Institute
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of Actuaries

A Cashless Society

Benefits, Risks and Issues (Interim Paper)

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Executive Summary

The Institute and Faculty of Actuaries (IFoA) is the UK's chartered professional body dedicated to educating, developing and regulating actuaries based both in the UK and internationally. The Institute promotes and supports a wide range of research and knowledge exchange activities with members, external stakeholders and international research communities.

This is the interim report from a volunteer working party sponsored by the Finance & Investment board at the IFoA, focusing on the "Cashless Society- Benefits and Consequences". Initiated on the backdrop of a demonetisation announcement in India in late 2016, a working group set out some original questions, yet soon revealed numerous layers of implications for the topic, as it grew its awareness about international developments.

Volunteers discovered the lack of a fundamental, neutral and holistic reflection on the cashless society, or one that pulls together the various strands of the argument from specialist organisations, as well as international events. This appeared all the more important as increased international media coverage exposed polarised opinions on the desirability to move towards a cashless society that appears to be already happening by stealth in many countries.

The rapid pace of change around the world has encouraged the group to communicate its initial findings, so the readership may reflect on the themes and developments in the first semester of 2017. This will lead to further engagement and discussions involving a broader range of stakeholders. This paper discusses sensitive topics and explores unique perspectives.

The digital economy and its nascent financial technology innovations prompt a review of the definition of money and its functions. A first section explores what seems to be replacing cash, defining and categorising a wide range of "new means of payments". It extends into the world of Digital Currencies, with associated technologies such as Blockchain. The theme expands into a focused Bitcoin case study, and explores potential for Central Bank Currencies.

The paper then considers the potential benefits of a cashless society. Cash is an expensive business, from production to handling. Going cashless may also prevent some illegal immigration, and help reduce or resolve the tax gap and expose the associated shadow economy. Potential benefits and limitations in tackling various crimes and frauds point to the "Increase in Notes In Circulation" paradox and its multiple attempted explanations. In the context of a cashless society, meaning a total removal of cash, alternative tax reform such as an Automated Payment Transaction Tax may have potential.

Media coverage for various related events has revealed a number of sensitive topics, leading to extreme opinions, as well as resistance towards the removal of cash. We define, discuss and offer potential mitigations and solutions for 20 key risks and issues, and propose that these lay at the core of evolution towards a cashless society.

The group then chose to focus on specific areas of interest. The potential of a cashless society to enable Negative Interest Rate Policies is a relevant topic for all economists, and derives its existence from a totally cashless economy. This section analyses the mechanisms and impacts on deposit-taking banks, the economy in general, the poor, and discusses considerations for life insurers and pension schemes.

A digital and cashless economy risks financial exclusion if the interests of the poor are not addressed. The glass is half-empty in western economies where technology can disrupt the social fabric by stealth. The glass is half-full in geographies such as Kenya where technology has been an enabler for financial inclusion for 10 years: a case study explores the impacts of M-Pesa.

The above draws us to a key point: the potential benefits or otherwise of a cashless society depends on the eye of the beholder. A Strength/ Weaknesses/ Opportunities/ Threats analysis offers an opportunity to comprehend polarised opinions taken from the point of view of different stakeholders. This section proposes that stakeholder management lies at the core of any successful future transition.

International events for the topic have underpinned many of the questions the group raised in the earlier parts of this interim report. Observations in the first semester of 2017 suggest the "cashless world is in motion". This section outlines key topics per geographical region, identifies countries with relevant developments during the study period and focuses on some countries of specific interest, such as Sweden, the USA, the UK, Nigeria, Kenya, Australia, India and China.

The international section provides extensive observations for the key aspects of a cashless society: strategic questions, various types of fraud, data and physical crime, the cost of money, digital currencies, macro and micro-economics, financial inclusion, legal & regulatory frameworks, payment systems & technology, politics and data privacy. It also identifies key areas impacting future transitions towards a cashless society, to be further analysed in a future report.

Regional analysis unveiled key differences in the drivers for a cashless society. In western countries, convenience mainly drives a natural evolution towards cashlessness, with contactless payments now impacting trends on low transaction values, historically the ground for cash transactions. There seems to be little political interest in removing cash, other than high denomination notes in the fight against terrorism, tax evasion and corruption.

Meanwhile, Africa has become a mobile payments innovation powerhouse, out of a necessity to equip the unbanked with a means of payments. In Asia, India's latest demonetisation exercise was aimed at restructuring the economy for a sustainable future, with corruption and tax collection in mind. In China and elsewhere in Asia, the digital economy and associated investments in infrastructure and payment systems, designed with financial inclusion in mind, drive cashless transactions. Innovations in Africa and Asia are now exporting to the western world.

Key take-away

A cashless society and its underpinning digital economy should open opportunities for most stakeholders in many economies, including the financially excluded. Yet the topic is divisive due to clashing stakeholder interests that lead this group to raise the importance of addressing substantial risks and issues for successful transition.

The working party will explore further themes in the next phase of study, including considerations for transition, legal & regulatory frameworks, and seek to expand knowledge on South America.

The group looks forward to further engagement from interested parties, including stakeholders and volunteers to continue the study.

