholesale payments between commercial banks and the central bank. Project Stella, conducted by the ECB and the Bank of Japan, and the joint work under way between the Bank of Canada, the Monetary Authority of Singapore and the Bank of England are exploring whether distributed ledger technology and CBDC can be used to facilitate cross-border payment and securities settlement arrangements.

anonymous medium of exchange and store of value. These features offer members of society autonomy and liberty in their finances. A CBDC could provide a low-risk form of digital money, but would only be able to provide pseudo-anonymity depending on its design.

5. CONSIDERATIONS FOR A CASHLESS FUTURE¹

*Cecilia Skingsley*²

Two years have passed since I asked the question of whether the Riksbank should issue digital money – the e-krona.³ Since then, we at the Riksbank have started an investigation and have been given the opportunity to analyse and discuss the matter from several different angles. Of course, the need to modernise the money is-sued by the Riksbank is new and is connected to the increased digitalisation of society as a whole. But there are also points in common with older issues such as that of which role central government should play on the payment market.

On 28 September 1900, a crowd of bankers gathered in Stockholm to listen to Professor Pontus E. Fahlbeck, a member of the Riksdag (the Swedish parliament). The subject of this meeting was the decision by the Riksdag to give the Riksbank sole right to issue banknotes in Sweden. As from 1904, the commercial banks' right to issue banknotes would thus come to an end. At the meeting, this reform was denounced as unnecessary, inappropriate and even dangerous. It was not considered possible for the Riksbank, on its own, to be able to provide the 'means of exchange' to such an extent as to satisfy the needs of the business sector.⁴ This was a period of great change, when responsibility for financial services was being reallocated between the private and public sectors. In retrospect, it was a success to change the rather undisciplined issuance of banknotes for a standard set by the Riksbank, leaving the private banks free to concentrate upon deposits and lending. Now, 118 years later, we are facing a similar situation: once again, we are discussing how the issuance of money is to be organised and how responsibility can best be allocated to ensure that our payments are secure and effective.

Now, as then, opinions are divided over the role the Riksbank should play on the payment market. There are those who are positive to the suggestion of an e-krona and those who are doubtful towards such an initiative from the Riksbank. What I would like to communicate today is the insight that, regardless of whether or not the Riksbank decides to issue an e-krona, the old order will change. We need a broad discussion of what it means when central government's presence on the payment market's supply side risks disappearing along with cash. Introducing an

¹ I would like to thank Hanna Armelius, Marianne Sterner and Calum McDonald for all their help with this speech. I would also like to thank my colleagues on the Executive Board of the Riksbank for valuable discussions. Stances and any remaining lack of clarity is entirely my own responsibility.

² Deputy Governor at the central bank of Sweden. This article is based on a speech given in Stockholm 2018-11-22.

³ Skingsley, S. (2016). "Should the Riksbank issue e-krona?" Speech at Berns, Stockholm, 16 November.

⁴ Fahlbeck, P. E. (1900). "Bankreformen" (the bank reform), *Statsvetenskaplig tidskrift*, (political science journal) vol. 3, no. 5.

e-krona would entail taking a new step and the consequences of this must be analysed carefully. But accepting a situation in which the general public no longer has access to any form of central bank money would also be a step into the unknown. Issuing digital Riksbank money, an e-krona, as a complement to cash would be one way of avoiding this situation. The alternative to an e-krona would be for central government to intervene with more detailed regulation of the market to ensure society's different interests are met. But this too would have its problems, as I shall discuss in more detail.

5.1. THE LARGEST AND SMALLEST PAYMENTS: THE RIKSBANK'S ROLE TODAY AND IN THE FUTURE

Traditionally, the Riksbank has been responsible for the underlying system in which all payments in Swedish kronor are settled, the RIX system. This system was created to manage large-value payments in a highly secure manner. In addition, the Riksbank's banknotes and coins have been used for the very smallest payments. The payment market is currently undergoing a large number of major changes that are affecting both of these 'systems'.

As cash usage declines, almost all consumer payments in shops are now made by card. This market is completely dominated by Visa and Mastercard and much of the infrastructure is located outside Sweden's borders. Unlike Norway and Denmark, Sweden has no card network of its own.

At the same time, new technology is leading to new, convenient ways of paying becoming available, such as the mobile application Swish, for example. In Sweden, 6.5 million of 10 million inhabitants are connected to Swish. As the rest of society becomes digitalised, demand is increasing for digital payments and, above all, for rapid payments that can be made in real time. For the Riksbank, this means adjusting or complementing the RIX system so that it is able to manage instant payments in a secure and efficient manner. It is important to ensure that all participants involved in payments act under equal and equitable rules. At the moment, we are busy analysing whether we can take advantage of our European cooperation by joining the European Central Bank's system for instant payments.⁵ We are aware, however, that this would mean that part of our infrastructure for payments would thereby end up outside Sweden's borders and are thus mulling over whether some kind of domestic back-up would be needed and over how the e-krona could be paired with this as a complementary means

⁵ The Riksbank sent out a consultation over joining TIPS on 5 June 2018. See Consultation on instant payments and the Riksbank's role in the payment infrastructure. www.riksbank.se.

of payment. This is particularly important as we expect instant payments to become increasingly important in the future.

The trend towards a cashless society has also continued – a trend that risks leaving Sweden without functioning cash in the near future. My speech two years ago was part of a proactive strategy to create different alternative courses of action from this trend. As the e-krona is something new, it will take time to analyse and perhaps develop such an alternative. This work must therefore be initiated in good time, before cash usage has declined to such a point that cash is no longer a generally accepted means of payment in Sweden.

5.2. THE RIKSBANK'S E-KRONA PROJECT: RESULTS AND THE WAY FORWARD

In my speech, I introduced the discussion of the e-krona by asking whether the Riksbank should adapt the money we issue to the modern, digital economy. I emphasised then that the e-krona should be seen as a complement to cash, which was in the process of becoming marginalised. I also pointed out the need of working in parallel in three areas: investigating the technical possibilities, analysing the consequences for, among other things, monetary policy, and reviewing the legal issues to which a possible e-krona would give rise.

After two years, I can say that we have come quite far within all of these areas, but also that we still have some way to go until we reach our goal. We have discovered that it would be possible to develop an e-krona using existing technology, but we will have to start constructing and testing a finished product to learn more and to establish different alternatives for the Riksbank in the future. We have also discovered that it is possible to design an e-krona that would not have excessive consequences for monetary policy or financial stability.⁶ On the legal side, we interpret this as meaning we have a mandate to issue a simpler, value-based variant of the e-krona that we will develop as a pilot version. We also intend to approach the Riksdag to propose legal amendments that will clarify our mandate and make it possible to issue an account-based e-krona.

⁶ See Armelius, H., Boel, P., Claussen, C. A. and Nessén, M. (2018) “The e-krona and the macro economy” Sveriges Riksbank Economic Review no. 3, and Juks, R. (2018) “When a central bank digital currency meets private money: effects of an e-krona on banks”. Sveriges Riksbank Economic Review, No. 3. Sveriges Riksbank.

5.3. WE NEED TO PREPARE OURSELVES FOR A CASHLESS FUTURE

As regards the rapid rate at which cash usage is declining, the Riksbank Committee has submitted an interim report with a few proposed measures to brake this development.⁷ The decline in cash usage that we are now witnessing is going too fast for certain vulnerable groups who are unable to use digital technology or who do not even have access to it. The Riksbank therefore welcomes the proposals that the Riksbank Committee has submitted. The Riksbank has been requesting protection for cash usage since 2016, when the Payment Accounts Directive was introduced. I therefore consider it a welcome step that there is a broad political will to speak with a clear voice in this matter and that the legislator intends to increase its influence over this structural transformation so that it is not steered by the private sector alone. The Riksbank Inquiry's proposal, supported by representatives of all parties in the Riksdag, would ensure access to cash. However, as the acceptance of cash in commerce is not legally required, the Inquiry's proposal will not ensure that cash will remain usable in society.

Consequently, even if the measures proposed may help slow down this development, I do not think that it will come completely to a halt. Streamlining within the banking industry, for example via cashless bank branches, may certainly have restricted the general public's ability to use cash, but other factors such as technological progress, changed consumption patterns and the lack of legal requirements forcing traders to accept cash are probably more important.

For example, in its report "Grundläggande betaltjänster i en digitaliserad framtid (Essential payment services in a digitalised future)"⁸, the Swedish Post and Telecom Authority (PTS) writes that "even if the cash infrastructure is maintained and cash is available, cash will not necessarily be fully usable in the future". The most recent results of the Riksbank's survey of payment patterns in Sweden also show that the proportion paying in cash is continuing to decrease, while Swish payments are increasing. So, even if the proposals of the Riksbank Inquiry were to be realised, there would be nothing to prevent shops and other establishments from refusing to accept cash. Neither is there any way to induce consumers to use cash. This development seems to be steered at least as much by demand as by supply.⁹

In other words, the tendencies that led us to start our analysis of the e-krona are continuing. And neither is the Riksbank alone in analysing this issue. Many other

⁷ See "Secure access to cash". Interim report from the Riksbank Committee. SOU 2018:42.

⁸ PTS-ER-2017:20.

⁹ See Erlandsson, F. and Guibourg, G. (2018), "Times are changing and so are payment patterns", Economic Commentary No. 6, Sveriges Riksbank.

central banks are expending resources in investigating digital central bank money and a number have already conducted experiments or developed pilot versions.¹⁰ The Riksbank has met with many other central banks, politicians with responsibility in Sweden and representatives of the private sector. Reactions have varied from great enthusiasm to great scepticism. The banking sector in particular often argues that an e-krona is not needed and that launching one would be an intrusion into the private sector. But the Riksbank's presence on the market and competition with the private sector's payment services are actually nothing new.

When private banknotes were first issued in the 1830s, the Riksbank had already been active in the issuance of banknotes for over 100 years.¹¹ The state started Postgirot in the mid-1920s to secure a national payment system, over 30 years before the private banks got started with Bankgirot. History shows that innovative capacity in the private sector functions best when it can use state infrastructure and clear regulations that develop apace with the possibilities offered by technology as a launching pad.¹² And, if the payment market is to be privatised completely, an active decision should be required in this case from the legislator regarding choosing such a new direction. It cannot be allowed to just happen.

5.4. CONFIDENCE IN MONEY IS A SOCIO-ECONOMIC ASSET

Since confidence in money among the general public is a public good, there is a social benefit in monitoring the development of the payment market. The confidence that has been built up is a kind of social capital and there are many examples from other countries of how badly it can go when confidence in money is lost.

Theoretically, it is often assumed that the possibility of converting private bank money into secure central bank money is a basic precondition for maintaining confidence in privately issued money.¹³ Above all in times of financial unease, problems can arise when confidence in the private banks' money can rapidly collapse. The question is what happens in a financial crisis if confidence in the entire banking sector sinks. Would there be problems if, in the future, it became impossible to switch from commercial bank money to central bank money?

Issuing an e-krona is sometimes described as something revolutionary and, in principle, I share this opinion. However, how revolutionary it will be depends, to

¹⁰ See the Riksbank's e-krona project report 2 for more information.

¹¹ See Söderberg, G. (2018), "Why did the Riksbank receive a banknote monopoly?" *Sveriges Riksbank Economic Review*, No. 3.

¹² This relationship is also pointed out in Carney, M. (2018) "New economy, new finance, new bank". Speech published 21 June. Bank of England.

¹³ See, for example, Tobin, J. (1985). "Financial innovation and deregulation in perspective". Keynote paper presented at Bank of Japan and BIS, CPSS (2003) "The role of central bank money in payment systems".

a great extent, on how the e-krona is designed. If it were to be approximately the same as cash but stored in a card or another physical unit, the consequences for the payment market, monetary policy and the financial system would generally be minor. The more popular the e-krona were to become, the greater the consequences would be, of course: greater competition with depositing in banks and greater risks for the Riksbank's balance sheet, for example. Careful analysis and calibration is therefore required here. It is also therefore wise to proceed with caution.

