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# Cash on Trial

**Edited and introduced by**

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*A joint publication with ZeFiR (UZH)*

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Paolo Tasca  
Jens Ulbrich

*A joint publication with ZeFiR*  
*(Zentrum für Finanzmarktregulierung, Universität Zürich)*

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CIP

**Cash on Trial**

*Editors:* Christian Beer, Ernest Gnan and Urs W. Birchler

*Authors:* Christian Beer, Aleksander Berentsen, Urs W. Birchler, Ernest Gnan, Nicole Jonker, Malte Krueger, Harry Leinonen, Katharina Linsbauer, Nikos Passas, Fabian Schär, Friederich Schneider, Paolo Tasca, Jens Ulbrich

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## 1. INTRODUCTION – CASH ON TRIAL

### Findings from a conference jointly organized by SUERF, University of Zurich and Liberales Institut, 4-5 November 2015, Zurich

*Christian Beer<sup>1</sup>, Ernest Gnan<sup>2</sup> and Urs W. Birchler<sup>3</sup>*

Over millennia, mankind has used hard cash in various forms ranging from shells to gold coins and paper. More recently, cash has become unpopular in political circles, as it effectively restricts states' power to tax (explicitly or via negative interest rates) or to survey and potentially control their citizens. Several states have enacted restrictions to the use of hard cash. Above all, a strong new competitor to cash has arisen in the form of various electronic means of payment. Are we heading towards a society in which 'coined freedom' (Dostojewski) will cease to exist?

Under this provocative 'motto' SUERF organised a combined evening event (in German at the University of Zurich) and one-day conference (in English at the theatre 'Millers' in Zurich) to take stock of the arguments brought forward in the current debate on the pros and cons and, more generally, the future of cash.

The main findings were the following:

- There are three main lines of arguments brought forward against cash: first, it is costly, inefficient and outdated. Second, it facilitates criminal activity, money laundering and tax evasion. Thus cash generates several negative externalities. Third, it limits the leeway for monetary policy to drive nominal interest rates deeply into negative territory to fight recessions and deflation.
- The main arguments mentioned in favour of cash are: It is still the preferred means of payment by many people in many countries. It is fast and easy to use, and facilitates the monitoring of expenses; thus is particularly important for young, old, less educated and lower income groups. It preserves privacy and anonymity both vis-à-vis the state and against transaction partners. It limits states' powers against individuals, which may be particularly urgent in unlawful states and in countries with hyperinflation. Thus world currencies available in cash generate a positive externality. Cash

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appropriately prevents central banks from implementing excessively low interest rates, which erode pension savings and lead to resource misallocation as well as asset price bubbles. It generates seigniorage for the central bank (i.e. for the state) rather than for private payment service firms.

- Ideally, the choice of payment instruments should be determined through competition; however, such an approach is difficult to implement because of the nature of payment services as a network industry. There are simultaneously various distortionary elements in force which either favour cash or put it at a disadvantage. More systematic information on competitive neutrality and subsidisation of different payment systems as well as a systematic cost-benefit analysis of alternative methods of payment is desirable.
- Crises trigger a sharp increase in currency circulation over nominal GDP; this effect lasts for about two decades after the crisis, until memory of the crisis fades. Cash provides an insurance against very bad outcomes, such as economic crises, hyperinflation, or the failure of computer or electricity networks. It is not clear how robust electronic payment systems would be in the absence of cash.
- Moderately negative interest rates are possible also in the presence of cash. It is not undisputed whether negative interest rates are desirable at all. Monetary policy is not powerless at the zero lower bound (forward guidance, QE). The case for abolishing cash for monetary policy reasons cannot assume a binding zero lower bound.
- Cash plays no dominant role in money laundering. Restricting the use of cash could lead to less criminal activity. However, the impact would be modest. Crime should be addressed at the source not at the final stage of payment flows. Many of the most damaging crimes in the recent past were not associated with cash.
- Any attempt to restrict the use of cash must take into account the negative externalities of such regulations, including the impact on disadvantaged groups of society and on people in other countries (e.g. with regard to remittances, escape option in unlawful states and countries with hyperinflation).
- Electronic wallets could be a superior alternative to cash: transaction costs are lower, violent crimes are less likely, anonymity can be preserved, and negative interest rates can be implemented. The blockchain technology can be used in a wide range of applications including digital currencies.



The evening event was well attended with around 200 people filling all seats of the auditorium and featured presentations by Peter Bernholz, Professor emeritus, University of Basle, and by Friedrich Schneider, Professor of economics, University Linz.

**Peter Bernholz** started out with an overview of the usual arguments for an abolition, or limitation on the use of, cash: allowing monetary policy to move nominal interest rates deeper into negative territory; fighting tax evasion and black markets; fighting illicit transactions, money laundering and terrorism. However, these advantages have to be weighed against advantages of keeping cash: individual privacy and personal liberty; the poor might be particularly affected by an abolition of cash; a limit on financial repression and the threat to private pension savings from negative nominal interest rates; a limit to the negative real economic effects (misallocation of resources) from negative nominal interest rates; a limit to central banks' capacity to generate stock and real estate price bubbles through negative interest rates; having a backup means of payment in the event of the failure of technical systems; and, last but not least, the possibility for citizens to hold (foreign) cash as protection against the arbitrariness of unlawful or irresponsible governments (e.g. authoritarian states, governments generating hyperinflation). If the US or the Euro Area were to abolish cash, the positive externality of these currencies for citizens from unlawful states would be lost. In a longer perspective, Bernholz views the current drive to actively abolish cash as a continuation of the erosion of monetary stability that started with the abolition of the gold standard and went on with the demise of the Bretton Woods system.

**Friedrich Schneider** explained that our knowledge about the proceeds of transnational crime and about the eventual use of these proceeds is quite limited. The fight against international crime is hampered by the lack of international cooperation. Schneider calls for the establishment of international organisations that are in the position to fight transnational crime on a global level. Regarding the use of cash by criminals, Schneider observes that cash is used for many criminal activities because it does not leave traces. As a consequence, restricting the use of cash can reduce criminal activity. However, the impact will be modest (10%-20% at most) because profits of criminal activity will remain quite high even after a potential abolishment of cash. According to Schneider, in some cases (e.g. drug-trafficking) liberalisation and legalisation could help reducing organized crime.

The following panel discussion led by **Michael Rasch**, *Neue Züricher Zeitung*, gave the audience the opportunity to inquire about further details on both presentations. The comments and questions raised by the audience bore witness

to a strong preference for cash, which is also reflected in the continued high importance of cash in Switzerland.

The conference on the following day assembled around 100 participants and was couched as a court trial in which cash – in line with recent allegations by prominent economist – was ‘accused’ of three charges: First, cash is an essential part of many kinds of criminal activities; second, it is an inefficient means of payment; and third, it prevents central banks from implementing optimal monetary policy in times when price stability would require negative interest rates.

Ahead of the actual ‘trial’, two presentations provided an overview and background information. **Malte Krueger**, Professor of Economics, University of Applied Sciences in Aschaffenburg, critically reviewed the state of the debate on the pros and cons of cash. Resource costs of cash (production costs, time of users) are generally considered to be quite sizable. Regulators, monetary authorities and, not surprisingly, private payment services share this view and there are several initiatives at national and pan-European levels under way to promote electronic payments. Ideally, the choice of payment instruments should be determined through competition; however, the nature of payment services as a network industry and various distortions raise serious doubts about such a ‘market-based approach’. Access inertia, chicken-and-egg and critical mass effects favour cash as the incumbent. Simple rules such as ‘cost-based pricing’ do not necessarily yield the optimal result. The nature of cash as legal tender in practice does not imply that everybody accepts cash of any denomination and amount as payment. Central banks, while often not charging for issuing and processing cash, at the same time earn non-negligible seigniorage from cash issuance. Contrary to private payment services, they do not advertise cash as a payments medium. On a regulatory level, cash is in many countries actually put at a disadvantage compared to electronic forms of payments (maximum amounts, constraints on tax deductibility of cash transactions). As regards the use of cash for illicit activities, the question is to what extent the abolition of cash would diminish these activities. This depends on the existence of substitutes for cash (foreign cash, electronic cash equivalents, some of which seem to have a number of other disadvantages). Also, the abolition of cash is probably not the first best measure to fight crime. He also questioned whether the abolition of illegal labor would be an unqualified benefit in all respects, given that high tax wedges on labor provide strong incentives for do-it-yourself, which may run counter to principles of comparative advantage. Krüger also reviewed various policy proposals aiming to make cash payments or holdings more expensive and less attractive. These proposals range from the abolition of large-denomination banknotes and making cash withdrawals less convenient; a carry tax on cash similar to Gesell’s

Schwundgeld ideas; ‘monetary separation’ in the sense of a flexible exchange rate between cash and deposits; to the abolition of cash altogether. Finally he also raised doubts of the robustness of a payment system without cash in periods of crises. A ‘bank run without cash’ would imply that depositors, who no longer have the escape to cash, might frantically buy assets in the event of a panic.

**Helmut Stix**, research economist at the Oesterreichische Nationalbank, presented preliminary evidence on the demand for cash across countries and over time, drawing on unique data sets just recently compiled. He showed that currency in circulation in relation to nominal GDP has not fallen since the turn of the millennium but instead increased strongly since the onset of the financial crisis. The high per capita cash holdings of USD and EUR reflect mostly foreign demand and hoarding, rather than payment transactions. Long time series spanning the last one and a half centuries for Austria-Hungary/Austria, the United States and Germany/the Euro Area show that crises trigger a sharp increase in currency circulation over nominal GDP; this effect lasts for about two decades after the crisis, until memory of the crisis fades. Time series for 57 countries covering 95% of world GDP show that the most important currencies in circulation are the Euro, the US dollar, the Japanese yen and the Chinese renminbi. Per capita circulation is highest in Switzerland, Japan, Hong Kong, Singapore, the Euro Area and the United States. The increase in currency demand is widespread across the vast majority of countries. Even in 2009, when world GDP contracted sharply, currency in circulation expanded. Econometric estimations indicate that the recent strong increase in currency in circulation cannot be fully explained by standard money demand equations, i.e. the extremely low level of interest rates does not fully explain it. Instead, the current crisis seems to mirror observations from the Great Depression when a loss of confidence in banks and generally higher uncertainty drive people into holding cash.

**Harry Leinonen**, Senior Financial Counsellor, Finnish Ministry of Finance, with his presentation on ‘Why cash is suboptimal’ acted as ‘witness of the prosecution’ against cash. He started his observations with data on the evolution of the number of ATM cash withdrawals per capita between 2002 and 2014. The initial increase in all countries reflected the transition from branch cash to ATM cash; more recently particularly in the Nordic countries and the UK cash has increasingly been substituted by card payments, implying a decrease in the ATM cash withdrawals per capita. Basically, nowadays with ATM cash withdrawal being the norm, cash payments involve bank accounts much the same way as card payments, with the additional – costly detour of paper currency to be handled by banks and by stores. Cards and mobile payments are therefore cheaper and more efficient. In practice, cash payments are cross-subsidized by debit card payments,

which results in biased user choices. In addition to direct payment and processing costs, cash also involves higher indirect costs (losses, robberies, safekeeping costs, tax evasion and black economy costs). 1-2% of GDP worth of savings could be achieved by abolishing cash. Cash is given preferential treatment by regulators, politics, consumer organisations and academics without good reasons. Regulators favour it by granting it exclusive legal tender status, accepting anonymity, and by subsidized cash transports and processing. Increased cost transparency would change consumer preferences in favour of card payments; probably, cash would disappear if it had to face open cost-based price competition. As a practical way forward, Leinonen proposed to abolish 1 and 2 cent coins as well as 100, 200 and 500 EUR banknotes. All payment instruments should benefit equally from zero interchange fees, i.e. all users would pay fees only to their own service providers. Basic payment accounts should also accorded legal tender status. Modern technology could be used to introduce audit trails also for cash payments, while card customer data could be made less transparent for payment recipients.

**Aleksander Berentsen**, Professor of Economic Theory, University of Basel, with his presentation on ‘The fallacy of a cashless society’ was the first witness of the defense. He argued that, as various central banks have shown recently, cash is no impediment to moderately negative nominal interest rates. Having said this, Berentsen noted that the very idea of negative real interest rates is a bad idea in the first place since it amounts to encouraging investments with positive private but negative social return, thus resulting in a waste of resources. Regarding crime and tax evasion, an abolition of cash would simply lead to new forms of circumvention through other cash-like substitutes. In terms of return, cash has always been inferior to other forms of savings. The reason why people use cash as a store of value is that cash is an insurance against really bad outcomes, such as financial crises (e.g. Lehman collapse), confiscatory taxes (e.g. Cyprus, Argentina), or forced conversion (e.g. Grexit). It also avoids reliance on third-party transaction processing, since it involves immediate settlement. It is easy to use and allows anonymity.

**Nicole Jonker**, researcher at De Nederlandsche Bank and the second witness of the defense, presented survey results on Dutch cash usage. In Holland, cash continues to be the dominant payments instrument. Cash is more frequently used by very young and very old citizens, by less educated and lower-income people. While in 2004 the main motives quoted by survey respondents in favour of cash payments were speed of payment, monitoring of expenses and acceptance by merchants, in 2014 the monitoring and cutting of expenses as well as habit figured most prominently. For many people, particularly those who continue to prefer cash payments, cash has two major advantages: first, it allows them to

monitor their expenditure behaviour very directly, preventing them from overspending; second, cash sets clear expenditure constraints based on the simple availability of cash in the wallet. Electronic forms of payment so far fail to provide the same immediate and direct benefits of payment control, particularly for vulnerable groups, such as elderly, lower income or less educated persons.

**Jens Ulbrich**, Head of the Economics Department of the Deutsche Bundesbank and the third witness of the defense, offered some monetary policy considerations. He noted that the abolition of cash would impinge on civil liberty rights, affect confidence in the established monetary order and hurt the poor. Simulations conducted at the Deutsche Bundesbank show that indeed the zero lower bound of interest rates limits central banks' ability to stimulate the economy and to drive up inflation. What does experience so far tell us about the effectiveness of open-market operations with long-term bonds ('QE')? In theory, QE operates through a number of transmission channels, such as signalling ('forward guidance'), through which the entire yield curve can be lowered. The portfolio rebalancing channel implies that the term premium is lowered. Relative lower interest rates depress the domestic exchange rate. Empirical estimates by various authors find substantial effects of QE on real GDP and consumer price inflation. At the same time, QE also involves risks, such as disincentives for governments to pursue sound fiscal policies and structural reforms; search for yield and asset price bubbles; and a threat to banks and pension funds' business model viability. All in all, monetary policy is not impotent at the zero lower bound; the zero lower bound is not binding; the zero lower bound argument is thus not suitable to argue in favour of the abolition of cash.

**Paolo Tasca**, Deutsche Bundesbank and ECUREX, acting as the first court expert, considered the potential role of digital currencies with a special emphasis on bitcoin. According to Tasca, the blockchain technology that underpins bitcoin allows for trustworthy records of transaction preserving anonymity. This technology cannot only be applied to digital currencies but to a much wider range of applications including rating or voting systems, distributed storage, authentication and anonymization of private information. Tasca presented figures showing that investment in bitcoin related start-ups is increasing rapidly even though the share of bitcoin related projects in total capital investments of start-ups is still relatively low. Furthermore, ongoing research reveals that the wealth distribution in the bitcoin system is highly unequal and that the mining industry can be regarded as an oligopoly.

The second expert of the court, **Friedrich Schneider**, complemented his presentation at the University of Zurich by providing further information on money laundering. Money laundering is essential if criminals want to make use of the



proceeds of their crime. Scrutinizing the different methods of money laundering, it becomes obvious that cash plays no dominant role. Furthermore, Schneider pointed to the growing importance of cybercrime. Cybercrime does not only entail direct costs (corresponding to criminal revenue) but includes also other cost components, e.g. costs to protect the computer infrastructure.

**Nikos Passas**, Professor of Criminology and Criminal Justice at Northeastern University and the third court expert, spoke about ‘Informal Payments, Crime Control and Fragile Communities’. Passas argued that many of the most damaging crimes in the recent past were not associated with cash. Cash neither contributed to the financial crisis nor to the LIBOR-scandal, nor was it used in the preparations of the 9/11 attacks. In the attempt to restrict the use of cash, the negative externalities of such regulations must be taken into account. Passas’ presentation made it clear that in this respect one cannot confine attention to Europe or the US but the impact on other countries must also be considered. For example, in their aim to fight terror, governments often hamper legitimate remittance payments. Even though regulation of the channels used for remittances is necessary to prevent the misuse of these channels for criminal activity, regulations should be proportionate to the risk and appropriate to socio-economic and cultural environments. In this regard Passas put special emphasis on the hawala-system. In the same vein, de-risking (i.e. financial institutions close down accounts that they regard as high-risk) raises both the cost to send remittances and systemic risk by e.g. shifting transactions to channels that are harder to monitor.

**Jean-Charles Rochet**, Professor of Banking at the University of Zurich, offered a wider view. He argued that cash does not matter but money is the important issue. Rochet predicted that cash will soon disappear. Nowadays cash is neither a good store of value nor the most suitable means of payment because cash involves high transaction costs and tends to generate crime. Electronic wallets are a superior alternative to cash. Electronic wallets exhibit lower transaction costs compared to cash and make violent crimes less likely. Furthermore, anonymity can be preserved. If cash is replaced by electronic wallets, negative interest rates can be implemented. Hence, the zero lower bound disappears. Even though demand for M1 might decrease, money will still matter as unit of account. Rochet observes that monetary decisions have a big impact on people (e.g. the consequences of the abandoning of the CHF-EUR peg by the Swiss National Bank or the distributional effects of quantitative easing). Concerning the control of our money, Rochet argued that currently technocrats are in power and these policy makers (have to) take bold decisions, while from an academic perspective, our knowledge about many money related developments is still very limited

The conference was concluded by the philosopher **Peter Sloterdijk**, Karlsruhe University of Arts and Design, who introduced the concept of postmodern money. The era of postmodern money began when President Nixon announced to suspend the convertibility of the US dollar into gold. Postmodern money neither has an intrinsic value nor does it represent value but it refers exclusively to itself. Furthermore, Sloterdijk stressed the role of believing. Human beings, as believing animals, also believe in the value of money. According to Sloterdijk, economists underrate the will of economic agents to believe. However, this will to believe must be taken into account in deliberations on cash and payments.



The positive feedback received by many spectators including the media after the ‘trial’ of cash confirmed SUERF’s dedication and will to generate value through innovation and ‘out-of-the-box thinking’ for the community of central banks and supervisors, financial practitioners, and academic economists. The topic addressed was proven to be not only relevant to monetary and financial circles but to societies globally. Merging deep analysis with a broad and encompassing collection of the various arguments and viewpoints has always been SUERF’s goal. The chosen ‘courtroom’ setting proved not only to add an element of entertainment, thus ensuring full attention of the audience through the entire day, but it also helped to sharpen positions and to systematically confront views with counterarguments. It is for sure that the debate on the pros and cons of cash will stay with us for the years to come. But, as the conference made clear, beware of over-simplified views that neglect the multiple facets of the topic.

## 2. THE FALLACY OF A CASHLESS SOCIETY

*Aleksander Berentsen and Fabian Schär<sup>1</sup>*

At the “Cash on Trial” conference, cash has been accused of three sins: First, cash is inefficient and costly to use, and society would be better off without it. Second, it promotes crime, and facilitates money laundering and tax evasion. Third, it makes negative nominal interest rates infeasible. In certain situations, this may hinder central banks from implementing optimal monetary policies. In this article, we argue that all three accusations are fallacies; they are based on faulty reasoning. There is absolutely no need to limit the use of cash. On the contrary, societies should facilitate its use.

The first two accusations have been around for a long time and there is an extensive literature on them. Our view is that, first, if cash is indeed inefficient, the market will eventually provide better solutions and cash will cease to exist. There is no need for policy intervention, since markets will address these kinds of inefficiencies. The reason that cash is still widely used only shows that it has unique features which create a strong demand for it. Second, in a historic context, the use of cash is a recent phenomenon. In contrast, crime, money laundering and tax evasion are much older phenomena, and it is therefore naïve to believe that cash is the cause of these problems.

The third accusation is new and for the rest of this article we focus on it. The accusation is that, because of cash (banknotes and coins), there is a zero lower bound (ZLB) or an effective lower bound (ELB) on nominal interest rates. The central bank is unable to lower short-term interest rates below the ZLB (in what follows we will use the terms ZLB and ELB interchangeably), because agents have the option to convert their book money into cash, which pays a zero interest rate. This argument has become increasingly popular in the aftermath of the financial crisis of 2007/2008 and the subsequent European sovereign debt crisis. The accusers believe that the existence of cash has been preventing central banks from setting the optimal level of (negative) interest rates in response to these crises. Furthermore, the inability to implement the optimal (negative) interest rate forced central banks to adopt unconventional measures such as Quantitative Easing (QE).

Let us first turn to the facts. A simple observation reveals that several central banks have implemented moderate negative interest rates, with deposit rates ranging from -0.2% to -0.75%<sup>2</sup>. In fact, the Danish National Bank has been

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<sup>1</sup> University of Basel.

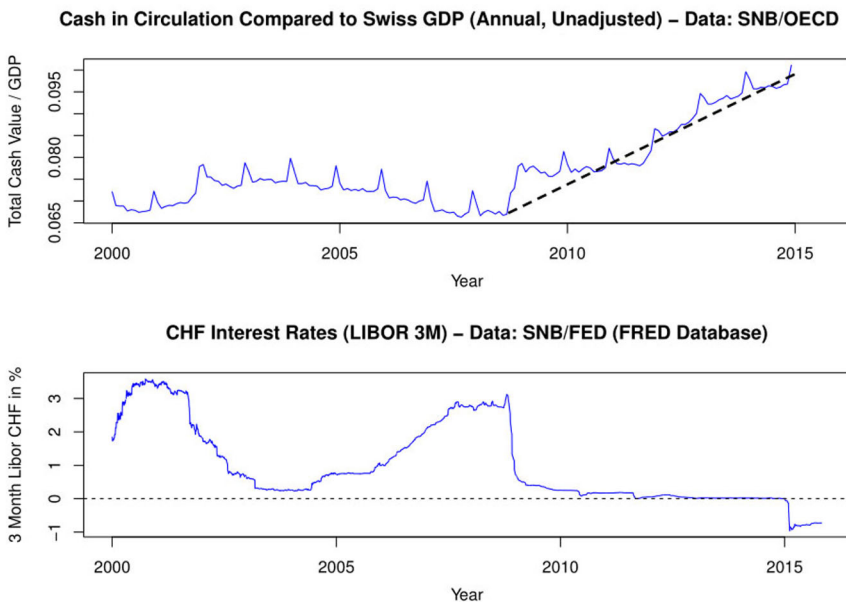
<sup>2</sup> The Danish National Bank (-0.75%), the European Central Bank, the Swedish Riksbank (-0.35%) and the Swiss National Bank (-0.75%) actively use negative interest rates as a monetary policy instrument.

using this instrument for nearly three years. Needless to say, all of these central banks still issue currency. This suggests that the coexistence of moderate negative interest rates and cash is feasible.

Let us consider the case of Switzerland in more detail. The Swiss National Bank (SNB) introduced negative interest rates on reserves in January 2015, with the current rate set at  $-0.75\%$ . Not all reserves that financial institutions hold at the SNB are subject to the negative rate. The SNB defines exemption thresholds, and reserve holdings which are below this threshold are remunerated at  $0\%$ , whereas reserve holdings above this threshold are subject to the negative rate. Although considerable amounts of reserves are exempted from the negative interest rate, the introduction of negative rates on sight deposits had a strong effect on money market interest rates. For example, the 3-month LIBOR fell immediately below  $-0.75\%$ , then recovered a bit, and, for several months, fluctuated around  $-0.75\%$ . Several other interest rates followed suit. The Swiss government can now borrow funds for up to 10 years at negative rates.

Due to the relative novelty of this measure, it remains to be seen if and how these negative rates will affect the demand for cash. However, as Switzerland has had very low interest rates for several years, studying how these low interest periods affected the demand for cash may lead to interesting insights.

Figure 1.



The upper figure shows cash in circulation as a fraction of the Swiss GDP. It becomes apparent that this fraction has increased from just below 7% to almost 10% between 2008 and 2015, which leads to the inevitable question of what is driving this increase. To answer this question, let us turn to the lower figure, which shows SNB's target rate, the LIBOR 3M interest rate since 2000. Bearing in mind that cash does not yield any interest, the nominal interest rate of an alternative riskless nominal asset is the opportunity cost of holding cash. The lower the nominal interest rate, the less costly it is to hold cash. Everything else equal, we would expect to observe an increase in cash holdings, after a decrease in the nominal interest rate.

However, following the same line of argumentation, we should be able to observe a comparable cash increase during the low interest-rate period between 2003 and 2005. Despite the similarly low nominal interest rate, there has only been a slight increase in the cash in circulation. Consequently, one would be hard pressed to believe that recent increases in cash holdings are driven solely by a decrease in the nominal interest rate. The descriptive analysis rather suggests that there must be another force which is causing the move towards cash.

In order to facilitate the discussion, it is helpful to distinguish between two types of assets: inside and outside assets. Inside assets are generated within the financial system. They are typically promises “to pay something”; that is IOUs (I owe you). For example, money held in a checking account (book money) is based on a promise by the bank to pay the depositor cash on demand. A company stock which is bought by a stockholder is an implicit promise made by the company's management to pay the stockholder a fraction of its future profits<sup>3</sup>. An IOU, being only a pledge, risks potential default. Quite naturally, demand for these inside assets reacts strongly to any changes in the probability of a default.

Outside assets, on the other hand, have no such promises attached. They are held because of their intrinsic value, or simply because people believe in them. Good examples are gold or fiat currency. Although the assets' market values are affected by common beliefs, or more specifically by people's expectations regarding future marketability, they are not subject to any issuer defaults. A person who owns a physical gold coin does not have to worry about a financial institution going bankrupt. In contrast, a person who owns a promise to a physical gold coin is subject to such a risk. Similarly, book money (money held in an account at a financial institution) is a promise to deliver cash on demand, which might not be honored, and therefore presents an additional source of risk.

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<sup>3</sup> This is, of course, not the textbook view on what a stock is. In the textbook definition, a stock makes the holder a fractional owner of the firm and so he has a say on how much is paid out. In practice though, the management of the company has the say.