Key findings

- ✓ Cash management activities have a substantial economic impact: they account for circa 0.5% of GDP in western countries, and as much as 3% in India.
- ✓ Potential savings in tax evasion are difficult to quantify, though estimated to be in excess of £6bn pa in the UK economy.
- ✓ A totally cashless economy presents opportunities in economic management, including NIRP, Monetary control, Central Bank Currencies and new taxation systems.
- ✓ The topic polarises opinions: substantial risks and issues threaten successful transition to a digital economy (the Internet of Things, dubbed the 4th industrial revolution) and its resulting cashless society.
- ✓ The strength of the argument in favour of a cashless society seems inversely proportional to the stage of economic development: western countries are cautious. The glass is half-empty in western economies where technology can disrupt the social fabric by stealth. The glass is half-full in geographies such as Kenya where technology has been an enabler for financial inclusion for 10 years.
- ✓ The Western World may have lost the lead on Fintech innovation: Africa has leapfrogged into a mobile innovation powerhouse in order to jump start economic development. Asia Pacific leads the digital economy drive and innovations on digital currencies, leading to a rise in cashless transactions.
- ✓ The potential benefits or otherwise of a cashless society depend on the eye of the beholder. This paper proposes that stakeholder management lies at the core of any successful future transition.

Keywords

cashless society; cashless transactions; de-cashing; cashlessness; risks and issues of a cashless society; demonetization; demonetisation; digital economy; virtual currencies; central bank digital currencies; digital currency; digital money; blockchain; bitcoin; cryptocurrency; bank payments society; Fintech; financial technology; cash and crime; tax evasion; cash and tax evasion; cash and fraud; tax gap; APT tax; removal of cash; NIRP; local currency; financial exclusion; financial inclusion; benefits of a cashless society; SWOT analysis; stakeholders in a cashless society; Sweden cashless; USA cashless; UK cashless ; Europe cashless; EU cashless; Nigeria cashless; Kenya cashless; Australia cashless; India cashless; China cashless; Africa cashless; APAC cashless; Asia Pacific cashless; North America cashless; mobile payments; mobile money; contactless payments; cash transactions; high denomination notes; the unbanked; means of payments; payment systems; cost of cash; cost of money; payments ecosystem; contactless donation boxes; cashless charity fund raising; shadow economy; hidden agendas; trust in banks; trust in governments; the economics of money; digital economy readiness; cashless change leadership; security of transactions data and biometrics; security; social value of cash; economic activity; promises of a cashless society; alternative means of payment; totalitarian regime; sovereignty risks; private life; innovation marketplace; payments user experience; payments market; reliance on technology; politics versus innovation; financial stability; ATM; payment automation; QR codes; interoperability; digital infrastructure; mobile wallets; digital disruption; card payments; UAE cashless; Israel cashless; Malabar cashless; Ghana cashless; Malawi cashless; Rwanda cashless; Senegal cashless; South Africa cashless; Tanzania cashless; Tunisia cashless; Zimbabwe cashless; Safaricom; Cambodia cashless; Hong Kong cashless; Indonesia cashless; Malaysia cashless; New Zealand cashless; Pakistan cashless; Philippines cashless; Singapore cashless; South Korea cashless; South Korea coinless; Sri Lanka cashless; Taiwan cashless; Thailand cashless; Vietnam cashless; illegal immigration; modern day slavery; payment ecosystem; M-Pesa; Negative Interest Rate Policy; Negative Interest Rate Policy and banking; Negative Interest Rate Policy and economic transmission; Negative Interest Rate Policy and the money supply; Negative Interest Rate Policy and long-term wealth; central bank currency; notes in circulation; digital transaction; Aadhaar and AEPS; distributed ledger; functions of money; virtual currency; Satoshi Nakamoto; initial coin offerings; anonymity; monetary policy; money creation; negative interest rates.

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Cashless Society - Benefits and Consequences

Section 1: Introduction

"I'm not a fan of the new pound coin, but then again, I hate all change." Ken Cheng, Edinburgh Festival 2017.

If you buy your morning coffee at a London Coffee Shop you will have noticed that fewer and fewer people are paying with cash.

It was not so very long ago that large ticket items were paid for by cheque or credit card but low value items were usually bought using cash. Indeed, signs saying that cheques or cards were not accepted for purchases of less than £5.00 were commonplace.

Today, partly accelerated by "contactless" cards, smart phone technology and reloadable loyalty and debit cards, cash is used less and less. About 2% of the total values of transactions in Sweden are cash with a target to lower this to below 0.5% by 2020. Most retailers and public transport systems there refuse cash, and even churches increasingly prefer online or mobile collections. London buses have implemented a cashless policy to speed-up boarding times and improve the safety for drivers who are no longer at the risk from theft of takings.

All this would have us believe that the move towards using less cash in many countries is already happening by stealth, a feature worrying various political and advocacy groups.

Cost cutting is causing banks to close branches in many rural areas, which is forcing many customers and merchants to accept non-cash payment methods. We read about global payment providers launching campaigns to persuade merchants to refuse cash in return for favourable electronic payment assistance and at least one large UK bank has written to their customers encouraging them to use less cash.

We hear about some countries withdrawing high denominational notes from circulation for economic and social reasons and South Korea is trialling a scheme that deposits small change onto prepaid cards. This means that customers won't have to carry change in their pockets after making cash payments.

How much of this gradual move towards less use of cash is by stealth, and how much by design?

We hear the calls for the need to reduce the "cash in hand" economy. We understand that cash can fuel the hidden economy and permit large-scale tax evasion, although the actual amount is, by definition, unknown. Should *we examine how much tax evasion might be fuelled by the "cash in hand" economy?*

The use of cash may facilitate crime and benefit fraud and allow illegal employment to flourish, sometimes fuelled by illegal immigrants who, being unable to open bank accounts, survive mainly by working for cash and often render themselves open to exploitation. *Do these factors warrant de-cashing in our society?*

We are aware that printing, minting, transporting, handling, insuring and storing cash supports an industry but is expensive and this might contribute towards the argument for abolishing notes and coin. However, we read about the level of Notes in Circulation (NIC) in the UK and Europe increasing at an unexpectedly large rate so somewhere along the chain, cash is still wanted and its demand is increasing. *Why is this, and should central banks satisfy this demand regardless the nature of demand?*

Digital currencies such as Bitcoin are emerging. *Could growth of digital currencies threaten financial stability and even undermine the banking and taxation system? What are the chances of Central*

Banks creating their own digital currencies and what might be the effect on economies and banking system, home and abroad, if they did?