At the same time, we must stand prepared with a state solution if cash becomes completely marginalised, which could happen quickly.¹⁴ Judicious government intervention in the payment market cannot be consigned to history. In my opinion, the presence of the state will also be needed in the future to allow us to manage the different problems that could arise if state-issued means of payment (bank-notes and coins) were to vanish entirely from the payment market.

5.5. THE ALTERNATIVE TO THE E-KRONA, INCREASED REGULATION, COULD BE DIFFICULT AND EXPENSIVE

One conceivable alternative to the introduction of an e-krona would be for central government to intervene with increased regulation of the payment market to ensure safeguard objectives that private agents may not see as important but which are important for society. These include objectives such as general accessibility, resilience and innovative capacity. However, achieving both efficiency and security via regulation on a market like the payment market may be complicated. Allow me to explain why. In general, we usually consider competition to be good for achieving cost-effectiveness and innovation on a market. However, this does not apply to all types of market. In economics, we talk about 'natural monopolies'. These arise on markets where major investments in infrastructure are needed and where the cost of serving an additional customer is low. A common example of such a market is the water system, where large investments are needed to lay water pipes and extend sewage systems. It would not be efficient to have two different companies digging up the streets and competing to supply water. In addition, once a system is in place, it is difficult for a competitor to enter the market and thus a monopoly arises.

On the payment market, we have what is basically a similar situation, requiring major investments in IT infrastructure, which easily leads to a monopoly

¹⁴ Arvidsson, N., Hedman, J. and Segendorf, B. (2018) "När slutar svenska handlare acceptera kontanter?" (When will Swedish retailers stop accepting cash?) Swedish Retail and Wholesale Council research report, 2018:1.

situation with one dominant company. So far, however, cash has always been available as an alternative that restricts the monopoly's chances of exploiting its power.¹⁵

Often it is central government that is responsible for production on markets with natural monopolies, but a private company can also have a monopoly at the same time as the state intervenes and regulates prices.¹⁶ If the company were allowed to set the price itself, excess profits would arise, in addition to which quantities of the product would be too small and/or the quality too poor, as in all monopoly situations.

On the payment market, there are also economic advantages in the participants using the same infrastructure. For the consumer, it is convenient if the same solution works everywhere the consumer makes a payment. We would prefer not to need one card for each shop, another for parking, using public transport and so on. This means that so-called network effects arise, as the more people who join the same system, the better it is for everybody in the system. However, this also means that it is difficult to set up normal competition on the market.

In addition to problems in achieving the right pricing and quantity, there are also other aspects that must be considered in the event that the state-issued means of payment disappears from the payment market in the future. Social welfare maximisation is a broader goal than private actors' interest in maximising their profits. For example, it is important for central government to achieve a good balance between socio-economic risks and costs. Central government also takes account of factors connected with ensuring accessibility for all groups in society, resilience to shocks, preparedness and equal conditions regardless of where in the country users may live, for example. What I want to say is that it would probably require increased state governance and quite extensive resources to ensure that the private market delivered on all these points. What would be required is something that needs to be analysed further in parallel with the analysis of the e-krona.

The alternative to regulation is for the Riksbank to continue to supply a means of payment that sets the standard for the country's means of payment and that also exposes the private sector to a certain amount of competitive pressure, just as we have done for 350 years.

¹⁵ See Mancini Griffoli, T., Martinez Peria, M. S., Agur, I., Ari, A., Kiff, J., Popescu, A., and Rochon, C. (2018) "Cast-ing Light on Central Bank Digital Currency". IMF Staff Discussion Note. SDN/18/08.

¹⁶ It may, however, be difficult to know what the right price is in such a market. Theoretically, an efficient market is considered to be one in which no company makes excess profits. The price of one product should approximately reflect the cost of producing one more product, known as the marginal cost. But if the price were to reflect the marginal cost, the company would make a loss in these special markets. In normal industries, the marginal cost normally rises when production encounters bottlenecks. For natural monopolies, fixed costs dominate instead, so that a price corresponding to the marginal cost will be too low.

5.6. SEVERAL MEASURES ARE NEEDED FOR RESILIENCE ON THE PAYMENT MARKET

The Riksbank also carries out other work than the analysis of the e-krona to safeguard the resilience of the payment market. For example, we are working within the framework of the Swedish Retail Payments Council to survey the possibilities of making card payments and withdrawing cash in an offline situation, which is to say when disruptions have made it impossible to check the balance of the account or credit to which a card is linked.¹⁷ At present, certain cards do not function at all in an offline situation, while others do.

If we were to be impacted by a complete breakdown of both the Internet and telecommunications, it would not be possible to withdraw cash. Consequently, we cannot, at present, rely upon cash being available in a crisis situation. It is possible that the e-krona could play a role for Sweden's crisis preparedness. But in any case, the Riksbank needs to clarify its role as provider of money in appropriate forms in a crisis situation. In the same way as the Riksbank is 'lender of last resort' for the banking system, we have a responsibility to enable payments in a crisis, to be a 'money provider of last resort'.

5.7. PERSONAL REFLECTIONS

Two years of intensive work on the e-krona have now passed and I will be leaving the chairmanship of the steering group as the project enters the next phase. It has been two incredibly educational years, but I think it is still too early for me to decide whether or not I shall support an e-krona for the general public in the future. As has hopefully been clear from my earlier reasoning, this depends on whether it emerges that there are better alternatives to guarantee both the security and efficiency of the payment market. And to answer this, the analysis needs to continue. At the Riksbank, we will work in two parallel tracks: partly, we will develop the pilot version of a simpler form of the e-krona and learn the lessons that may be needed if it turns out that an e-krona is to be issued. And partly we will deepen our analysis of the consequences for Sweden if the payment market should become entirely privatised. In collaboration with other parties in society, we need to discuss which characteristics should be prioritised for an e-krona and make costbenefit analyses of various alternative solutions to the problems we see that the e-krona could solve. For example, if we conclude that the e-krona is needed for contingency purposes, this may lead to characteristics such as offline

¹⁷ See Report from the Swedish Retail Payments Council (2018) "A scenario analysis of payments at points of sale and withdrawals from ATMs in the event of disruptions to the card systems" Sveriges Riksbank.

functions being prioritised, while other characteristics may be prioritised if other aspects turn out to be more important.

As the payment market is an infrastructure that is fundamental for Sweden's economy to function, questions of this type must ultimately be determined by our legislators in the Riksdag. In our talks with agencies that make state disbursements, we have noticed that these could be rationalised with the help of an e-krona. It is possible that the best route would be to build the e-krona together with others. The Riksbank also intends to review the legislative amendments that may need to be implemented to provide us with a clear mandate in the issue.

If the e-krona is to be realised, I believe that the best solution would be for the Riksbank to provide the e-krona via our balance sheet but that the private sector then be involved in its distribution. Private companies are better at handling customer contacts and finding the tailor-made solutions that the general public demands.

5.8. EQUIPPING OURSELVES FOR THE FUTURE

My speech in 2016 had the heading "Should the Riksbank issue e-krona?" After two years of analysis, we now know that the technological possibility exists and we know a bit more about how the design of the e-krona can affect the consequences for financial stability and monetary policy. We are also working to ensure that the means of payment issued by the Riksbank will have legal support, even in a digital future. But it is too early to be able to answer fully the question of whether the Riksbank *should* issue a broader variant of the e-krona to the general public. Ultimately, this is a political decision, for which the Riksbank, as an expert authority, needs to be prepared to provide advice and suggest solutions.

By starting the analysis and creating alternative courses of action, we have made sure we stand better equipped should cash be marginalised further in the future. As Benjamin Franklin famously said: "by failing to prepare, you are preparing to fail".

6. CASH AND THE ZERO-LOWER-BOUND CONSTRAINT¹

*Katrin Assenmacher*²

6.1. INTRODUCTION

Estimates suggest that over the past decades the equilibrium real risk-free interest rate has declined by about two to three percentage points and is currently in a range between zero and minus one per cent for most advanced countries (Summers 2018). In combination with central banks' wide-spread inflation objective of around two per cent, nominal interest rates are thus uncomfortably close to their lower bound, leaving conventional monetary policy little room to respond to a potential downturn. Although a number of central banks, such as Denmark's Nationalbank, the European Central Bank, the Bank of Japan, Sveriges Riksbank and the Swiss National Bank, have lowered their policy rates to negative levels, in the event of another recession the space for conventional monetary policy would be severely constrained by the effective lower bound on nominal interest rates.

To further stimulate the economy when interest rates approached their lower bound, central banks have resorted to other, less conventional measures of monetary policy accommodation, such as asset purchases, targeted lending operations or forward guidance. These measures, however, also come with certain drawbacks. First, they are more difficult to calibrate in order to achieve the intended monetary policy stance as experience with them is still limited. Second, they might also face limits themselves: For instance, central banks may not be able or willing to expand their balance sheets indefinitely for different reasons and forward guidance may lose its credibility if its horizon already extends far into the future. Third, they may have side effects that are less well known than those related to changes in the policy rate and that may become fully apparent only over longer horizons.

Overall, there might be benefits to expanding the space for monetary policy to continue interest rate policies also at negative levels. This would require exploring the conditions that need to be in place in order to make negative interest rates feasible and effective in stimulating the economy.

¹ The views expressed are those of the author and do not necessarily reflect those of the European Central Bank.

² Head of Monetary Policy Division, European Central Bank.

6.2. CASH AND THE LOWER BOUND ON INTEREST RATES

The existence of cash introduces a key friction in the transmission process of negative rates. Cash is a bearer instrument that yields a zero nominal interest rate by construction. Agents would not be willing to hold money in a negative interest yielding account if they can switch into cash and hold it without cost. This arbitrage opportunity establishes a lower bound on nominal interest rates and prevents central banks to set their policy rates significantly below zero. With perfect arbitrage, negative interest rates would in the limit only increase the demand for banknotes without increasing real demand and stimulating the economy.

By lowering their policy rate, which is in general a short-term risk-free interest rate, central banks aim to influence other rates that are more relevant for economic decisions, such as long-term bond rates or bank lending rates. These market-determined rates include risk and term premia and therefore are typically still positive even if the policy rate is already at zero, suggesting that further room for lowering them exists. For monetary policy being able to influence these rates, the negative policy rate would have to transmit to market-determined rates in a similar fashion like rate cuts in positive territory. Otherwise, one could not expect negative rates to actually have an expansionary effect, that is, to increase lending and eventually leading to higher GDP growth and inflation.

Experience has shown that policy rates can be set somewhat below zero without triggering a run into cash. Although in principle the existence of cash allows agents to shift from negative interest bearing assets into cash, it may in practice not be a close substitute for other assets for various reasons. First, in contrast to deposits, it needs to be physically stored in a safe place, with many agents not having such storage capacities immediately at hand. Second, it is subject to the risk of loss, theft or fraud. Holders may therefore want to insure themselves against these risks which significantly increase the cost of holding large quantities of cash. Third, cash is less easily transferable than electronic assets, requiring transportation capacities, security and insurance. All in all, estimates taking into account the costs of storing, insuring and using cash suggest that they lie in the range of 0.25% to 0.75% (Witmer and Yang 2016). Substitution on a large scale thus would not set in at mildly negative rates as it would only become profitable once interest rates are lowered below this range. These considerations also imply that the cost of holding cash consists of fixed costs, such as those related to setting up storage facilities and associated processes, and variable costs for security, insurance, cash handling and the like. On the one hand, the longer negative rates are expected to prevail, the more agents would be willing to incur the fixed cost related to setting up storage facilities. Forward guidance on negative interest rates thus may not only affect the interest rate path but also raise the effective lower

bound. On the other hand, the variable cost may increase more than proportionally with the amount held through the cost of insurance. For sufficiently large amounts, insurance companies may even refuse to cover cash-storage related risks. Large account holders like firms or non-monetary financial institutions may therefore be less prone to substitute into cash when confronted with negative rates than households.