The financial meltdown of 2007/2008 and the Euro Crisis triggered massive interventions by central banks. Furthermore, the events sharply increased debt-to-GDP ratios in many countries. We believe that these events have influenced people's subjective beliefs, increasing the perceived likelihood of a major financial catastrophe. In particular, these crises have diminished trust in the financial system, quite naturally causing investors to move out of these assets. They have also undermined trust regarding the central bank's ability to act as a lender of last resort, and the government's capacity (tax payers) to prevent another financial crisis without having to resort to drastic measures, such as confiscatory taxes (think of Cyprus) or forced conversions (think of the Greek euro exit discussion). We believe that these events and doubts have played an important role, and partially explain why investors are switching from inside assets into outside assets.

Cash provides an insurance against bad outcomes, by enabling its holder to remain liquid when disaster hits. Financial crises (e.g., Lehman collapse), confiscatory taxes (e.g. Cyprus, Argentina, Hitler-Germany, to name only a few), or forced conversion (e.g., Grexit, Argentina) are just a few examples of events in which it may be advantageous to hold cash.

We do not claim that outside assets are completely immune to financial disaster. Historically, hyperinflation has impoverished many households which have held a large part of their wealth in the form of physical central bank currency. The observed increase in Swiss Franc cash holdings simply shows that a scenario of hyperinflation for Switzerland is not considered to be very likely at the moment. People seem to be far more concerned about irresponsible governments, which resort to confiscation and forced conversion to make up for bad policy decisions<sup>4</sup>. By holding some of their wealth in outside assets, households and firms are able to partially protect themselves against such unpleasant events.

Given the desire to hold assets outside of the financial system and the potentially disciplining effects of the existence of such instruments, it would be clearly welfare-reducing to outlaw cash. Needless to say, for financial intermediaries, outside assets are a nuisance, since they do not generate income. This consideration provides an explanation why so many banks are pushing for a cashless society. Their fervor is simply motivated by the prospect of pumping up their earnings from bank card charges and other fees.

So far, we have argued that cash does not prevent central banks from implementing moderate negative interest rates. However, we do not claim that a decrease in the nominal interest rate does not increase the demand for cash. How

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<sup>4</sup> We do not claim that the Swiss populace is concerned with an irresponsible government. We believe that a large part of the observed increase in currency is most likely held by non-Swiss nationals.

much is substituted depends on two parameters: first, the cost (or gains) of holding cash, and second, the expectations about the duration of a regime with negative interest rates. The latter is important, because a switch into cash involves significant fixed costs.

The costs of switching into cash are different for various economic agents. A person who holds a few thousand francs on a bank account faces low costs when exchanging them for cash and stuffing the bills under the mattress. However, for a firm or a pension scheme which holds several hundred million francs in cash, the same operation can be very costly. The costs involve storage and handling, security measures, and insurance. Furthermore, current anti-money laundering laws make it very difficult to use cash for large payments or to exchange it for book money. Recent trends suggest that these laws will become even stricter in the years to come.

Beliefs about the duration of negative interest-rate regimes are heterogeneous as well. Agents who believe this to be a temporary measure are unwilling to pay the fixed cost involved in order to switch to cash. In contrast, agents who believe that such a regime is permanent are more likely to do so. Furthermore, not all agents are subject to the same negative rate. In Switzerland, with one exception, Swiss banks have not yet passed on negative interest rates to their retail customers<sup>5</sup>. Negative rates are, however, passed on to large cash holders such as pension funds.

Because of heterogeneities in duration beliefs and in switching costs, substitution is a gradual process, and many central banks are currently estimating how much switching is likely to occur for various negative interest rates. There is no single level at which all economic agents suddenly decide that cash is superior, just as there is no positive nominal interest rate which causes economic agents to collectively abandon cash altogether. It is rather based on a personal decision, driven by individual beliefs and cost structures. Hence, there is no strict ZLB or ELB.

It is, though, quite clear that for sufficiently low negative interest rates, we would see a large rush into cash. This might prevent central banks from setting very low interest rates. In contrast to those who advocate a ban on cash, we believe that this is a virtue of cash and a reason to promote it. Cash protects us from irresponsible policy advice. As an example, consider Buitter and Rahbari (2015, pp. 2-3) who argue that central banks need to occasionally set negative nominal interest rates within a range of between -5% and -10%<sup>6</sup>:

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<sup>5</sup> The exception is the Alternative Bank. Other banks are likely to have passed on the cost in less transparent ways; e.g., in the form of fees.

<sup>6</sup> Buitter and Rahbari (2015), "High Time To Get Low: Getting Rid Of The Lower Bound On Nominal Interest Rates", *Global Economics View*, Citi Research.

*“But the effective lower bound on nominal interest rates is unlikely to be at the -5% or -10% that central banks may at times wish to set the policy rates at.”*

We do not know where the scientific underpinnings for nominal rate of -5% to -10% are coming from, nor do we agree on the desirability of such drastic measures<sup>7</sup>. Buiter and Rahbari justify such large negative interest rates with a symmetry argument, which makes no sense at all. We quote their statement here, because we are afraid that the reader will not believe it otherwise (2015, the Abstract and p. 14):

*“The -100bp deposit rate set by the Swedish central bank suggest that the carry costs of currency are higher than past consensus guesstimates. Nevertheless, they are unlikely to permit the policy rate to be moved as freely to -5% as to +5%. (...) Bringing symmetry to the central bank’s traditional policy instrument, the official policy rate clearly makes sense.”*

To paraphrase, they mean is that a central bank that occasionally sets the nominal interest rate at 10% should also be able to occasionally set it at -10%. Clearly, a central bank that occasionally sets the nominal interest rate at 100% should then be allowed to occasionally set it at -100%. Because of symmetry, this is welfare-maximizing (QED according to Buiter and Rahbari (2015)).

We probably do not have to emphasize that we disagree with this view. In fact, we think that policy advice based on such weak foundations as the latter by Buiter and Rahbari (2015) is irresponsible. It only serves the advisor, because he can get the attention of the media, but it is a disservice to the public.

Fortunately, cash provides an insurance against the potential implementation of bad policy advice. We are, therefore, thankful for its existence and wish it a good and long healthy life.

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<sup>7</sup> Of course, one can find some simplistic theoretical models or heuristic monetary policy rules (e.g. the Taylor rule) which can yield such large negative rates.



### 3. DEVELOPING FUTURE PAYMENT INSTRUMENTS?

#### When is the time to move from cash and cards to new generation instruments?

*Harry Leinonen<sup>1,2</sup>*

During the past two decades payment instruments and habits have become topical discussion and regulatory issues. Both academics and authorities have taken critical views on legacy payment instruments and their business models for example in case of interchange fees and delivery times. Technical developments have resulted in a plentitude of new payment service offerings both new instruments and added electronic features to existing instruments. Are we approaching the time for more radical changes in payment instruments in which we would move from current legacy instruments to the new generation of future instruments, which would fully utilize the possibilities of modern technology for the benefit of all users? Is there a need to develop and simplify the current payment habits, update associated regulations and streamline the complex flora of alternative instruments?

#### 3.1. HOW FRUITFUL IS THE DEBATE ON CASH VERSUS OTHER PAYMENT INSTRUMENTS?

During the SUERF conference in Zurich in November 2015 the main theme was “Cash on Trial” with the focus on the justification for and problems with cash usage. As in similar debates, the participants were also in Zurich clearly divided into pro- and anti-cash advocates. Typical for these debates is a rather strong emotional emphasis on maintaining traditional cash payments habits: the easy use of cash, the benefits of privacy and monetary policy benefits of cash. However, reduction in processing and social costs, diminishment of cash related criminality and larger monetary flexibility could be achieved by increased use of account-based payments. The advocates in these debates take often a completely non-cash society as the stand point, at least as the ultimate result. This is understandable as new generations of consumers in almost all societies use less cash payments than earlier generations. In the rapidly expanding world of internet, facebook, twitter, instagram etc cash is a non-functional solution, but

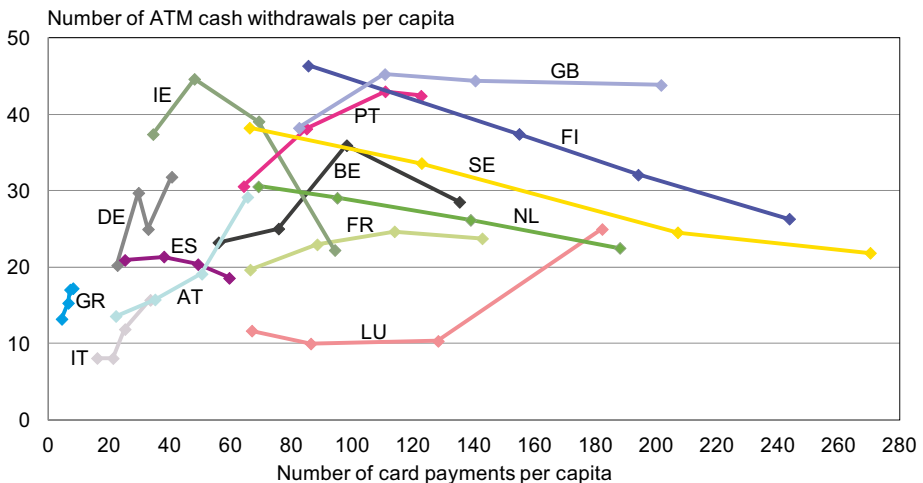
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<sup>1</sup> Ministry of Finance, Finland.

<sup>2</sup> Please note that the views expressed are those of the author and do not necessarily reflect the views of the Ministry of Finance.

also current account-based instruments are also outdated. Numerous new kinds of mobile payment and block-chain based solutions have entered the market. However, until now none of these new offerings have been successful in gaining any substantial market share. The chicken-and-egg-barrier seems to be a too large hurdle to overcome. What we can experience today, is a gradual, continuous and stable reduction in the use of cash payments, when payers have found that account-based payments are more favorable to use than cash. This development has progressed with rather big national differences in pace especially within the EU area, but probably also in other countries (see figure 1). However, although the use of cash is replaced by card and other account-based payments the amount of cash in circulation tend to remain the same or is even increasing, but the turn-around time of cash decrease as users keeps the same average cash balances. Users go to the ATMs less frequently to make the same average withdrawals, which maintain the same average balances, but for a longer period as cash payments have become less frequent.

**Figure 1: Cash withdrawals and card payments per capita, years 2002, 2006, 2010 and 2014**



Source: ECB and Blue Book Publications

This article could have focused as many others on assessing these different payment instrument related arguments and comparing current payment instruments. Which present-day instrument is faster, more convenient and low cost in different payment situations varying from ice-cream kiosks to internet shops made by youngsters or seniors? Which is the bigger reason for consumers' increased over-spending, the easy access to consumption and other credits or the lack of monitoring tools for consumers' financial situation? How much would the

average citizens gain in tax reductions, lower social costs and criminal losses, if these kinds of cash related social costs would be redistributed away from tax evaders and criminals to the benefit of average law-abiding citizens?

The development from landline phones to mobile phones, from snail-mail to email, from paper flight ticketing to e-ticketing have all emerged based on market developments without major regulatory support? To which extent should the regulators try to affect the speed of developments in payment systems? Future payment developments would probably be considerably changed already if a more level-playing-field situation would be implemented among current payment instruments regarding regulatory requirements on legal tender, price/cost transparency, anonymity, transaction reporting etc. Which are the overall benefits and drawbacks in the society of today in maintaining a preferential situation for central bank cash?

However, I find that this kind of debate limits itself unnecessarily strongly by focusing of the current legacy payment instruments. These have developed over centuries following a winding and partly random path as reactions to different historic incentives. Even the current form of central bank cash has been a regulatory creation seen necessary for more than one century ago and it is still highly regulated following the same rules implemented back then. The debate would probably become more fruitful, if it would take the standpoint of what kind of payment instruments will be needed in the future and which would be the efficient path towards that future. What kind of elements should tomorrow's instruments carry? What kind of basic regulatory requirements should be fulfilled in future? What kind of modern technical solutions should be included in future payment offerings? Is it time to update the payment instrument regulations in order to fit better the current social and technical developments and user requirements? Which would be suitable change-over process?

Cash was introduced in order to simplify and secure payments especially when the industrial revolution resulted in production specialization, longer delivery chains from production to consumption and increased use of money-based salaries. Previously common barter-based trading, private notes and the varying non-standardized credit-risk containing IOUs and promissory notes in circulation became a major hurdle for economic growth. The current situation in electronic and internet payments in the beginning of the 21<sup>st</sup> century seems to have much in common with the payment problems experienced in the 19<sup>th</sup> century. Is it from social point of view efficient that in the current global internet environment payers and payees need to select among a very large variety of continuously changing parallel payment solutions with different non-standardized characteristics for the simple task of transferring funds from payer to payee? Is there a need for a standardized modernization of e-payments in line with those achieved when

cash was initially introduced? What kind of authority involvement would be beneficial in these developments seems to become a main issue.

### 3.2. THE ESSENTIAL ELEMENTS IN PAYMENT SERVICES

The objective and end-result of any payment service is to move liquid funds from the payer to the payee. Payments is a form of basic utilities used several times a day by the average users. Most of payments are business related, that is, either the payer or payee is an institution transferring funds to or receiving funds from consumers or other institutions. A minor but important part of payments are also made between consumers. The general requirements<sup>3</sup> for all payment instrument users

1. ease of use including efficient integration with the underlying delivery process of goods and services;
2. sufficiently rapid delivery time;
3. low processing costs;
4. security of funds and associated transfers as well as the operational reliability of the system;
5. a suitable balance between payer/payee anonymity and counterparty recognition when necessary;
6. a payment/settlement media carrying little or no currency value, liquidity and credit risks.

The recent developments in IC technology have made it possible to redesign payment services in such a way that the current service level could be improved regarding all of these elements. The largest benefits can only be achieved by a thorough redesign based on integration with other processes connected to service delivery logistics associated with the payments for example the ticket to a concert, the ticket reservation process, the actual payment and the receipt for paying can all be integrated into one highly automated easy-to-use and standardized ticketing process, which could replace the current non-harmonized setups. The global electronic flight ticketing shows already what can be achieved, but regarding payments the flight ticketing system has still to cope with a multitude of different card and other payment instruments, currencies, user interfaces etc.

Following developments can be foreseen regarding these elements.

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<sup>3</sup> See for detailed analysis in Leinonen (2008).

### 3.2.1. Ease of use including and efficient integration

Cash payments are often referred to as easy to use for some user groups for example young, old, less educated and lower income groups. However, the very wide use of mobile payment systems in several developing countries, for example the M-Pesa experiences in Kenya and Tanzania indicates that modern mobile payment systems can be used by a very wide user group which is mostly 'unbanked'<sup>4</sup>.

Mobile phones can be and are used by almost everyone today. Smart phones have the possibility to contain a very large variety of useful apps and it is up to the users to select which apps are of interest to them. Most users employ only a very small portion of all available apps on their phones. Still, mobile payment apps have not yet conquered the payment markets in the industrialized countries, although they have a major market share in several developing markets<sup>5</sup>.

The user interfaces in mobile phones can be tailored to individual needs. Instead of physical cash mobile phones could show pictures of notes and coins. You can also govern the payment process by speech using voice recognition, which can be helpful for many users. Via the phone users can also view their whole liquidity position in real-time as well as any payment transactions, as often they need and in the same easy way as they view their email and facebook accounts. The apps in phones can also restrict the usage of funds and warn on overspending in a much more detailed way than a traditional physical cash wallet. This will become more important when a larger share of customers spending will move to network-based shopping.

There are major benefits in deeper integration of the payment process with other associated processes like e-invoicing, e-ordering, e-ticketing etc. Customers will via this integration be presented with e-archives of all their payments, receipts and invoice including any guarantee certificates, which can be browsed in the same way as e-mail accounts. E-mail and payment accounts will via this integration process start to resemble each other. A payment account consists basically of sent and received payment messages. A large part of payments can be highly automated, for example gasoline payments could be made automatically by the chips and processors in the car, which the gasoline pump access at the same time the refill is done. There would be no need to pay gasoline with cash and cards as the payment account, necessary PINs etc can be preprogrammed into the chips and processors in the car. Many of our payments are this kind of recurrent events which could be automated for efficiency.

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<sup>4</sup> Cull R. (2010) and Chaix L. & Torre D. (2015).

<sup>5</sup> Thomas, D. (2015).

Basically IC technology developments can make the payment process easier for all parties and can mimic digitally the physical cash and card processes of today, whichever the user finds interesting and according to the needs of each user.

### 3.2.2. Sufficiently rapid fund transfers

Cash payments have had a clear benefit of transferring the funds immediately with finality in face-to-face payments. Legacy payment systems have generally provided longer settlement and finality times. However, a larger share of account-based payment systems operates today in real-time, providing immediately settlement and finality. Providing immediate bank transfers is not a technical problem as is demonstrated by the immediate account debiting of ATM withdrawals made anywhere in the world using payment network-connected ATMs. The use of online debit cards has also increased rapidly and these require real-time transactions from EFTPOS-shops to the card issuer for payment transaction verification and processing. PayPal and similar internet-payment services operate also in real-time on the international level. We have witnessed in Europe growing provision of third party payment service providers (often called payment initiation service providers, PIS), which have constructed a real-time layer upon the normal SEPA-payment services in order to provide real-time payment services for internet-based e-commerce. These service providers and their access rights are even regulated in the new EU Payment Service Directive (PSD2)<sup>6</sup>.

Banks have delayed moving to real-time fund transfers also due to legacy float benefits. Float is a non-transparent pricing method, which due to its payment delaying effect has become hurdle for e-commerce growth and general economic growth. Banks have been able to delay the speeding up of interbank real-time payments by refusing to improve the delivery speed of interbank payment systems. This has been especially of interest to large banks, which in this way can reduce the competition possibilities of smaller banks and new entrants. As there are no technical or cost-based reasons delaying the move to true interbank real-time payments, it would be high-time to take this step and bring payment transfers to the delivery time, which is the norm within electronic network-based services. There are important projects in this area in many regions and immediate payments are already available or in the pipeline in several countries<sup>7</sup>.

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<sup>6</sup> See for PIS details in the PSD2 background paper of the EU commission (2013).

<sup>7</sup> A description of different national real-time payment systems can be found in the report of ACI Worldwide, 2015.

### 3.2.3. Low processing costs

Both cash and legacy account-based payment services contain much higher processing costs than a modern fully electronic payment service would carry. Cash carry especially high physical logistic costs in the form of manual counter service, ATMs, cash transportation, sorting and packaging. Both are slow processes in the payment situation compared to highly integrated alternatives. The largest cost elements in current payment services can be found in the interaction between the payment operations and the underlying bill presentment and ordering processes. These costs are accepted just because users are used to them. These costs are mostly non-transparent to the payers. More developed low-cost alternatives are not provided to customers so they have to accept what is available.

The payment service market differs greatly from normal competitive markets. The development incentives of banks are much lower or in some cases even non-existent. Payments are just ancillary services to payment obligations emerging as a consequence of other economic transfers, trading, service provision etc. The volume of payments is therefore a function of these economic activities. Payment developments can only affect the share of payments made by different instruments. When banks develop the payment system, they will therefore face a cannibalization process, as any new payment instruments will 'eat' the volumes of old instruments. If banks invest in new instruments, it will not increase their volumes and revenues and could in fact even reduce their revenues if margins are squeezed and competition increase. If banks do not develop their services, customers have just to be content with what is available. The non-transparent consumer pricing via float, package pricing, interchange fees embedded in merchant prices of goods and services, hinders price competition and cost-based selection of payment instruments. It hinders also new cost-efficient instruments to come to the market, as they cannot show their cost benefits via price differences.

The new IC developments and especially block-chain-based accounting solutions and general global standardization could decrease the payment processing costs considerably. However, the special market and competition conditions in the payment markets imply a major delaying factor as the current service providers have no incentives for change and new entrants are efficiently barred from this market by these special conditions and the strict regulations safe-guarding legacy instruments.

Moving to more low cost payment processing would require that these market conditions are changed and most probably by authority interventions with the aim to reduce the overall social costs. A major issue has also been that, although, the overall processing savings would build up to billions euros a year due to the many billions of transactions processed, these will constitute of small savings in

the range of some ten cents per transaction, which will be difficult to concretely demonstrate, due to the current non-transparent pricing and cost structure.

### 3.2.4. Security and operational reliability

New developments in bio-identification, cryptology and hardware security can be used to enhance payment service security at rather modest costs when provided in large volumes. For example some mobile phones are already equipped with finger print recognition. Some banks provide their customers with e-signature devices<sup>8</sup>. Today, even cash notes could be equipped with security chips<sup>9</sup>. There are new possibilities to improve payment security, which will result in fewer robberies and other cash and payment related criminality. This will not reduce the overall criminality, but it will make it more difficult to thrive on criminal acts and reduce the overall gains of criminality related to payments and liquid funds.

The society has especially during the last decades become increasingly dependent on an integrated electronic infrastructure. Account-based payments require that terminals can access banks' mainframes, the accounting software need to operate correctly. This is also true for cash withdrawals as these use the same account and network systems of the banks. If banks' mainframes and account software become inoperable almost all type of payment services will become non-usable. Banks have been able to maintain a high reliability level, although some individual banks have had problems from time to time. However, when payment systems are redesigned for the future, one of the main issues to improve is the reliability and backup systems. The design itself needs to become more robust, reliable, flexible including built-in backup and reserve features in order to be able to continuously operate in very special and difficult circumstances.

### 3.2.5. Suitable balance between payer/payee anonymity and recognition

One of the main characteristics supporting cash usage seems to be counterparty anonymity. This was the general situation when legacy cash was introduced. In barter and in exchange using valuable metal coins, the payer's identity was not important. In the 19<sup>th</sup> century the taxes was paid based on other items than payment flows and mostly in kind. Economic criminality was of less concern than today.

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<sup>8</sup> Bankxafe is an e- and m-signature solution created in Belgium for signing e-and m-payment using PKI infrastructure. The e-IDAS regulation (Regulation (EU) No. 910/2014) sets the rules and requirements for cross-border public e-identification services in EU and PSD2 (Directive (EU) 2015/2366) will require security device based e-signature verification for payments.

<sup>9</sup> Violino (2003).



With the increasing use of payment accounts, it has become necessary to identify the users of the payment accounts and their access/withdrawal rights. The VAT and income taxation of today focuses mostly on payment transactions. Criminality operates in large international business organizations, which have a need for internal payments within their organizations for example, the long chain in drug dealing networks from farmers in developing countries to customer dealers in industrial countries. The economic criminality has grown and diversified itself into new complex formats. The recent terrorist attacks have put focus on barring terrorist financing.

The regulations and authority controls have been tightened so that the owners of all customer accounts need to be recognized, the KYC, know-your-customer principle, is enforced on the institutions maintaining customer accounts. The possibility for ‘numbered’ customer accounts has been abolished in most countries. However, some new developments like virtual currencies are often based on anonymous or pseudonymous accounts. Global payment networks make it also possible to maintain payment accounts in countries where the KYC-principle is enforced less strictly. On the other hand, the current account owner setup for example in card payments and credit transfers exposes the identity of payers and payees to a wide number of parties, which do not necessarily need that information. This information might be abused by these outside parties. It would therefore be good from privacy concern and objectives to improve the payer privacy in account based payments.

The current anonymity of cash provides criminal organizations with an easy to use non-traceable payment instrument. Robberies become radically less frequent in cashless environments like gasoline stations, shops, taxies with no or very low cash volumes. The most common tax evasion form, non-complete VAT reporting, is a main problem in cash-based shops and service provision outlets. The anonymity of cash makes it therefore easy for some groups in the society to extract benefits, for which the costs will be levied on the rest of the society in some form for example via higher tax rates and other social costs. The average citizen will bear these extra costs, as the benefits of anonymity will in an unbalanced way go to those smaller special groups having the main possibilities for tax evasion and economic criminality.

The current anonymity setup contains therefore two separate problems:

- a regulatory arbitrage promoting inefficient use of cash;
- an unbalanced privacy solution.

The anonymity rules can be the same for all payment instruments. There is no point in maintaining a regulatory policy granting some virtual currencies, card payments and cash payments complete anonymity while others would be required to maintain different levels of identity transparency. A regulatory

arbitrage will distort competition and result in suboptimal solutions and would delay developments, when new efficient instruments would be in an inferior regulatory position in this regard.

The main issue regarding future payment instruments is to find a balanced global privacy solution. It has to be global as payment systems and networks are increasingly global, especially in the future. The electronic developments in cryptography and virtual currencies points towards an interesting development towards pseudonyms. By using pseudonyms in different formats the identity of the payers and payees can be made private in a granular way, that is, only a necessary part of the payer's identity is revealed based on the need in each particular situation<sup>10</sup>. For example when there is a need to ensure the buyer/payer fulfils a certain age limit, then age is the only essential information needed to be revealed to the shopkeeper, for example over 20 years or below 15 years old. Consumers would in most payment situations want to keep their identity unknown to stores, although the frequently used different point collection systems have changed the situation. However, with modern technology revealing his identity to stores could be made completely optional to the consumers. The traceability of payments is important to most customers in case of fraud, robberies, lost instruments etc because it will reduce their losses. Therefore a granular approach where authorities can trace criminal transactions, but payments would otherwise be anonymous, would be beneficial. It would also reduce tax evasion possibilities, which would even out the tax burdens in the society. This kind of granular pseudonymous identity system would resemble quite much the registration plate convention on cars. Without registration plates on cars we would for certain have more hit-and-run accidents when it would be more difficult to identify individual cars. There would also be more car thefts and car tax avoidance incidents.

We would need in depth discussions of what kind of privacy and granular registration plate type of solution would be beneficial for the society and average citizen in future payment offerings, because it is clear that neither complete anonymity or full transparency are the optimal solutions. We can instead move towards a varying privacy level depending on the situational need and with different kinds of controls for limiting different kinds of identity information abuse.

### 3.2.6. Choice of settlement media

An account-based payment system constitutes a book-entry system using an account system set-up. All electronic payments are just book-entries moving

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<sup>10</sup> See for example Birch, D., 2007.

funds from one account to another. The total balance of settlement media in the system will always remain unchanged after a fund transfer between the accounts. The processing costs of making such fund transferring book-entries are the same irrespective of the type of funds or settlement media used. The processing costs decrease and the reliability of book-entry accounting systems will improve with technological developments like the block-chain-technology, which can be used for all types of settlement media. The in real-time operating exchange services provides a highly efficient possibility to convert funds from one settlement media and currency type to another based on user considerations.

Today, the main alternatives used are central bank money in the form of cash and central bank accounts, which is generally only RTGS-accounts for credit institutions and other market participants and bank money in the form of balances on customers' payment accounts at banks and other regulated payment services providing institutions. The unit of account in both forms is the currency (currencies) maintained by central banks. One future alternative could be e-cash provided by central banks, which would imply that all consumers and private entities could have an e-cash account with the central bank.