Financial exclusion is identified as a problem for many people in both developed and developing countries and it is not clear whether modern payment systems, which are developing at different speeds and with different outcomes in different countries, will help or exacerbate this problem. We look at this with reference to both developed and developing countries.

Emotions have run high in the press as some parts of Australia trialled a cashless welfare card to prevent social benefits from being spent on alcohol, drugs or gambling. What other social innovations can a cashless society enable?

Some media sources have advised us that advisors to the then UK Prime Minister, David Cameron, developed plans to force the pace of the transition away from cash starting with the withdrawal of small value copper coins. Apparently, the proposals almost made it into the Prime Minister's 2015 Tory Party conference speech, only to be dropped at the last minute by Mr Cameron on political grounds. So, *what are the political issues involved in de-cashing and do they clash with the economic arguments?*

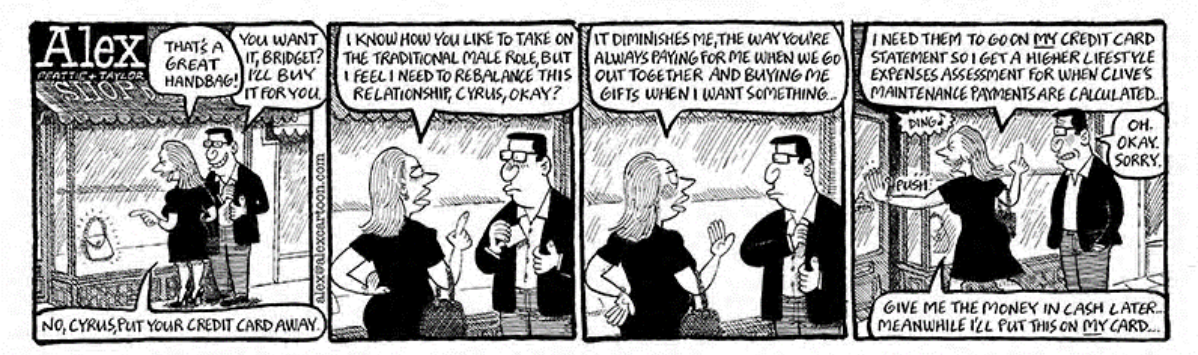
With this background, The Institute and Faculty of Actuaries' Cashless Society Working Party was formed to analyse the arguments, and consider the possibilities and consequences of removing cash (notes and coin) from currencies and societies, i.e. a totally Cashless Society. Whilst our research is deliberately UK-centric, we have focused much effort in observing developments from around the world and our section "The Cashless World in Motion" examines worldwide events.

The outcome is a library of well over 1,200 articles and research pieces from around the world over the first half of 2017 alone, which forms the basis of this paper.

This paper takes no stand on the rights or wrongs of the move towards a cashless society. It analyses and presents our findings in order that others, be they governments, regulators or members of the public, may form their own opinion on the topic.

This work presents the findings from five different authors, with each different professional background, culture, personal interest and orientation towards the topic. Each author also expresses their analysis in their own way, hence diverse writing styles contributing to a wealth of perspectives.

Phase 1 of our report is presented here. As often happens in research we have found that the more we uncover the more there is still to uncover. Phase 2 will examine many of our workstreams in more detail but delaying too long in producing this initial report may be unproductive. Movement towards a less-cash society is progressing so quickly that articles, speeches and thoughts much over a year old are often too outdated to be useful.



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Section 2: Background to a Cashless Society - What is Money and what forms of Cashless alternatives exist?

2.1 What is money?

Although many people use money on a day-to-day basis for the purchase of goods and services, the definition of money remains rather abstract. Money is usually defined through its function [1166].

- As a unit of account, money provides a common standard to measure the total volume of production, income, savings, wealth etc.
- As a medium of exchange, money provides a common medium for the exchange of goods and services, which would have otherwise have taken place with barter. This advantage comes under seigniorage, which includes a large reduction in the information cost involved when comparing the relative prices of goods and services within an economy.
- As a store of value, money allows for wealth to be stored and savings to occur.
- Lastly, as a standard of deferred payment, it allows exchanges and payment for goods and payments at different times.

As a result of these functionalities, a clear characteristic of whatever constitutes 'money' requires it to be sufficiently acceptable and trusted. Examples of money include notes and coinage, fiat currency (i.e. legal tender whose value is backed by the government), electronic money (e.g. bank deposits) and more recently, digital currencies (i.e. cryptocurrencies like bitcoins).

2.2 Categorising Cashless Alternatives

Cashless alternatives to physical notes and coins have been in existence for quite some time and have evolved with alongside the payment technologies and the financial sophistication of their users. These include cheques, debit cards and credit cards. Each cashless alternative has their individual level of security, user protection, settlement time, ease of use, and associated costs and fees.

Given the fast-changing field of financial technology, a universal definition and taxonomy have yet to emerge. We present several possible definitions below.

In a quarterly bulletin by the Bank of England, a digital currency and other cashless alternatives through the four innovation categories summarised as follows. [1207]

Category	New Payment System	New Currency	Examples
I: Wrappers	No	No	Apple Pay, Paym
II: Mobile money	Yes	No	M-Pesa (See Case Study)
III: Credits and local currencies	No	Yes	Bristol Pound
IV: Digital currencies	Yes	Yes	bitcoin, ether

Table 1: Categories of innovations in payment systems and alternative currencies

According to the BoE, the first category of innovation focuses on providing 'wrapper' services to improve the user interface and accessibility of existing payment systems architecture. These innovations therefore represent neither a new currency nor a new core payments system.