A number of lessons can be learned from current experience with moderately negative interest rates. Central banks that lowered their policy rates below zero found that transmission to unsecured and secured money markets has worked well and does not appear to have impacted market functioning much. Bech and Malkhozov (2016) study four jurisdictions that have introduced negative rates (Denmark, the euro area, Sweden and Switzerland) and do not find large changes in how the overnight money market rate tracks the policy rate or how policy rate changes are transmitted to longer maturities. Though the transaction volume on money markets has in general decreased, negative yields do not seem to be the main reason because other, coincident, non-standard policies – such as asset purchases or foreign exchange intervention – generated high excess liquidity that depressed trading especially on unsecured money markets.

The transmission of negative policy rates to longer-term bond rates seems to have worked equally well. Bond rates declined across maturities and risk classes although the effect of negative interest rate policies is difficult to disentangle from asset purchase programmes that several central banks had started simultaneously. Government bonds have traded at negative rates even for benchmark ten-year yields in some countries. Moreover, a strong effect on the whole yield curve resulted when market participants adapted their perceptions of the effective lower bound as documented by Grisse et al. (2017).

Nevertheless, it is evident that negative policy rates did not transmit to retail deposit rates, which seem to be sticky at zero. While non-financial corporations and wholesale depositors face negative deposit rates in some countries, households are almost never confronted with a negative yield on their accounts. One reason may be that households are perceived as being able to substitute more easily into cash than institutional clients. Moreover, there seem to be psychological barriers to accepting a negative remuneration on savings. Cliffe (2016) reports that in a survey of 13,000 consumers, 77% responded that they would withdraw their deposits should rates on their saving accounts become negative. On average, a third of the respondents indicated that they would switch to hoarding cash, with this share being particularly high in the Netherlands, France and Belgium.

Evidence on bank lending rates is mixed though, currently, the evidence does not indicate a contractionary effect of negative policy rates. In most jurisdictions,

lending rates reacted to a change in the policy rate in a similar way after the introduction of negative rates as before (Jobst and Lin, 2016). Initially, banks still had some leeway to lower deposit rates before they reached zero. After this point, lending rates continued to decline, with banks trying to compensate for the compression of interest margins by increasing fees and cutting costs. Though banks benefit from lower funding costs on the bond market and were able to move rates on wholesale deposits into negative territory, their funding costs did not fall to the same extent as policy rates.³

Models have been developed that analyse potentially contractionary effects of interest rate cuts based on transmission through banks. Eggertson et al. (2017) build a model to show that a lower bound for deposit rates limits the extent to which a central bank can stimulate the economy by lowering its policy rate. Following similar reasoning, Brunnermeier and Koby (2019) define a so-called reversal rate at which lower interest rates reverse their effect and become contractionary for lending. In their model, the reversal rate – that does not need to be negative – depends on banks' fixed income holdings, banks' initial capitalisation and the strictness of capital constraints as well as the degree of pass-through to deposit rates. When interest rates are low for long, the reversal rate increases as long-duration, high-yielding assets mature on banks' balance sheets and are replaced by lower-yield assets. Once recapitalisation gains are offset by tighter interest margins, low interest rates reverse their effect. Both papers rely on the assumption that – despite negative policy rates – a zero lower bound on deposit rates exists, illustrating that for an effective transmission of negative interest rates this lower bound needs to be addressed.

Summing up, the existence of cash prevents interest rates to move significantly below zero as evidenced by sticky deposit rates. Even if a run into cash does not take place, the effects on bank profitability and their interest rate margins will over time hamper transmission through the bank lending channel, with potential adverse effects on financial stability. To avoid these developments one option would be to make a switch from deposits into cash unattractive for consumers, for instance by imposing an equally negative yield on cash.

6.3. PROPOSALS TO OVERCOME THE LOWER BOUND

Different proposals have been made for how to make monetary policy effective also with negative nominal rates. An obvious but radical solution would be to phase out cash completely (Rogoff, 2014). This does neither seem a workable nor

³ Some central banks have introduced tiered remuneration systems for bank reserves to reduce the pressure on bank profitability. As the size of reserves is usually far smaller than banks' deposit base, however, such schemes will not be able to fully compensate the effects of negative rates on bank margins.

a desirable solution. First, for a large part of the population cash still plays an important role in payments at the point of sale. In the euro area, for instance, 79% of payments at the point of sale were made in cash in 2016 (Esselink and Hernández, 2017). Cash provides a quick, convenient way to pay and is cost efficient, especially for low-value payments.⁴ Compared to other means of payments, it is easy to use and robust with regard to disruptions such as electricity outages or cyber attacks. Second, less financially literate population groups cannot easily substitute to other means of payments and often also use cash to save. Phasing out cash completely would be disruptive and difficult to reverse. Suggestions to phase out only large banknote denominations, making hoarding less convenient, cannot be expected to have much effect on the lower bound since storage constraints are not dominated by volume but rather by value or handling costs (Witmer and Yang, 2016).

Alternative proposals therefore focus on how to establish a negative yield on cash. Making cash bear a (negative) interest rate would make agents indifferent with regard to holding banknotes as a store of value, compared to deposits. Banks could lower the rate on deposits into negative territory and would not have to fear large-scale withdrawals. An early proposal was made by Gesell (1916), who suggested discouraging cash hoarding by introducing a demurrage fee. His idea was that money would need to be stamped at regular intervals to remain valid and that these stamps would have to be purchased. Such a scheme was implemented in some Austrian and German communities during the Great Depression, but the practice was soon stopped by the respective central banks. While the scheme was successful in restarting the economy, a proper assessment whether it would be able to remove the lower bound is difficult as it was implemented locally and only for a short period. Moreover, money supply during the Great Depression was arguably not expanded sufficiently so that local monies first and foremost helped to alleviate liquidity shortages. Overall, taking into account the different economic and technological environment at the time, it is difficult to draw strong conclusions from these episodes for today.

Another proposal, building on an idea of Eisler (1932), relies on the introduction of a flexible exchange rate between cash and electronic currency to let cash depreciate in terms of central bank reserves. While this idea is theoretically elegant, it is not clear how the economy would operate once the value of cash and electronic currency can diverge. In particular, for being able to remove the lower bound, agents would need to value their consumption in terms of the electronic currency, not in cash (Buiter, 2007). While technical implementation seems feasible, other issues such as legal frameworks or the determination of the relevant unit of

⁴ Krüger and Seitz (2014) survey studies that suggest that cash is the cheapest way to pay for purchases of less than €3 to €12, with more recent studies generally yielding values closer to the lower bound of this range.

account pose more challenges, in particular since there is no experience with such schemes to draw on.⁵

6.4. CONCLUSIONS

Since the global financial crisis, many central banks have been faced with a reduced space for interest rate policy. In the current low-inflation, low-growth environment this outlook is unlikely to change soon. Other policies such as fiscal and structural policies should complement monetary policy in stimulating the economy and might even be more effective in dealing with such environments. Nevertheless, there is value in thinking about how to enlarge the scope for lowering interest rates further, especially since unconventional monetary policy measures also come with some draw-backs.

The main obstacle to lowering interest rates more than a few basis points into negative territory is the zero nominal interest rate on cash. Substitution into cash can be expected to set in as soon as the interest rate falls below the cost of holding and using cash. Judged on the basis of recent experience, this substitution prevents bank deposit rates to fall below zero, requiring solutions that would allow banks to set negative rates on retail deposits.

Phasing out cash would potentially cause large disruptions as cash plays an important role as a means of payment and has undisputable advantages, in particular for small-value payments. Alternative suggestions that try to impose a negative yield on cash to make consumers indifferent between keeping their money in a negative-interest yielding account and holding cash have so far not been tried and are likely to impact on the unit-of-account function of money. Overall, many unanswered questions remain around the transmission of negative interest rates and whether the lower bound can be removed.

Looking ahead, this assessment may change as rapid financial innovation in payment systems is leading to a stronger reliance on electronic means of payment. Central banks are investigating whether they should issue digital money themselves and how such central bank digital currency should be designed (Meaning et al., 2018). While many of the proposals surveyed above struggle with the technical limitations to impose a yield on cash, central bank digital currency would not face such difficulties. Nevertheless, current proposals for central bank digital money seem to try to mimic cash as closely as possible, thus also retaining the zero nominal yield (Riksbank, 2018).

⁵ For more details on how such a scheme could be designed and would work, see Agarwal and Kimball (2015, 2019), Assenmacher and Krogstrup (2018), Buiter (2009), Buiter and Panigirtzoglou (2003) and Goodfriend (2016).

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7. STABILITY ORIENTED MONETARY POLICY AND CASH – NO CONTRADICTION!

Fritz Zurbrügg¹

Ladies and Gentlemen

Listening to the witnesses for the prosecution, it is easy to understand why the eminent economist, and current professor of economics at Harvard University, Kenneth Rogoff titled his 2016 book ‘The Curse of Cash’. With cash standing accused of being at the root of so many problems, the solution would appear simple: Why not just get rid of it, or limit its use?

However, let us not forget that many consider cash to be a blessing. Private households in Switzerland definitely belong to this latter group. The Swiss National Bank’s 2017 Survey on Payment Methods shows a clear preference for cash, which is used in seventy percent of transactions examined. Cash plays a crucial role in the current monetary system and is inextricably intertwined in our everyday lives.

So, when it comes to deciding if cash should be abandoned or somehow restricted, the question from a monetary policy perspective boils down to the following: Do the potential benefits of being able to implement deeply negative interest rates outweigh the costs of fundamentally reshaping of our current monetary system?

I put it to you that this is not the case.

7.1. THROWING LONG-STANDING AND WELL ESTABLISHED CONVENTIONS INTO DISARRAY

Let us first assume – for the sake of argument – that the necessity and benefits of expanding monetary policy further into negative territory as given. I will return to the questionable basis for this assumption later. However, in such a scenario, the only question would be as to the implications of deliberately restricting universal access to cash. The short answer is that such a move would be hugely disruptive and hence very costly.

¹ Vice Chairman of the Governing Board, Swiss National Bank.

As economists, we typically ascribe three functions to money, and to cash in particular: It serves as a medium of exchange, as a unit of account, and as a store of value. While all forms of monies could provide these functions, cash fulfills the medium of exchange and unit of account function particularly well. The results of the survey I mentioned at the outset underscore this fact. As a medium of exchange, cash has unique properties in terms of reliability and universal accessibility. As a unit of account and a store of value, a key feature is its intertemporal stability in nominal value. This nominal stability makes cash a particularly useful nominal anchor for measuring and comparing income and prices. Finally, in most advanced economies, cash constitutes the only way the broader public can access legal tender.

To sum up, I would assert that any move away from universally accessible cash would turn long-standing and well established conventions on their head. Conventions that are enshrined in our legal system and in many financial contracts. Doing away with cash would therefore impair the smooth functioning of our monetary system.

7.2. DEEPLY NEGATIVE INTEREST RATES WITH UNCLEAR BENEFITS

Given the price that would have to be paid, is the elimination of cash for the sake of expanding the monetary policy toolkit really worth it? The answer is no, and there are two reasons why.

First, monetary policy does not end at the zero lower bound. As experience in recent years has shown, moderate negative policy rates are possible, and this without additional measures to constrain cash. This is mainly because cash hoarding comes at a significant cost. While there is certainly a limit to how low negative interest rates can go, the exact level of the effective lower bound is unknown.

Recent experience has also shown that in a cyclical downturn, central banks are not powerless even when the interest rate is restricted by a lower bound. Unconventional quantitative measures such as buying large amounts of assets and currency proved effective following the financial crisis of 2007/2008. In fact, they were key in avoiding another Great Depression. These unconventional measures reduced the urgency and necessity of lowering interest rates even further. They may have been ‘unconventional’, extensive, and not without cost, but implementing these measures did not require a fundamental overhaul of our monetary system.

In short, from the perspective of being able to react optimally to the possibility of a future cyclical downturn, there is no pressing need to expand the monetary policy toolbox by abolishing cash.