However, there are some other alternatives to select among as potential future settlement media and unit of account. The virtual currency developments have introduced private fiat-money. There have also been discussions on reverting to gold standard, which is worth analyzing in a border concept as moving to a commodity-based or securities-based basket currency as settlement media. The developments in book-entry and exchange systems provide new possibilities to revert to commodity-based efficient barter-type of settlement using real-assets instead of monetary assets.

Current bitcoin-type of virtual currencies can be seen as perpetual bearer bonds without interest or redeemability requirements. These constitute individual currencies and are therefore individual units of accounts for which the value compared to other currencies are set in the virtual currency exchanges based on supply and demand. Based on the experience up to know, the virtual currency exchange rates have been very volatile probably due to large speculative volumes. It is difficult to foresee, how the economy and users in large could find this kind of non-interest-bearing and non-redeemable settlement media interesting in the long run compared to more stable ones<sup>11</sup>.

Without going into details regarding the history in cash, it can be said that it was and has been a very important innovation in the area of paying. Originally it was backed by gold or silver, but after the First World War most countries were in the situation that they had not sufficient gold reserves to back the conversion rate and

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<sup>11</sup> See for details on virtual currencies in Leinonen, 2016.

today national currencies are fiat money with legal tender position and acceptance for public/government payments. Going back to a gold standard is an option that very few academics seem to support<sup>12</sup>. It would also mean dependency on the supply and demand of one single metal asset. However, with the current developments in exchange trading, common securities depositories and virtual currencies, it has become technically feasible to use either a basket of traded commodities (precious metals, grain, energy etc) or traded shares as assets backing the settlement media as real assets. The payments would be made as transfers of title to real assets and not as a conversion possibility used in former gold standard currencies.

Moving to payments made in real asset type of settlement media would imply some very fundamental changes to the current legacy systems. National currencies and central bank monetary policies and interventions would become redundant. A very versatile basket of commodities would have a very stable value, as the different price developments of single commodities would level out each other. This would basically mean that inflation/deflation developments in the unit of account would disappear, when the value development of a versatile and wide basket of commodities would be close to the of consumer price index basket. However, there would still be a market for credits with credit risks and different interest rates, but the payments would be safely made as bookings in real assets without any direct and immediate interest rate connections and credit expansions. There could be several commodity baskets used and the trading exchanges would fix the exchange rates. However, as in other network (internet) developments, one basket would probably become dominant over others. This could result in the long-run development towards one common global commodity basket-based unit of account and a common global settlement media.

Shares are also real-assets in book-entry systems, which could technically be used as settlement media. A basket of shares, basically shares in a specialized mutual fund or several funds, could be maintained for payment purposes. A very diversified portfolio of shares would have a stable value following the overall developments in the stock market(s). There could be short-term differences between the value developments between the stock market and consumer price index, but in the long-term these would even out. One interesting outcome would be that, if salaries would be paid out in this kind of settlement media, salaries would directly follow the stock exchange developments in shares. In other words, if the average value of share increases then the labour force will automatically benefit from this development. The seignorage revenues of this kind of settlement media would be distributed evenly to the users of the media. In addition to pure

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<sup>12</sup> See for example IGM Poll in January 12, 2012 on gold standard: [http://www.igmchicago.org/igm-economic-experts-panel/poll-results?SurveyID=SV\\_cw1nNUYOXSAKwrq](http://www.igmchicago.org/igm-economic-experts-panel/poll-results?SurveyID=SV_cw1nNUYOXSAKwrq).

baskets of commodities or share, it would also be possible to construct an asset-based settlement media containing both commodities and shares.

This analysis of different potential settlement media types was triggered of by the discussion in the SUERF conference on negative interest rates and the role of cash in making it at least more difficult or costly to introduce negative interest rates. The introduction of negative interest rates by central banks can only be viewed, at least by me, as a result of a long-term unsuccessful monetary policy. Renting capital and other assets should according to normal market practices provide revenues to the lender, who lets the borrower use the asset for a given period.

Today, there are more than 100 national or regional currencies in the global market and more than 500 virtual currencies. There are today also some developments towards regional currencies type EUR, which will reduce the overall number of currencies. Services and goods available in internet are often priced just in one currency or then in a range of different national and virtual currencies. In that case the buyer would need to check, in which currency the price is most beneficial according to provided exchange rates. Will the e-commerce developments result in a convergence towards some dominant trading currency/currencies in the internet, because the exchange rate transparency in real-time internet services will most probably abolish any arbitrage possibilities? Or will consumers be able to use a large number of currencies and e-merchants are quoting their goods and services based on customer requests providing also the necessary exchange services? This has become common already now in ordinary EFTPOS-shops at the check-out, although customers need to be attentive of offered exchange rates.

It is impossible in this article to analyze in depths the developments in the settlement media. With the increased globalization and e-commerce, we will most probably experience a convergence to some smaller number of de facto dominant currencies and units of accounts and pricing. Other less used will be exchanged via trading platforms to these dominant currencies. This would be in line with the general network-based converging processes. Modern technology provides an efficient possibility to move to real asset-based settlements, which would imply radical changes to current legacy setups. This would bring more stability to currency values and potentially a more even distribution of seignorage benefits. The complete monetary theory and policy implementations would become obsolete. This will clearly require further studies. However, this could also be the actual future based on virtual currency developments in the form of asset-backed solutions, which the e-commerce environment starts to adapt. I think we need to be more opened-minded even for this kind of very radical changes.

### 3.3. WAIT AND SEE OR DIRECTING AND SPEEDING UP DEVELOPMENTS

Especially network-based ICT developments have revolutionized processes and services in most industries during the last decades. Internet-services have become the norm in many data processing industries. Today almost everybody have mobile phones and even smart phones. Games, music, movies and other entertainment services are provided on-demand in real-time from large centralized or decentralized databases. All kinds of e-commerce grows rapidly. These e-developments and digitalization in general have in most cases increased competition, reduced costs, lowered prices, improved service availability and made deliveries faster. Although, banks provide e-banking services, these are still following legacy structures and practices with for example delivery times in days and not seconds. They are not 'native' new-generation services. The ultimate step to new generation payment services has not yet been taken.

As pointed out earlier, the competition and market situation differs considerably in the payment industry from other industries. The payment industry and banking in general is highly regulated. The central banks play a critical role in monetary and payment developments. The special market conditions and heavy regulation are probably the main reasons for the slow developments compared to other industries.

The volume of account-base payments in EU is close to 100 billion transactions per year. There are no exact figures on the number of cash payments. Different approximations of the share of cash payments of total payments varies from 50% in low cash volume countries up to 80% or even slightly more in high cash volume countries. This would imply that the number of cash transaction would vary somewhere between 200-300 billion transactions per year in the EU region. Even with modest savings by improving and integrating payment services of 5 eurocents for electronic account-based transactions and 10 eurocents for cash and other paper transactions, the total savings would be in the range of 30-40 billion EUR per year. Integrating payments into e-invoicing, e-ticketing, e-ordering etc systems would in most cases result in major additional cost savings.

These potential benefits pose several interesting questions and issues:

- Which would be the optimal change-over timing and process to next generation offerings?
- To which extent can these benefits been assessed more firmly?
- What kind of market developments can be foreseen in the payment industry to realize these benefits and within what kind of timelines?

- To which extent are market developments delayed by the internal service cannibalization situation and special market conditions?
- To which extent are developments barred by outdated regulations and authority/central bank policies?

The change-over to next generation payment services described above would imply major changes to the current payment behavior of consumers, private institutions and government entities. Are these innovations inevitable at some point of time also for payment processing? Is it only an issue of more exact timing of the full scale introduction of these technology developments in the payment industry? Or differently stated, are there special circumstances in the payment industry which makes introduction of ICT technology completely non-beneficial or requires postponed introduction?

The payment industry constitutes a large scale infrastructure, which the global and national economies are completely dependent on. This necessitates careful assessments of the optimal characteristics of the new infrastructure and the optimal cooperative change-over process to achieve it. Payment infrastructure developments require the same kind deep co-operation as in other network industries to introduce new standards and processes. (The GSM standards and infrastructures of mobile phone services provide a good comparison.)

Regulations imposed on industries will affect their business models and development decisions. One important issue to challenge is therefore to which extent current regulations are outdated and thereby barring developments by safeguarding legacy service models and instruments. Would we experience more market developments, if regulatory policies would become more future-orientated?

The most controversial issue challenged in this article is the need and benefits of the current settlement media of payments: fiat-type of central bank money and bank-based account money. Would we be better-off in future by moving to a common commodity-based or securities-based settlement media and unit of account? Would the global and national economies function better without central banks' monetary interventions and interest policies? Would an economy operating with an asset-based unit of account be more stable than one operating with an inflation/deflation prone fiat-based unit of account? Can these kinds of developments be triggered-off by customer choices and virtual currency offerings?

These are all major issues calling for further studies. These were brought up, because these are the underlying large issues behind the current debate on the future of cash. Will a new payment solution emerge, which is dominant in all

characteristics compared to current legacy instruments? I have not the answers to these questions, but I have the firm belief that if more research along these lines is made, the results will point towards the need for major future technology changes also in the payment industry.

### 3.4. CONCLUSIONS: HOW TO IMPROVE THE SERVICE LEVEL OF FUTURE PAYMENT INSTRUMENTS

All payment instruments have been introduced via private or authority regulations. These regulations will also affect further and future developments of instruments. Outdated regulations can delay developments, which imply lost potential benefits due to late introduction of technological improvements. The difficult question in the payment industry seems to be to find a clear answer on when something is outdated, but also on what should be the new alternative and when and how it should be introduced. There are always a risk of backing wrong alternatives and premature introductions. In the payment industry, there seems to be many legacy stakeholders with large legacy benefits, which have an interest and a possibility to maintain the status quo. Moving to the next generation of payment systems will affect the whole society. However, as history shows, there will always be a next generation of technology. In payments, the regulators are in a key position in this change-over process. Will they promote it? Will they ensure that it is a planned change-over instead of a random walk type of development? When will they have sufficient interest in updating legacy regulations according to future needs?

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## 4. CASH AS A BUDGET CONTROL DEVICE

*Nicole Jonker*<sup>1</sup>

### 4.1. INTRODUCTION

Although consumers increasingly use payment cards, cash is still the dominant means of payment at points-of-sale in most countries. If consumers were to use their debit cards more often, safety in shops and restaurants would increase and the social costs of the payment system would be reduced (Jonker, 2013, Schmiedel, Kostova and Ruttenberg, 2013). It would therefore be beneficial for society as a whole if debit card usage increased at the expense of cash.

However, it seems unlikely that the role of cash in society will diminish substantially in the near future, as it provides important benefits to vulnerable groups of consumers which the debit card has not been able to provide them yet. In this paper special attention is paid to one specific benefit of cash for these people, namely the role of controlling one's budget control when choosing how to pay<sup>2</sup>. The article shows which consumers perceive cash as more helpful than the debit card with respect to providing insight into their budget left to spend. In addition, it presents evidence that differences in perceived usefulness between cash and the debit card affect consumers' choice of payment instrument at the counter.

### 4.2. CASH USAGE IN THE NETHERLANDS

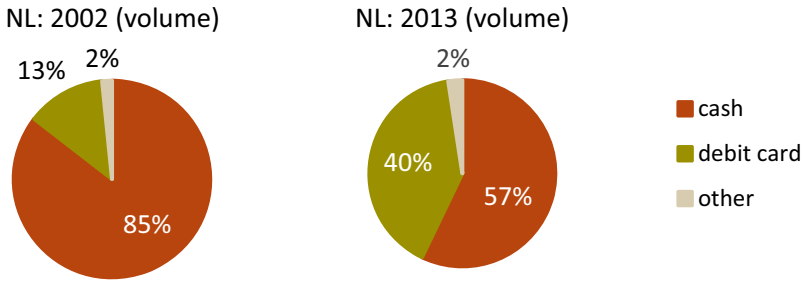
As in many countries, cash usage in the Netherlands has been declining steadily since the introduction of the debit card as a means of payment. However, the latest figures on cash and debit card usage reveal that cash is still used in the majority of the payments, see Figure 1. In 2002, consumers made 7.1 billion payments using cash at the point-of-sale, and these payments represented a value of EUR 66 billion (Brits and Winder, 2005). In 2013, consumers made 3.8 billion cash payments, representing a value of EUR 47 billion (DNB/DPA, 2014). In the same period, debit card usage grew from 1.1 billion payments with a total value of EUR 47 billion to 2.7 billion payments with a total value of EUR 85 billion.

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<sup>1</sup> De Nederlandsche Bank.

<sup>2</sup> This article heavily draws on Hernandez, Jonker and Kosse (2014). Views expressed are those of the author and do not necessarily reflect official positions of De Nederlandsche Bank.

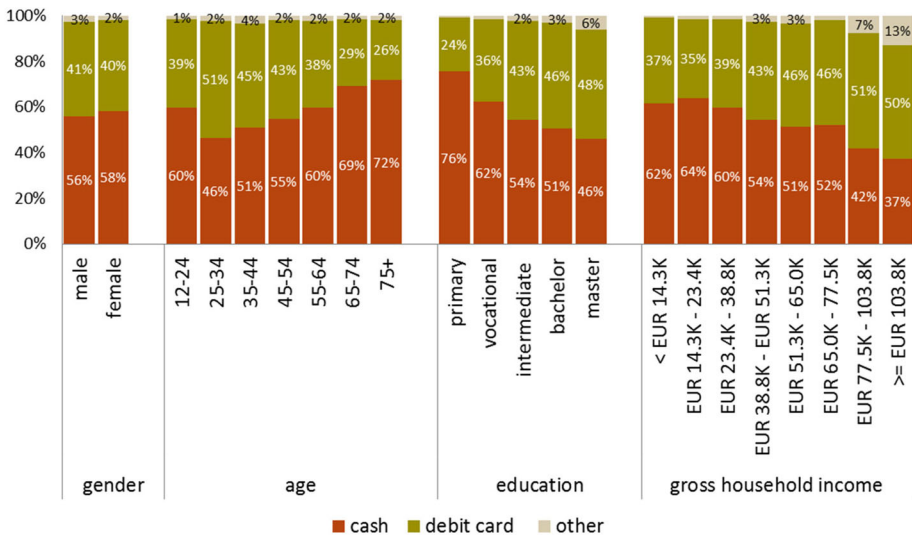
Figure 1. Cash usage is declining, but still used in most payments



Source: Brits and Winder (2005), DNB/DPA (2014)

When we look at who uses cash, we see that its usage is still widespread in society, see Figure 2. Both young and old people use cash, both low and high educated people make cash payments and both low income earners and high income earners use it. However, the extent in which they use it differs. Especially, people aged 65 or older, people with little education and people with a low income make the majority of their payments using cash. The debit card is used relatively much by young adults, people who have a master’s degree and people whose yearly household income exceeds EUR 77,500.

Figure 2. Cash usage is widespread in Dutch society (2013)



Source: DNB/DPA (2014)

### 4.3. WHY DO PEOPLE USE CASH?

Consumers may have different reasons to use cash, and these reasons may change over time. Table 1 shows the Top 3 reasons mentioned by Dutch consumers in 2004 and 2014. It turns out that in 2004 consumers mostly opted for cash because of the relatively high transaction speed. At that time a debit card payment took about 26 seconds to be processed at the counter, whereas the transaction speed of cash payments was about 19 seconds (Brits and Winder, 2005). Other reasons mentioned by consumers were that cash usage allowed them to monitor their expenses or because it was the only way they could pay at the point-of-sale.

Ten years later, the Top 3 looked rather different. Newcomers in the Top 3 are using cash out of habit and using cash because it helps people to cut their expenses. Two out of three reasons in the Top 3 are related to the need by consumers to manage their household budget. This suggests that cash still fulfils an important need of consumers. It may be that the importance of this need has become more pronounced due to the financial crisis that started in 2008. This crisis led to a deterioration of the financial situation of many households in the Netherlands. In 2013 the purchasing power of Dutch households declined for the fourth year in row (see e.g. CPB, 2013).

The change in Top 3 may also be partly due to changes in the payment infrastructure for debit card payments. In 2014, consumers did not indicate anymore that they had to use cash, simply because it was the only accepted means of payment. This is probably due to the rise in card acceptance by merchants between 2004 and 2014. In 2014, 99% of the shops in the Netherlands accepted debit card payments (Panteia, 2015), which was not the case yet in 2004. People also did not mention the higher transaction speed of cash as often as they did in 2004. This is probably at least partly due to the fact that technological improvements, like faster internet connections, led to a reduction of the transaction speed for debit card payments. However, in 2014 the transaction time of cash was with 14 seconds per payment still 4 seconds faster than that of a debit card payment which took on average 18 seconds.

**Table 1. Top 3 reasons for using cash mentioned by consumers**

|    | 2004                      | 2014                |
|----|---------------------------|---------------------|
| 1. | Highest transaction speed | Monitoring expenses |
| 2. | Monitoring expenses       | Habit               |
| 3. | Only cash was accepted    | Cutting expenses    |

*Source:* Jonker (2007) and DNB/DPA (2015)

#### 4.4. CASH AS A TOOL TO CONTROL YOUR BUDGET

The economic literature attention has paid attention to the role of budget and spending control in consumers' choice of payment instruments, see Hernandez *et al.*, (2014) for an overview. These papers are related to a broader stream of literature on self-control (see e.g. Thaler and Shefrin, 1981) i.e. consumers need some form of self-control in order to balance their desire for spending their income immediately on the one hand with their long-term expenditure goals on the other hand. The literature proposes two mechanisms for self-control, i.e. that consumers monitor their spending behaviour, (e.g. by tracking their expenses) and by setting clear spending constraints (e.g. setting periodic budgets, see e.g. Heath and Soll, 1996 or Ameriks *et al.*, 2004). Cash and debit cards are mentioned as payment instruments that consumers can use as tracking devices and as ways to limit their spending, They both have several characteristics that may make them valuable as budgeting tools. Table 2 provides an overview of these features.

Table 2. Overview budgeting features cash and debit card

| Self-control mechanism                     | Cash  | Debit card  |
|--|---|---|
| Monitoring behaviour: budget left to spend | Immediate (wallet)<br><br>No need for own calculations/memory | Immediate (smartphone) or delayed (bank statements, online banking)<br>Need for own calculations/memory |
| Setting predefined budgets                 | Physically set<br>Low freedom to exceed                       | Mentally set<br>High freedom to exceed  |

Source: Hernandez *et al.* (2014)

Regarding the first self-control mechanism, monitoring one's expenses, cash allows consumers for immediate feedback about their financial situation. Just before a payment is being made, one can see in his/her wallet how much money (s)he has, and after the payment has been made, one can immediately check how much money is still left. By using the debit card one can check the remaining budget by checking one's bank statements. The time frame within which this information becomes available to a consumer depends on the technology used by him/her, from immediate (mobile phone), a few hours (online banking) to a few days/weeks (paper bank statements sent by mail). Usage of technical innovations such as a mobile phone or online banking requires consumer to make some investments, both in terms of money, in case of buying a PC in combination with Internet access or a smartphone, and in terms of time as learning to use new technologies requires time (Kalckreuth, Schmidt and Stix, 2014). These investments are not necessary when using cash.

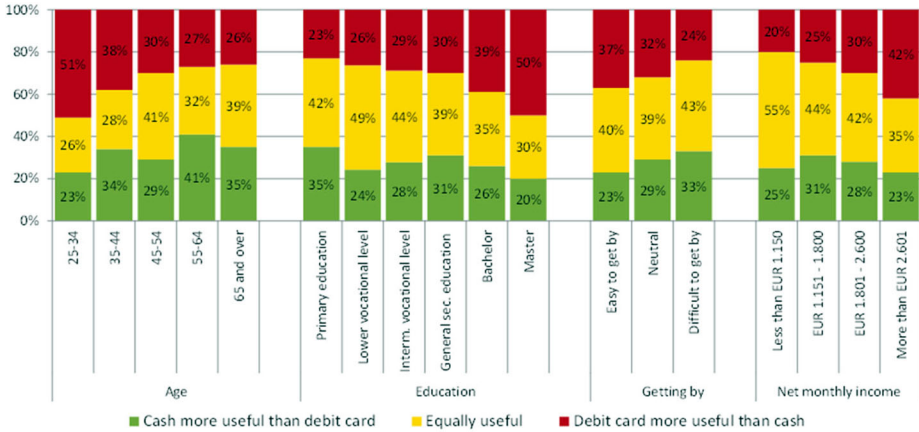
With respect to the second self-control mechanism ‘setting budget constraints’, there are also clear differences between cash and the debt card. Consumers using cash may stick to their predetermined budget by simply withdrawing the amount of money which they allow themselves to spend during a specific period and by only using cash at points-of-sale. This makes unconsciously overspending impossible, as the only way cash-users can overspend is by withdrawing an extra amount of cash. In contrast, people using debit cards run a higher risk of overspending, as card payments leave consumers relatively much freedom to spend more than they intended, as long as the balance on their account is higher than their pre-defined budget. In order not to exceed their budget, people need to assess themselves how much money they have spent. They need to memorize their predefined budget, check their bank statements or their own recordings of their payments in order to estimate how much they have already spent, and calculate their remaining budget. These actions require more self-control from consumers as the budgets are mentally set instead of physically in case of cash. They also require more effort and more cognitive abilities from consumers than cash because of all the math consumers have to do to figure out their remaining budget.

Both cash and debit cards are useful to help consumers monitor their spending. Hernandez *et al.* (2014) show that on average, Dutch consumers generally perceive debit cards and cash as equally useful tools for providing them insight into the amount of money they have left to spend, i.e. their remaining budgets. However, consumers preferences’ are heterogeneous; 27% of the consumers prefer the debit card and 26% prefer cash. So, consumers’ opinions differ on which payment instrument is the most useful budgeting tool. It turns out that especially vulnerable population groups, including older people, the lower educated, liquidity-constrained consumers and low earners, perceive cash as the most useful tool for monitoring their spending (Figure 3, p. 42).

#### 4.5. IMPACT ON CASH USAGE

The need that consumers feel to control their expenses and their perceptions as to which payment instrument will help them best to do so has proved to play a significant role in their actual payment choices at points of sale. This finding is depicted in Figure 4. More than two third of the people who prefer the debit card as a budgeting tool indicate that they only sometimes use cash for payments in shops. They mainly use the debit card for these payments. On the other hand, about two third of the consumers who prefer cash as a budgeting tool indicate that they use cash often to very often to pay in shops.

Figure 3. Vulnerable groups perceive cash as most helpful



Source: DNB (2014)

Using ordered probit regression Hernandez *et al.* (2014) explained in more detail the impact of budgeting on consumers’ payment behaviour, while also controlling for other factors that may explain consumers’ payment behaviour. It turned out that consumers’ perceptions as to which means of payment (cash or debit card) helps them best to control their budget was one of the most influential factors explaining consumers’ payment behaviour in shops. People who found cash most useful as a monitoring tool were 20 percentage points less likely to be frequent debit card users than consumers who perceived cash and debit card equally helpful. This effect was significant at the 1 percent level. Other factors influencing consumers’ payment behaviour were age, gender, income and educational level.

Figure 4. Cash usage by consumers who differ in preferences for cash and debit card



Source: DNB

## 4.6. CONCLUDING REMARKS

Innovations aimed at providing consumers immediate insight into the budget left to spend when making debit card payments may encourage them to use electronic payment instruments more frequently instead of using cash. Banks, payment service providers and telecom companies have recently responded to this need by introducing several innovations. For instance, banks provide apps for smartphones enabling consumers to check their bank balances whenever they want, i.e. also immediately following a debit card payment. In addition, consumers can now use their smartphones to make point-of-sale payments from a prepaid balance. This keeps them from spending more than the amount left to spend much in the same way as cash in their wallets does. However, it is likely that further efforts are needed in this area to make electronic payments more attractive to consumers who now often still prefer to use cash in order to manage their budget well. For example, it may be good if consumers would be able to set pre-defined budgets for debit card payments as well in order to limit the possibility to overspend on point-of-sale payments without being aware of it, in almost the same way as cash does. In addition, consumers may benefit from alerts if their spending exceeds certain thresholds.

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## 5. PROS AND CONS OF CASH: THE STATE OF THE DEBATE

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### 5.1. INTRODUCTION

For many years, there has been a debate about the pros and cons of cash and the imminent appearance of the cashless society. In an increasingly digital world paper currency somehow does not seem to fit into the picture. The case against cash has been aptly summarised by James Gleick (1996):

*“Cash is dirty... Cash is heavy... Cash is inequitable... Cash is quaint, technologically speaking... Cash is expensive... Cash is obsolete.”*

By contrast, electronic means of payment are perceived as clean, technologically advanced, supposedly cheap and convenient.

In spite of the alleged advantages of cashless means of payments, cash is still widely used and the quantity of bank notes in circulation is rising in many currency zones. Therefore, the critics of cash call for regulation to either limit the use of cash or even abolish cash all together. However, not everybody agrees and there is an intensive debate on the pros and cons of cash that addresses a wide range of issues:

- costs of payments;
- the shadow economy, money laundering and terrorist financing;
- privacy and data protection, and;
- monetary policy and the zero lower bound.

### 5.2. THE COSTS OF CASH

#### 5.2.1. Results of cost studies

In the past 20-30 years there have been numerous studies of the relative costs of payments instruments. However, even though some of the authors have derived clear-cut results from their findings, the results should be interpreted with caution. First, ‘costs of payments’ is a complex issue. There are the ‘pure’ costs of production, such as printing cash, manufacturing cards, sorting cash, processing

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card payments, customer service, fraud management etc. In addition, there are costs involving resources of the payment users, such as the time it takes to carry out a payment or the time it takes to go to an ATM and get cash. Finally, there may be external costs such as facilitating criminal activities (an argument often levelled against cash).

For a long time, there has been little interest in the costs of the payment system. However, during the past 20 years the number of cost studies has been increasing.

A widely cited estimate of the costs of cash payments is the EPC (European Payments Council) estimate of EUR 50b. for the EU as a whole (EPC 2003). The estimate covers the costs of banks (incl. central banks) and merchants. This figure is certainly impressive. But the EPC also came up with an estimate of the number of cash transactions: 360 billion. Putting the two figures together yields average costs per cash transaction of 15 cents. This is not so bad for an all-purpose means of payment that can be used under various circumstances (P2P, P2B, B2P and B2B) for small- as well as large-value payments. Unfortunately, the EPC did not come up with a comparable figure for card payments. There are, however, numerous studies that attempt to provide comparative estimates.

One of the most ambitious cost studies has been the study of the Dutch National Forum on the Payment System (National Forum on the Payment System 2004). The Forum does not simply try to estimate costs. Rather it attempts to derive cost functions for the different payment instruments. The main result of the study was that cash is relatively cheaper for low-value payments whereas debit cards are relatively cheap for payment values above 11 EUR. Credit cards had the highest costs and e-purses had the lowest costs<sup>2</sup>. The Dutch study has influenced numerous other studies such as the cost study of the Belgian Central Bank (Banque Nationale de Belgique 2005) and the cost study of the Eurosystem (Schmiedel, Kostova, & Ruttenberg 2012).