The BoE describes Mobile Money as new payment systems, with money stored as credits on a smart card or a system-provider's books, but continue to use national currencies. One example is M-Pesa, a popular service in Kenya that grants access to financial services, including payments, to anybody with a mobile phone. (See Case Study in Section 6)

Category (iii) according to the BoE relies on users trusting a new currency as a unit of account and medium of exchange. Credits are schemes in which private companies accept money in exchange for an alternative unit of account, which can be spent on a particular platform (such as within an online game). Nevertheless, they generally make use of existing payment systems, including use of 'wrapper' services, to make transfers. Local currencies are similar in that people exchange national currencies for a local equivalent, which can be spent in a specific geographical area. UK local currencies such as the Bristol Pound or Liverpool Pound are often backed by and remain on a fixed exchange rate with sterling.

2.3 Digital Currencies

2.3.1 What is a digital currency?

Digital currency is a form of electronic money combined with new technology involving cryptography, peer-to-peer networking, databases and a system of consensus. The most prominent example of a digital currency is bitcoin.

2.3.2 How does a digital currency differ from a currency without notes and coins?

In a speech given by the Bank of England in 2016, digital currencies were defined not so much by the fact that balances can be stored electronically, nor the fact that alternative currencies like bitcoin exists as units of accounts [1064]. 97% of the money belonging to people in the UK is already held electronically as deposits [1080], but are not digital currencies.

The defining feature of digital currencies is the "decentralised virtual clearinghouse and asset register" – the blockchain [1064]. In an earlier 2014 Quarterly Bulletin also published by the Bank of England, this same key innovation in digital currencies was described as the 'distributed ledger' – a payment system to operate in an entirely decentralised way without the need for intermediaries like banks. [1102] Blockchain is the new technology combined with electronic money that forms the basis of digital currencies like bitcoin.

Even the term, digital currency does not have a universal definition and some organisations use the term, virtual currency [1073] or cryptocurrency (i.e. due to the prominent use of cryptography within the blockchain). In this paper, we use the term digital currency to refer to cryptocurrencies like bitcoin, that is electronic money but with a blockchain component.

2.3.3 How transactions in a blockchain work

Digitally-signed transaction messages are broadcast to the entire blockchain network where they are selected and grouped together in an encrypted block by 'miners'. These miners within the network possess large amounts of computing power and compete to validate the transactions by solving complex coded problems. The first miner to solve the problem and validate the block receives a reward (e.g. bitcoins). They may also be paid a transaction fee associated with each transaction determined by the payer. This "miner" system seems to be a feature of all typical digital currencies although who would fulfil this function in a Central Bank Digital Currency would seem a

key ingredient in its design.

This newly validated block of transactions is timestamped and added to a chain linked to older blocks in a linear, chronological order. This results in a 'blockchain' that shows every transaction in its history. The first miner that validates a new block, broadcasts it to the entire network so that other miners can validate its result and add it to their existing chains. As a result, the entire network would be kept abreast of all transactions through validated blocks and each miner would thereby possess a copy of the blockchain. [1064][1207]

2.3.4 Taxonomy of virtual currency

In an IMF staff discussion note on virtual currencies, the paper described virtual currencies as digital representation of value, issued by private developers and denominated in their own unit of account. These include simple IOUs of issuers like mobile coupons and airline miles, virtual currencies backed by assets such as gold, and also "cryptocurrencies" such as bitcoin. [1073]

The paper provided a different taxonomy of virtual currencies, where the definition of digital currencies is based on the digital representation of value.

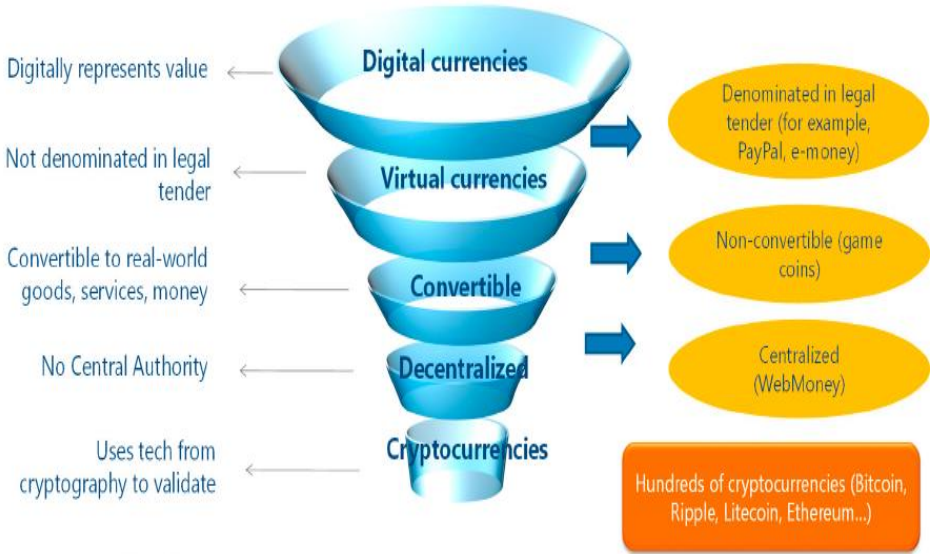


Figure 1: Taxonomy of virtual currency

2.4 Bitcoin: A Case Study

2.4.1 Introduction to Bitcoin

On 31st October 2008, an anonymous person or group of people, named Satoshi Nakamoto, sent an email to hundreds on an obscure cryptography mailing list, stating the development of a new electronic cash system that is fully peer-to-peer. The text points to a white paper titled "Bitcoin: A Peer-to-Peer Electronic Cash System". In January 2009, Nakamoto released the first bitcoin software that launched the blockchain network, thus creating the very first bitcoins. [1082; 1102]

Since its inception in 2009, bitcoin has grown in prominence and value which is shown in the figure below.