Second, there is fundamental uncertainty regarding the effectiveness of deeply negative interest rates in raising demand and inflation. The benefits of overcoming the effective lower bound may prove elusive. On the one hand, more accommodative monetary policy may be the wrong tool if structural factors are responsible for the decline in long-term growth and the natural rate of interest. Such structural factors include large indebtedness in the aftermath of the most recent crisis, as well as long-term trends such as demographic change. One could even argue that relying on monetary policy too extensively reduces the incentive to implement much-needed structural reforms.

On the other hand, it is unclear whether the traditional transmission channels of monetary policy perform their intended function in a deeply negative interest rate environment. To put it another way, it is uncertain whether lowering interest rates deeply into negative territory is as effective in raising investment, consumption and bank lending as a comparable cut in a positive rate environment. While the key friction usually mentioned in this respect would not exist in a cash-free world – namely the effective lower bound on deposit rates due to the availability of cash –, other types of friction may become more significant.

A first friction could stem from the fact that nominal considerations affect consumption and saving decisions. For instance, when pursuing a nominally fixed savings objective, savings increase, rather than decrease in the face of deeply negative interest rates. As economists, we typically argue that it is real rates that matter rather than nominal. Hence, in a situation with negative inflation, negative nominal rates should not be overly relevant. However, as we are all well aware, money illusion is widespread. People often do not distinguish between nominal and real interest rates. This may be even more prevalent in the case of negative nominal rates, which can seem a little more difficult to grasp. The negative signs may dominate perception.

Another friction relates to the existence of alternative stores of value or zero-yield assets besides cash, which could negatively affect the interest-rate elasticity of investment. Once the marginal efficiency of investment hits zero, optimising firms may prefer to use available financial resources to acquire alternative stores of value rather than to invest. Among others, such alternatives include land and commodities such as gold.

To sum up, there are many unknowns regarding the efficacy of a monetary policy relying on deeply negative interest rates.

7.3. THE CASE FOR CASH

Your honour, ladies and gentlemen. Let me conclude by stressing that a stability-oriented monetary policy serving the interest of the country as a whole is by definition averse to far-reaching and radical institutional changes. Abandoning cash would constitute such radical change and would entail substantial costs. At the same time, it is unclear whether overcoming the effective lower bound is necessary and whether this would provide the postulated benefits for monetary policy. In the event of a more expansionary monetary policy stance being necessary, there are better and less disruptive instruments available than deeply negative interest rates. Central banks certainly reassess the costs and benefits of alternative monetary policy instruments on a regular basis, and will continue to do so. However, I see no reason at present to abandon a key feature of our monetary and financial system.

8. RESTRICTING OR ABOLISHING CASH: AN EFFECTIVE INSTRUMENT FOR ELIMINATING THE SHADOW ECONOMY, CORRUPTION AND TERRORISM?¹

*Friedrich Schneider*²

This paper has **four** goals: **First**, the use of cash as a possible driving factor of the shadow economy and **second**, the use of cash in crime, here especially in corruption, is econometrically investigated, too. The influence is somewhat larger than on the shadow economy, and it is certainly not a decisive factor for bribery activities. **Third**, some remarks about the use of cash and terrorism are made and here a cash limit doesn't prevent terrorism. **Fourth**, some remarks are made about the restriction or abolishment of cash on civil liberties, with the result that this will strongly limit them. The conclusion of this paper is that cash has a minor influence on the shadow economy, crime and terrorism, but potentially a major influence on civil liberties.

8.1. INTRODUCTION

In recent years intensive discussion has arisen about restricting or even abolishing the use of cash. I am aware that there is a much longer and more extensive debate about the costs and benefits of phasing out paper currency, which is the title of a paper of Rogoff (2014).³ But what is new, all of a sudden, is the suggestion that the restriction or even abolition of cash would more or less do miracles: If cash were to be severely restricted or no longer existed, there would be much less crime and the shadow economy would be drastically reduced, because most shadow economy transactions are usually undertaken in cash. Also if cash were not easily available, terrorist attacks would be severely hampered. This paper tries to shed some light on whether cash has such an important influence on the shadow economy, crime and terrorism, but also on the effect which reduced cash would have on civil liberties.

¹ A first and much longer version of this paper was presented at the Bundesbank Conference in Konstanz/ (Germany), April 20-23, 2017.

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³ Compare here only some recent references: Sands (2016), Feige (2012), Schneider and Linsbauer (2016), Riccardi and Levi (2017), Imordino and Wussow (2016), and Masciandaro (2004, 2005, 2006).

In many countries the dominant means of transfer in paying legally (but also illegally) for goods and services is cash, which has proved to be an efficient means of handling all economic activities. But there is a growing literature claiming that cash supports the shadow economy, crime and terrorism and is risky, old fashioned and unnecessary, especially if one considers the fast increase in electronic payments.⁴

Hence, the goal of this paper is to undertake an empirical econometric investigation about the relations (1) between cash and the shadow economy and (2) between cash and crime, here corruption. Furthermore, some remarks are made about (3) cash and terrorism and (4) cash and civil liberties.

The paper is organized as follows: Chapter 8.2. deals with cash versus illegal activities; in subchapters 8.2.1. cash and shadow economy, in 8.2.2. cash and crime (here corruption) and in 8.2.3. cash and terrorism. In the final chapter 8.3. some considerations about cash versus civil liberties are undertaken and conclusions are drawn.

8.2. CASH VERSUS ILLEGAL ACTIVITIES

My major research question is “To what extend does cash stimulate illegal activities?”, starting with the shadow economy, then crime and corruption, and finally considering terrorist financing. It is obvious that cash cannot be easily traced, which makes cash attractive for transactions related to the shadow economy, bribery, crime and finance of terrorism. But still an important question is: Is cash a major source/reason of the shadow economy, of crime (here corruption) and of terrorism?

8.2.1. Cash and the shadow economy

Shadow economy refers to business/economic activities off the books, which are legally allowed but not recorded in order to avoid tax and social security payments and to avoid labor market and other regulations.⁵ In this subchapter I investigate the role cash “plays” as an indicator of the size of the shadow economy. In figure 1, the share of cash payments versus the size of the shadow economies of 36 highly developed countries averaged over 2013-2014 are shown. One clearly realizes that the larger the share of cash in total payments the larger

⁴ Riccardi and Levi (2017), Levi (2016), Andersen et al. (2013).

⁵ There is an extensive literature about the definition of a shadow economy also estimating a shadow economy and its interaction with the official economy. Compare for example Feld and Schneider (2010), Schneider (2015, 2017), Schneider and Williams (2013) and Williams and Schneider (2016) as well as Sauka, Schneider and Williams (2016). Due to this extensive literature a longer discussion about defining and estimating a shadow economy and its interaction with the official one is not undertaken in this paper.

the size of the shadow economy. The correlation coefficient between the two variables is 0.50 and is highly statistically significant. Hence, at a first glance, it looks like the higher the share of cash (as a percentage of total payments) the larger the shadow economy. However, if one also looks at figure 1 there are some distinct exceptions, for example Germany and Austria are cash-intensive countries with relatively small shadow economies. In Sweden, where cash payments have become rare, the country still has a medium-sized shadow economy.

Given these inconclusive findings and in order to fulfill the *ceteris paribus* conditions an econometric investigation is undertaken. I know that the shadow economy is driven by tax burden, by regulation, by the quality of public institutions, unemployment, tax morale and other factors.⁶ But how is it related to the use of cash and/or cash limits?⁷ I choose **three** ways of investigation.

First, using a MIMIC estimation, shadow economy is a constructed figure with various causes, such as tax burden, regulation measures, economic freedom, legal system, tax morale, etc. Indicators, like employment and GDP and cash or cash limits are neither used here as indicator nor as cause variables. These “cash free” shadow economy figures are now regressed on the availability of cash approximately by the share of cash in total payments and by cash limits. The results are shown in table 1. The size of the shadow economy in 38 highly developed countries as averaged over the years 2013/2014 is regressed on GDP per capita, share of cash payments and cash limits, which exist in a number of European countries. The results clearly show that the share of cash payments has an influence on the size and development of the shadow economy and is statistically significant; the more cash, the larger the shadow economy, *ceteris paribus*. However, the estimate coefficient of cash limits which is in place in various European countries (for example Italy, France) has the theoretically expected negative sign, but is not statistically significant.

In table 2 some simulation results are undertaken about the importance of the cash figure on the size of the shadow economy. Table 2 clearly shows that when GDP decreases by 10%, the shadow economy increases by 18.4%. When the share of cash payments decreases by 10% the shadow economy decreases just by 2%. If we make the assumption that no cash is available anymore, the shadow economy would decrease by 20%. Cash limits have no significant effects.

⁶ Compare here for example Feld and Schneider (2010) and Schneider (2015, 2017).

⁷ It is obvious, that cash is an important element or indicator of the shadow economy. There is even one method, the currency demand approach, which originally was developed by Vito Tanzi and Gutmann in the 80s, who use the idea that the amount of cash held outside banks is a function of traditional factors like consumption habits, income and interest rates, but also one can include factors which are drivers of the shadow economy, like tax burden and regulation. One can econometrically estimate such a function and can derive value-added figures of the size of the shadow economy. But again, here cash is only an indicator and not the primary reason why people work in the shadow economy.

The **second** way to test how important cash is for the shadow economy, or whether a cash limit would reduce the shadow economy as a causal variable, is investigated by undertaking a MIMIC estimation⁸; the results are presented in table 3. We clearly see that the cash limit variable has no statistically significant influence as a causal factor on the size of the shadow economy whereas the tax burden, rule of law index and the inflation rate all have the theoretically expected sign and are highly statistically significant; the only exception is unemployment, which has the expected sign, but is **not** statistically significant. Cash as an indicator of the shadow economy has a statistically significant influence on the size of the shadow economy.

The **third** way is a first attempt to undertake a micro study. In figure 2 some first micro results about the following question are shown. The question is: „Imagine there was no cash anymore. What would you have done in the following situations?“ The answers are in percent of those persons who said that they paid in cash for services or craftsmen’s activities because it was anonymous. 33% of the Austrians interviewed (interviews were done from May 24 to June 29, 2016 in Austria with 1056 interviewed persons) would still demand the service and would pay cashless. 13% said that they would still have demanded this service but would have paid more attention to correct tax treatment. 13% would not have demanded this service anymore and 41% would have negotiated another anonymous payment method with the other party, such as vouchers or gifts. Hence, even under the extreme assumption that no cash is available, 41% of the people who prefer anonymous payment would still seek an anonymous payment method.⁹ To summarize, cash is an important element in the shadow economy. But cash is by no means a causal factor and it has quantitatively limited influence on the development of a shadow economy. Without any cash a shadow economy might be reduced between 15 to 20%.

8.2.2. Cash versus illegal activities – the case of corruption

As in subchapter 8.2.1., the use of cash is often blamed as the main enabler of bribery, corruption and other crime activities. In many countries the simple equation of much cash, much bribery, seems to hold true in media stories. In countries such as Switzerland and Austria, low levels of perceived public-sector corruption and bribery occur alongside a high share of cash in total payments and/or low number of cashless payments per person. Compare here figure 3, in which the share of cash payments and the transparency corruption perception

⁸ This estimation procedure is explained in detail in Schneider (2017), Feld and Schneider (2011), and Schneider and Enste (2010).

⁹ These are first results on a project of a micro-investigation for Austria about the structure of the shadow economy motivation and why people work in the shadow economy.

index are plotted. We clearly see in this figure that the higher the corruption the lower the transparency corruption index value, and the higher the cash share. Hence, countries like Greece and Bulgaria (which have high corruption) also have a high share of cash payments measured as a percentage of total payments; the correlation coefficient is -0.72 and highly statistically significant. But, as already argued, other countries such as Switzerland, Germany and Austria have a high share of cash payments, but quite low corruption. As in the shadow economy case from this figure, we cannot draw the conclusion that cash is responsible for corruption.