Overall, it is difficult to draw straight-forward conclusions from the multitude of cost studies. But when looking at the results of numerous existing cost studies, it can be said with some caution that cash does not come out as an expensive outlier<sup>3</sup>.

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<sup>2</sup> The fact that e-purse payments had the lowest costs has never been followed up by regulators. Rather, in the Dutch policy debate the main issue has been cash versus debit cards.

<sup>3</sup> A completely different interpretation of the data can be found in van Hove (2007).

**Table 1: Costs of payments: comparative international overview (cost per transaction)**

|                      | Cash | Cards | Debit | Credit |
|----------------------|------|-------|-------|--------|
| US 2003 \$54         | 2.18 |       | 1.07  | 1.16   |
| US 2003 \$11         | 0.90 |       | 1.00  | 0.95   |
| Austr. 2005 \$A50    | 1.64 |       | 0.80  | 0.99   |
| Austr. 2005 \$A10    | 0.96 |       | 0.80  | 0.99   |
| Australia 2007 (\$A) | 0.37 |       | 0.80  | 1.22   |
| Germany 2004 (€)     | 0.36 |       | 0.82  | 2.73   |
| Belgium 1998 (€)     | 0.56 | 0.64  |       |        |
| Sweden 2009 (€)      | 0.78 |       | 0.42  | 1.15   |
| Norway 2007 (€)      | 1.53 | 0.74  |       |        |
| Denmark 2009 (€)     | 0.78 |       | 0.36  | 3.86   |
| Hungary 2009 (€)     | 0.39 |       | 0.33  | 3.59   |
| Netherlands 2002 (€) | 0.30 |       | 0.49  | 3.59   |
| Netherlands 2009 (€) | 0.39 |       | 0.32  |        |
| Italy 2009           | 0.33 |       | 0.74  | 1.91   |
| EU13 2009 (€)        | 0.42 | 0.99  | 0.70  | 2.39   |

*Notes:* US: Calculation for transactions of 54 and 11 US dollars, respectively; Australia 2005: Calculation for transactions of 50 and 10 Australian dollars, respectively. The annual number relates to the data upon which the study is based.

*Source:* Krueger and Seitz (2014, 57)

### 5.2.2. Why regulate?

Even if cashless means of payments were cheaper to use than bank notes, why should that be a cause of concern for regulators? After all, if there is competition between payment instruments, inefficient means of payment will be weeded out. But there are doubts that competition may do the job. The two main arguments in favour of some kind of regulation are:

- cash has a privileged position (‘no level-playing field’ arguments);
- payment services are a network industry.

An argument often put forward is that cash has a privileged position because of its legal tender status. But what does ‘legal tender’ mean? That is difficult to answer<sup>4</sup>. It is clear, however, that it does *not* mean that everybody has to accept cash. This becomes plain to see at many gas stations, for instance, where customers find signs indicating that large-value notes will not be accepted. In fact, there are many legal restrictions on the use of cash. Given that some of these have

<sup>4</sup> As the Dutch National Forum on the Payment System (2015, 2) points out: “case law on this point is scarce, and ultimately it falls to the European Court of Justice to interpret the provision that cash is ‘legal tender’”.

been in existence for a long time, it is difficult to understand why the claim is still frequently made that merchants ‘have to accept cash’ (Shy and Tarkka 2002).

As early as 2003 a survey of the Bank of International Settlements (2003) showed that most legal tender laws leave it to the parties involved in a payment transaction to determine what type of medium of exchange they want to use. Legal tender laws will come into effect only if market participants do not explicitly determine a particular medium of exchange. In this case, the paying party may use cash to make a payment or repay a debt. In addition, the survey shows that some countries even discouraged the use of cash by ruling that payments exceeding a certain threshold value may not be carried out in cash. The number of such regulations has increased since then (Häring 2015)<sup>5</sup>. Thus, the idea that people use cash because they are forced by the state to do so is ill-founded. To a large extent, people are free to use whatever means of payment suits them.

Many economists also argue that cash is favoured by inefficient pricing. In its simplest form, the argument runs like this: Cash is free to use and therefore it is overused (van Hove 2007, 29). ‘Free’ means that payers usually do not have to pay a fee for withdrawing cash and that they usually do not have to pay a transactions fee when paying with cash. In some cases, it may also imply that cash deposits are free of charge. At the same time, so the argument goes, providing and accepting cash involves costs. Payers, the ones who usually select the payment instrument from a variety of instruments offered by merchants, do not have to bear the costs. Therefore, they are making an inefficient choice. As a consequence, regulators see a need for intervention and mandate ‘cost-based’ pricing. This sounds like a fairly straight-forward application of standard textbook economics. Unfortunately, this approach does not take into account that many payment services can be characterised as two-sided market goods. In these markets, the standard intuition of regulators may lead to an inefficient outcome (Wright 2004). For instance, in two-sided markets, cost-based pricing is not necessarily efficient (Krueger 2009)<sup>6</sup>. Indeed, we see highly skewed pricing in many of these markets (for instance, ‘caller pays’ in telephony).

Sometimes, it is also argued that the strong position of cash in retail payments rests on central bank involvement in the process of producing and issuing cash. Therefore, some authors think that cash is somehow ‘subsidised’ (ten Raa and Shestalova 2001)<sup>7</sup>. However, it is difficult to see, in what way central banks are

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<sup>5</sup> For the past decades, there have been more and more severe restrictions on the use of cash. For instance: maximum transaction amounts for cash transactions in general, or for commercial transactions, taxes on cash withdrawals (agreed in Ireland).

<sup>6</sup> Often, it is not even clear what ‘cost-based’ is supposed to mean. After all, a payment is *one* service provided to *two* parties. Therefore, any division of costs is somewhat arbitrary. To provide a concrete example, if a card terminal reads out the card data and sends them to the card issuer for authorisation, is this a service provided to the merchant or to the card holder? Who should carry the costs?

supposed to subsidise cash. The whole idea seems to be based on a misconception of the cash issuing business. The main income generated in the cash business is seigniorage. The entire seigniorage goes to central banks. Central banks use seigniorage income to pay for the bank note production and to pay for their involvement in the distribution of cash. However, these costs are only a small fraction of seigniorage income. Thus, issuing cash is a very profitable business for central banks – at least during periods in which interest rates are significantly positive<sup>8</sup>. Commercial banks are also involved in the process of distributing cash. In fact, they have to carry the main burden of this process because they are the ones mainly in charge of delivering cash to retail clients and of collecting it from retail clients. However, they receive only very little compensation for their services<sup>9</sup>.

One may argue that this is due to legal restrictions that outlaw charges on cash withdrawals by customers. However, cash users are already paying an (implicit) fee for the use of cash in the form of interest foregone. This fee goes to central banks<sup>10</sup>. Therefore, it could be argued that cash is a central bank business and that commercial banks are providing services to the central bank and should therefore also be paid by the central bank. This model is comparable to the insurance market where agents are paid by insurance companies ('issuers' of insurance contracts) for their sales services. Seen from this point of view, there is no subsidy involved. Rather, the opposite is true. Central banks do not pay commercial banks for their services. Consequently, they provide an enormous incentive for commercial banks to promote cash substitutes. Thus, central banks have created a structure that provides disincentives for banks to market cash and incentives to find other solutions.

Therefore, it is not surprising that large sums are spent on promoting payment cards (for instance football world cup and Olympics sponsorships by MasterCard and Visa) – whereas next to nothing is spent to promote cash.

Given these incentives, the Leinonen (2016) argument that the no-fee use of cash leads to an overuse of cash and a suboptimal low use of cards seems flawed. The reverse is true. To the extent that banks would like to take a fee but are prevented to do so by regulation, this pricing structure works against cash – at least in the long run.

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<sup>7</sup> A related point is made by Leinonen (2016) who argues that the prices charged by central banks for processing low-value notes do not cover the costs.

<sup>8</sup> van Hove (2007) criticises that there is a conflict of interest for central banks who are the issuers of cash and (one of) the regulator(s) of the payment system.

<sup>9</sup> Banks are often legally prohibited from charging their own customers for cash disbursements. They do, however, receive service charges from merchants and (in some countries) cash withdrawal fees levied on other banks' customers.

<sup>10</sup> Thus, the argument of the EPC that banks should participate in seigniorage income seems well founded.

### 5.2.3. External effects

#### 5.2.3.1. Negative external effects

A serious argument against cash is that it facilitates transactions in the black economy. In doing so, cash may have a number of harmful effects:

- distortion of the structure of production;
- reduction of tax and social security income (possibly leading to higher tax rates);
- reduction of employment in the legal part of the economy;
- facilitation of crime.

When judging the activities in the black economy one has to distinguish between activities that are – in principle – legal but which are moved into the black economy in order to evade taxes etc. (plumbing, construction work, child care, hair dressing,...) and outright criminal activities (drug dealing, smuggling, extortion,...). In the first case, there is a clear damage to society as a whole if black market activity replaces legal activities. Law-abiding companies that pay taxes may have to go out of business because they cannot compete against companies from the black economy – even if the latter are less productive. As a consequence, the structure of production is distorted and tax and social security income is reduced. However, if the service could only be supplied in the black economy because high taxes would have otherwise made it unprofitable, the case looks different. Many countries have high taxes and social security contributions<sup>11</sup>. These put a wedge between the amount a customer pays and the amount the supplier earns. If the wedge becomes very large, black market activity may also be an important ‘safety valve’. In such a case the black market may make it possible to maintain a high level of production in spite of excessive taxation and regulation (see also Schneider and Enste 2000, 88-90). Consequently, the role of cash as a facilitator of black market transactions does not necessarily cause welfare losses. Or, to put it differently, by providing an anonymous means of payment such as cash, governments restrain their ability to ‘overtax’ an economy<sup>12</sup>.

As far as criminal activities are concerned, it seems to be undisputed that cash is widely used by criminals as a means of transaction and – possibly – as a store of value. However, the argument that abolishing cash (or reducing the highest note value) might be an effective means to reduce crime seems overly optimistic. First

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<sup>11</sup> On the role of taxation and regulation as causes of black market activity see Schneider (2002) and Schneider and Enste (2000).

<sup>12</sup> This idea is also captured in the notion that cash may be interpreted as a ‘signal’ that a government will not try to overtax. This argument was proposed by Kai Konrad in a discussion of Drehmann, Goodhart and Krueger (2002, 222).

of all, criminals do not just use cash but also bank money. Using complicated chains of transactions including transfers from and to foreign countries, criminals seem to be remarkably apt to hide the sources and destinations of their funds<sup>13</sup>. Second, if cash were to be abolished, this would have to be on a global scale. Thus, it would not help to move in this direction, say, in Europe. In this case, criminals would simply increase the use of US-dollars. Third, even if cash were no longer available, criminals could use other stores of value to facilitate criminal transactions (for instance gold, diamonds, prepaid phone cards...). Fourth, the use of cash for criminal purposes often seems to be strongly exaggerated. Empirical results indicating that only a small fraction of cash is required to carry out legal transactions are often interpreted to imply that the rest is used for criminal activities. For instance, Buitter (2009, 23) states “The only domestic beneficiaries from the existence of anonymity-providing currency are the underground economy – the criminal community”<sup>14</sup>.

However, this statement lacks any empirical basis. Even if some economists think that hoarding does not make sense, the large jumps of cash in circulation after the Lehman bankruptcy show that cash is not just used as a means of payment but also used as a store of value (see section 6.2.).

To sum up: Cash is probably not used as widely for criminal activities as is often thought and its abolition would not be as effective in preventing crime as is hoped<sup>15</sup>.

### 5.2.3.2. Positive external effects

Some currencies such as the US dollar or the Euro are also used outside of their currency zones<sup>16</sup>. Such foreign circulation may also be connected to criminal activities. But in many cases dollars or euros are used in payments and held as store of value because local currencies are highly unstable. For most people in these countries it is impossible to open a bank account abroad. Without the recourse to foreign cash, the costs of making payments would be higher and the return on savings (net of transaction costs) would be lower.

In the past, there have been arguments that the use of bank notes from developed countries in the developing world entails a transfer from the developed countries to the bank note issuing countries (Pieper 1994). While some bank note issuers

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<sup>13</sup> Therefore, it does not come as a surprise that large parts of anti-money laundering regulations are addressing non-cash payment instruments. See the proposals of the Financial Action Task Force (FATF) ([www.fatf-gavi.org](http://www.fatf-gavi.org)).

<sup>14</sup> Others have cited the finding that almost all bank notes have traces of cocaine on them. However, as police have been pointing out, this can be easily explained by the fact that bank notes are usually going through sorting machines. If a few bank notes with traces of cocaine pass through these sorting machines, the machines will be ‘contaminated’ and all notes passing through them will have traces of cocaine on them (see Drexler 2003).

<sup>15</sup> See also Schneider (2016).

<sup>16</sup> See Bartzsch, N., Rösl, G. & Seitz, F. (2011a and b) for Euro bank notes and Judson (2012) for US dollars.



such as the US and the eurozone certainly gain seigniorage, it never-the-less seems likely that the ‘stability import’ that comes with dollars and euros is much more valuable for the cash importing countries than the loss of seigniorage.

#### 5.2.4. Privacy and data protection and budgeting

Focussing only on costs presupposes that all payments are alike – or, put more technically, that payments are homogenous goods. However, numerous studies show that from the point of view of users (not just criminals) it makes a difference (beyond costs) which payment instrument is used. In fact, a cashless world in which all payments are electronic would provide the state (and possibly also criminals) with a frightening potential to control ordinary citizens. In the words of Goodhart and Krueger (2001, 10) it would be a complete “Orwellian nightmare”.

It may be argued that a move towards a cashless world would not make such a difference. In the modern computerised and interlinked world citizens already leave behind a digital trail that covers a large part of their activities. This concerns their activities on the internet, video surveillance in the ‘real’ world, use of mobile phones, and an already existing use of electronic payments. In other words, privacy has already been largely compromised<sup>17</sup>. However, payment data are far from complete because people still use cash intensively. In many cases, they may choose which instrument to use and if they wish to preserve privacy they can choose cash. Such payments do not leave any trail. Given the large number of cash payments, this matters. For Germany, Krueger and Seitz (2014, 27) estimate a volume of 32 b. cash transactions (2011). That implies that the average German conducted 400 cash transactions per year<sup>18</sup>. If all of these transactions were carried out electronically the potential amount of control would be increased considerably. There would be no more privacy to speak of.

Kahn *et al.* (2005) argue that “cash is privacy” and that the loss of privacy and anonymity would make transactors worse off. There would be less legal (!) transactions and correspondingly a deadweight loss – as in the case of distorting taxes. The importance of privacy for many transactors can also be inferred from the fact that cash is even used in e-commerce. The model “order on the net – pay in store” is widely used.

In 2002, Drehmann, Goodhart and Krueger (2002) wrote: “There are many reasons why people may prefer anonymity – many of which are connected with

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<sup>17</sup> Birch (2014, 43) makes the disturbing argument that, in the future, it may well be possible to preserve privacy in the virtual world but *not* in the real world.

<sup>18</sup> This figure should be interpreted as a lower bound. In the same period (2011) the number of card transactions per person amounted to 36.

‘bad’ behaviour.” But ‘bad’ does not necessarily mean ‘illegal’. It also refers to the little weaknesses of human nature. Moreover, it should also be considered that governments may also mis-behave.

Another important advantage of cash is that it provides people with an easy way of budgeting. If somebody wants to spend only 50 dollars in a certain period using cash may be the simplest means to achieve this. As Jonker (2016) reports, this aspect is important for many cash users.

Of course, it is conceivable that an anonymous electronic means of payment could be created. At the moment, Bitcoin receives a lot of attention. But Bitcoin is far from being an electronic equivalent of cash. From the point of view of uses, products like Bitcoin are complex and it is difficult to ascertain, how well anonymity is protected. According to Böhme *et al.* (2015, 228) Bitcoin is not as anonymous as cash: “Bitcoin raises certain privacy risks, most notably the risk that transactions can be linked back to the people who made them. Bitcoin transactions are not truly anonymous: instead, they are pseudonymous,...”<sup>19</sup>.

From the point of view of governments, such products would be worse than cash: Criminals, terrorists, etc. could send around millions across the globe with one click. For instance, according to press reports, there have already been cases in which blackmailers have demanded ransom to be paid in Bitcoin (The Paypers 2015). As a consequence, governments are increasingly regulating Bitcoin-related services<sup>20</sup>.

### 5.3. MACRO-ECONOMIC EFFECTS (ZERO LOWER BOUND,...)

During the financial market crisis, policy rates probably should have been negative. According to some estimates for the US, as low as -5% or even -7.5% (quoted in Buiter 2009).

Japan has battled since the 1990s with a mild deflation and is incapable to return to an inflation rate in significantly positive territory. Therefore, Japan may also be viewed as a case requiring negative rates.

As a consequence, more and more economists are contemplating drastic action to make negative rates possible (Rogoff 2014, Buiter 2009, Haldane 2015, sceptical: McAndrews 2015). The main problem on the road to negative rates is cash. Cash has a nominal return of zero and a real return (taking carrying costs into account) that is mildly negative.

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<sup>19</sup> See also Koshy *et al.* (2014).

<sup>20</sup> Examples are Switzerland (see FINMA 2014) or the state of New York where a new BitLicense law has been passed. See also EBA (2014).

$$i_C^{real} = i_C^{nom} - k = -k$$

$i_C^{real}$  is the real return on cash,  $i_C^{nom}$  is the nominal return on cash and  $-k$  represents carrying costs (storage, risk of theft,...)

Once a negative rate on short-term instruments such as bank deposits, money market funds etc. has been introduced, there comes a point when it will be profitable to take cash out of the bank and store it in a safe place. Thus, an attempt to get interest rates significantly into negative territory (below  $-k$ ) requires a mechanism to interfere with such hoarding behavior<sup>21</sup>.

However, abolishing cash would constitute a fundamental institutional change and whether or not a strong case in favour of such a drastic measure could be built depends on two questions:

- Do we really need negative rates?
- Are there alternatives that might be preferable?

While some economists seem to take it for granted that we need negative rates, others do not agree. For instance, the German Council of Economic Experts (Sachverständigenrat 2014) has calculated Taylor rates for the euro area. Only very briefly, in 2009, one of the estimates dipped below zero. For the rest of the post-crisis period, Taylor rates have been positive and most of the time also above the main refinancing rate (Sachverständigenrat 2014, 143).

Much of the discussion about negative interest rates has been about getting the interest rate below zero. However, if the aim is not only to discourage saving<sup>22</sup> but also to encourage investment, it is important to get the costs of capital down. Costs of capital consist of the riskless rate plus a risk premium. If central banks think that getting the riskless rate down to zero is not enough they can work on the risk premium. This could be done via granting credit to the corporate sector, buying corporate bonds, discounting bills of exchange (a time-honoured central bank practice) or accepting private securities as collateral. The Eurosystem has moved already a little into this direction but in order to have a significant effect on private investors, more is in order<sup>23</sup>.

Central banks seem to be reluctant to move into this direction because it entails taking on more risks on their balance sheets. But, historically, they often have taken large risks on board, for instance by piling up huge stocks of foreign

<sup>21</sup> How such a policy can be implemented, will be discussed in section 4.4.

<sup>22</sup> Whether savings are, indeed, negatively influenced by negative interest rates is open to debate. A lower return on savings might also entice people to save more. Thus, it seems crucial that there really is a positive effect on investment.

<sup>23</sup> Krueger (2013) makes a case for monetising private debt rather than public debt.

currency reserves which often involved high losses (Krueger 2013). Moreover, as Hellwig (2015) reminds us, central banks are, after all, banks. So, it should not be their prime concern to minimize risks. Indeed, it is somewhat strange that the very institution that has the lowest default risk is so keen to limit its exposure to risk<sup>24</sup>.

Finally, the current situation may be a good opportunity to think, once again, about the appropriate policy mix. Should the entire burden be on monetary policy or does fiscal policy also have a role to play<sup>25</sup>? Prominent economists such as Larry Summers (2014) or Carl Christian von Weizsäcker (2015) have made a strong case for more public spending. Summers argues in favour of more public investment whereas von Weizsäcker wants governments to promote consumption. Basically, the argument is that we can invest too much today so that in the future we will be stranded with a capital stock that is expensive to maintain. So, in the end, higher investment would lead to lower consumption possibilities in the future.

#### 5.4. PROPOSED POLICIES

The anti-cash camp seems to be growing over time and there is no shortage of proposals on how to reduce the use of cash. Some of these proposals are motivated by cost of payments arguments others by macroeconomic arguments.

- Focus on costs of payments
  - promote cards (and other e-payments);
  - cost-based pricing;
  - nudging;
  - central bank e-money;
  - abolish large-value notes.
- Focus on zero lower bound
  - abolish cash altogether;
  - carry tax on cash (“Schwundgeld”);
  - monetary separation.

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<sup>24</sup> Also in this respect, the crisis has been instructive. We could witness central banks with negative equity. For instance, the Czech Central Bank had negative equity over an extended period – and nobody seemed to worry!

<sup>25</sup> Of course, this is only an issue worth considering if Ricardian equivalence does not hold.

### 5.4.1. Focus on costs of payments

In Holland, the National Forum on the Payment System (the “Forum”) which is chaired by the Dutch Central Bank has been co-ordinating efforts to make the payment system more efficient. The Forum had a clear vision what ‘efficient’ means:

*“Among other things, this means encouraging electronic payments and discouraging cash payments (‘war on cash’). These initiatives can help to achieve the aim of greater social efficiency as pursued by the Forum.” (National Forum on the Payment System 2006, 6).*

Thus, there is a strong tendency to equate ‘efficiency’ with ‘less cash’<sup>26</sup>. The measures that the Forum envisions are:

- stimulating retailers to accept debit card payments at no extra charge;
- emphasise security advantages of electronic payments;
- change consumer perceptions of the costs of payment instruments;
- make inefficient payment methods relatively expensive<sup>27</sup>.

The Bank of Norway has ‘encouraged’ (or ‘nudged’) banks to introduce cost-based pricing with the explicit aim to reduce paper-based means of payment – including cash<sup>28</sup>. This has led to a stronger use of electronic payment instruments. This action has been based on the notion that cost based pricing will improve efficiency.

*“Prices should reflect the value of the product or service and the cost of producing it. Prices that reflect relative costs of producing various payment services provide an incentive for users to select services that meet their needs at the lowest possible cost. This promotes correct use of resources and increases the efficiency of the payment system.” (Gresvik and Øvre 2003, 3).*

The Bank of Finland even developed an e-purse scheme (Avant) which was launched in 1993 and sold to a consortium of large banks in 1995. The aim was to create a national e-purse scheme that could be used for low-value transactions and would be capable to replace cash. The system did not succeed in the market, however, and was dis-continued (Jyrkönen and Paunonen 2003, 11-12).

<sup>26</sup> A recent publication of the Forum seems to be less anti-cash. See National Forum on the Payment System (2015).

<sup>27</sup> The Forum also makes it clear which methods are deemed inefficient: “Many consumers are unaware of the costs of cash payments and still think this is the cheapest way to pay. The same applies to credit card payments and paper-based transfers. Charging for the costs of these relatively inefficient methods will encourage the consumer to make a well-considered choice, resulting in the increased use of more efficient electronic alternatives.” (National Forum on the Payment System 2008, 22).

<sup>28</sup> For instance, from July 2001 on banks have no longer been allowed to receive float income. See Norges Bank, Annual Report on Payment Systems, various issues and Gresvik and Øvre (2002, 125).

Abolishing large value notes is a proposal that has also been frequently advocated (see, for instance, Rogoff 1998 and van Hove 2007, and, cautiously, Europol 2015). Technically, it would be easy to implement. However, so far, high denomination issuers such as the Swiss National Bank or the Eurosystem, have not become active in this direction. In the UK, the authorities have worked with the financial sector to prevent the sale of EUR 500 bank notes in the UK (HM Treasury 2015).

It is difficult to predict what the effect of abolishing large-value notes would be. But a comparison of the US with a relatively low maximum denomination (100 USD) and the euro area with a high maximum value (500 EUR) suggests that the highest denomination may not matter as much as one might believe. For both currencies the average annual growth rate for the period 1997 to 2015 has been around 7%.

Attempts to steer people away from cash have also been linked with the nudging approach. Van Hove (2009) discusses a number of measures that could be used to get people to use more cashless means of payments. However, he thinks that cost-based pricing would be more effective.

## 5.4.2. Focus on zero lower bound

### 5.4.2.1. Abolish cash altogether

Kenneth Rogoff and others have proposed to abolish cash in order to fight activities in the shadow economy and to make monetary policy more effective (see, for instance, Rogoff 2014, Kimball 2013 and Buiter, 2009)<sup>29</sup>.

In theory, these proposals may work. Modern electronic means of payment seem to be perfectly capable of handling all types of transactions. However, there are a number of serious practical problems. First of all, abolishing cash within a single currency area would hardly achieve the desired results. There would be widespread substitution into other currencies that still exist in the form of paper. If Euro bank notes were abolished there would be strong demand for Swiss Francs and US dollars.

Thus, abolishing cash requires international co-ordination on a large scale. Even if such a co-ordinated effort were successful in eliminating cash it would still be doubtful whether the desired positive effects could be achieved.

Non-existence of cash does not mean that people will not try to escape from the effects of negative interest rates. Rather, they will shift into other assets. For

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<sup>29</sup> Abolishing large value notes is a less radical proposal that has also been advocated (see Rogoff 1998 and van Hove 2007).

instance, it is highly likely that the demand for gold and other precious metals is going to rise considerably. Similarly, real estate would be in high demand and there would be the risk of price bubbles.

Other types of assets may also play a prominent role. Vouchers or checks, for instance. People may also try to make high advance payments of taxes<sup>30</sup>. On top, there may be financial innovations in stock that we do not have on the radar at the moment. The incentive to look for new ways to escape negative interest rates will rise with the duration of negative interest rates.

#### 5.4.2.2. A negative rate on cash (“Schwundgeld”)

The idea of creating a type of money that yields a negative interest rate is not new. It has been championed by Silvio Gesell (1916) and found a prominent advocate in Irving Fisher (1933)<sup>31</sup>. Some of the modern contributions predate the financial crisis (Buitter and Panigirtzoglou 2003, Goodfriend 2000)<sup>32</sup>. But the financial crisis and the subsequent debate about the pros and cons of negative interest rates have given a boost to the idea (Buitter 2009, Agarwal and Kimball 2015).