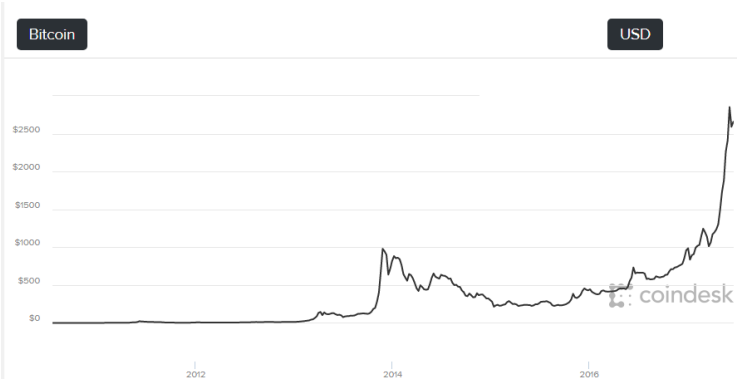


Figure 2: Value of a bitcoin in USD from 2010 till June 2017 [1112]

The value of a bitcoin on 20th June 2017 is approximately $2672 USD with the market capitalisation value of bitcoins is approximately $43.82 billion USD. [1112]

2.4.2 Bitcoin as money

It is estimated that the value of bitcoin transactions in 2015 in the US to be worth $5bn in contrast with the annual consumer spending of $12.5tr. Some economist predict that it is unlikely that bitcoin's use as a means of exchange to be widespread [1064] or at least not in the near- term. [1073] Even in a largely cashless country like Sweden, use of bitcoin is limited [1169]. Furthermore, bitcoin has experienced high price volatility compared to other currencies.

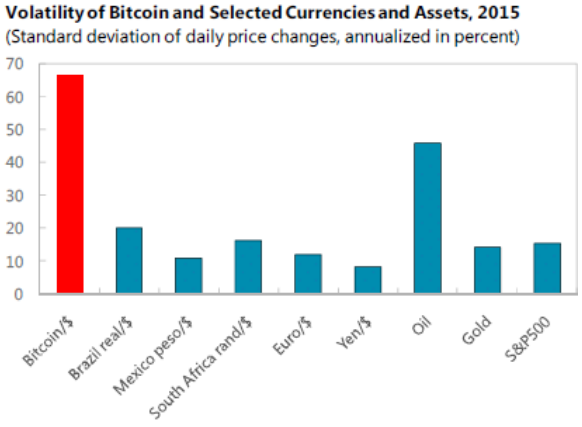


Figure 3: Volatility of bitcoin and Selected Currencies and Assets [1073]

Although it is not uncommon to make payment in bitcoins for coffee at a hipster café or to purchase prescription drugs online, we observe that retailers would still mainly price their goods and services in fiat currencies, but accept payment in bitcoins at the prevailing exchange rate. A lack of stable price for bitcoins makes it currently unsuitable for use as a measure of value of goods and services. [1073]

2.4.3 Bitcoin as an Asset Class

Some are starting to view digital currencies as an asset class for financial investment. The values of several digital currencies appear to have an upward growth trend characterised by high volatility. The launch of new digital currencies, ICOs (initial coin offerings) are seen as the new dot-com boom and potentially, a fast-forming asset bubble. The SEC has stepped in to highlight potential risks involved in ICOs [1167] and also to clarify that digital tokens used to raise capital could be subject to security laws [1168].

To provide better access to mainstream investors, an application for the creation of a bitcoin exchange traded fund (ETF) was filed in the US. SEC's rejection of this application in May 2017 proved to be only a minor setback - Europe's launched its bitcoin exchange traded note issued by XBT Provider shortly after. [330]

2.4.4 Turning Bitcoins mainstream

For digital currencies, access can be made more readily available through the use of familiar "interfaces" like the ATM.

Figure 4: Bitcoin ATM machine where users can deposit cash for bitcoins, which are transferred almost immediately into their digital wallets.

2.4.5 Dangers associated with Bitcoins

What are the dangers associated with bitcoins? Other than fraud and Ponzi schemes that are common with any currency, digital or otherwise, we note the development of bitcoins and its use below. [1102]

2.4.6 Anonymity within the blockchain

Hackers of the global WannaCry ransomware attack in May 2017 demanded payment in bitcoins before decrypting files on victims' computers. Although transactions of the associated ransom payments are publicly accessible, the wallet owner's identity remains unknown. [414][1073]

Furthermore, the ability to perform shuffling or coin tumbling enables digital currencies within multiple wallets to be mixed and redistributed in the same amounts. Therefore, digital currencies within wallets identified as being involved in illegal activities can no longer be easily traced back to the original source when mixed with digital currencies from other wallets. [221]

2.4.7 Security breaches of systems built on top of the blockchain

In February 2014, Mt. Gox, the largest bitcoin exchange at that time handling 70% of all bitcoin transactions worldwide, announced the loss of 850,000 bitcoins belonging to customers and the company. This was the result of a security breach as a hacker had allegedly used credentials from the company auditor's compromised computer, in order to transfer the bitcoins to himself. [222]

Although the bitcoin blockchain is a decentralised ledger, the exchanges and systems that are built *on top* of it still act in a centralised manner in performing order matching (i.e. smart contracts). There are other blockchain implementations like Nxt which can perform these activities *within* the blockchain and are less vulnerable to such security breaches (i.e. smart transactions).

2.4.8 Weaknesses within the blockchain

All blockchain systems have to address the inherent problems of double-spend and orphaned blocks. As blockchains are implemented in software, any number of software vulnerabilities can also exist due to poor code implementations.