Again, I undertake an econometric investigation, trying to explain corruption. Corruption has considerable impact on economic, political and social factors and is subject to a vast range of institutional, jurisdictional, society and economic conditions. In a survey paper, Dimand and Tosato (2017) provide a comprehensive state of the art survey of the existing literature on corruption and its causal effects. They reach the conclusion that thanks to more convenient and better availability of data, empirical research on corruption has advanced vastly over the last decade. They conclude that from a scholarly perspective the remaining challenge is how to deal with noisy data and they try to capture hidden behavior. Their survey shed light on the development of empirical corruption research and on the non-robustness of older and newer empirical findings. They show that recent empirical findings on the interrelation between corruption and bureaucracy, press and economic freedom, poverty wages and/or the shadow economy are in line with both theoretical assumptions and older empirical research. They further conclude that the quality of empirical research and corruption is still advancing and needs to settle important issues, such as the right way to measure corruption, before being able to settle debate of conflicting empirical findings. They conclude that more micro-data is required in order to get consistent findings.¹⁰

Considering these survey results, an attempt is made here to explain corruption. The transparency corruption index (TCI) is used as dependent variable; and indices of rule of law and economic freedom, GDP per capita, share of cash payments and cash limits are used as independent variables. The TCI of 38 highly developed countries over 2014/2015 is used. The results are reported in table 4 (note that for the dependent variable the TCI, the higher the value the lower the corruption!). The regression shows that the better the rule of law and the more economic freedom is granted, the lower is corruption. It also shows, the higher GDP per capita is, the lower is corruption. The result also shows that the higher the share of cash payments, the higher is corruption; the estimated coefficient is

¹⁰ A similar conclusion was also reached by Dreher and Schneider (2009), who empirically investigated the interaction between corruption and the shadow economy.

statistically significant. Finally, the cash limit dummy variable has the wrong sign and is not statistically significant.

In table 5 some simulation results about quantitative importance are presented. One realizes that if the rule of law (economic freedom), increases by 10 percentage points, the TCI increases by 6.1 (5.0%), which means less corruption. If the share of cash payments is decreased by 10 percentage points, the TCI increases only by 1.8%, which means less corruption. I have here a statistically significant effect of the estimated coefficient of the cash variable, but compared to the other two variables, it is only of minor importance.

Finally, in table 6 a robustness test for six different specifications is presented, as Dimand and Tosato (2017) argued in their survey about the instability of the regression results explaining corruption. Table 6 clearly shows that the estimated coefficient of cash share is in three cases statistically significant and in three cases not. The estimated coefficient of cash limit is not statistically significant in any the six cases. I must confess that the results are not stable. Hence, I cannot conclude that cash is a driver of corruption.

8.2.3. Cash versus terrorist financing

There are quite a number of statements and also papers which draw a connection between the financing of terrorism and cash. Some studies also support the view that cash is used also for terrorism financing.¹¹ In table 7 the costs of terrorist attacks are presented. This table clearly shows that not much money is needed in order to undertake terrorist attacks. Even if all of such a sum is needed in cash, it can be easily supplied. What is also quite often the case that before the attacks terrorists are unknown as terrorists and they can use their bank accounts and other financial means. Hence, even severe cash restrictions can easily be bypassed if one goes several times to cash (ATM) machines or asks friends to do this.

8.2.4. Summary of the empirical findings

Summarizing subchapters 8.2.1. to 8.2.3. I reach the following findings/conclusions:

- (i) Figures on crime and criminal cash usage often contain large errors (problem of double counting) and are difficult to interpret.
- (ii) The available evidence suggests that restrictions on cash use will probably reduce profits from crime to a small amount but will certainly not eliminate them. Due to my empirical investigation, I reach the following figures, when

¹¹ Compare e.g. Riccardi and Levi (2017), Halliday, Levi and Reuter (2014).

cash is reduced in cash or a cash limit is put into effect: Shadow economy reduction between 2 and 20% (the higher figure is the extreme case: no cash); corruption reduction between 1.8 and 18 percentage points (the higher figure is the extreme case: no cash); crime reduction between 5 and 10%.

- (iii) Other means of storing and transferring illegally obtained assets without leaving traces are already in use. They include:
 - a. the transport of physical valuables (e.g. prepaid instruments, precious metals, diamonds),
 - b. using false identities and fake firms,
 - c. criminal middlemen and shell companies to facilitate cashless transfers via regulated entities like the banking system, money transmitters or online payment service providers.
- (iv) Also, funds can be moved through traditional or new, alternative transfer systems like hawala or private virtual currency schemes.
- (v) Finally, technical progress, especially cyber money (bitcoin), and other electronic means are rapidly changing payment habits and hence will be heavily used by criminals, too.

8.3. CONCLUSIONS: CASH AND CIVIL LIBERTIES

For liberal societies the importance of cash has much deeper aspects than “pure” economic ones. Cash reflects the fundamental relation between citizens or taxpayers and state authorities. Using cash means freedom, independence and personal fulfillment for a citizen who doesn’t want a state intervention when using cash. The “voices” calling for the limitation or abolishment of cash argue that tighter and more comprehensive state control over individuals’ financial flows and funds will effectively fight crime, shadow economy and terrorism. But in my opinion we have weak or almost no empirical evidence.

Of course, anonymous cash makes tax evasion easier, especially for those who cannot afford to shift funds abroad. However, easy available cash is clearly not the main reason for tax evasion, though it does facilitate it. Indeed citizens’ willingness to pay taxes crucially depends on tax morale.¹² Tax morale has been found to correlate with the relation between citizens and the government. The better the relation the higher the tax morale. A high degree of trust and of political influence (direct democracy) strengthens tax morale and the willingness of the citizens to pay their taxes, so that the state can provide goods and services. Tax authorities should treat taxpayers or citizens with respect and as clients

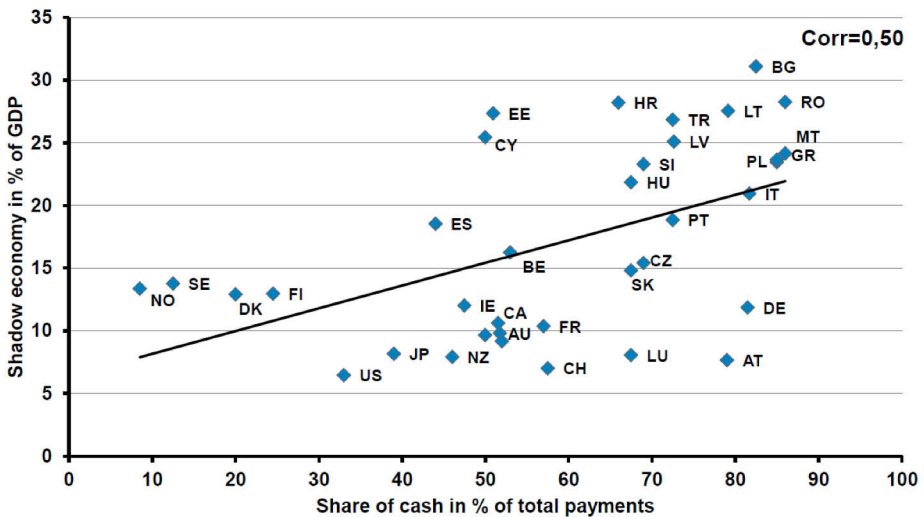
¹² Compare here the work of Feld and Frey (2002, 2007), and Schneider (2015).

rather than as suspects or servants. Hence, such a fundamental basic contract (developed by Frey and Feld (2002, 2007)) between the tax payer and the state is crucial for the functioning of society.

The abolishment or strict limitation of cash carries the risk of seriously weakening trust in state authorities. Abolishing cash as a simple tool against citizens to enforce state control can easily prove to be counter-productive. Given the real perceived importance of cash for civil liberties, a limitation or abolition could only be justified by sound reasons and large benefits. Only then may trust between citizens and authorities remain intact. As cash is neither the motivation nor the reason for shadow economies, crime or terrorist attacks, its abolition would not lead to large welfare gains. In a democracy the choice between cash and other means of payment should be left to users, who happen to be citizens, taxpayers, consumers and producers at the same time. Hence, my final conclusion is that citizens don't want to be forced by state authorities not to use cash anymore. They should be free to choose which payment instrument they use.

8.4. FIGURES AND TABLES

Figure 1. Share of cash payments versus the size of the shadow economy (averages over 2013-2014)



Source: Own calculations.

Table 1. OLS-Regression with robust standard errors; 38 highly developed countries; average of the shadow economy of the years 2013/2014

Dependent variable: <i>Shadow Economy</i> <i>in % of GDP (average over 2013/2014)</i>	Coefficients (t/z-value) [beta-value]	Independent variables
	96.490** (6.46)	Constant term
	-7.991** (-6.30) [-0.714]*	log(GDP p.c.) (average over 2013/2014)
	0.075* (2.06) [0.204]	Share of cash payments in % of all payments (average over 2013/2014)
	-1.450 <i>(-1.07)</i> [-0.091]	Cash limit (dummy-variable 1=limit, 0=no limit)
Test-Statistics: R ² =0.742 F-value=43.39(0.000) RMSE=4.05 D.F.=32		

Not statist. significant!

Source: Own calculations.

Table 2. Static simulation results (no adjustment procedures are assumed!)

Simulations of standardized effects		
Variable	Effect on shadow economy	
GDP p.c.	10% decrease	→ Shadow economy <i>increases</i> by 18.4%
Share of cash payments	10% decrease	→ Shadow economy <i>decreases</i> by 2.01%
No cash payments, at all	Drops to 0!	→ Shadow economy <i>decreases</i> by 20.1%
Cash limit	[Introduction of cash limit]	<i>no significant effect</i>

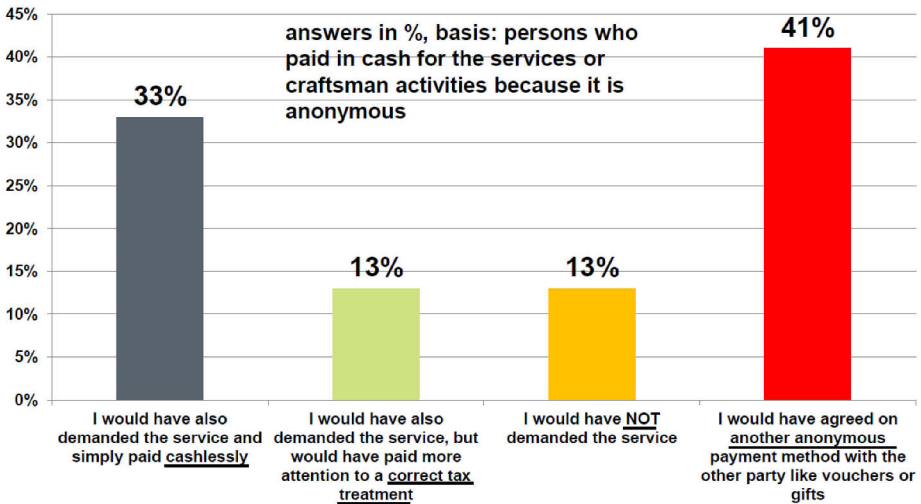
Source: Own calculations.

Table 3. MIMIC estimation, latent variables: shadow economy of 36 highly developed countries; years 2012 to 2014

MIMIC Estimates	
Causal variables	Est. Coeff.
Cash limit (dummy-variable: 1=limit, 0=no limit)	1.889 (0.56)
Tax burden in % of GDP	0.174** (2.10)
Rule of law index (the better, the higher)	-2.995*** (-3.28)
Inflation rate	2.824*** (3.50)
Unemployment rate	1.735 (0.60)
Indicator variables	
Cash as share of all payments	1.00 constrained
Labor force participation rate	-0.431***(-3.44)
Chi-Square	6.14 (0.188)
RMSA	0.122
Coefficient of determination	0.908
Observations	36

Source: Own calculations.