Details regarding the implementation differ, but the general principle is the same: some kind of holding costs (on top of storage costs) have to be imposed. Goodfriend (2000) proposes a ‘carry tax’. Buitter (2009) comes with the idea of creating a new unit of account (the ‘Wim’) and Agrawal and Kimball (2015) basically suggest to use a flexible exchange rate between cash and deposits. As they are showing, such a system would be easy to implement. The central bank simply adjusts over time the ‘exchange rate’ between cash and reserves. Leaving storage costs aside, if a central bank wants to lower interest rates on deposits to minus 4% it has to devalue cash gradually at a rate of 4% per annum. In this case, a dollar deposited in a checkable account would shrink to 96 cents within a year. A hoarder of cash would still hold one dollar. But if he wanted deposit cash, he would receive only 96 cents into his bank account. Would this stop the typical hoarder? This may not be the case. After all, people have been hoarding even in times of relatively high inflation. However, for financial intermediaries, there would be no benefits of moving funds into cash<sup>33</sup>. Thus, it looks fairly obvious that the wholesale part of the market can be moved into decisively negative territory. The open question is how the retail investors would react.

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<sup>30</sup> McAndrews (2015) stresses how deeply ingrained current rules and regulations are based on the past experience of positive interest rates.

<sup>31</sup> Gesell is often viewed as a crank. But Keynes (1936) forcefully argues that he is not – and, I think rightly so. Even if you do not agree with Gesell’s main proposal, he is a stimulating read.

<sup>32</sup> There is also some overlap with the discussion about the possibility of a moneyless world that has been triggered by the proponents of New Monetary Economics. A critical review can be found in Krueger (1999) and (2012).

<sup>33</sup> Agarwal and Kimball (2015) also discuss how the exchange rate can be brought back to par in “normal” times.

McAndrews (2015) mentions the ‘visceral negative reaction’ to negative interest rates that many retail investors have. Such reactions may make it difficult for financial institutions to pass negative wholesale rates through to retail depositors. This may effect the health of financial institutions.

In general retailing, a similar problem may emerge. If the expected period of negative interest on cash is relatively short, retailers are likely to maintain price coherence. In other words, they will not charge extra for cash payments. Consequently, they will have to absorb the falling cash exchange rate. Suppose, a retailer has sales of USD 2 million, USD 1 million in cash and USD 1 million in cards. If the exchange rate declines over time at a rate of 4% per annum this retailer will have paid an implicit tax of 2% on the cash receipts<sup>34</sup>. Given today’s card fees, for some payment cards, retailers have to pay more. So, at least for a limited amount of time, merchants may be prepared to sustain such an approach.

Thus, cash would be used as a means of payment as before. However, if the period of depreciation of cash should last relatively long or if the depreciation rate were higher, the payment system could be seriously affected. Interestingly, in some countries there could be a shift towards more cash-less means of payment and in others a shift towards cash. In countries in which electronic means of payment are widely used, retailers would have an incentive to steer their customers away from cash. They may even consider not to accept cash anymore. But in countries in which cash is still widely used even at the B2B level, the reaction might be to use cash more intensively. For instance, small retailers in Poland also use cash on the purchasing side (Górka 2014, 95). So, if depositing cash implies accepting a discount they will be tempted to spend more of their cash receipts in the hope that their suppliers will also accept cash at par. Thus, in a more cash oriented economy, cash might be the instrument that defines the medium of account. In this case, deposits would be the ‘odd’ thing that would be traded with a premium<sup>35</sup>.

If the period of negative interest rates were only brief there would be limited effects on the payments system and the financial system as a whole. But if it were to last longer there could be significant changes in the payment system. Another possible consequence would be disintermediation and a rise of un-mediated investment of retail investors in supposedly stable assets.

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<sup>34</sup> Assuming that all cash has been deposited daily in a bank, the retailer will receive USD 980,000 for one million dollar in cash.

<sup>35</sup> The importance of cash also became apparent after the introduction of the Euro. Prices were expressed in Euros only from 2002 on, the year in which Euro bank notes were introduced.



## 5.5. MISCELLANEOUS ISSUES

### 5.5.1. Stability of the payment system

What if the electronic payment system is down? What if its security is compromised? Paper works without infrastructure (to a certain extent). An instructive example is provided by the bank strikes in Ireland in 1970 (Central Bank of Ireland 1971). People and businesses did not have access to bank accounts for a protracted period of time. As a consequence, there was a heavy use of cash, checks and foreign cash. In this way, it was possible to keep the economy running.

Today, such a bank strike might have more serious problems. In many countries, checks are on the way out. Even if they are still used, the relationship between payer and payee has changed. In 1970, a lot of the transactions were between people who knew each other. Thus, they could form some kind of expectation regarding the likelihood that the check would not bounce. In today's environment, it would be much more difficult to use checks as substitutes for other payment instruments.

Cash allows market participants to carry out transactions without the help of any intermediary. Thus, it also works when intermediaries are shut down or cannot be reached. However, access to cash is relying on payment cards and central switching points. Thus, cash provision is also vulnerable in exactly the same way as card payments. Still, by keeping some cash reserves people can prepare for such a contingency. Thus, cash still provides a limited fall-back in times of disruption. But what are the fall-back solutions in a cashless world?

The types of security problems that would be caused by a shift towards a cashless payment system are often underestimated. Cash is still used intensively and in very different environments. A complete move away from cash would not only imply that everybody could make payments with cashless payment instruments, it would also imply that everybody would be able to accept payments. 'Everybody' includes people with reduced cognitive capabilities as well as notorious fraudsters. If there is no cash really everybody needs access. This implies that such a system must be simple to use. As experience with existing electronic means of payment has demonstrated, it is also necessary to have a fall-back solution which would be, in all likelihood, usable offline. This would allow payments to be carried out even if lines of communication are interrupted. Moreover, a solution that is completely online might be too costly. Thus, the system would have to be simple and also usable offline. Moreover, some kind of privacy is required. Such a combination has been provided only by cash. Attempts to create an electronic cash-equivalent have failed, so far.

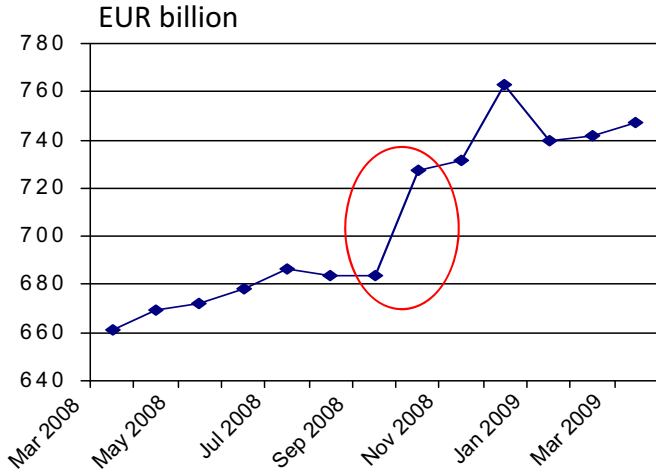
Bitcoin, for instance, is not easy to use and it is slow. Payment confirmation may take a few minutes<sup>36</sup>. Moreover, doubts have been raised to what extent Bitcoin provides anonymity (Koshy *et al.*, 2014).

Bitcoin has also demonstrated that it is not only the security of the underlying technology that counts. There can also be theft, just as in the case of cash (Reißmann, 2014). Moreover, protecting your Bitcoins may be more complex than protecting cash. You have to trust your hardware (PC, notebook, tablet, smartphone), the software that has been installed and/or service providers that are storing Bitcoins.

### 5.5.2. Bank runs with and without cash

An important aspect that has received little attention, so far, is the role of cash in times of financial crisis and general lack of trust in the financial system. During such periods the demand for cash is usually rising. Thus, the Bundesbank alone paid out EUR 11.4b. in cash in October 2008 (the month of the Lehman bankruptcy). A large part of the notes delivered to the public were high denomination notes (Deutsche Bundesbank, 2009, 56-7)<sup>37</sup>.

Figure 1: The Lehman-effect



Source: ECB data warehouse

<sup>36</sup> The average time it takes until a Bitcoin payment has been confirmed can be found on the net under <https://blockchain.info/de/charts/avg-confirmation-time>.

<sup>37</sup> See also Negueruela (2014) and Cusbert and Rohling (2014) analysing the Lehman effect for Spain and Australia.

Such a ‘run’ on the banking system is usually seen as a serious threat that may lead to a collapse of the banking system. However, experience shows that the ability to withdraw cash from the banks may also calm the nerves of the public. As soon as people realise that ‘their money’ is still in the bank trust is restored<sup>38</sup>. So, the ability to get ‘money’ out of the system may serve as a safety valve (Negeueruela 2014) – a safety valve that would be missing in a cashless world<sup>39</sup>.

In a system based entirely on electronic means of payment, it is impossible for non-banks to withdraw funds from the banking system – unless the banks cooperate and sell assets to non-banks. As a result, there may be frantic buying and selling which only moves claims against the banking system from one non-bank to the other. Such a process is unlikely to restore trust into the banking system any time soon and may considerably distort financial market prices. It has similarities with hyperinflation when everybody tries to get rid of money as fast as possible but where all money holders taken together are unable to reduce their (nominal) money holdings.

### 5.5.3. Cash and banking

Banks seem to view cash mainly as a burden. But in the eyes of bank customers, cash may be the fundamental factor that distinguishes banks from non-bank competitors. Willie Sutton, the eminent ‘theorist’ of money and banking<sup>40</sup>, made the famous remark

*“A bank is where the money is” (Sutton’s law).*

Obviously, Sutton refers to cash. That is not unusual. For most people ‘money’ means ‘cash’<sup>41</sup>. But if cash were abolished there would be no more ‘money’ in the bank. This raises the uncomfortable question: “If the money is not in the bank anymore – is a ‘bank’ still a ‘bank’?”. What would become of the wonderful business model of issuing zero interest liabilities? In the eyes of customers, what would distinguish a bank from other financial intermediaries? In the modern IT world, every 10-15 years banking is declared dead, banks to be replaced by Microsoft, mobile telecom operators, Apple, crowd funding, etc., etc... So far,

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<sup>38</sup> Of course, other factors were at work. The German government, for instance, declared that deposits are safe – a statement that the public immediately interpreted as a guarantee of the government.

<sup>39</sup> At this point a trained economist may object that cash is a liability of the central bank and that the holder of cash would still be tied ‘in the system’. But this is not the way people see it – and rightly so, one should add. For the value of money it is relatively unimportant what the central bank holds on the asset side of its balance sheet. For money holders it is important that others will accept money against goods and assets.

<sup>40</sup> Actually, he was more of a practitioner who could look back on a long and distinguished career as bank robber. See Wikipedia (2015).

<sup>41</sup> The beer garden “Hofgarten” in Aschaffenburg is a case in point. On its menu guests will find the following statement: “As payment we accept money – not plastic!”

none of these predictions has materialised. But once bank notes have been phased out such predictions may finally become true.

## 5.6. CONCLUSIONS

Cash is an ancient institution that has served mankind well. The breadth of issues that are related to cash and its potential abolition serves as a testimony of its importance. Abolishing cash is not just a technical matter that can be decided with the help of a relatively simple cost-benefit analysis. A world without cash might differ more radically from today's world than we think. Therefore, we should not decide such a move with undue haste. Maybe, there should be no 'decision' at all. If we really can do without cash, sooner or later, it will disappear.

When considering the case against cash, one is reminded of Hayek's (1978) critique of 'constructivism': "the innocent sounding formula that, since man has himself created the institutions of society and civilisation, he must also be able to alter them at will so as to satisfy his desires and wishes" (Hayek 1978, 3). Of course, Hayek was highly skeptical of this approach because he viewed human institutions as product "of human action but not human design" (Hayek 1978, 5).

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## 6. THE DUAL NATURE OF BITCOIN AS PAYMENT NETWORK AND MONEY

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### 6.1. INTRODUCTION

Back to 2008, Nakamoto combined the distributed ledger technology with cryptography and gave origin to what is now known as ‘blockchain’ technology<sup>2</sup>. The blockchain technology allows for a trustworthy record of transactions among anonymous without the need of a neutral central authority. The blockchain contains all the transaction history and each transaction is tamper-proof, publicly auditable (traceable) and no-reversible. The first application of the blockchain technology is Bitcoin: a digital currency that combines together the characteristics of money with those of a payment system. This dual nature is explained by the fact that Bitcoin is money expressed as a string of bits sent as a message in a fully decentralized network composed of millions of users with computers and devices connected among each other. ‘Miners’ are special users that identify and validate the messages (i.e., transactions) using copies of all or some information of the blockchain. Before the transactions are accepted by the network, miners collect them in blocks and have to show ‘proof of work’ using a cryptographic hash function – a special algorithm – that aims to provide high levels of protection. Miners receive some form of compensation, expressed in transaction fees and newly created Bitcoins (i.e., money supply), for their computing power contribution, avoiding the need to have a centralized system. Although Bitcoin remains the dominant currency in terms of use and capitalization, at the moment of writing there are more than five hundreds different digital currencies<sup>3</sup>. Digital Currencies differ among each other by the consensus protocol (synchronous or asynchronous) and by the rewarding (money supply) mechanism<sup>4</sup>. In this chapter we analyze the dual nature of Bitcoin both as payment system and money<sup>5</sup>.

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<sup>1</sup> Deutsche Bundesbank.

<sup>2</sup> See Satoshi Nakamoto’s paper “Bitcoin: A Peer-to-Peer Electronic Cash System”, <http://nakamotoinstitute.org/>.

<sup>3</sup> See CoinMarketCap. <https://coinmarketcap.com/all.html>, 2015.

<sup>4</sup> Bitcoin relies on asynchronous consensus protocol which require ‘miners’ to agree on the transaction order. And this is a time and computing consuming activity. Instead, newer protocols such as Ripple rely on a synchronous consensus process that does not need miners nor proof of work and can agree on the changes to the blockchain within seconds. For a technical explanation of the different digital currencies consensus protocols and rewarding mechanisms see A.M. ANTONOPOULOS, *Mastering Bitcoin: Unlocking Digital Cryptocurrencies*, O’Reilly Media, Inc., 2014.

<sup>5</sup> For a more comprehensive market analysis of digital currencies we refer the reader to P. TASCA, “Digital Currencies: Principles, Trends, Opportunities and Risks”, *ECUREX Research working paper*, 2015.

## 6.2. BITCOIN AS PAYMENT NETWORK

Blockchain-based payment network solutions provide a fast, cheap and secured cross-border payment and settlement framework. Differently from Payment as a Service solutions (PaS) like Paypal, these methods have back-ends relying only on decentralized consensus protocols like Bitcoin or Ripple. These solutions allow for domestic and international payments, in any combination of currencies, which can then be settled directly between the parties without the need for credit cards, central clearing houses or correspondent banks. At the moment of writing Bitcoin is the biggest blockchain-based payment network and therefore it is useful to compare its expansion with other competitive payment networks like VISA, Mastercard, Discover and Western Union. The first three methods are consumer credit card channels and the last one is the biggest person-to-person global money transfer. During the period 2011-2015, the daily transaction volume in the Bitcoin network was ca. USD 60 million. The figure certainly pale if compared with VISA which processes ca., USD 20 billion daily transactions or with other payment networks. Namely, Bitcoin payment network is the smallest among those ones considered in the analysis. See Table 1.

Table 1: Volume in million USD (Vol.) and millions of transactions (TX)

| Year | VISA      |       | MasterCard |       | Discover |       | Western Union |       | Bitcoin |       |
|------|-----------|-------|------------|-------|----------|-------|---------------|-------|---------|-------|
|      | (Vol.)    | (Tx.) | (Vol.)     | (Tx.) | (Vol.)   | (Tx.) | (Vol.)        | (Tx.) | (Vol.)  | (Tx.) |
| 1Q11 | 15,153.8  | 198.3 | 8,011.0    | 65.6  | 746.5    | 14.7  | 208.8         | 0.6   | 0.04    | 0.002 |
| 2Q11 | 16,604.4  | 213.2 | 8,934.1    | 72.5  | 787.0    | 15.7  | 226.4         | 0.62  | 1.6     | 0.006 |
| 3Q11 | 17,033.0  | 217.7 | 9,285.7    | 77.1  | 787.0    | 15.4  | 231.9         | 0.63  | 0.92    | 0.008 |
| 4Q11 | 17,450.5  | 223.6 | 9,505.5    | 84.4  | 761.3    | 15.1  | 226.4         | 0.65  | 2.1     | 0.006 |
| 1Q12 | 16,934.1  | 215.7 | 9,329.7    | 84.8  | 804.3    | 15.8  | 214.3         | 0.62  | 0.7     | 0.007 |
| 2Q12 | 17,252.7  | 218.7 | 9,780.2    | 93.8  | 861.1    | 17.5  | 220.9         | 0.64  | 1.04    | 0.021 |
| 3Q12 | 17,582.4  | 225.3 | 10,087.9   | 95.4  | 860.9    | 17.6  | 216.5         | 0.63  | 2.47    | 0.032 |
| 4Q12 | 18,648.4  | 236.8 | 10,835.2   | 101.3 | 840.1    | 16.8  | 219.8         | 0.64  | 2.45    | 0.033 |
| 1Q13 | 18,120.9  | 227.9 | 10,406.6   | 95.1  | 819.2    | 16.1  | 207.7         | 0.61  | 8.12    | 0.052 |
| 2Q13 | 19,109.9  | 245.6 | 11,087.9   | 104.1 | 856.1    | 17.0  | 225.3         | 0.66  | 26.2    | 0.053 |
| 3Q13 | 19,175.8  | 252.1 | 11,494.5   | 109.9 | 850.5    | 17.1  | 231.9         | 0.69  | 19.3    | 0.050 |
| 4Q13 | 20,197.8  | 259.9 | 12,142.9   | 114.0 | 883.8    | 17.2  | 236.3         | 0.71  | 108.65  | 0.061 |
| 1Q14 | 19,011.0  | 249.9 | 11,483.5   | 108.2 | 850.4    | 16.5  | 223.1         | 0.66  | 91.01   | 0.063 |
| 2Q14 | 20,274.7  | 269.6 | 12,351.6   | 116.6 | 892.2    | 17.6  | 239.6         | 0.70  | 52.35   | 0.063 |
| 3Q14 | 20,703.3  | 275.9 | 12,714.3   | 120.5 | 881.0    | 17.5  | 242.9         | 0.72  | 51.07   | 0.068 |
| 4Q14 | 20,879.1  | 285.4 | 12,879.1   | 127.1 | 912.0    | 17.7  | 233.0         | 0.72  | 60.1    | 0.084 |
| 1Q15 | 19,263.74 | 275.6 | 11,681.32  | 121.3 | 852.32   | 16.3  | 214.29        | 0.68  | 48.80   | 0.094 |

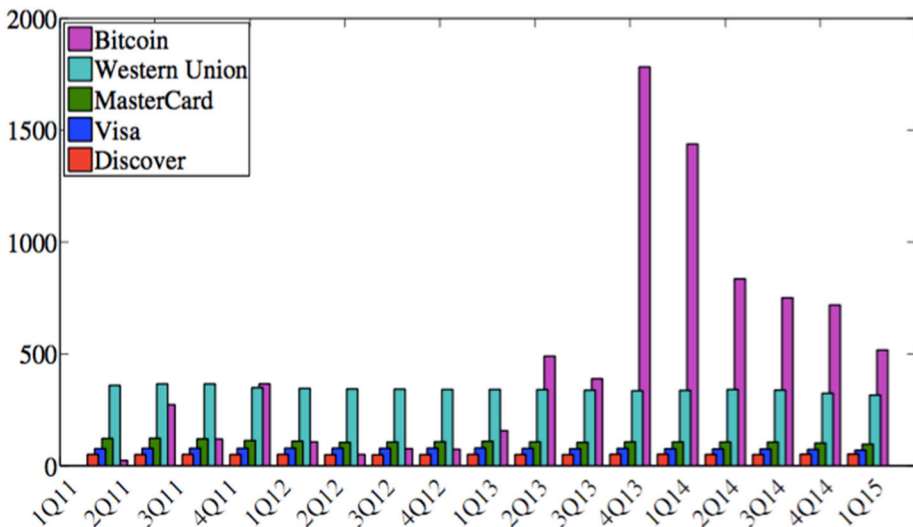
However, if we rank the payment networks according to the average US Dollar amount per transaction, Bitcoin constantly moved forward, and since 2013 it overtook and remained larger than the other payment networks. At the moment of writing, the average amount per Bitcoin transaction range bound between 600 and 1,000 US Dollars<sup>6</sup>. The payment network more closed to Bitcoin is Western

<sup>6</sup> The huge oscillation is due to volatility of the conversion rate with the US Dollar which amounts in about 100% annualized standard deviation.

Union with an average value per transaction amounting to ca. 500 US Dollars. The other credit card payment networks record an average amount per transaction between 50 and 90 US Dollars. See Figure 1.

Credit cards offer an easy method for consumption credit and are used to buy goods and services of relatively small amount that are consumed and used during our daily life, from an event ticket to a travel arrangement or a dinner. The evidence that Bitcoin as payment network resembles more Western Union rather than VISA, Mastercard or Discover is significant of the fact that Bitcoin is a network used more for remittances or relatively large transfers of money from person to person instead of consumptions. Indeed, the Bitcoin consensus protocol requires 6 confirmations (equivalent to ca. 1 hour) in order for a transaction to be considered 'secure' by the whole network participants<sup>7</sup>. Also for those technical reasons, Bitcoin as payment network has been so far more used for relatively large amount of money transfer from user to user that do not require real-time exchange of services or goods.

**Figure 1: Comparison between different payment networks.**  
Average daily USD amount per transaction from 1Q2011 to 1Q2015.



Data source: Bitcoin blockchain, VISA, MasterCard, Discover, Western Union performance reports.

<sup>7</sup> The mean time until the Bitcoin nodes receive a transaction is measured in ca. 12,6 seconds. After that time, the probability of a Bitcoin fork falls almost to zero (Decker, C., 2013, Information Propagation in the Bitcoin Network, 13-th IEEE International Conference on Peer-to-Peer Computing). With six confirmations (ca. 1 hour) it is essentially mathematically impossible for an attacker with less than 51% of all mining capacity to get six blocks in a row and still surpass the longest block chain. So transactions included in the previous six blocks are considered 'secure', at least from double spending. See <https://en.bitcoin.it/wiki/Confirmation>.

### 6.3. BITCOIN AS MONEY

The economic theory defines money by looking at its functions as: medium of exchange, unit of account and store of value. For our analysis we consider a fourth monetary aspect, what we will call ‘the utility of reward’.

**Medium of exchange.** In this respect, money is a device that avoids the coincidence of the wants to be met before people can trade. This device should avoid the barter system. Bitcoin is an extraordinary medium of exchange. The statistics reveal that the number of transactions registered in the blockchain rose from around 1,000 daily transactions in 2011 to around 130,000 daily transaction in 2015 which, as we have seen before in Table 1, are equivalent to USD 60 million in value<sup>8</sup>.

**Unit of account.** It is unit of measure used to value any economic item, e.g., goods, services, assets, liabilities, income. A unit of account needs to be:

- (a) **Divisible.** This means that it can be divided such that its component parts will equal the original value. Bitcoin is a perfectly scalable money because the value of 1 Bitcoin is divisible by up to  $10^8$ . The smallest possible unit is called Satoshi: 1 satoshi = 0.00000001 Bitcoins<sup>9</sup>. However, as we will see below, Bitcoin is a deflationary currency and this aspect, in the long-run, may have some perverse effects on its divisibility;
- (b) **Fungible.** One unit is viewed as the same as any other with no change in value. In this respect, Bitcoin is a perfectly fungible money;
- (c) **Countable.** A unit of account is also countable and subject to mathematical operations. Bitcoin is perfectly countable.

**Store of value.** As a store of value, an asset should have the possibility to be saved, retrieved and exchanged at a later time, and be predictably useful when retrieved without costs or losses. In this respect, Bitcoin’s deflationary property prevent it to be considered as a good store of value. On the contrary, Bitcoin is an imperfect store of value. At the moment, 25 Bitcoins are created each time a user discovers (mine) a new block. The rate of block creation is approximately constant over time: one every 10 minutes. The number of Bitcoins generated per block is set to decrease geometrically, with a 50% reduction every four years. The result is that the number of Bitcoins in existence will never exceed 21 million. Because of its deflationary property, Bitcoin has a low liquidity in the market. Many users prefer to hoard Bitcoins in the hope that the price will rise. Through this process,

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<sup>8</sup> The estimated US Dollar amount of daily transactions was on the order of USD 500,000 in 2011.

<sup>9</sup> See, <https://en.bitcoin.it/wiki/Units>.

it becomes increasingly illiquid and expensive, rendering it less useful, with fewer merchants incentivized to accept it. Imagine an economy with Bitcoin as official currency. The problems related to such a deflationary Bitcoin-denominated economy would be: (1) unemployment (wages are fixed because they don't easily adjust downward); (2) costly constant downward adjustment of price-lists; (3) price of goods closed to zero and even the GDP could come closed zero (this would imply multiple currency denominations and at the end the currency would become more closed to an index); (4) increasing incentives to buy-and-hold. At the moment of writing about the 85% of the total Bitcoins ever issued are hoarded<sup>10</sup>. This means that users assign to Bitcoins an intrinsic value and this makes Bitcoin a terrible store of value.

**Transactional utility of reward.** With this characteristic we mean that money should allow users to make their own expenditure decisions – without frictions and with full degree of choice –, such to maximize their personal utility. Usually, this is a characteristic not possessed by traditional money or credit cards because of jurisdiction or technical boundaries. However, Bitcoin and similar tokens when linked to real assets and exchanged via global platforms could represent in principle the optimal way to maximize the utility of reward of the users. We are rapidly entering into the 'digital era' characterized by a cashless and a massively connected society utilizing high frequency transnational transactions of products and services that will be increasingly digitalized. According to recent studies, the 90% of US transactions will be cashless by 2020 and by the same year the 50% of EU transactions will be done through a phone device. Technology companies like Google, Facebook, Apple are already entering the payment space with digital wallets uploaded into our mobile devices using NFC systems that replace the credit or debit card chip and PIN or magnetic stripe transaction at point-of-sale terminals. A more general adoption of digital wallets and equivalent technologies will foster a higher adoption of digital currencies. The combination of universal-digital wallets containing different digital currencies with the adoption of multi-currency systems has the potential to increase the utility of reward of Bitcoin and other digital (centralised or decentralised) currencies used for real-time, and cross-border transactions.

## 6.4. CONCLUSIONS

An entirely digital, distributed peer-validated time-stamped ledger where transactions are cryptographic protected and can be publicly auditable is now a reality. Bitcoin is just the first application of this blockchain technology. Although

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<sup>10</sup> The hoarding loop also increases the volatility of the Bitcoin price with respect to other currencies.