2.5 Central Bank Currencies (CBC)

There has been much interest and research on the development of Central Bank Currencies (CBC) throughout the world including countries like Canada, Sweden, the UK and Norway. [1064][417][1043][1151].

CBC already exists as commercial bank reserves held within the central bank. By providing access beyond commercial banks, individuals and firms could hold their cash with the central bank in the form of digital cash instead of with commercial banks as bank deposits. Here, digital cash can refer to either electronic money or digital currencies, as the reasons are mainly economic and not technological.

2.5.1 Reasons for central banks to issue CBC to the wider public

Fung and Halaburda, from the Bank of Canada, provided a broad framework by considering a central bank's functions in relation to issuing its own digital cash. [1043]

- Responsibilities over bank notes
  To the extent that a central bank is responsible for the design, production, distribution and destruction of bank notes, it would be involved in exploring ways to improve the efficiency of currency operations, reduce the cost of handling cash, enhance bank note security and increase its durability.

- Responsibilities over payment systems
  CBC has the potential to improve the efficiency and safety of both retail and large-scale payment systems resulting in faster settlement times, extended settlement hours and also reduce settlement risk.

- Policy response to privately issued digital cash
  To the extent that privately issued electronic money and digital currency impairs the central bank's ability to achieve its policy goals and promote financial stability, it may be in the central bank's interest to issue its own.

In the report issued by Positive Money on central banks issuing digital cash, it listed out several important benefits. [1151] (see also Risks and Issues 20 in section 4)

- Allow for a wider range of monetary options
  For instance, below-zero interest rates would be possible when such central bank currencies completely replace physical cash (see section 5). In addition, the central bank would be able to provide 'helicopter money' straight into the hands of citizens to stimulate aggregate demand in the economy. This could potentially be more effective than Quantitative Easing.

- Safer financial system
  The systemic importance of big banks is reduced when individual and non-financial firms settle their transactions in central bank money (instead of bank deposits), thereby reducing liquidity and credit risks within the payment system.

- Encourage competition and innovation in the payment system
  The paper describes an 'indirect access' model with intermediaries (i.e. digital cash account providers) providing innovation payment services in competition with banks.

- Recapture a portion of seigniorage and address the decline of physical cash
  As physical cash is replaced by electronic money, an increased seigniorage (i.e. electronic money is cheaper to create than physical cash) is earned by the central bank and passed on to the Treasury.

- Help address the implications of alternative finance upon money creation and distribution
  Issuing digital cash would cause a shift in lending away from money-creating banks (and the subsequent fall in money creation) to non-bank lending, where pre-existing deposits are transferred from saver to borrower (eg. peer-to-peer lending).

- Improve financial inclusion
  Whereas banks primarily function is lending, firms providing central bank accounts would act foremost as payment service providers, which are more likely to offer accounts to customers typically excluded by conventional banks.

2.6 Innovations for Making Cashless Payment Easier

"Only a decade ago social media was in its infancy, smartphones were a rarity and internet access was sporadic. The world we live in has changed and so too has the way that we pay for things. It is clear that the way consumers make payments is going to change considerably over the next decade. For example, in the next few years we predict that debit cards overtake cash as the payment method most frequently used by consumers. This will be aided by the continued rollout and adoption of contactless payments. Looking further ahead, we can expect to see more radical change".

Helen Doyle, Director of Research & Customer Policy, Payments UK [1183]

In this paper, we are looking at how the payment landscape is changing.

For those of us in the developed world we are familiar with chip and pin, contactless payments, payment Apps for parking our cars, internet banking, loyalty reloadable store cards and similar schemes.

We are beginning to take for granted that most car park machines accept card payments and might get irritated where some may only take cash, especially where they are not fully compliant with new coinage or don't provide change. Worst still where they dispense copious amounts of coins as change for a payment in notes.

As Helen Doyle states above, payment methods will change considerably and experience tells us what is new today can also become obsolete very rapidly. (The Walkman comes to mind as do VCRs).

We discuss elsewhere in this paper digital currencies such as bitcoin, Local Currencies such as the Bristol Pound, and Central Bank Digital Currencies. We also look at Mobile Money, such as M-Pesa, and how it can make such an enormous difference particularly to developing nations. We mention how consumers can scan QR codes to pay through WeChat Wallet or Alipay which automatically records the trades and acts like an account book.

Whilst most consumers embrace the newer payment options, society should also recognise the need of those who may otherwise find more modern technology confusing or are sceptical. *How many consumers prefer to go into a bank rather than withdraw money from an ATM as they just don't trust them? How are they going to be affected with continued closure of local bank branches?* [See sections on Sweden and Financial Inclusion].

The challenge will be as the movement away from cash continues, so will the difficulties increase for those who do not use, from choice or access, the newer payment methods. We seem to have passed the point of no return. Innovation, technology and convenience appear to drive us inextricably towards using less cash.

Payments UK inform us that in 2003 the UK was [amongst] the first countries in the world to roll out Chip and PIN technology to make cards safer. Card readers have since been updated and brought directly to the customer so that the card does not leave his sight. Oddly, in some countries such as the USA, the card is still taken away and often a signature on a payment slip is still required.

Since 2007 contactless technology has been available making cards generally more convenient. The majority of UK cards have now been upgraded. As the upper limit for contactless is increased, so will the convenience rise and more contactless payments will be made.

The criticism for contactless payments is that if a card is lost or stolen then the finder can use it immediately to make purchases. In this case, timely security checks and fraud protection aim to protect users of contactless payments so that they are not left out of pocket. [1171]

The innovation of Apple Pay which requires a fingerprint to activate the payment is an improvement in security, but again, this only favours those owning certain smartphones.

In 2008, Faster Payments was launched, enabling online and phone payments to be made at the touch of a button.