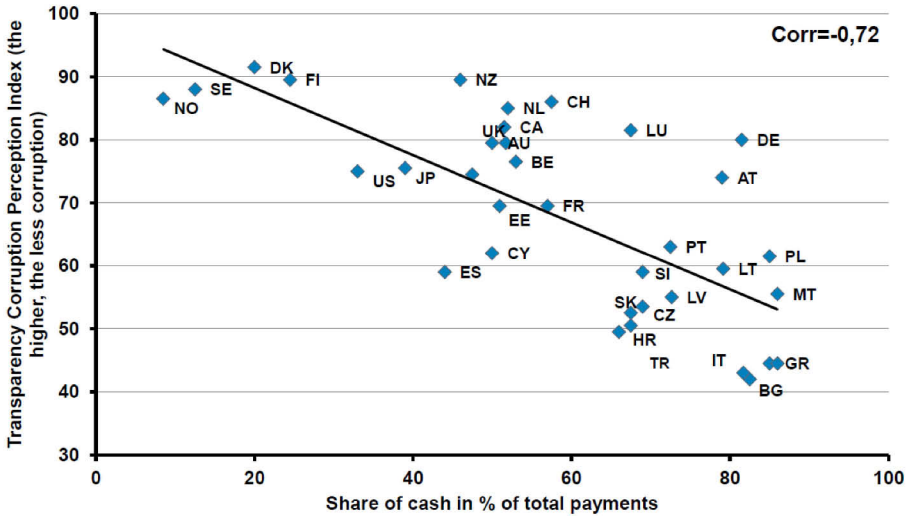
Figure 2. “Imagine there was no cash anymore. What would you have done in the following situations?”



N=1,056 interviews, representative for the Austrian population.

Source: Friedrich Schneider: Market Linz, May 24 to June 9, 2016.

Figure 3. Share of cash payments as an indicator of corruption (averages over 2014-2015)



Source: Own calculations.

Table 4. Regression results: Transparency Corruption Index (the higher the value, the lower corruption); 38 highly developed countries; years 2014/2015

Dependent variable: <i>Transparency Corruption Index (TCI) (average over 2014/2015) (The higher the value, the lower corruption)</i>	Coefficients (t/z-value) [beta-value]	Independent variables
	-44.725* (-2.48)	Constant term
	0.616** (3.18) [0.424]	Rule of Law Index; the higher, the better
	0.507* (2.59) [0.204]	Economic freedom index; the higher, the better
	4.060(*) (1.65) [0.176]	log(GDP p.c.) (average over 2013/2014)
	-0.176** (-3.30) [-0.233]	Share of cash payments in % of all payments (average over 2013/2014)
Test-Statistics: R ² =0.924 F-value=124.64(0.000) RMSE=4.67 D.F.=32	-2.192 (-1.23) [-0.066]	Cash limit (dummy-variable 1=limit, 0=no limit)

Wrong sign!

Not significant!

Source: Own calculations.

Table 5. Simulation results on TCI Transparency Corruption Index (the higher the value, the lower corruption)

Standardized effects → Simulations		
Rule of law	+10 percentage points	→ <i>Increase of 6.1</i> percentage points of the TCI → Less corruption
Economic freedom	+10 percentage points	→ <i>Increase of 5.0</i> percentage points of the TCI → Less corruption
Share of cash payments	-10 percentage points	→ <i>Increase of 1.8</i> percentage points of the TCI → Less corruption
Cash limit=1		<i>Wrong sign!</i> <i>Not significant!</i>

Source: Own calculations.

Table 6. Problem of stability of the estimated coefficients of the variables “cash share” and “cash limit”

No.	Estimated coefficient of “Cash share”	Estimated coefficient of “Cash limit”	Specification of the regression; depended variable; Transparency Corruption Index
1	<i>-0.176**</i> <i>(-3.30)</i>	-2.191 (-1.23)	Log(GDPAV), ECFI av., LAW av.
2	-0.079 (-1.54)	-0.089 (-0.06)	Log(GDPAV), ECFI av., LAW av., Gov. Eff.
3	-0.083 (-1.13)	0.032 (0.02)	Log(GDPAV), ECFI av., Gov. Eff.
4	<i>-0.195**</i> <i>(-3.38)</i>	-1.915 (-1.05)	LAW av., EFI av.
5	<i>-0.109(*)</i> <i>(-1.82)</i>	-2.86 (-1.46)	Log(GDPAV), LAW av., BFI av.
6	-0.083 (-1.13)	0.033 (0.02)	Log(GDPAV), ECFI av., Gov. Eff.

GDPAV=GDP average 2013–2014; LAW av.=Rule of Law Index, Gov. Eff.=Gov. Efficiency index, EFI av.=Economic Freedom Index, BFI av.=Business Freedom Index

Source: Own calculations.

Table 7. Cost of terrorism – selected examples

Date	Incident	Cost
1993	World Trade Center bombing in New York	US\$19,000
2002	Bali bombing	US\$25,000
2004	Madrid train bombing	US\$10,000
2003	Jemaah Islamiyah operatives captured in Cambodia	Carrying US\$50,000
2001	9/11 bombings	13 hijackers received US\$10,000 each
2015	Charlie Hebdo attacks in Paris	€6,000

Source: Sands, P. (2016): Making it Harder for the Bad Guys: The Case for Eliminating High Denomination Notes, Weil Hall, p. 25.

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9. CASH: EMPOWERING THE INDIVIDUAL THROUGH DATA PROTECTION

*Heike Mai*¹

9.1. CASH ENHANCES PRIVACY

Cash leaves hardly any traces, but cashless funds and payments do. While the information accompanying electronic transactions traditionally only used to facilitate the payment execution, it is now a valuable product.² Personal data extracted from payments can be enriched with information from other sources, e.g. from data-generating applications like market places or social media. Modern data analytics allow the extraction and collection of information specific to an identifiable user, which enable the data receiver to approach an individual with offerings and information tailored to his (perceived) needs. Companies are interested in targeted advertisement in order to raise their sales. Political parties can send messages to a voter which he will likely agree with. Those who can access and analyse personal data profiles can take deep insights into an individual's life.

However, citizens have the right to preserve their personal privacy. Physical cash works without registers of cash holders and transactions. When paying with banknotes and coins, it is only the buyer and the seller who are aware of this transaction: what is bought, how much, when, where, by whom and at what price – all valuable information about an individual's habits.

But even cash purchases are not fully anonymous. Our world is becoming ever more digital, and even though a cash transaction is not recorded, the buyer may have left related data points: He might have searched for product information online before the purchase or might have commented on the purchase via social media. Besides the tracking of the buyer's deliberate online activities there can also be offline data generated e.g. from his smartphone's log-ins or a store's security video surveillance.

Nevertheless, banknotes and coins reduce your digital footprint. In contrast to an electronic payment, a cash transaction itself does not generate digital data and no third party – e.g. a payment provider – will automatically receive the transaction data. Cash helps the individual to protect his privacy, even though it does not guarantee full data protection given today's digital environment.

¹ Deutsche Bank Research, heike.mai@db.com.

² Ich weiß, was Du gestern gekauft hast, Zeit Online, June 20, 2018.

9.2. “I HAVE NOTHING TO CONCEAL?” – KNOWLEDGE IS POWER!

Why does privacy matter? A law-abiding citizen might say “I have nothing to conceal.” This is a misconception. In any debate, negotiation or competitive situation, it is an advantage to know about the other party’s position in order to achieve one’s own desired outcome. It should therefore be in anybody’s interest to protect his privacy to strengthen his bargaining position. However, the data industry allows interested parties to gain insight into an individual’s personal and financial situation. This can easily become detrimental to the individual.

Collecting information on individuals has a long tradition, be it for commercial ends (e.g. debtor registers, phone books) or public purposes (e.g. land registers). But the digitalisation has multiplied the data generated and facilitated processing and analysis, resulting in rather comprehensive personal profiles, which data users obviously deem so useful that they are willing to pay for it. Demand for meaningful data on potential consumers, voters, etc. drives the data industry. Maybe surprisingly, the data mined by large online platforms is not necessarily comprehensive enough. In order to get a picture of an individual as complete as possible, specialised companies – data brokers – buy and combine data from various sources (online and offline) to deliver information on exactly defined target groups to their customers.³

In Europe, the General Data Protection Regulation (GDPR) has introduced stricter rules on the use of personal data, i.e. data relating to an identified or identifiable living individual.⁴ However, the use of personal data is allowed for specific purposes like fulfilment of contract or legal obligation, and also if the data subject has consented to it. In the online sphere, consent to processing one’s personal data is often given with little consideration by clicking a box which then enables the customer to use the provider’s services.

Data holders often claim that personal data is only used in an anonymised form. But data protection agencies upheld that most data is only pseudonymised and that persons can easily be identified.⁵ Scientists were able to correctly identify 90% of 1.1 million credit card holders only based on their “anonymised” card transactions over three months, including day and shop of the purchase but without personal data like names or card numbers.⁶

³ So hinterlassen Sie jeden Tag eine riesige Datenspur, *WirtschaftsWoche*, May 24, 2018.

⁴ “General Data Protection Regulation”, Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 (taking effect May 24, 2018).

⁵ Data brokers: regulators try to rein in the ‘privacy deathstars’, *Financial Times*, January 8, 2019.

⁶ De Montjoye, Yves-Alexandre et al, Unique in the shopping mall: On the reidentifiability of credit card metadata, *Science*, January 30, 2015.

Digital payments – both online and offline – are a rich data source which can give valuable insight into a person’s consumption habits, daily routines and financial resources. Despite the wealth of its own data about its users, online platform Google took recourse to buying offline transaction data from Mastercard in order to prove to the customers of its advertising business that user clicks on an online ad correlate with subsequent in-store purchases. Both companies affirm that no personal data was provided.⁷

9.3. BALANCE OF POWER: INDIVIDUAL (CONSUMER) VS COMPANIES (MERCHANTS)

The digitalisation has tremendously increased the information asymmetry between companies and retail clients to the latter’s detriment. Digital analysis of internal client data as well as bought data profiles allow especially “click-world” merchants to know a lot more about their clients’ private and financial habits than the individual knows about the merchant company or its competitors. Given the increasing bargaining position of merchants, is the consumer still getting a good deal?

Advertisements can be targeted directly at clients who are likely to buy a certain product or service, based on their data history. On the one hand, the client might benefit from more meaningful advertisement. On the other hand, there is a higher risk the client is tempted to buy too much. The internet allows consumers to compare prices and products conveniently. However, online merchants are venturing into dynamic pricing, i.e. prices change frequently in order to decrease the market transparency and to create pressure to buy before the next price change might occur. Prices can even be tailored to an individual’s estimated willingness and financial ability to buy. E.g., prices can be higher for clients logging into a website with a tablet instead of a PC or for clients who have clicked on an offer several times.⁸ The client’s bargaining power vis-à-vis a merchant is mostly based on his ability to turn to a better offer at a competing shop. If price transparency is seriously diminished, the consumer runs the risk of paying too much. The commercial value of personal data is even less transparent for consumers. Data has become an economic good for which the “producer” is usually not remunerated. Given the dynamic growth of data-based business models, it would be interesting to know how good a deal consumers get when they exchange their data for free-of-charge online services.

⁷ Google and Mastercard Cut a Secret Ad Deal to Track Retail Sales. Google found the perfect way to link online ads to store purchases: credit card data, Bloomberg, August 31, 2018.

⁸ Dynamic Pricing. Warum online jeder einen anderen Preis zahlt, Bayerischer Rundfunk BR 2, April 16, 2019.

9.4. BALANCE OF POWER: INDIVIDUAL (CITIZEN) VS PUBLIC AUTHORITIES

The significance of physical currency runs deeper than the economic aspects discussed above. It touches upon the relation between citizens and the state. The shift to transparent and traceable electronic funds – with no easy option left to pay without a digital data trail and involvement of a third party – can open the door to data abuse and infringement of civil rights. In fact, comprehensive data about an individual citizen can facilitate surveillance for political reasons.