Bitcoin and other digital currencies have the potential to revolutionize money and disrupt finance by eliminating costly – and sometimes obscure – layers of intermediation, perhaps even more important will be the impact of the blockchain technology in areas which are not strictly related to finance like intermediation or clearing and settlement. Indeed, the blockchain technology has the potential to replace the legacy systems currently used in: record system; rating or voting system; database management; distributed storage, authentication and anonymisation of private information; rewarding and punishing-incentive schemes; transaction traceability schemes; refereeing, arbitration or notarization. Blockchain applications spanning a number of sectors promise to change the way companies and people transact, send payments, sign contracts, transfer ownership of things, and much, much more. The hope is that this new technology will instead turn the digital divide, among and within our countries, into digital opportunities. However, blockchain technologies will also introduce new risks to users, market participants as well as new risks to financial integrity: e.g., frauds, money laundering and cyber-crimes. Therefore new forms of ‘tech regulation’ should be designed and implemented in order to boost innovation, define blockchain standards and guarantee market stability in those sectors that will be affected by the adoption of blockchain technologies.

## 7. INFORMAL PAYMENTS, CRIME CONTROL AND FRAGILE COMMUNITIES

*Nikos Passas*<sup>1</sup>

### 7.1. INTRODUCTION

A widespread institutional aversion to cash and cash-related operators characterizes public policy and bank practices for a number of years. As stated by SUERF, “Recently cash has become unpopular in political circles, as it effectively restricts states’ power to tax (explicitly or via negative interest rates) or to survey and potentially control their citizens. Several states have enacted restrictions to the use of hard cash.” Regulatory developments regarding money laundering, terrorism finance, sanctions violations and corruption along with a risk-based approach recommended by the FATF and other bodies underlie and fuel this tendency. Efforts towards drastic reduction or even elimination of cash transactions, formalization of remittance markets and what is misleadingly called ‘de-risking’ by banks that close down accounts of money transfer companies which serve ethnic and fragile communities around the world have accompanied new rules on financial controls intended to address serious crime threats. The problem is that the negative externalities of all this include financial exclusion, harm to rule of law, economic growth and development, human rights violations and humanitarian crises as well as higher crime risks (Passas, 2005, 2006).

Before national or international bodies conclude that cash is the problem and biggest risk for financial and security problems, review of the available evidence and experience is critical. Rather than taking it for granted, we must ask: Is switching out of cash better for risk management and control? Are most damaging crimes and risks in cash? Is the ‘de-risking’ that chases away money transfer operators many of whom handle cash remittances actually serving the goal of risk reduction? Are current regulatory arrangements and guidance adequate and sufficient? Is it possible to leverage informal and cash payment operators to monitor suspicious activities and help develop economies and fragile states?

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<sup>1</sup> Northeastern University, Boston.

This paper first points out that some of the most important financial crimes, scandals, questionable practices and systemic risks have actually involved formal financial institutions and no cash transactions. Secondly, it suggests that ‘de-risking’ is a misnomer that in addition to other negative effects it actually increases systemic risks and totally defeats the purpose. Thirdly, the paper argues that many informal remittance operations constitute an asset and opportunity that authorities would do well to draw on in order to more effectively ‘follow the money’ and promote sustainable development.

## 7.2. NO-CASH SCANDALS AND RISKS

Just as democracy is a deeply flawed political system but far better than the alternatives, cash has flaws but so do formal financial institutions. Case after case in the recent and remote past reveal how dangerous banks and other formal financial institutions can be to themselves, their national economy and the global system. Take the Deutsche Bank long practice of devising and offering ‘OFAC-safe’ services to clients doing business with sanctioned countries and entities under US rules. The bank paid a \$250 million fine for this: “From at least 1999 through 2006, Deutsche Bank used non-transparent methods and practices to conduct more than 27,200 U.S. dollar clearing transactions valued at over \$10.86 billion on behalf of Iranian, Libyan, Syrian, Burmese, and Sudanese financial institutions and other entities subject to U.S. economic sanctions, including entities on the Specially Designated Nationals (‘SDN’) List of the U.S. Treasury Department’s Office of Foreign Assets Control (‘OFAC’).” (New York State Department of Financial Services Press Release, November 4th, 2015; available at [www.dfs.ny.gov/about/press/pr1511041.htm](http://www.dfs.ny.gov/about/press/pr1511041.htm)).

In 2014, BNP Paribas pleaded guilty to violating US sanctions (for concealing \$190 billion-worth of dollar-based transactions between 2002 and 2012) and agreed to pay a fine of \$8.97 billion<sup>2</sup>.

In 2012, HSBC paid \$1.9 billion and entered a deferred prosecution agreement for failure to implement adequate anti-money laundering and sanctions violations controls for many years (BBC “HSBC to pay \$1.9bn in US money laundering penalties”, 11<sup>th</sup> December 2012, <http://www.bbc.com/news/business-20673466>).

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<sup>2</sup> See ([www.economist.com/news/finance-and-economics/21606321-frances-largest-bank-gets-fined-evading-american-sanctions-capital-punishment](http://www.economist.com/news/finance-and-economics/21606321-frances-largest-bank-gets-fined-evading-american-sanctions-capital-punishment), [www.nytimes.com/2014/09/28/business/international/bnp-paribas-chairman-to-step-down-as-french-bank-seeks-to-shed-stigma.html](http://www.nytimes.com/2014/09/28/business/international/bnp-paribas-chairman-to-step-down-as-french-bank-seeks-to-shed-stigma.html)).



JPMorgan Chase has been involved in numerous major scandals in the last decade, e.g. it has paid:

- \$13 billion to settle well-documented charges of massive and widespread foreclosure fraud;
- \$296.9 million for lying to investors about the payment status – and hence, the investment quality – of its mortgage-backed securities;
- more than a third of a billion dollars to settle charges that it bilked customers by charging them for credit monitoring services it never provided;
- agreed to pay between \$1.8 billion and \$4.5 billion for illegally foreclosing on American families and throwing them out of their homes;
- another \$56 million for cheating active-duty service members and their families, and for illegally foreclosing on them as well;
- \$228 million for rigging the bidding for 93 municipal bond transactions in 31 states;
- \$410 million to settle charges related to its rigging of electricity prices;
- \$1.2 billion for colluding with credit card companies and other institutions to rig merchants' credit prices;
- two major fines for illegally investing with customers' money.

All in all, JPM has paid \$20 billion in fines in 2013 alone<sup>3</sup>.

The LIBOR rigging scandal involved a number of global banks that colluded and systematically manipulated market rates resulting into billions of dollars in fines:

- Barclays settled its case with authorities for \$435 million (July 2012);
- UBS spaid global regulators a combined \$1.5 billion (December 2012)<sup>4</sup>;
- Rabobank settled charges for over \$1 billion (2013);
- EU regulatory authorities settled their investigation into Barclays, Deutsche Bank, RBS, and Société Générale, fining the latter three banks a combined total of 1.7 billion euro (December 2013); guilty of colluding to manipulate market rates between 2005 and 2008; in exchange for revealing the cartel to regulators, Barclays was not fined; JPMorgan Chase and Citigroup were also fined;
- the total amount of fines paid by Deutsche Bank to U.S. and European regulators was \$3.5 billion;
- Citigroup, JPMorgan Chase, Barclays, Royal Bank of Scotland, and UBS pleaded guilty to criminal charges of manipulating foreign exchange markets, agreeing to pay over \$5 billion to the U.S. Justice Department and

<sup>3</sup> See [www.abc.net.au/news/2013-09-20/jp-morgan-fined-920-million-usd-in-london-whale-trading-scandal/4970068](http://www.abc.net.au/news/2013-09-20/jp-morgan-fined-920-million-usd-in-london-whale-trading-scandal/4970068), [www.commondreams.org/views/2014/01/07/now-we-know-jpmorgan-chase-worse-enron](http://www.commondreams.org/views/2014/01/07/now-we-know-jpmorgan-chase-worse-enron), [www.socialism.com/drupal-6.8/articles/unpacking-jpmorgan-chase-scandals](http://www.socialism.com/drupal-6.8/articles/unpacking-jpmorgan-chase-scandals).

<sup>4</sup> The complaint, led by the U.S. Commodity Futures Trading Commission (CFTC), cited over 2,000 instances of wrongdoing committed by dozens of UBS employees.

other regulators (May 2015); UBS pleaded guilty to additional Libor-related fraud, paying \$203 million in penalties<sup>5</sup>.

Crimes and lawful but awful risk-taking practices were behind the sub-prime mortgage debacle and subsequent major financial crisis that brought the world economy to its knees (Morgenson and Rosner, 2012; Nguyen Tomson and Pontell, 2010). Big US German and French financial institutions were behind the creation and hiding of the disastrous Greek debt<sup>6</sup>, while non-cash bank activities underlie African and other 'odious debt' and assistance to kleptocratic top government officials around the world (e.g., Global Witness, 2009; Willett, 2009).

The list can go on to include Savings and Loans institutions Lloyds, Madoff, Citigroup, Bank of New York, BCCI, Polly Peck International and many other major scandals over the years. Notable also is that the financing of the 9/11 attacks in the US involved no cash transactions: all funds were transferred through formal financial institutions.

So, even if it were feasible to eliminate cash transactions, this would not mean eliminating such consequential and significant risks. As Mastercard Advisors have reported, 85% of global transactions are made in cash and 2.5 billion people have no bank account. This reality is not about to change very fast. It is, moreover, important to note the widespread distrust around the world of both government and banks, partly due to high fees, capital controls, failures and bail-ins. In this context, it is important to recognize in practice the importance of cash and to improve regulatory policy.

### 7.3. FIGHTING TERROR WITH ERROR AND 'DE-RISKING'

Many years of research has pointed out how the regulation of cash-handling remittance operators, Money Service Businesses (MSBs) and related financial intermediaries leaves a lot to be desired. The main findings can be summarized

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<sup>5</sup> See [www.wsj.com/articles/SB121200703762027135](http://www.wsj.com/articles/SB121200703762027135) – *Wall Street Journal* 2008 article [www.bbc.com/news/business-19199683](http://www.bbc.com/news/business-19199683) – Libor: What is it and why does it matter?, BBC, 3 August 2015; [www.cfr.org/united-kingdom/understanding-libor-scandal/p28729](http://www.cfr.org/united-kingdom/understanding-libor-scandal/p28729); Understanding the Libor scandal, Council on Foreign Relations, 21 May 2015; <http://blogs.wsj.com/deals/2012/07/09/who-else-is-under-investigation-for-libor-manipulation/>; Who Else Is Under Investigation for Libor Manipulation?, *WSJ* 9 July 2012, [https://www.washingtonpost.com/business/economy/eu-fines-first-us-banks-in-rate-rigging-scandal/2013/12/04/828468da-5cf6-11e3-95c2-13623eb2b0e1\\_story.html](https://www.washingtonpost.com/business/economy/eu-fines-first-us-banks-in-rate-rigging-scandal/2013/12/04/828468da-5cf6-11e3-95c2-13623eb2b0e1_story.html); *JPMorgan Chase*, Citigroup first U.S. banks to be fined in rate-rigging scandal, *The Washington Post* 4 December 2013, [www.nytimes.com/interactive/2015/04/23/business/dealbook/db-libor-timeline.html#time370\\_10913](http://www.nytimes.com/interactive/2015/04/23/business/dealbook/db-libor-timeline.html#time370_10913); Tracking the Libor Scandal, *NY Times* 3 August 2015; [www.nytimes.com/2015/08/04/business/dealbook/former-citigroup-and-ubs-trader-convicted-in-libor-case.html](http://www.nytimes.com/2015/08/04/business/dealbook/former-citigroup-and-ubs-trader-convicted-in-libor-case.html); Former Citigroup and UBS Trader Convicted in Libor Case, *NY Times* 3 August 2015; [www.businessinsider.com/the-libor-scandal-reveals-the-rotten-heart-of-finance-2012-7](http://www.businessinsider.com/the-libor-scandal-reveals-the-rotten-heart-of-finance-2012-7).

<sup>6</sup> See N. PASSAS, 16 September 2015, TEDx talk: <https://www.youtube.com/watch?v=d4Dj0qdWLnk> and RT 12 November 2015, interview <https://www.youtube.com/watch?v=iTztqULd8M>.

thus: Informal remittance channels furnish vital service but also facilitate serious crime, not unlike banks and other formal financial service providers. Regulation at national and international levels is inconsistent, misapplied, mis-measured, ineffective, costly and counter-productive. Policies have been formed with imperfect knowledge of sectors and networks subject to regulation, independently of industry/community views, and without coordination at national and international levels. Regulation of this sector is necessary but must be proportionate to the risk and appropriate to socio-economic and cultural environments (Passas, 2005, 2006a and b; 2015a).

In 2014, FATF stated that “de-risking refers to the phenomenon of financial institutions terminating or restricting business relationships with clients or categories of clients to avoid, rather than manage, risk in line with the FATF’s risk-based approach”<sup>7</sup>. Cash handling remittance operators have been seriously affected; in practice ‘de-risking’ means the closure of existing accounts or refusal to open new ones for remitting companies and agents catering to ethnic minority/diaspora needs for remittances to extended families in developing countries. The effects are widespread and negative.

It is true that such actions serve to reduce company risk for individual financial institutions as their customer base shrinks, but they increase the systemic risks and create additional externalities. This is because any illicit flows hiding in excluded volumes are merely displaced to other channels, which are harder to monitor. In the meantime, billions of legitimate flows are unduly criminalized or treated as suspicious because remitters turn to other means to support their families in fragile environments. This raises the cost of sending money to the very people who need more options and lower costs for remittance services. As a result, needy regions, communities and families suffer; some may be unable to survive in challenging and conflict-ridden contexts. Moreover, development projects and economic growth are undermined in several countries by the lack of liquidity and investment with dire effects on the banking and other industries. In addition, all this fuels anti-West sentiment, radicalization and violent conflict as well as additional pressures to migrate to Europe or OECD countries in search of economic and security shelter. Because of the quotas and diminished capacity of several countries to welcome refugees fleeing misery and fratricidal violence, this leads to additional criminal markets, animosities, xenophobia and security threats. As a G20 survey found, banks are not even mentioning non-compliance or violations of the money service providers as a top-5 reason for the account exclusion, but rather pressure from regulators, low revenue expectation and lack of confidence in such clients (World Bank, 2015), so risk-reduction is actually not really a main reason for this ‘de-risking’, which produces added risks.

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<sup>7</sup> Available at [www.fatf-gafi.org/publications/fatfrecommendations/documents/rba-and-de-risking.html](http://www.fatf-gafi.org/publications/fatfrecommendations/documents/rba-and-de-risking.html).

Finally, this 'risk-adding' and financial exclusion practice contradicts at the same time efforts to reduce cash transactions, which cannot be achieved by turning millions of clients away from banks.

#### 7.4. INFORMAL REMITTANCES AS A TOOL: HAWALA AND MONITORING CAPACITIES

The operations of informal value and fund transfer systems, such as hawala, have been described in works freely available online (Passas, 1999, 2003b, 2004b). More recent details on hawala routes and transactions of Pakistani and Indian networks (Passas, 2006a; Razavy, 2005) apply to Somali and Afghani as well (Maimbo, 2002; Orozco and Yansura, 2013; Thompson, 2011).

Hawala is a hierarchical network and market in which fund transfers for retail clients are tangential. Hawaladars – active in different occupations and economic sectors – trade and speculate in currency in parallel to their main business. The basic way it works is as follows: migrants or donor organizations wish to send money from point A (e.g. the UK) to point B (e.g. Afghanistan). Importers and other customers want to send money from B to A. Intermediaries collect the money, organize and send payment instructions from each end and execute payment instructions received on a daily basis. Payment instructions contain a reference point for each transaction, as well as data on amount, payer, beneficiary, so if there is a delay or error, hawaladars go back to their records and sort it out.

Delivery can be made at the hawaladar's office, in a bank account or at the beneficiary's doorstep in local or foreign currency. The exchange rate they offer is much better than that of banks, Western Union or money changers. The service is fast, reliable, convenient, cheap and, in some locations, the only option. Recipients can get their money at the speed of a fax and receive their funds even when police confiscate hawala assets. Delivery at the recipient's home benefits women who in parts of the world do not leave their house unaccompanied. Illiteracy and lack of formal ID cards do not block access to this service, which yields more cash to the recipient than any alternative. Even small savings on the transaction cost represent significant amounts to those dependent on these flows for survival and basic expenses.

If the amounts sent from each jurisdiction were the same, there would be no need for either physical or other cross-border funds transfer or currency conversion: pounds of expatriates cover exporters to Afghanistan, for example, while the afghanis of importers are distributed to family recipients in Afghanistan. However, these flows are asymmetrical because people remit to multiple

directions or wish to receive funds in a third country, sometimes on behalf of another client. Account reconciliation between hawaladars occurs at regular intervals and depends on their relationship. If they are family, this may happen irregularly. If they do not know each other well, they may balance accounts weekly. US dollar accounts in the big financial centers (e.g. New York, London, Dubai, Hong Kong, Singapore) are typically used for that purpose.

So, the generic hawala *modus operandi* involves three components: the sending, delivery, and account consolidation and balancing process. As networks evolve and grow, hawaladars engage in arbitrage and shop around for the best dollar, pound, rupee or other currency rates. Consequently, multiple intermediaries get involved adding to the complexity of hawala networks of operators, agents and sub-agents, clients and clients of clients. These counterparties and clients may be traders or service providers (e.g. travel agencies, money changers, corner shops, delicatessen shops, music and import/export business are often involved in hawala).

The more intermediaries join in, the less transparent transactions become to outsiders or government authorities, even in countries where hawala business is authorized. On the other hand, traceability is not lost. On the contrary, because each node of these networks maintains records and knows its immediate counterparts, it is feasible and possibly easier to follow transactions and the money in these networks than in Western financial institutional systems. Despite the mythology of paperlessness in hawala, operators create and keep records. The reason is simple: as retail, payment instructions, delivery and reconciliation transactions take place constantly, there is no other way they can keep track of what they are doing and with whom. It is a commonsense, necessary business routine. At least for the legitimate side of their business, they maintain their records for some time. Illegitimate deals may be entered in a different way or records are destroyed after reconciliation is done, but this would create a red flag for controllers (Passas, 2004a).

For this reason, we need to draw a distinction between transparency (that is, easy access to comparatively mechanized data) and traceability (the ability to find answers to investigative questions by contacting the information-rich nodes of these networks). To the extent these nodes are open to collaboration, this is a great opportunity and low-tech tool for investigators and intelligence collectors, who can trace funds and intermediaries (Cockayne & Shetret, 2012; SIGAR, 2013) and solve important money laundering and terrorism cases.

## 7.5. CONCLUSION

We have seen that non-cash transactions and formal financial institutions have found themselves in the center of risk-generating activities, some of them illegal, some criminal and some lawful but awful in their consequences. Reduction or elimination of cash transactions will do nothing to manage those national and international risks caused by formal institutions mis-behavior. The practice of financial exclusion for whole categories of cash operators, remitters and migrant communities, regions and entire countries yields more crime control, security and developmental problems than it solves. As was argued, instead of de-risking, we should be considering them as risk-adding activities that must be held in check with better regulatory approaches and clearer guidance from the authorities. Finally, informal remitters connecting cash societies with refugee-sheltering and labor importing countries need more context-sensitive regulation on the one hand, and more attention on the monitoring and crime-control opportunities they furnish on the other.

In short, cash itself is not the problem. Informal remittance providers are not riskier than other financial intermediaries, while they may extend a helping hand with better governance and control in financial sectors especially in challenging environments. Hawala is a very good business model that helps communities and can foster development and humanitarian support. When traceability is possible, authorities and banks should take advantage of it rather than squander the opportunity to use such a strategic and operational tool.

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## 8. THE FINANCIAL FLOWS OF TRANSNATIONAL CRIME AND TAX FRAUD

### How much cash is used and what do we (not) know?<sup>1</sup>

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#### Abstract

This chapter has three goals: First, some remarks about money laundering and the use of cash are made. Second, a preliminary review of the empirical findings of the proceeds of transnational crime organizations worldwide and for some developed countries as well as a breakdown of the different types of crime (including cybercrime) proceeds are provided. Third, the illegal cross-border flows of global dirty money (including financial and tax fraud figures) are shown; financial and tax fraud constitutes by far the biggest share (66%) of all illegal transactions. The conclusion of this contribution is that a detailed analysis of the financial proceeds and their sources is crucial in order to reduce the basis of operations of the organized crime organizations.

*Keywords:* Transnational crime organizations, financial proceeds, money laundering, use of cash, illegal cross-border flows, tax fraud figures, infiltration of transnational crime

*JEL-Codes:* C80, C82, H56, K42, O17, Y1

### 8.1. INTRODUCTION

Over the last two decades, the growth of the world economy was quite high and improved the economic well-being all over the globe. However, this development was accompanied by some negative developments as well. Two of these negative processes are the remarkably rising proceeds from (1) international organized crime and (2) financial and tax fraud over the last 25 years. Hence, in this paper, I will deal with two questions:

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<sup>1</sup> An earlier and extended version of this chapter has been published in Friedrich Schneider (2013), "The Financial of Transnational Crime and Tax Fraud in OECD Countries: What do we not know?", *Public Finance Review*, 41/5, September (2013), pp. 677-707.

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- (1) From which sources do international crime organizations get their proceeds, how much cash is used and what do we know about their size and development?
- (2) How large are the proceeds from financial and tax fraud?

Hence, the main focus lies on providing a detailed knowledge about the size of the proceeds from international crime and from financial and tax fraud as well as the share of cash in these proceeds. An attempt is also made to give a preliminary answer about the origin of both types of criminal proceeds (question 1). An analysis of the financial proceeds, their sources and the use of cash is important in order to reduce this illegal income. Hence, my paper will try to meet two objectives: to widen (i) the knowledge of this subject and (ii) the understanding of the main issues of transnational crime. The body of literature on transnational crime is huge and diverse and quite often descriptive. Hence, in this paper only those contributions are summarized, which contain the latest and (hopefully) reliable figures<sup>4</sup>.

This paper is structured as follows: In chapter 2 some methodological remarks about money laundering are made and chapter 3 gives a review of the empirical findings and on the kinds of transnational crime (including cybercrime) proceeds. In section 4 some conclusions and policy recommendations are drawn.

## 8.2. MONEY LAUNDERING – SOME METHODOLOGICAL REMARKS

It is obvious that ‘crime’ or dirty money is laundered. This has the purpose of making dirty money appear legal (compare Walker, 1999, 2007)<sup>5</sup>. There are many methods of money laundering; in table 2.1 according to Unger (2007) and Schneider (2015) the 12 most common methods are shortly explained. Which of these methods is chosen depends on the type of crime activity and on the institutional arrangements in the country where the criminal money is ‘earned’. For example, in the drug business method 8 ‘business ownership’ is quite often used<sup>6</sup>. In big cities quite reasonable amounts of cash are earned by drug dealers in a lot of different places, which they infiltrate into cash intensive operations such as restaurants, which are especially well suited for money laundering purposes, by adding the criminal proceeds to the ‘legal’ turnover of the business. Table 2.1 also shows that in 8 out of the 12 methods cash is dominantly used.

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<sup>4</sup> See for an example Unger (2007), Walker and Unger (2009) and Masciandaro (2004, 2005, 2006), Schneider (2010a,b, 2011, 2013, 2015), UNODC (2010), D’Souza (2012) and Pickhardt and Prinz (2012).

<sup>5</sup> Step one is the earning and collection of the crime money. Step two is to become as rich and influential as possible in the underground and legal world.

<sup>6</sup> Compare Schneider (2004) and Masciandaro (2004).

Quite obviously, when using cash deposits (method 2), cash smuggling (method 4), business ownership (method 8), credit card advance payments (method 11) and ATM operations (12) for money laundering, more or less only cash is involved in these transactions. Only for wire transfers, the purchase of insurance policies, security purchases and the creation of shell corporations cash is of little or no importance. Therefore, cash is quite important for money launderers.

Unger (2007) estimates the amount of laundered money for the top 20 destination countries of laundered money. These figures are shown in table 2.2. In this table two estimates are presented, one by Walker (1999, 2007) and one by the IMF. The Walker figure of 2.85 trillion USD is much larger than the IMF figure of 1.50 trillion USD (both figures are for the year 2005). Walker's figures have been criticized as too high, which was one reason why the IMF estimates are shown, too.

Table 2.2 clearly demonstrates that two thirds of worldwide money laundering are destined for these 20 countries listed. One should realize that most of these countries are highly developed and have quite sizeable legal/official economies, which makes them highly attractive for re-investing the laundered proceeds. What is also amazing is that there are only a few small countries, offshore countries (OFCs) and/or tax havens among them (Cayman Islands, Vatican City, Bermuda and Liechtenstein)<sup>7</sup>. The majority of countries that attract money laundering flows are economically big players. The United States has the largest share in worldwide money laundering of almost 19.0%, followed by the Cayman Islands (4.9%), Russia (4.2%) and Italy (3.7%). However, also smaller countries like Switzerland (2.1% of worldwide money laundering), Liechtenstein (1.7%) and Austria (1.7%) are attractive. If one takes the lower IMF values for Austria, Switzerland and the United Kingdom, about 5.5% of the total amount is laundered in these three countries, which comes close to roughly 10% of their official GDP.

Yet, it needs to be emphasized that it is not clear, whether this money is 'only' laundered in these countries or whether it also remains there. The money may well leave these countries after the laundering process. In general, table 2.2 demonstrates how substantial the amount of laundered money is and that two thirds of these funds are concentrated in only 20 countries.

Bagella *et al.* (2009, p. 881) apply a two-sector dynamic general equilibrium model to measure money laundering for the United States and the EU-15 macro areas over the sample period 2000:01 to 2007:04 at a quarterly basis. Their time

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<sup>7</sup> Compare also Masciandaro (2005, 2006), Zdanowicz (2009), Truman and Reuter (2004), and Walker and Unger (2009).

series are generated through a fully micro-founded dynamic model, which is appropriately calibrated to replicate selected stochastic properties of the two economies (legal and illegal). Their model has a short run perspective. Bagella *et al.* get the following results: First their simulations show that money laundering accounts for approximately 19.0% of the measured GDP in the EU-15, while it accounts for 13.0% in the US economy, over the sample 2000:01 to 2007:04. Second, the simulated size of money laundering appears less volatile than the corresponding GDP. As regards the EU-15 macro area, the simulated statistics suggest that money laundering volatility is one-third of GDP volatility. For the US economy, the same statistics produce a figure of two-fifths. Considering these estimates I admit that they are quite high and I have some doubts about how plausible these large figures are.