In 2014 Paym was introduced, making payments via a mobile phone a widely-available option.

These innovations have collectively helped mobile and online shopping and banking become the norm for many of the UK's consumers and businesses.

The challenge for a totally cashless society will be to include those currently without smartphone technology, decent internet access or even without a bank account into the new model.

We will discuss any transition to a possible Cashless Society in Phase 2 of our research but below we give a few examples of how innovation is already happening.

2.6.1 Mobile Card Readers

Mobile card readers allow merchants, and other people to accept card payments quickly and easily.

An important player in this market has been iZettle [410] which offers a card acceptance service which enables small businesses to take credit and debit card payments.

In 2013, iZettle upgraded its system to include a Chip & Pin device alongside its previous model, allowing it to accept all major credit cards.

In February 2015, iZettle introduced Lite Reader, a new card reader which was offered to merchants free of charge. It was used by plugging it into the audio jack of an iPhone, iPad or any Android device.

In June 2016, iZettle launched a new card terminal. Just as its previous siblings the iZettle reader connects through Bluetooth and integrates both Chip & PIN and contactless payments. The new card reader replaced all previous iZettle card readers in Europe and iZettle was the first mobile payments company to accept contactless payments in the UK.

MobilePay [1181] is an application for credit and debit card payments using smartphones developed by Danske Bank which allows contactless payments.

This is an "application" for phones with operating systems iOS, Android and Windows Phone. By downloading this application, users are required to connect a credit card and account information to their mobile number. Money transfers are performed by entering a mobile phone number which is registered in the system. The funds are then transferred to this account, while the amount is deducted from the sender's credit or debit card.

Currently commonplace in Denmark, MobilePay is also used in Finland and Norway and is being trialed in the UK.

2.6.2 Charitable Donations. [334]

There is concern by charities that any removal of cash might affect charitable donations through boxes, busking or even church collections.

Solutions to this problem are already being found by those concerned that fewer people carry cash.

The Helping Heart jacket which has been designed by a Dutch advertising agency makes it easier for people who tend to carry little or no cash to help others.

Homeless people in Amsterdam and Rotterdam have been testing a jacket equipped with a contactless terminal to enable passers-by to tap their contactless cards and make a €1 donation, which can then be redeemed through official homeless shelters.

The money never goes to the homeless person as cash, but is redeemable in kind through the official shelters.

Churchgoers in the UK are to be offered an alternative method to provide donations when they attend a service. A number of churches are trialling the provision of either handheld or fixed terminals to allow congregants and visitors an alternative to making donation by cash, using contactless card payments. It would appear that the Church of England is aware that younger people in particular carry less cash and would like to still give them an opportunity to make a donation.

2.6.3 Contactless Donation Boxes

Contactless charity boxes are set to be widely introduced after a successful trial of the technology drew donations from members of the public who travel without cash amongst fears that a rise in cashless payment methods might reduce cash donations.

Generally, the boxes are set to a fixed amount that can be donated using contactless cards, however this could be adjusted by smartphone apps.

Charities have experienced larger donations using this method than the previous cash based system.

2.6.4 Reloadable Debit Cards

A reloadable (or pre-paid) debit card is one which can be charged up with an amount of money to be spent in the same way that other debit cards are used, using card readers, contactless or with a pin, or shopping online. Such cards cannot go into overdraft and so users can only use them to the limit that they have been pre-paid.

Users of the London Underground system will be familiar with the Transport for London Oyster Card, which is a pre-paid, reloadable debit card which negates the use of cash on the transport system. For buses, it also reduces boarding times and protects drivers from the threat of violent robbery as no cash is carried.

Other examples are Coffee Shop reloadable cards which again reduce the time needed to provide change, but also provide loyalty points.

We discuss elsewhere in this paper about the Australian benefit card which is being trialled in parts of Western and Southern Australia. Such cards may not be used for certain purchases such as gaming and alcohol. By keeping the payments cashless, it effectively rules out the purchase of drugs too.

Go Henry [1182] is a pre-paid reloadable debit card designed for children in conjunction with Visa. The idea is to pay pocket money to children by “loading” this card which can then be used just as any debit card can be used. The added feature of this particular card is that parental control can be added, limiting the amounts that children can spend and the products they can buy.

However, the current downside of all these reloadable cards is that one usually needs a bank account, a smartphone or internet facility to load money and, equally importantly, to read the amount stored on them.

Holders of reloadable debit cards should be able to know how much money remains on the card and if they are to replace cash for the young and financially excluded then loading and reading them would need to be made easy for all.

This section considers some of the benefits that might accrue from a Cashless Society ranging from the economy and the exchequer to the effects on crime, illegal immigration (and modern-day slavery). It also demonstrates how the taxation system could be revolutionised and gives as an example a different form of taxation which could replace all the other taxes within an economy.

3.1 The Cost of Handling Cash (With specific reference to the UK)

Intuitively it might be thought that cash payments should be more expensive to handle than electronic transfer however there is evidence (see below) that currently that may not be the case for retailers. It is difficult to reconcile this seeming anomaly. Is it partly to do with the complicated payments ecosystem or maybe that banks are making higher charges for electronic payments as the market allows them to do it, possibly because retailers will pay a charge rather than having to handle large amounts of cash?