Even in democracies governed by the rule of law, citizens are well advised to be vigilant that state authorities do not abuse their powers. This does not only refer to obvious executive powers like the police's use of force. Knowledge of the private and financial situation of individual citizens gives public authorities additional power over them. Even with stringent data protection rules in place, the unlawful abuse of such information asymmetry cannot be ruled out. Comprehensive data on individuals might tempt abuse for personal or political ends, be it by a single civil servant or by domestic or foreign intelligence services.

An abolition or strict limitation of cash usage carries the risk of seriously eroding trust in state authorities. The willingness of citizens to be transparent towards authorities depends crucially on their trust that public authorities function well and do not overstep their mandate. Depriving citizens of a simple tool to guard their privacy in financial matters can easily prove to be counterproductive: Feeling captive to public authorities – as opposed to being a citizen – would loosen the bond between people and government.

Wherever civil rights are not respected by the government, cash – much more than digital payments – helps opposition activists to protect themselves from the illegitimate use of public power, e.g. from surveillance and intimidation.

9.5. CASH EMPOWERS THE INDIVIDUAL

By providing a high degree of privacy in payments, cash helps to slow the growing information asymmetry between consumers and companies as well as between citizens and public authorities. As knowledge about your counterparty is power, privacy is crucial for individuals to safeguard their position when dealing with organisations which are more powerful than a single person.

10. LIBRA: A NEW COMPETITOR AMONG INTERNATIONAL CURRENCIES?

*Beat Weber*¹

The recent publication of a “white paper” by a Facebook-initiated consortium to start a virtual currency called “Libra” has generated considerable public attention. Based on the limited amount of information currently available, we try to assess Libra’s potential to become legitimate money, and its possible prospects to compete with existing official currencies.

10.1. WHAT IS “LIBRA”?

In June 2019, Facebook has presented its project to develop a digital currency called “Libra” by 2020. “Libra” is to be issued by an association of corporations from various platform-based business areas.² Its value is to be pegged to a basket of official currencies, and backed by bank deposits and government securities in official currencies.³ According to information released by the initiators, Libra is intended to initially serve as a payment instrument in target markets with underdeveloped banking and payment infrastructure. Its future expansion in other fields of activity and geographic areas is envisaged.⁴

First reactions among national authorities were sceptical. Central bank officials have warned of the project creating systemic risk, parliamentary committees have raised consumer protection and even national security concerns, and some authorities stressed the need to address potential money laundering and privacy issues.⁵

While it is too early to determine precise regulatory measures in response to the project given the current lack of clarity about important design details, public attention and debate around the project can be considered a welcome oppor-

¹ Oesterreichische Nationalbank.

² Libra (2019a) offers the following list: Payments (Mastercard, Mercado Pago, PayPal, PayU, Stripe, Visa), technologies and markets (Booking Holdings, eBay, Facebook/Calibra, Farfetch, Lyft, Spotify AB, Uber Technologies, Inc.), telecom (Iliad, Vodafone Group), Blockchain (Anchorage, Bison Trails, Coinbase, Inc., Xapo Holdings Limited), risk capital (Andreessen Horowitz, Breakthrough Initiatives, Ribbit Capital, Thrive Capital, Union Square Ventures), non profit, multilateral organizations and academic institutions (Creative Destruction Lab, Kiva, Mercy Corps, Women’s World Banking).

³ According to Libra (2019b), “the actual assets will be a collection of low-volatility assets, including bank deposits and government securities in currencies from stable and reputable central banks.” The actual composition of the basket is yet unknown.

⁴ See Libra 2019a and 2019b.

⁵ FAZ 2019, FT 2019c and FT 2019d, Guardian 2019.

tunity to develop a more widespread and deeper understanding about the actual working of the current monetary and financial system and its future prospects.

10.2. MONEY NEEDS LEGITIMACY

The amount of comments that have been published in response to the “white paper” on the Libra project and the strong views held by most commentators⁶ highlight that money and its design involve issues that go way beyond the mere technical or economic dimension: Money is inseparable from legitimacy. To work properly, money requires legitimacy. Value is a social phenomenon. Acceptance of an economic instrument by market participants is a social phenomenon, too. The notion of legitimacy tries to capture the multi-dimensional issues involved that turn a (physical or digital) object into money.⁷

Introducing a new form of money into the economy requires ensuring a widespread perception among potential users that it is legitimate. Legitimacy of a means of payment involves two key dimensions⁸:

First, “input legitimacy” refers to the relation between issuer and user of a monetary instrument. Do users trust in the issuer, do they have a form of influence or control over its goals and behavior?

Second, “output legitimacy” refers to the characteristics of the monetary instruments with respect to its economic performance. Does it conform to users’ quality requirements?

In the following, we review key components behind a currency’s claims to legitimacy along these two dimensions, and compare existing official currencies with the prospective features of a corporate currency like Libra.

10.2.1. Input legitimacy

All forms of money (banknotes and bank deposits) in the modern economic system have an issuer guaranteeing its value. Issuers back their guarantees with assets. Whereas money is an asset for its individual owners (e.g. those among us who have cash in their wallets), it represents a liability for its issuer, recorded in a balance sheet where liabilities must be matched by assets.

⁶ See for example FT 2019c, Grygiel 2019, Guardian 2019, Morozov 2019, Stiglitz 2019, Wolf 2019.

⁷ See Weber (2018) for a fuller presentation of the analytical framework and its application to the current monetary system. The following discussion draws on this text.

⁸ Scharpf 2012.

In the current monetary system in contemporary OECD countries, central banks and commercial banks serve as issuers of means of payment in each currency area. They entertain a hierarchical relationship where commercial bank deposits represent a claim on central bank money available on demand by customers. They are subject to a number of channels aimed at producing “input legitimacy”, a trustful relationship between issuers and users of money.

In general, central banks are subject to a public mandate, many of which operate with some form of inflation target, some also include output targets. In most currency areas, legal provisions foresee independence of central banks with respect to employing instruments at their disposal in pursuit of their mandates without government interference (e.g. setting the terms of access to its balance sheet with respect to collateral accepted, interest rate required, duration etc.). In most currency areas, equity of central banks is held and guaranteed by the public sector, and governments appoint central bank management. Accountability towards parliaments and the general public typically takes the form of mandatory hearings, and transparency requirements (publications, minutes of key meetings etc.).

Commercial banks are subject to licensing requirements, public regulation and supervision, as well as market competition among banks, plus monitoring by their equity owners and creditors. Their demand liabilities are treated as means of payment among users as long as banks can uphold their guarantee to maintain par value to cash and provide cash on demand against deposits.

Arguably, the co-existence of public and private issuers in the contemporary monetary system in each currency area mirrors the co-existence of both sectors in the broader system of economic activity, where both the public sector and commercial activity by private property owners share responsibility.

In the case of Libra, there would be a single issuer only, the Libra Association, serving as the system’s central bank. Devised as “an independent, not-for-profit membership organization headquartered in Geneva”, its membership “will consist of geographically distributed and diverse businesses, nonprofit and multi-lateral organizations, and academic institutions”.⁹ Its main decision making forum is a council. Council membership requires an investment of USD 10 mn. in “Libra investment tokens” that fund the project and offer a share in the returns from reserve assets backing Libras in circulation. Major corporations from payments, digital platforms, telecommunications and venture capital industries have already subscribed. Extension of membership towards 100 members is envisaged.

⁹ Libra 2019a.

While the White Paper suggests that the Libra system is “decentralized” because the association has many members beyond Facebook, and the system subcontracts distribution of funds on the retail level, at best this kind of decentralization is at par with those of existing central bank arrangements e.g. in the US (with its Federal Reserve Board and regional Fed members) and the Euro area (with its “Eurosystem” consisting of the ECB and National Central Banks of member states). In all three cases, decision-making is centralized in a committee structure involving system members.

But in contrast to the current monetary system, Libra is not based on a decentralization of issuers, and does not offer input legitimacy channels for the general public with regard to the system’s governance. Unless some public regulation and supervision is established over the Association, its currency issuing activity would be mandated and held accountable by its profit-oriented members. Their reputation and motives may or may not be perceived as in line with potential users’ expectations of legitimate governance. Most observers have expressed severe doubts about that.¹⁰

As a first indication, note that the Libra project’s whitepaper has been published with a call for feedback from the engineering community on technical aspects of its proposed infrastructure.¹¹ Meanwhile, the main target group of users mentioned in the white paper are the group of “unbanked” people suffering from financial exclusion. The pictures used to illustrate the target group show young urban fashionistas from Africa. None of the latter two groups are called upon to give feedback on the Libra proposal. This is in line with established practice in social media platform business models, where the user serves as the product.¹² But it is very far away from entering a relationship that serves to provide any meaningful form of input legitimacy.¹³

10.2.2. Output legitimacy

Through public mandates for central banks and regulatory frameworks for commercial banks, the community of money users in a currency area communicate their quality requirements on money. These requirements can be understood as the “output” dimension of legitimacy. In general, users want money to be generally accepted in their respective currency area, they want purchasing power to remain stable over a reasonable time period, they want protection from financial crises, they want money to contribute to macroeconomic activity, and they expect convenient practical useability of monetary objects.

¹⁰ Morozov 2019, O’Dwyer 2019, Posner 2019.

¹¹ <https://github.com/libra/libra>.

¹² Posner 2019.

¹³ FT 2019b.

10.2.2.1. General acceptance

From a user's perspective, the attractiveness of a currency rises with the number of other users. In this respect, money has properties similar to language, digital social networks, computer software and other infrastructural phenomena. A greater currency network means greater choice of available goods priced in the same currency and a greater number of potential transaction partners accepting the currency as means of payment. Because more users of a currency mean greater benefits for each individual user, and because the parallel use of several different currencies involves costs, there is a tendency for the dominance of a single currency in any currency area.

The fact that national tax systems impose tax duties on domestic economic actors in domestic currencies as well as the costs and organizational difficulties involved in collective switching to a foreign currency keep users anchored in domestic currencies and prevent the spread of the network logic across national borders towards the evolution of a single world currency. Nevertheless, if the perceived quality of a national currency departs too much from available alternatives, users can become prepared to overcome switching costs and adopt a foreign currency in domestic transactions (this is the experience of countries having undergone "Dollarization", "Euroization" etc.).

Stressing a focus on currently unbanked groups of people and statements like "Our goal is for Libra to exist alongside existing currencies" in the Libra Whitepaper suggest a complementary currency approach.¹⁴ But severe doubts about the viability of a strategy based on this niche exist¹⁵, and even if it worked, the project is unlikely to refrain from attempts to expand into more profitable areas. This means currency competition, at least for some currency areas where users perceive weaknesses in the domestic monetary system's legitimacy. Both issuer's push and users' pull effects can be the driving force behind such developments.

Enthusiasts have been hoping for a decade that crypto coins would one day develop into competitors to official currencies.¹⁶ That never happened. Lacking a responsible issuer guaranteeing the value of coins and backing them with assets, Bitcoin and altcoins never took up as means of payment beyond niches in which official currency was inapplicable. Instead, their wild swings in value made them attractive as objects of speculative trading by users.

But private digital currencies did exist and manage to develop into competitive currencies before Bitcoin. In China, social media platform Tencent introduced its own digital currency Q-coin in 2002. In the context of an underdeveloped

¹⁴ Libra 2019b.

¹⁵ After all, Libra is unlikely to address two key problems behind "financial exclusion" outside industrialized countries: lack of funds and access to technical infrastructure like smartphones. See FT 2019a and 2019b.