In another study Walker and Unger (2009, p. 821) again undertake an attempt to measure global money laundering and/or the proceeds from transnational crime. They criticize the traditional and often used methods such as case studies, proxy variables, or models for measuring the crime economy, arguing that they all tend to overestimate money laundering. They present a theoretically orientated model, which is a gravity one and which makes it possible to estimate the flows of illicit funds from and to each jurisdiction in the world. This “Walker Model” was first developed in 1994, and was updated in 2008/2009. The authors elaborate that their model belongs to the group of gravity models which has recently become popular in international trade theory. The authors argue that the original Walker Model estimates are compatible with recent findings on money laundering. Once the scale of money laundering is known, its macroeconomic effects and the impact of crime prevention, regulation and law enforcement as well as the scale of transnational crime can also be measured. Walker and Unger (2009, pp. 849-850) conclude that their model still seems to be the most reliable and robust method to estimate global money laundering, and thereby the important effects of transnational crime on economic, social and political institutions. Rightly they argue that the attractiveness of the distance indicator in the Walker Model is a first approximation, but is still not theoretically satisfactory. A better micro-foundation for the Walker Model is needed. Micro-foundation here means that the behavior of money launderers is analyzed, in particular the reasons that make them send their money to a specific country. Hence, Walker and Unger (2009, p. 850) conclude that an economics of crime micro-foundation for the Walker Model would mean that, similarly to international trade theory, behavioral assumptions about money launderers should be made. Their gravity model can be seen as a reduced form or outcome of a rational calculus of sending the money to a certain country and potentially making large profits.

## 8.3. TRANSNATIONAL CRIME PROCEEDS<sup>8</sup>

### 8.3.1. Worldwide and Regional Figures

‘Dirty’ money from crime is earned through various underground activities, like drug and weapon dealing as well as human trafficking. How much illicit crime money in all its forms can be observed<sup>9</sup>? The most widely quoted figure for the extent of money laundering criminal proceeds is the IMF consensus range of 2.0% to 5.0% of global GDP in 1998 (compare IMF, 2001 and UNODC, 2011).

In the tables 3.1 and 3.2 the FATF estimates as well as the IMF estimates of worldwide money laundered for a similar period are shown (FATF estimates for 1988 to 2005 and IMF estimates for the period 1996 to 2009). Considering first the FATF estimates, the amount of worldwide money laundering is 2.0% in 1988, which increased to 3.5% in 1996 and decreased again to 3.0% in 2005. The IMF estimates vary between 2.0% and 5.0% over the period 1996 to 2009. In absolute terms the worldwide money laundered increased by 36.0% from 1996 to 2005 and by 33.0% from 2005 to 2009, which is quite a strong increase. These FATF or IMF figures are more or less in a similar range.

In table 3.3 the FATF estimates of global amounts of laundered money up to the year 2009 are shown. The FATF model of global amounts laundered starts with an estimate of drug sales and from this estimate the total amounts laundered from all criminal proceeds are calculated. For the year 2003 the FATF estimate of the total amounts laundered (from all criminal proceeds) is 880 billion USD or 2.4% of world GDP. Extrapolated to the year 2009, the calculation reaches 1.4 trillion USD.

In table 3.4 money laundering by region is shown over the period 2000 to 2005. North and South America have by far the biggest share with 37.8% in 2000, which remains more or less constant up to 2005, with 37.7%. Then the region Asia Pacific follows with a modest increase in the share of money laundering from 29.7% in 2000 to 31.5% in 2005. The share in total money laundering of Europe slightly decreased; it was 27.8% in 2000 (of all money laundered proceeds) and declined to 26.0% in 2005.

In table 3.5 the cross-border flows of global ‘dirty money’ in trillion USD are shown over the period 2000 to 2005 on a worldwide basis. This includes financial and tax fraud money and all money which leaves a country due to some criminal reason. Table 3.5 shows that the overall amount of dirty money

<sup>8</sup> For a detailed analysis see Schneider (2008a, 2008b, 2009, and 2011), Schneider and Windischbauer (2008), Schneider, Dreer and Riegler (2006), and Takats (2009).

<sup>9</sup> Smith (2011) estimates that this amount is 1.5 trillion USD per year. However, these estimates are more guesstimates, because no clear sources are given and, even more importantly, the procedure of calculation is not shown and critically discussed.

laundered varies between 1.1 and 1.6 trillion USD between 2000 and 2005 and increases to 1.7 to 2.5 trillion USD in the year 2009. This is quite a large sum which accounts for a range of 2.9% to 4.3% of the world GDP. Moreover, 10.0%-15.0% of this sum is used in the form of cash. The classical criminal component lies only between 27.0% and 31.0% of the total dirty money. Hence, one clearly realizes that capital flight and tax fraud money is by far the biggest proportion of dirty money<sup>10</sup>.

In table 3.6 the different types of proceeds of transnational crime (time range 2003 to 2009) as well as their shares in total proceeds are shown. Here we have clear-cut results: Drugs are the biggest business with 50.0%, followed by counterfeiting with 39.0%, human trafficking with 5.0% and oil with 2.0%. The proceeds from all other types of crime are much lower. In total we have a sum of approximately 650 billion USD which amounts to 1.1% of global GDP in 2009. The drug business is also the most cash-intensive activity, with a share of cash of 80.0%. Counterfeiting proceeds consist of 30.0% cash, the proceeds from human trafficking of 50.0% cash whereas oil crime activities involve only 10.0% cash.

Finally, in table 3.7 the various estimates or 'guesstimates' of worldwide turnover of organized crime in billion USD are shown. Table 3.7 clearly shows a huge range and it is left to the reader to make his or her own judgment of plausibility. A median of all estimates is 1,900 billion USD for the year 2009 and the average is 2,100 billion USD in 2009 or 3.6% of world GDP. The confidence interval lies between 1,600 and 2,600 billion USD or 2.7% to 4.4%.

### 8.3.2. National Crime Proceeds

In table 3.8 the estimated earnings from criminal activities for the United States are shown over the period 1965 to 2010. Table 3.8 contains two series: estimated criminal income including financial and tax fraud proceeds and estimated criminal income excluding financial and tax fraud proceeds (share of cash in these proceeds on average 40.0%). In absolute figures one observes a strong increase from 49 billion USD in 1965 to 1,043 billion USD in 2010. If one standardizes these figures in percent of GDP, one observes a modest increase up to the year 2000; it was 6.8% in 1965 and 8.0% in 2000, then it decreased to 7.0% in 2010. If one considers the ratio of criminal income in percent of total illicit income (criminal plus financial and tax fraud income), one realizes that classical criminal income ranges between 29.0% in the years 2000 and 2010 and a maximum of 49.0% in 1985. This clearly shows that financial and tax fraud is again by far the largest crime figure in the US<sup>11</sup>.

<sup>10</sup> Compare also Pickhardt and Prinz (2012).

<sup>11</sup> See also Pickhardt and Prinz (2012).

In table 3.9 some figures for Australia are shown. Table 3.9 demonstrates that fraud, drugs and shop lifting are the three biggest types of crime in Australia. In total the criminal proceeds in Australia reached 10.9 billion Australian dollars or 7.1 billion USD in 2003 (minimum estimates) or are in a range between 1.5% (2003) and 2.8% (1998) of Australian GDP. Table 3.9 also provides the cash shares of the different crime activities. Thefts, stealing from persons and burglaries have with 95.0%, 90.0% and 90.0% the largest cash shares, after that follow drug activities and robbery and extortions with a share of cash of 70.0%. The lowest use of cash is demonstrated by fraud and car theft with a cash share of only 30.0%.

Table 3.10 shows the crime proceeds for the Netherlands. Again, the remarkable result shows up that 73.3% of all crime proceeds come from financial, social security and tax fraud, followed by drugs with 12.4% and illegal workers with 3.1%. In the Netherlands crime proceeds are in a range between 11.0 and 19.0 billion euros, which makes up between 2.6% and 4.3% of official GDP. Again also the different cash shares of the various crime activities in the Netherlands are shown. As in Australia, theft and burglary have the highest cash shares with 95.0% and 90.0%, respectively. The drug business and illegal workers have a cash share of 70.0%, prostitution of 60.0% and illegal gambling and copying involves only 30.0% of cash.

Finally, in table 3.11 the crime proceeds of Italy are shown. Crime proceeds from drugs are by far the largest amount with 60.0 billion euros, followed by ecomafia/agromafia activities with 16.0 billion euros and loan sharking with 15.0 billion euros. Total income of crime proceeds is 135.0 billion euros or 8.9% of the Italian GDP, which is a quite high figure. Additionally, table 3.11 shows the share of cash in the different types of organized crime proceeds in Italy. Prostitution with 60.0%-80.0% and arms trafficking with 70.0% are the most cash intensive activities, and then follow theft and robbery with 50.0%-70.0%, as well as drug trafficking, human trafficking and gambling with 50.0%.

### 8.3.3. Costs and Proceeds of Cybercrime – The Latest Development in International Organized Crime

According to Anderson *et al.* (2013), in the last 10-15 years cybercrime has originated from white-collar crimes. In the year 2007 the European Commission defined cybercrime in the following way<sup>12</sup>:

1. traditional forms of crime such as fraud or forgery, though committed over electronic communication, networks and information systems;

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<sup>12</sup> This definition is taken over from Anderson *et al.* (2013, pp. 268); compare also Levi and Suddle (1989) as well as Levi (2009 a,b).

2. the publication of illegal content over electronic media; and
3. crimes unique to electronic networks.

Today, cybercrime takes on many forms, like online banking fraud (phishing), fake anti-virus software, fake computer programs and fake error messages. In a first systematic paper Anderson *et al.* (2013) try to give a survey in measuring the cost of cybercrime and/or the criminal proceeds from some types of cybercrime<sup>13</sup>. Cybercrime is a rather new development and is certainly becoming more and more important. What type of cybercrime costs can one observe? Anderson *et al.* (2013, p. 269) state the following four:

1. costs in anticipation of cybercrime, such as antivirus software, insurance and compliance;
2. costs as a consequence of cybercrime in the form of direct losses and indirect costs, such as weakened competitiveness as a result of intellectual property compromise;
3. costs in response to cybercrime, such as compensation payments to victims and fines paid to regulatory bodies; and
4. indirect costs such as reputational damage to firms, loss of confidence in cyber transactions by individuals and businesses, reduced public-sector revenues and the growth of the underground economy.

These types of costs are shown in figure 3.1, where Anderson *et al.* try to analyze the costs of cybercrime and also some criminal revenues. From figure 3.1 one clearly realizes that criminal revenues or criminal proceeds can be derived from the direct losses of the victims due to cybercrime. Direct losses (or proceeds of national or transnational criminal activities) include:

1. money withdrawn from victims' accounts;
2. stolen software; and
3. faked financial transactions.

What does one know about the costs (and partly proceeds of criminal activities) in the cybercrime area? Anderson *et al.* (2013, pp. 294-295) provide an interesting table (table 3.12) about a first estimation of the costs (and partly proceeds) of the category of cybercrime<sup>14</sup>.

Considering the four cost components (costs of genuine cybercrime, costs of transitional cybercrime, costs of cybercriminal infrastructure, costs of cybercrime against public institutions) in table 3.12 one clearly realizes that component 4

<sup>13</sup> Compare also Detica and Office of Cyber Security and Information Assurance (2011), Kanich, *et al.* (2011), Levi (2011), Levi and Burrwos (2008), Taylor (2011), Van Eeten and Bauer (2008).

<sup>14</sup> In the following table own calculations are added but it originally comes from Anderson *et al.* (2013, pp. 294-295).

“Cost of crime against public institutions (welfare and tax fraud)” becoming ‘cyber’ is by far the largest part covering 67.5% of all costs of cybercrime, which amounts to a sum of 150.2 billion USD on a global estimate. If one further turns to the global estimates of the other components of cybercrime, one realizes that the costs of ‘genuine cybercrime’ on a worldwide basis are 3.5 billion USD or 1.6% of the total costs of cybercrime. The 3.5 billion USD can also be seen as the large part of the proceeds of genuine cybercrime activities. If one considers component 2 “Costs of transitional cybercrime” one realizes that it amounts to 44.2 billion USD or 19.8% of the total costs of cybercrime. With 24.8 billion USD the costs of cybercriminal infrastructure are quite sizable as well; they amount to 11.9% of the total costs. As already said, the costs of traditional crimes becoming cyber are with 150.2 billion USD the largest part of the costs of cybercrime. Again this could at least partly be seen as the criminal proceeds from cybercrime activities in these areas, especially for tax fraud. In general table 3.12 clearly demonstrates that the costs and proceeds of cybercrime activities are sizable. In future they will certainly rise because the use of electronic networks for crime activities becomes more and more attractive.

#### 8.4. SUMMARY AND CONCLUSIONS

In this paper an attempt is made to review the literature on the finances of international crime organizations with a strong focus on estimations of the volume of the finances of transnational crime; this paper comes to the following preliminary findings:

**First**, the necessity of money laundering for transnational crime organizations is obvious as a great number of illegal (criminal) transactions are done by cash. Hence, this amount of cash from criminal activities must be laundered in order to have some ‘legal’ profit for investments or consumption in the legal world.

**Second**, to get an estimate of the extent and development of the amount of the financial means of transnational crime over time is very difficult. On a worldwide basis in 2009 1.4 trillion USD (or 2.5% of world GDP) are estimated to be laundered coming from all types of crimes (UNODC, 2011, pp. 31-32). These figures are very preliminary with a quite large margin of error, but still they give a clear indication of how important money laundering and the turnover of transnational crime nowadays are.

**Third**, tax fraud and/or illegal cross-border capital flows have by far the biggest/highest share in all illegal transactions; quite often 66% of all illegal capital flows/proceeds.



From these preliminary results one can draw five conclusions:

- (1) The proceeds of transnational crime are extremely difficult to estimate scientifically. They are defined differently in almost every country, the measures taken against them are different and vary from country to country and it is not at all clear which part of these revenues from transnational crime stays in a country<sup>15</sup>.  
Hence, we have no or little empirical evidence, whether these dirty or 'white-washed' financial proceeds 'stay' in a country or are transferred to other countries with the consequence of a severe double counting problem.
- (2) To reduce transnational crime activities is very difficult, as there are no efficient and powerful international organizations which cooperate among each other and which can effectively fight against transnational crime<sup>16</sup>.
- (3) It should be the prime target for governments to nationally and internationally reduce tax fraud and/or other illegal cross-border capital flows; e.g. the rigorous fight against tax havens should have high priority.
- (4) Cash is still used in many crime activities because it does not leave traces. A reduction of cash can reduce crime activities as transaction costs rise, but as the profits of crime activities are still very high, the reduction will be modest (10-20% at most!).
- (5) Hence, this paper should be seen as a first attempt in order to shed some light on the grey area of the revenues/proceeds of tax fraud and of transnational crime. We have some knowledge about the use of the proceeds of TOC, but little knowledge of how to successfully reduce it.

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<sup>15</sup> The definition of money laundering considerably varies from country to country; also there are no internationally organized and harmonized efforts to fight money laundering with the result that little has been done so far; compare D'Souza (2012).

<sup>16</sup> Some first attempts have been made, for example by the FATF or by some sub-organizations of the UN, compare e.g. UNODC (2004, 2005), FATF (2004, 2005a,b, 2006); see also D'Souza (2012).

## 8.5. TABLES

Table 2.1: The methods of money laundering and the use of cash

|     |   |   |
|-----|---|---|
| 1)  | <b>Wire transfers or electronic banking</b><br>( <i>no cash</i> )       | The primary tool of money launderers to move funds around in the banking system. These moves can conceal the illicit origins of the funds or just place the money where the launderers need them. Often the funds go through several banks and even different jurisdictions.  |
| 2)  | <b>Cash deposits</b><br>( <i>only cash</i> )                            | Money launderers need to deposit cash advances to bank accounts prior to wire transfers. Due to anti-money-laundering regulations they often 'structure' the payments, i.e. break down large to smaller amounts. This is also called 'smurfing'.  |
| 3)  | <b>Informal value transfer systems (IVTS)</b><br>( <i>mostly cash</i> ) | Money launderers need not rely on the banking sector, other transfer providers, such as the Hawala or Hindi are readily available to undertake fund transfers. These systems consist of shops (mainly selling groceries, phone cards or other similar items), which are also involved in transfer services. IVTSs enable international fund transfers, as these shops are present in several jurisdictions. |
| 4)  | <b>Cash smuggling</b><br>( <i>only cash</i> )                           | Money launderers might mail, Fedex or simply carry cash with them from one region to another, or even to different jurisdictions.   |
| 5)  | <b>Gambling</b><br>( <i>mostly cash</i> )                               | Casinos, horse-races and lotteries are ways of legalizing funds. The money launderer can buy (for 'dirty' cash) winning tickets – or in the case of casinos chips – and redeem the tickets or the chips in a 'clean' bank check. Afterwards, the check can be easily deposited in the banking sector.   |
| 6)  | <b>Insurance policies</b><br>( <i>no cash</i> )                         | Money launderers purchase single premium insurance (with dirty cash), redeem early (and pay some penalty) in order to receive clean checks to deposit. Longer term premium payments might make laundering even harder to detect.  |
| 7)  | <b>Securities</b><br>( <i>no cash</i> )                                 | Usually used to facilitate fund transfers, where underlying security deals provide cover (and legitimate looking reason) for transfers.   |
| 8)  | <b>Business ownership</b><br>( <i>only cash</i> )                       | Money might be laundered through legitimate businesses, where criminal funds can be added to legitimate revenues. Cash-intensive operations, such as restaurants, are especially well suited for laundering.  |
| 9)  | <b>Shell corporations</b><br>( <i>little cash</i> )                     | Money launderers might create companies exclusively to provide cover for fund moves without legitimate business activities.   |
| 10) | <b>Purchases</b><br>( <i>mostly cash</i> )                              | Real estate or any durable good purchases can be used to launder monies. Typically, the item is bought for cash and resold for clean monies, like bank checks.  |

**Table 2.1: The methods of money laundering and the use of cash (continued)**

|     |   |   |
|-----|---|---|
| 11) | <b>Credit card advance payment</b><br>(only cash) | Money launderers pay money in advance with dirty money, and receive clean checks on the balance from the bank   |
| 12) | <b>ATM operations</b><br>(only cash)              | Banks might allow other firms to operate their ATMs, i.e. to maintain and fill them with cash. Money launderers fill ATMs with dirty cash, and receive clean checks (for the cash withdrawn) from the bank. |

Source: Unger (2007, pp.195-196) and own remarks.

**Table 2.2: The amount of laundered money for the top 20 destinations of laundered money, year 2005**

| Rank | Destination    | % of worldwide money laundering | Walker estimate<br>2.85trillion USD<br>Amount in billion USD | IMF estimate of 1.5<br>trillion USD worldwide<br>Amount in billion USD |
|------|----------------|---------------------------------|--|--|
| 1    | United States  | 18.9%                           | 538,145  | 283,500  |
| 2    | Cayman Islands | 4.9%                            | 138,329  | 73,500   |
| 3    | Russia         | 4.2%                            | 120,493  | 63,000   |
| 4    | Italy          | 3.7%                            | 105,688  | 55,500   |
| 5    | China          | 3.3%                            | 94,726   | 49,500   |
| 6    | Romania        | 3.1%                            | 89,595   | 46,500   |
| 7    | Canada         | 3.0%                            | 85,444   | 45,000   |
| 8    | Vatican City   | 2.8%                            | 80,596   | 42,000   |
| 9    | Luxembourg     | 2.8%                            | 78,468   | 42,000   |
| 10   | France         | 2.4%                            | 68,471   | 36,000   |
| 11   | Bahamas        | 2.3%                            | 66,398   | 34,500   |
| 12   | Germany        | 2.2%                            | 61,315   | 33,000   |
| 13   | Switzerland    | 2.1%                            | 58,993   | 31,500   |
| 14   | Bermuda        | 1.9%                            | 52,887   | 28,500   |
| 15   | Netherlands    | 1.7%                            | 49,591   | 25,500   |
| 16   | Liechtenstein  | 1.7%                            | 48,949   | 25,500   |
| 17   | Austria        | 1.7%                            | 48,376   | 25,500   |
| 18   | Hong Kong      | 1.6%                            | 44,519   | 24,000   |
| 19   | United Kingdom | 1.6%                            | 44,478   | 24,000   |
| 20   | Spain          | 1.2%                            | 35,461   | 18,000   |
|      | SUM            | 67.1%                           | 1,910,922  | 1,006,500  |

Source: Unger (2007, p. 80).

**Table 3.1: FATF estimate of worldwide money laundering (1988 to 2005)**

| Estimation of laundered crime proceeds |           |                               |
|--|-----------|-------------------------------|
| Year                                   | in bn USD | As a percentage of global GDP |
| 1988                                   | 340.00    | 2.0%                          |
| 1996                                   | 1,100.00  | 3.5%                          |
| 2005                                   | 2,300.00  | 3.0%                          |

Source: IMF (2001), UNODC (2011, p. 19) and own calculations.

**Table 3.2: IMF estimates of laundered money, worldwide (1996 to 2009)**

| Estimation   | Minimum | Mid-point | Maximum | Increase in % |
|--|---------|-----------|---------|---------------|
| IMF estimates of money laundered as a percentage of global GDP | 2.0%    | 3.5%      | 5.0%    | –             |
| Estimate for 1996 in billion USD                               | 600     | 1,100     | 1,500   | –             |
| Estimate for 2005 in billion USD                               | 900     | 1,500     | 2,300   | 36.0%         |
| Estimate for 2009 in billion USD                               | 1,200   | 2,000     | 2,900   | 33.0%         |

Source: UNODC (2011, p. 19).

**Table 3.3: Updated FATF model of global amounts laundered**

|  |                         |
|--|-------------------------|
| Estimate of drug sales in key markets (1988)                                     | 124 bn USD              |
| As a percentage of global GDP (1988)   | 0.8%                    |
| Estimate of drug sales in key markets (UNODC estimate for 2003)                  | 322 bn USD              |
| As a percentage of world GDP   | 0.9%                    |
| Assumed proportion that is laundered (initial FATF estimate)                     | 66-70%                  |
| Estimate of amounts laundered related to drugs (2003)                            | 220 bn USD              |
| Proportion in % of global GDP (2003)   | 0.6%                    |
| Estimated proportion of drugs in total amounts laundered (initial FATF estimate) | 25.0%                   |
| Estimated total amounts laundered in 2003  | 880 bn USD              |
| As a percentage of GDP   | 2.4%                    |
| <b>Extrapolated to global GDP in 2009</b>  | <b>1.4 trillion USD</b> |

Source: UNODC (2011, pp. 31-32).

**Table 3.4: Annual money-laundering by region, billion USD (2000-2005)**

| Region               | 2000 |        | 2002 |        | 2005 <sup>1)</sup> |        |
|----------------------|------|--------|------|--------|--------------------|--------|
| America              | 313  | 37.8%  | 328  | 38.3%  | 350                | 37.7%  |
| Asia-Pacific         | 246  | 29.7%  | 254  | 29.7%  | 292                | 31.5%  |
| Europe               | 230  | 27.8%  | 234  | 27.3%  | 241                | 26.0%  |
| Middle East / Africa | 38   | 4.6%   | 40   | 4.7%   | 44                 | 4.7%   |
| Total                | 827  | 100.0% | 856  | 100.0% | 927                | 100.0% |
| In % of GDP          | 2.7% |        | 2.6% |        | 2.0%               |        |

<sup>1)</sup> Projection

Source: UNODC (2011, p. 33) and own calculations.

**Table 3.5: Cross-border flows of global 'dirty money' (including financial and tax fraud) in trillion USD, shown as a percentage of average GDP over the 2000-2005 period; cash 10-15% (own calculation)**

| Variable                    | 2000-2005    |               |                          | extrapolated to 2009 |                       |               |
|-----------------------------|--------------|---------------|--------------------------|----------------------|-----------------------|---------------|
|                             | low trillion | high trillion | in % of GDP<br>2000-2005 | low trillion         | mid-point<br>trillion | high trillion |
| Overall amounts laundered   | 1.1          | 1.6           | 2.9%-<br>4.3%            | 1.7                  | 2.1                   | 2.5           |
| of which criminal component | 0.3          | 0.5           | 0.9%-<br>1.5%            | 0.5                  | 0.7                   | 0.9           |

Source: UNODC (2011, p. 34).

**Table 3.6: Proceeds of transnational crime and the use of cash (time range 2003-2009)**

| Kind of Crime                       | billion USD | in % of total<br>proceeds | Sources  |
|-------------------------------------|-------------|---------------------------|--|
| (1) Drugs<br>(cash 80%)             | 320         | 50%                       | UNODC, World Drug Report, Washington D.C., 2005 (data refer to 2003)                                       |
| (2) Counterfeiting<br>(cash 30%)    | 250         | 39%                       | OECD, Magnitude of Counterfeiting and Piracy of Tangible Products, Paris, 2009                             |
| (3) Human trafficking<br>(cash 50%) | 31.6        | 5%                        | P. Belser (ILO), Forced Labor and Human Trafficking: Estimating the Profits, 2005                          |
| (4) Oil<br>(cash 10%)               | 10.8        | 2%                        | GFI estimate based on Baker 2005 (quantities) and US Energy Information Administration (prices: 2003-2010) |

**Table 3.6: Proceeds of transnational crime and the use of cash  
(time range 2003-2009) (continued)**

| Kind of Crime                                   | billion USD | in % of total proceeds | Sources  |
|---|-------------|------------------------|--|
| (5) Wildlife<br>(cash 50%)                      | 7.8-10      | 1.4%                   | GFI estimate based on Francesco Colombo, "Animal Trafficking – A Cruel Billion-Dollar Business", Inter Press Service, September 6, 2003; Coalition Against Wildlife Trafficking, World Wildlife Fund |
| (6) Timber<br>(cash 50%)                        | 7.0         | 1.1%                   | GFI estimate for 2009 based on Wood Resources International, OECD, Paris, various years  |
| (7) Fish<br>(cash 50%)                          | 4.2-9.5     | 1.1%                   | GFI estimate for 2010, based on Norwegian national advisory group against organized IUU-fishing (FFA) and United Nations Food and Agriculture Organization   |
| (8) Art and cultural property<br>(30% cash)     | 3.4-6.3     | 0.8%                   | GFI estimate based on Interpol, International Scientific and Professional Advisory Council of the United Nations Crime Prevention and Criminal Justice Programme                                     |
| (9) Gold  | 2.3         | 0.4%                   | GFI estimate based on estimates from UNODC, 2010 and other sources on illegal gold trade in DRC, South Africa and Peru   |
| (10) Human organs<br>(cash 50%)                 | 0.6-1.2     | 0.1%                   | GFI estimate based on United Nations   |
| (11) Small arms and light weapons<br>(cash 70%) | 0.3-1.0     | 0.1%                   | GFI estimate based on Small Arms Survey and UNODC  |
| (12) Diamonds and coloured gemstones            | 0.9         | 0.1%                   | GFI estimate for 2009 based on UN, Kimberley Process: Rough Diamond Statistics and US Geological Survey  |
| Total (1)-(12)<br>(midpoint estimates)          | 645         | 100.0%                 | Own calculations   |
| Total (1)-(12) rounded                          | 650         | –                      | Own calculations   |
| In % of global GDP in 2009                      | 1.1%        | –                      | Own calculations   |
| In % of average global GDP, 2000-2009           | 1.5%        |                        | Own calculations   |

Source: UNODC (2011, p. 36) and own remarks.

**Table 3.7: Estimates of worldwide turnover of organized crime, billion USD and as a percentage of GDP**

| Origin/study   | Year      | Volume in bill USD (worldwide) | as a percentage of global GDP |
|--|-----------|--------------------------------|-------------------------------|
| M. Schuster  | 1994      | 500-800                        | 0.9%-3.0%                     |
| International Monetary Fund and Interpol                             | 1996      | 500                            | 1.6%                          |
| UN estimates   | 1994/98   | 700-1,000                      | 2.4%-3.4%                     |
| S. Kerry   | 1997      | 420-1,000                      | 1.4%-3.3%                     |
| J. Walker  | 1998      | 2,850                          | 9.5%                          |
| National Criminal Intelligence Service                               | 1998      | 1,300                          | 4.3%                          |
|  | 2001      | 1,900                          | 5.9%                          |
|  | 2003      | 2,100                          | 5.6%                          |
| E. Takats (2009)   | 2005      | 600-1,500                      | 1.3%-3.3%                     |
| J.D. Agarwal and A. Agarwal (2006)                                   | 2005      | 2,000-2,500                    | 4.4%-5.5%                     |
| Global Financial Integrity (2011) (estimate for transnational crime) | 2000-2009 | 650                            | 1.5%                          |
| J. Walker (based on J. Walker and B. Unger) (2009)                   | 2001      | 1,000                          | 3.4%                          |
| Median of all estimates <sup>1)</sup>                                | 2009      | 1,900                          | 3.3%                          |
| Inter-quartile range of all estimates <sup>1)</sup>                  | 2009      | 1,500-2,400                    | 2.6%-4.1%                     |
| Average of all estimates <sup>1)</sup>                               | 2009      | 2,100                          | 3.6%                          |
| Confidence interval of the mean (95%) <sup>1)</sup>                  | 2009      | 1,600-2,600                    | 2.7%-4.4%                     |

<sup>1)</sup> Extrapolated to global GDP in 2009

For exact sources of the individual estimates see UNODC (2011, p. 38).

Source: adapted from UNODC (2011, p. 38).

**Table 3.8: Estimated earnings from criminal activity<sup>1)</sup> in the United States, billions of current USD (1965-2010)**

| Year               | Financial and tax fraud included |             | Criminal income ( <i>financial and tax fraud excluded</i> )<br>(average cash 40%) |                     | Ratio of criminal income in total illicit income |
|--------------------|----------------------------------|-------------|---|---------------------|--|
|                    | Estimated criminal income        | in % of GDP | Estimated criminal income   | in % of GDP         |  |
| 1965               | 49                               | 6.8%        | 18  | 2.5%                | 37%  |
| 1970               | 74                               | 7.1%        | 26  | 2.5%                | 35%  |
| 1975               | 118                              | 7.2%        | 45  | 2.7%                | 38%  |
| 1980               | 196                              | 7.0%        | 78  | 2.8%                | 40%  |
| 1985               | 342                              | 8.1%        | 166   | 4.0%                | 49%  |
| 1990               | 471                              | 8.1%        | 209   | 3.6%                | 44%  |
| 1995               | 595                              | 8.0%        | 206   | 2.8%                | 35%  |
| 2000               | 779                              | 8.0%        | 224   | 2.3%                | 29%  |
| 2010 <sup>2)</sup> | 1,043                            | 7.0%        | 300<br>(235-350)  | 2.0%<br>(1.6%-2.3%) | 29%  |

<sup>1)</sup> Criminal activities included: trafficking in illicit drugs, human trafficking, burglary, larceny-theft, motor vehicle theft, robbery, fraud, arson, non-arson fraud, counterfeiting, illegal gambling, loan sharking and prostitution. Tax evasion crimes included federal income, federal profits and excise tax evasion.

<sup>2)</sup> Tentative UNODC estimate based on previous estimates and trends derived from new drug and crime data.

Source: UNODC (2011, p. 20) and own remarks.

**Table 3.9: Estimated criminal proceeds in Australia, million AUD (1998 and 2003)**

| Illegal Activities                                | 2003 (revised estimates) |       | Mid-point estimates in % of GDP |             |
|---|--------------------------|-------|---------------------------------|-------------|
|   | min.                     | max.  | 1998                            | 2003 (rev.) |
| (1) Fraud (30% cash)                              | 3,000                    | 3,500 | 1.8%                            | 0.4%        |
| (2) Drugs (70% cash)                              | 2,000                    |       | 0.2%                            | 0.3%        |
| (3) Theft (95% cash)                              |                          |       | 0.3%                            |             |
| (4) Shoplifting (50% cash)                        | 1,020                    | 2,460 |                                 | 0.2%        |
| (5) Car theft (30% cash)                          | 654                      |       |                                 | 0.1%        |
| (6) Stealing from persons (90% cash)              | 545                      |       |                                 | 0.1%        |
| (7) Other theft (50% cash)                        | 659                      |       |                                 | 0.1%        |
| (8) Burglaries (breaking and entering) (90% cash) | 1,193                    |       | 0.2%                            | 0.2%        |
| (9) Assaults                                      | 979                      |       | 0.1%                            | 0.1%        |
| (10) Homicide                                     | 323                      |       | 0.0%                            | 0.0%        |



**Table 3.9: Estimated criminal proceeds in Australia, million AUD  
(1998 and 2003) (continued)**

| Illegal Activities                    | 2003 (revised estimates) |        | Mid-point estimates in % of GDP |             |
|---------------------------------------|--------------------------|--------|---------------------------------|-------------|
|                                       | min.                     | max.   | 1998                            | 2003 (rev.) |
| (11) Property damage                  | 510                      |        | 0.2%                            | 0.1%        |
| (12) Robbery and extortion (70% cash) | 37                       |        | 0.0%                            | 0.0%        |
| Total (1)-(12) in million AUD         | 10,920                   | 12,860 | 2.8%                            | 1.5%        |
| Total (1)-(12) in million USD         | 7,100                    | 8,300  |                                 |             |
| In % of GDP                           | 1.4%                     | 1.6%   |                                 |             |

Source: adapted from UNODC (2011, p. 24) and own remarks.

**Table 3.10: Estimated unlawful earnings in the Netherlands, million EUR (2003)**

| Type of Crime  | Proceeds of crime, million € | Proceeds of crime Mid-point estimates in % of total |
|--|------------------------------|---|
| (1) Financial, social security and tax fraud <sup>1)</sup> | 7,735 – 15,450               | 73.3%   |
| (2) Drugs (cash 70%)                                       | 1,960                        | 12.4%   |
| (3) Illegal workers (cash 70%)                             | 490                          | 3.1%  |
| (4) Prostitution (cash 60%)                                | 460                          | 2.9%  |
| (5) Theft (cash 95%)                                       | 345                          | 2.2%  |
| (6) Burglary (cash 90%)                                    | 340                          | 2.1%  |
| (7) Fencing  | 190                          | 1.2%  |
| (8) Illegal gambling (cash 30%)                            | 130                          | 0.8%  |
| (9) Illegal copying (cash 30%)                             | 90                           | 0.6%  |
| (10) Computer-crime  | 26                           | 0.2%  |
| (11) Violent offences                                      | 6                            | 0.0%  |
| (12) Other offences  | 187                          | 1.2%  |
| Total (1)-(12) in million EUR                              | 11,959-19,674                |   |
| Total (1)-(12) in million USD                              | 13,500-22,300                |   |
| As a percentage of GDP                                     | 2.6%-4.3%                    |   |

<sup>1)</sup> Based on the assumption that between 5% and 10% of the total amounts were discovered and reported.

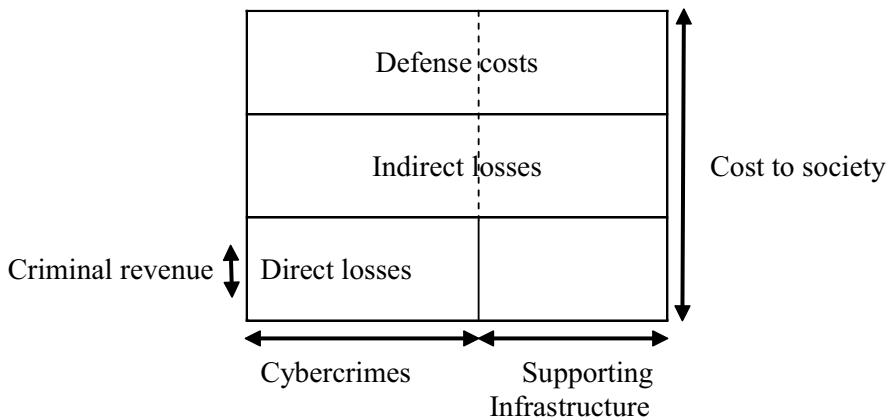
Source: Unger (2007, p. 66) and own remarks.

**Table 3.11: Estimates of the income and profits of organized crime in Italy (2009)**

| Income  | In billion EUR                   |               |
|---|----------------------------------|---------------|
|   | (1) Trafficking drugs (50% cash) | 60.00         |
| (2) Trafficking in human beings (50% cash)      | 0.87                             |               |
| (3) Arms trafficking (70.0% cash)               | 5.80                             |               |
| (4) Smuggling                                   | 1.20                             |               |
| Subtotal trafficking (1)-(4)                    |                                  | 67.87         |
| (5) Protection racket                           | 9.00                             |               |
| (6) Loan sharking (usury)                       | 15.00                            |               |
| Subtotal, predatory activities' (5)+(6)         |                                  | 24.00         |
| (7) Theft and robbery (cash 50-70%)             | 1.00                             | 1.00          |
| (8) Procurement                                 | 6.50                             |               |
| (9) Agro-crime                                  | 7.50                             |               |
| (10) Games and gambling (50.0% cash)            | 2.50                             |               |
| (11) Counterfeiting                             | 6.50                             |               |
| (12) Illegal construction                       | 2.00                             |               |
| Subtotal – illegal economic activities (7)-(12) |                                  | 25.00         |
| (13) Ecomafia/agromafia                         | 16.00                            | 16.00         |
| (14) Prostitution (cash 60-80%)                 | 0.60                             | 0.60          |
| (15) Financial gains                            | 0.75                             | 0.75          |
| <b>Total income in bn EUR (1)-(15)</b>          | <b>135.22</b>                    | <b>135.22</b> |
| <b>Total income in bn USD (1)-(15)</b>          |                                  | <b>188.58</b> |
| <b>Total income in % of GDP</b>                 |                                  | <b>8.9%</b>   |

Source: adapted from UNODC (2011, p. 26) and own remarks.

**Figure 3.1: Framework for analyzing the costs of cybercrime**



Source: Anderson et al. (2013, p. 270)

Table 3.12: An estimation of the various cost components (partly proceeds) of cybercrime

| Type of cybercrime                              | UK estimate (in bn USD) | Global estimate (in bn USD) | Reference period | Criminal revenue | Direct losses  | Indirect losses | Defense cost   |
|---|-------------------------|-----------------------------|------------------|------------------|----------------|-----------------|----------------|
| <b>1. Cost of genuine cybercrime</b>            |                         |                             |                  |                  |                |                 |                |
| Online banking fraud                            |                         |                             |                  |                  |                |                 |                |
| – phishing                                      | 0.016                   | 0.32                        | 2007             | x <sup>2</sup>   | x <sup>2</sup> |                 |                |
| – malware (consumer)                            | 0.004                   | 0.07                        | 2010             | x†               | x†             |                 |                |
| – malware (businesses)                          | 0.006                   | 0.20                        |                  | x†               | x†             |                 |                |
| – bank tech. countermeasures                    | 0.050                   | 1.00                        | 2010             |                  |                |                 | x <sup>2</sup> |
| Fake antivirus                                  | 0.005                   | 0.10                        | 2008-10          | x‡               | x‡             |                 |                |
| Copyright-infringing software                   | 0.001                   | 0.02                        | 2010             | x‡               | x‡             |                 |                |
| Copyright-infringing music etc.                 | 0.007                   | 0.15                        | 2011             | x†               |                |                 |                |
| Patent-infringing pharma                        | 0.014                   | 0.29                        | 2010             | x                |                |                 |                |
| Stranded traveler scam                          | 0.001                   | 0.01                        | 2011             | x†               |                |                 |                |
| Fake escrow scam                                | 0.010                   | 0.20                        | 2011             | x†               |                |                 |                |
| Advance-fee fraud                               | 0.050                   | 1.00                        | 2011             | x†               |                |                 |                |
| <b>SUM of 1 in bn USD (in % of total costs)</b> | <b>0.164 (0.9%)</b>     | <b>3.50 (1.6%)</b>          |                  |                  |                |                 |                |
| <b>2. Cost of transitional cybercrime</b>       |                         |                             |                  |                  |                |                 |                |
| Online payment card fraud                       | 0.21                    | 4.20                        | 2010             |                  | (x)            |                 |                |
| Offline payment card fraud                      |                         |                             |                  |                  |                |                 |                |
| – domestic                                      | 0.11                    | 2.10                        | 2010             |                  | x†             |                 |                |
| – international                                 | 0.15                    | 2.94                        | 2010             |                  | x†             |                 |                |
| – bank / merchant defense costs                 | 0.12                    | 2.40                        | 2010             |                  |                |                 | x†             |
| <b>Indirect costs of payment fraud</b>          |                         |                             |                  |                  |                |                 |                |
| – loss of confidence (consumers)                | 0.70                    | 10.00                       | 2010             |                  |                | x <sup>2</sup>  |                |
| – loss of confidence (merchants)                | 1.60                    | 20.00                       | 2009             |                  |                | x <sup>2</sup>  |                |

Table 3.12: An estimation of the various cost components (partly proceeds) of cybercrime (*continued*)

| Type of cybercrime  | UK estimate (in bn USD) | Global estimate (in bn USD) | Reference period | Criminal revenue | Direct losses  | Indirect losses | Defense cost   |
|---|-------------------------|-----------------------------|------------------|------------------|----------------|-----------------|----------------|
| PABX fraud  | 0.19                    | 4.96                        | 2011             | x <sup>4</sup>   | x <sup>†</sup> |                 |                |
| <b>SUM of 2 in bn USD (in % of total costs)</b>           | <b>3.07 (6.7%)</b>      | <b>44.20 (19.8%)</b>        |                  |                  |                |                 |                |
| <b>3. Cost of cybercriminal infrastructure</b>            |                         |                             |                  |                  |                |                 |                |
| Expenditure on antivirus                                  | 0.17                    | 3.40                        | 2012             |                  |                |                 | x <sup>4</sup> |
| Cost to industry of patching                              | 0.05                    | 1.00                        | 2010             |                  |                |                 | x <sup>2</sup> |
| ISP clean-up expenditures                                 | 0.00                    | 0.04                        | 2010             |                  |                | x <sup>2</sup>  |                |
| Cost to users of clean-up                                 | 0.50                    | 10.00                       | 2012             |                  |                | x <sup>2</sup>  |                |
| Defense costs of firms generally                          | 0.50                    | 10.00                       | 2010             |                  |                |                 | x <sup>2</sup> |
| Expenditure on law enforcement                            | 0.02                    | 0.40                        | 2010             |                  |                |                 | x <sup>4</sup> |
| <b>SUM of 3 in bn USD (in % of total costs)</b>           | <b>1.24</b>             | <b>24.84 (11.9%)</b>        |                  |                  |                |                 |                |
| <b>4. Costs of cybercrime against public institutions</b> |                         |                             |                  |                  |                |                 |                |
| Welfare   | 1.90                    | 20.00                       | 2011             | x <sup>4</sup>   | (x)            |                 |                |
| Tax fraud   | 12.00                   | 125.00                      | 2011             | x <sup>2</sup>   | (x)            |                 |                |
| Tax filing fraud  | --                      | 5.20                        | 2010             | x <sup>4</sup>   | (x)            |                 |                |
| <b>SUM of 4 in bn USD (in % of total costs)</b>           | <b>13.90 (75.7%)</b>    | <b>150.20 (67.5%)</b>       |                  |                  |                |                 |                |
| <b>SUM of 1 – 4 in bn USD (in % of total costs)</b>       | <b>18.37 (100%)</b>     | <b>222.70 (100%)</b>        |                  |                  |                |                 |                |

Source: Anderson *et al.* (2013, pp. 294-295)

Estimating costs and scaling: Figures in boldface are estimates based on data or assumption for the reference area. Unless both figures in a row are bold, the non-boldface figure has been scaled using the UK's share of world GDP unless otherwise stated in the main text. Extrapolations from UK numbers to the global scale should be interpreted with utmost caution. A threshold to enter this table is defined at \$10m for the global estimates. Legend: x: included, (x): partly converted; with qualifiers x<sup>†</sup> for likely over-estimated, x<sup>‡</sup> for likely underestimated, and x<sup>2</sup> for high uncertainty.

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## 9. GETTING RID OF CASH?

### Some monetary policy considerations

*Jens Ulbrich<sup>1</sup>*

There are several arguments in favour of abolishing paper currency which have nothing to do with monetary policy: Some expect in a cashless world tax-evading or other criminal activities would be dampened. However, one important line of argumentation rests on specific monetary policy concerns: In a world without notes and coins electronic deposits cannot be converted into zero-interest paper currency anymore; i.e. hoarding of paper money would not be possible. In this world the issue of the Zero Lower Bound (ZLB) of interest rates in monetary policy would disappear. Finally, the discussion about raising inflation targets in order to minimise the negative risk to hit the ZLB would be superfluous, too.

Defenders of cash doubt that without cash criminal activities would be reduced. Moreover, cash usage is higher the older and the less-well educated people are. Thus, removing cash would mostly hurt those who usually receive support by government policies. There is also a risk that deliberately eliminating cash would lead to an erosion in the confidence in our monetary system.

Whatever the balance of these arguments is, it is clear that the case against cash would be less powerful if monetary policy would not be powerful at the ZLB.

Does the ZLB constrain MP reaction in response to a negative shock? Figure 1 shows impulse responses of inflation and output for a given negative demand shock. A negative demand shock decreases output and inflation. The central bank sets the policy rate by following a Taylor-type rule. The red line describes impulse responses derived from a model that is solved without any constraints on the policy reaction function of the central bank. In contrast, the blue line describes impulse responses derived from a model that is solved subject to the zero lower bound constraint. It is obvious that the shock produces more damaging effects under a ZLB constraint. This leads to a higher overall volatility in inflation and output because the central bank cannot reduce the real rate anymore at the ZLB by using its standard instrument<sup>2</sup>.

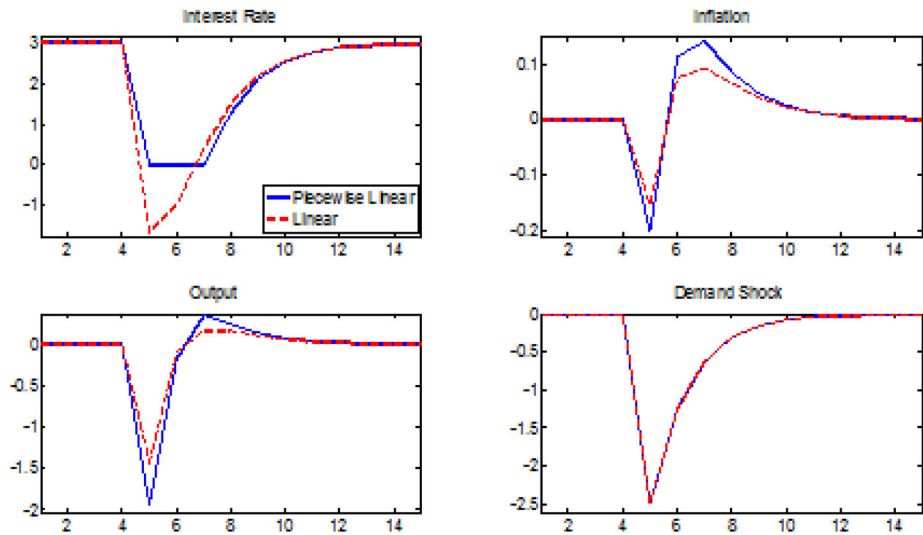
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<sup>1</sup> Head of Economics Department, Deutsche Bundesbank.

<sup>2</sup> To solve the underlying model (here: Clarida/Gali/Gertler 3eq model - including IS equation, Phillips curve, Taylor rule) we used a procedure developed by GUERRIERI & IACOVIELLO ("OccBin: A toolkit for solving dynamic models with occasionally binding constraints easily", *Journal of Monetary Economics*, 2015). They implement a so called piecewise linear procedure, to account for some aspects of the full nonlinear solution of the model.

There have been various proposals to overcome the ZLB, the most radical being the abolition of cash. All large central banks, however, have introduced a variety of unconventional monetary policy measures in fighting the fall-out of the crisis over the past years. The most prominent approach was the direct purchase of long-term bonds, a policy known as Quantitative Easing (QE). What do we know about its effectiveness?

Figure 1. Can monetary policy fulfill its mandate at the effective lower bound?  
An illustration.



Source: Own calculations based on Occbin (Guerrieri & Iacoviello, 2015)

The goal of QE is the stimulation of economic activity through additional channels:<sup>3</sup>

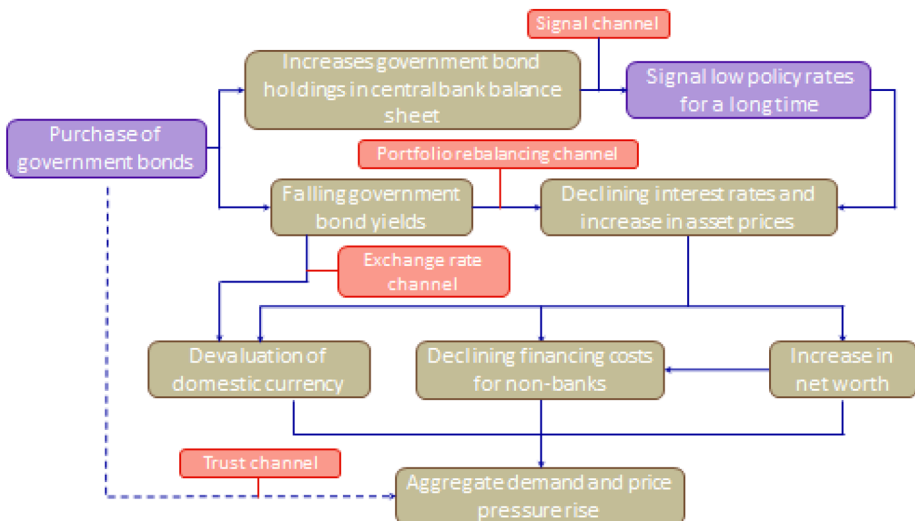
1. Signalling channel: By implementing an asset purchase program, the central bank sets a signal to pursue an expansionary policy stance for a longer period of time. Market participants can adjust their expectations of the future interest rate path (possibly at the zero lower bound). According to expectations hypothesis, this will also reduce the long-term yields. Thus, the signalling channel affects the entire yield curve.

<sup>3</sup> This means that the strict conditions of the Wallace irrelevance theorem do not hold. This theorem postulates that purchases of government bonds do not have an impact on the economy. It relies on the following assumptions: a) The assets in question are valued only for their pecuniary returns – they may not be perfect substitutes from the standpoint of investors, owing to different risk characteristics, but not for any other reason, and b) that all investors can purchase arbitrary quantities of the same assets at the same (market) prices, with no binding constraints on the positions that any investor can take, other than her overall budget constraint. Thus, if investors have heterogeneous preferences on bonds they do not hold assets only for their pecuniary returns.

2. Portfolio adjustment channel: based on the “preferred habitat” hypothesis. When investors have heterogeneous preferences for bonds with different characteristics (e.g. different maturities), different bonds will therefore only be partly substitutable. The purchase of bonds will then affect long-term returns (more precisely the term premium) via two channels:
  - 2.1. Investors with special preference for these long-term bonds will be willing to pay a higher price. This lowers both the yield on this class of bonds as well as the return on close substitutes (scarcity channel)
  - 2.2. Purchases of bonds will reduce the average maturity of investors’ portfolios. As a consequence, the interest rate risk tends to decrease (duration channel).

There are also other effects at work, e.g. general trust and the exchange rate. Figure 2 documents in a highly stylised way the main transmission channels.

Figure 2. Is cash putting a brake on monetary policy?  
Open market operations in long-term bonds.



What do we know about the quantitative effects of the QE programs implemented by major central banks? Without any doubt the uncertainty surrounding available estimates is large, arguably much larger than for the traditional interest rate instruments in normal times. However, despite visible estimation ranges the general result is, that QE programs have stimulated the economy in the desired direction.

This is not to say, that QE policies do not have also their problems. Buying government bonds intensifies the relationship between monetary and fiscal policies in making central banks the largest creditors of their respective governments. An additional layer of complexity might be seen in a monetary union without a central fiscal actor. All these arguments constitute possible negative side effects of QE. However, they do not cast into doubt the principle effectiveness as a monetary policy tool at the ZLB.

Thus, the simple argument that monetary policy is powerless at the ZLB is unfounded. This is another argument against the radical solutions to abolish cash.

Figure 3. Estimates of QE effects in UK and US

| Study                           | Episode                      | Real GDP      | CPI          |
|---------------------------------|------------------------------|---------------|--------------|
| Baumelster and Benati (2012)    | UK/US QE1                    | 1.8% / 1.08%  | 1.5% / 0.84% |
| Kapetanios et al. (2012)        | UK QE1                       | 2.5%          | 1.5%         |
| Weale and Wieladek (2016)       | UK/US QE1                    | 3.08% / 1.12% | 4.2% / 1.2%  |
| Sohenkelberg and Watzka (2013)  | Japan QE1                    | 0.5% in IP    | No impact    |
| Bank of Japan (2016)            | Japan QE2                    | 1-3%          | 0.6-1%       |
| Chen, Curdia and Ferrero (2012) | US QE2                       | 0.39%         | 0.12%        |
| Del Negro et al. (2016)         | Fed MBS + Liquidity policies | 5%            | 3%           |
| Bertler and Karadi (2013)       | QE1 – Sovereign Purchases    | 2.2%          | 3%           |

Source: Haldane (2015)

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