¹⁶ Jeffries 2019.

electronic payment market with respect to cards and other instruments, it was very successful. Initially, Tencent sold Q-coin at a fixed exchange rate against official currency to users in order to enable the purchase of services offered by Tencent in games and other applications on their platform. Q-coins can also be earned for activity. Soon, users started to transfer Q-coin among each other, and merchants and platforms outside the Tencent platform started to accept it as means of payment. Speculators started trading them against official currency. After trade using Q-coins reached several billions renminbi (around a tenth of the size of cash payments in China at the time), Chinese authorities outlawed payment with Q-coin outside the issuer's platform in 2009. Recently, Q-coin development has been more subdued, but it is still in use.¹⁷

In contrast to crypto coins, the consortium behind Libra has considerable tools at their disposal to encourage adoption of Libra among users. They build on an existing platform with billions of users serving as potential transaction partners for each other and for businesses partnering with the platform. If it fits their business model, corporations running the platform could use accumulated revenue from other business areas to offer incentives to users for using Libra as means of payment. They could start to denominate prices for existing products and services on their platform in Libra, absorbing the costs of exchange rate fluctuations and currency conversion involved in paying suppliers and tax authorities in various national currencies, resulting in Libra becoming a unit of account for economic activity on its platform, the key attribute of money. They could offer discounts for prices of products and services offered when payment is made in Libra. They could offer products and services exclusively available against payment in Libra. They could distribute rewards to platform users in Libra in return for particular on-platform behavior (e.g. viewing ads or providing useful customer data, creation of user-generated content on entertainment platforms etc.), thereby creating funds for future on-platform spending by users in Libra. They could use their market power to persuade other businesses to join and accept Libra payments, thereby continuously enlarge the platform and enhance its attraction.

If Libra's issuer made full use of the instruments at its disposal, this could turn the project into a potential competitor to (at least some) official currencies that could rival the strength of national currency networks supported by user habit, tax authority and switching costs. If mandated to defend the integrity of their domestic currency network, authorities would have to resort to regulatory

¹⁷ ECB 2012, Halburda and Sarvary 2016, Technode 2019. Facebook itself experimented with a currency called "Facebook Credit" from 2009 to 2012. Facebook Credit could be purchased for a fixed value of US Dollars (but not reconvertible), and could be used to purchase virtual goods in Facebook applications. In 2012, the project was stopped, and outstanding "Facebook credits" reconverted into local currency (ECB 2012). To my knowledge, no information about the motives behind the move has become public.

measures reducing the attractiveness of Libra compared to domestic currency (e.g. subjecting the exchange of domestic currency against Libra to administrative capital controls, taxation or other regulatory requirements; using competition law to scrutinize user incentives offered by the Libra platform etc.)

10.2.2.2. Stable value

In an instable world, stability is always of a relative nature. Official currencies issued by central banks subject to a mandate involving price stability are stable over time in relation to major domestic prices in the currency area concerned.

Libra is generally referred to as a “stable coin”. “Stable coins” are a particular class of crypto coins that depart from the design model behind projects like Bitcoin and Ethereum by being issued by an entity that promises stability of the coin’s value.¹⁸ Most “stable coins” define stability in relation to an official currency, e.g. the US Dollar. That makes them similar to commercial bank deposits in official currency, the major difference being that their issuers do not have a banking license with the associated regulatory and supervisory framework, resulting in major questions around the quantity and quality of the assets backing their stability claim.

Libra’s version of stability refers to a basket of major official currencies yet to be defined. By implication, when issuing Libra in exchange for funds in official currency to users, Libra would invest funds received in liquid and safe assets that reflect the currency composition of the predefined basket.

The best known example for such a construction is the IMF’s Special Drawing Rights which refers to a basket of member state currencies. Also, some national currencies have envisaged currency pegs in relation to a basket of foreign currency over time.

A key open issue around Libra is whether possessing Libra means having a claim on the issuer that is redeemable in official currency at a predetermined value. Whereas all prices of incomes, goods and services are denominated in national currencies and stable over time in stable currency areas, prices in Libra would be instable over time in line with fluctuations among currencies within the basket (unless some platform participants are prepared to absorb the resulting risks and costs and offer products and services denominated in stable Libra prices, making Libra their unit of account and pushing towards the establishment of a full currency network).

From the perspective of a user receiving current income, comparing prices, saving and making purchases in stable domestic currency, this would make switching to

¹⁸ Bloomberg 2019, Brave New Coin 2018.

Libra unattractive in terms of stability. For users having no access to digital forms of domestic currency, for users in instable currency areas, and for users faced with exchange rate risk in remittance transactions¹⁹, attractiveness of Libra could be greater, depending on terms and costs of access (all of which are yet to be defined or disclosed).

10.2.2.3. Financial stability

As users of financial services and products, as borrowers, as recipients of income in an economy dependent on a functioning circuit of money and credit, all economic subjects depend directly or indirectly on financial stability.

The Libra Whitepaper offers a number of hints that suggest lack of awareness of the financial stability risks involved in the construction of its would-be currency: “The association does not set monetary policy. It mints and burns coins only in response to demand from authorized resellers. Users do not need to worry about the association introducing inflation into the system or debasing the currency. Because the reserve will not be actively managed, any appreciation or depreciation in the value of the Libra will come solely as a result of FX market movements”²⁰

This sounds like a statement equating regular monetary policy by central banks with unilaterally forcing a money supply potentially in excess of money demand into the economy, thereby introducing inflation and depreciating the currency. Such an account may resonate with a popular narrative widespread among supporters of crypto coins, gold-backed currencies and other fantasies around money, but it is out of touch with institutional realities. A central bank willing to create money requires a counterparty willing and able to provide an asset in exchange for new money on the terms set by the central bank. There is no way to supply money that is not demanded, and no way to supply money without any backing received in exchange. But the mere fact that all money creation must cater to money demand and needs asset backing does not in itself guarantee money’s stable purchasing power with respect to domestic prices. That is why central banks must undertake monetary policy to fulfill their mandate, which refers to stable prices in the economy.

If domestic prices are heavily influenced by developments abroad, it may make sense for the central bank concerned to have an exchange rate peg as its monetary policy strategy. In order to make it work, such a peg needs to be defended in view of potentially fluctuating market assessments of both assets and liabilities of the currency issuer. Some pegs are tested by sudden stops, where after a period of

¹⁹ FSB 2019.

²⁰ Libra 2019.

massive inflows of funds, a movement of massive outflows ensues, triggered by whatever influences capital owners behavior. The issuer may have assets backing its liabilities, but face challenges in liquidating its assets under fire sale conditions.²¹

If Libra were to become a success, its stock of reserves would be massive, creating systemic problems from the outset by intensifying the worldwide shortage in safe assets and becoming a systemic investor in many asset classes (e.g. government bills and bonds)²², and posing systemic risks by potentially destabilizing markets in the assets backing Libra whenever faced with significant outflows of funds. Absent deposit insurance for Libra holdings, Libra users could be very vulnerable to financial instability.

10.2.2.4. Macro effects

Money creation results from a swap of liabilities between an issuer and a counterparty. Banknotes issued by the central bank carry no interest, while deposits held by commercial banks at the central bank sometimes do (note that they can also be negative at times). When central banks acquire securities against issuing either banknotes or deposits, returns on these securities usually surpass interest paid to holders of banknotes and central bank deposits. The spread of income earned on central bank assets over income paid on their liabilities is called “monetary income”. In general, monetary income is used to cover central banks expenses, the rest accruing to its shareholders (in most countries this is the public sector).

Based on a similar mechanism, “monetary income” created by issuing Libra accrues to shareholders in its private “central bank”, corporate members of the Libra association.

Concerning the macro effects of introducing a private world currency, potential effects on capital flows and relocation of (the occurrence or recording) of economic activity, or even the generation of additional economic activity, are possible but very hard to foresee at the current stage, given current lack of details and uncertainty about the ultimate size of the Libra network.

10.2.2.5. Practical useability aspects

A further dimension influencing user choice for a currency could be called “useability”. This covers a number of features, some of which have a stronger economic dimension, some of which have a more practical dimension.

²¹ Eichengreen 2019.

²² FAZ 2019.

The use of digital monetary instruments requires an infrastructure on which to record their existence, ownership and transfer. Such infrastructures involve particular access requirements for users and can be equipped with a number of services related to storing and transferring users' funds. Digitalization of the economy may result in a shift of user needs and requirements with respect to access and associated services. Libra would require decision making on which kind of access criteria and services would be available to users.

We know that Libra holdings would not earn interest, and that payments in Libra are announced to have low fees and be quick, but beyond that there is no information yet on issues like fee levels and structure, nor of any upper or lower limits with regard to the amount of funds available to individual users, and the purposes on which Libra can be used for. Also, the range of account services is still unknown. The precise terms and methods of privacy protection are to be determined yet. It looks like most of these questions will be determined not on the issuing level, but on the level of wallets, which are required to hold and transfer Libra funds. Facebook is the first known provider of wallets for Libra, Calibra. Calibra seems to be intended by its creators to serve as the link in the Libra value chain that submits itself to regulation with regard to anti-money laundering and data protection requirements.²³ And it seems to serve as the main element on which Facebook intends to develop business ideas, e.g. by integrating it with various applications on its platform for communication, customer identification, micropayments, e-commerce etc.²⁴

Inferring from Facebook's track record, expectations for Calibra useability are high in some aspects (e.g. user-friendly interface) and low in others (e.g. data protection).²⁵

In setting the terms and functionalities offered, wallet providers will be influenced by their goals depending on their business models, by the terms offered by competitors, and by regulatory requirements. All of these aspects are heavily in flux.

10.3. CONCLUSIONS

At the current stage, Libra is just one among thousands of white papers proposing an electronic currency with a particular construction. Publishing a white paper, reaching out in the tech community to gather feedback, calling its register a "blockchain" although it does not record transactions in blocks²⁶, presenting a

²³ "Facebook created Calibra, a regulated subsidiary, to ensure separation between social and financial data and to build and operate services on its behalf on top of the Libra network." (Libra 2019).

²⁴ Halaburda/Sarvary 2016, Music Business Worldwide 2018, O'Dwyer 2019, Wolf 2019.

²⁵ Morozov 2019, Posner 2019, Wolf 2019.

²⁶ Lopp 2019, O'Dwyer 2019.

business idea as a contribution to freedom of users: all these features are a strong nod towards the culture that evolved around Bitcoin and other crypto projects in the recent decade. Maybe Libra will add to the existing crypto white paper graveyard, maybe it will become another member of the “stable coin” club that serves as a kind of shadow banking system to the speculative crypto trading universe and similar niches.

But in contrast to most crypto projects, there is a powerful global corporate structure behind Libra, and its construction is in many aspects as close as possible to a traditional currency. That makes it unique among crypto projects in having a potential to grow beyond the crypto world and become something of relevance to the global monetary and financial system, echoing medieval private currency networks.²⁷

Based on the limited amount of information available on Libra’s design, it looks like its governance mechanisms fail to offer a meaningful channel for input legitimacy, and it faces severe questions over its ability to deliver output legitimacy. Nevertheless, market power behind the platforms supporting the project may be used to promote its spread, both complementing or rivaling existing networks, and triggering the emergence of rival corporate projects.

Those responsible for the monetary system’s integrity now face the challenge to cooperate globally (and with authorities responsible for protecting competition²⁸, privacy and other key issues) in a way that matches the cooperative ability of the corporate alliance behind the Libra project, in order to avoid the emergence of a shadow currency sector which fails to contribute to the public good – which would be a particular shame given that the latter goal is so strongly emphasized in the Libra proposal.

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²⁷ Jeffries 2019, Posner 2019.

²⁸ Tirole 2018.

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Table: Overview of currency projects’ main characteristics

	Responsible issuer?	How is value defined?	Mainly serves as...
Official currencies	Central bank and commercial banks	In domestic prices, and exchange rate against other currencies	Money in domestic currency area
Bitcoin ^a	None	Exchange rate against official currencies	Speculative asset
Libra ^b	Libra Association	Basket of official currencies	Means of payment?
Special Drawing Rights (SDR) ^c	IMF members	Basket of USD, EUR, RMB, YEN, GBP	Reserve asset for IMF Members

a. See Weber 2018, 101-135.

b. Libra 2019 a and b.

c. <https://www.imf.org/en/About/Factsheets/Sheets/2016/08/01/14/51/Special-Drawing-Right-SDR>.

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