The cost of handling cash in an economy can be split into:

1. The cost of accepting cash as a method of payment for businesses. This includes cost of transporting cash. Cash in transit companies have varying charging structures.
2. The cost of using cash for the public. For example, paying to withdraw money from an ATM machine which includes the costs associated with the ATM network. At present c97% of cash machines in the UK offer customers free withdrawals. This is different to many countries around the world where free withdrawal is only available from an ATM provided by the withdrawer's own bank. The cost of running the 'free' network is c£1bn per year and is funded by the card machine operators which are typically banks and building societies, schemes and independent operators [1159]. However, one bank is challenging this system as it argues that it provides more ATMs than others. The remaining 3 percent of ATM's charge customers c £1.70 per transaction [1160].
3. The cost of cash to banks including the central bank. For example, producing and issuing notes and coin. According to the September 2016 Bank of England accounts the cost of printing and issuing notes was c£80m [1161] for the year. Note that this likely to include some of the 'one-off' costs associated with the new £5 polymer note issued on 13 September 2016. Printing commenced in September 2015. We were unable to obtain figures from the Royal Mint regarding similar costs for coins.
4. The costs to industry of adapting to new notes and coin
    a. A new £1 coin was issued in March 2017. The Royal Mint estimated the cost of converting machines would be c£15-20m. However, the British Parking Association said that this could cost up to £50m just to fix the UK's parking meters [1162]. The new £1 coin has come into circulation. At the time of writing we are not aware of the actual cost of implementing this.
    b. The UK is phasing in new polymer notes. It was estimated to cost c£236m to change the ATM cash machines to accept the new polymer notes [1163]. In September 2016, the first of these notes was issued, the new £5 note. At the time of writing we are not aware of the actual cost of implementing this.

A McKinsey report of March 2013 attempted to estimate the cost of cash within an economy. In that report, it believed that the cost of handling cash in the EU was c0.45% of GDP. An average figure of c0.45% of GDP would equate to c£9.0bn for the UK. This figure includes the costs associated with producing, storing, distributing and handling notes and coin, the ATM network and time lost by retailers. Costs associated with the development, issuing new and decommissioning old notes and coins are not included nor is the time lost by consumers.

Some countries in the EU use cash more than others - for example Germany and Italy typically use cash as a method of payments more frequently compared to Sweden (see Case Study on Sweden) and Belgium [1164]. However, based on the size of the UK economy and its relative cash usage, we do not believe c0.45% of GDP is an unreasonable estimate for the cost of cash in the UK.

In other economies, the cost of handling cash is thought to be much higher. As an example, the cost of handling cash in India is thought to exceed 3% of GDP (see case study on India).

Some banks in the UK have begun charging businesses for depositing cash. As an example, Barclay's bank has two merchant charging plans for businesses with a turnover of less than £5m a year [1165]:

1. 1.5% of the amount of cash deposited and no charge for electronic payments
2. 0.9% of the amount of cash deposited and 0.35p per electronic deposit.

Card payment providers have a different cost structure for small businesses which reflects the complicated payment ecosystem. This is a competitive market where fees are reducing. The EU led Interchange Fee Regulation (IFR) has reduced the overall charge that banks may charge for credit card payments.

The following card receiving fee structure has been provided to us by a small UK business:

- Debit Cards - £0.74 per transaction
- Business Debit Cards - £1.09 per transaction
- Credit Cards - 0.75%
- Commercial Cards - 1.8%

Clearly, larger businesses will be able to negotiate more competitive rates.

Certainly, based on the first Barclay's plan above for business with an average transaction of greater than £50, it would seem cheaper to accept debit cards than cash, however the BRC (which only represents the retail sector) survey suggests that currently, for its members "Cash nevertheless remains the most cost-effective payment acceptance channel for retailers as the cost of processing a card transaction remains high – particularly for credit cards".

3.2 Cost of collection

The BRC survey [59] included costs such as merchant service charges, fraud, bad debt, cash-in-transit and related administrative costs in all categories. These costs amount to c£1.1bn across the entire UK retail industry. It is worth noting that the costs to society associated with cash are not fully included within the survey. For example the costs of printing, maintaining, distributing and storing notes and coins and the ATMs are not included.

3.3 Cash vs card usage

The BRC survey tells us that cash is still a key method of payment. However, signs are emerging that cards are being used more frequently. In 2016 cash accounted for 42.3% of payments which is 4.9% lower than in 2015, whereas debit cards accounted for 42.6% of payments, an increase of 4.5% from 2015.

Historically cards were used for high value transactions and cash was predominately used for low value transactions. However, the introduction of contactless payment has been a game changer and there is evidence that consumers are increasing turning to cards for transactions in general.

3.4 Average Transaction Values

According to UK Cards Association [1208], there has been a consistent trend of declining average transaction values (ATVs) since 2011, mainly driven by the continuous migration of low value cash payments to cards. This has been accelerated by the increasing use of contactless cards, with the number of contactless payments accounting for over 25% of total card purchases – up from 11% only a year ago.

3.5 Investment in payment technology

The BRC survey indicates that retailers are willing to invest in new payment technology. In 2016, 68% of the manned terminals could accept contactless payment; this is up from 47% in 2015. The survey also outlined that retailers are investing in software and hardware to accept other new payment methods, for example ApplePay and AndroidPay. For further examples see Cashless World in Motion section [refer to section on Visa in the USA].

3.6 The Contribution of Cash on the Hidden Economy and Tax Evasion

It is commonly believed that the use of cash enables privacy in transactions and can and does assist in the evasion of taxation. This was one of the reasons given by the Indian Government for their demonetisation experiment in November 2016 (see Case Study on India in Section 8 of this paper). We are unable to uncover any direct proven link between the use of cash, the hidden or shadow economy and the evasion of taxation, but it would be churlish to believe that it doesn't exist. Analysis from the UK's HMRC does make a link between the hidden economy and tax evasion, but it does not attempt to analyse the contribution that transaction paid in cash plays a part in it.

By definition, anything that is private, secret or hidden is very difficult to analyse and assess. There have been many efforts to quantify the size of the issue, but the divergence in results does not give great confidence in any of the estimates. We look at recent attempts in the UK as an example of this problem. However, general reasoning might suggest that those economies with higher levels of cash usage may have a larger hidden economy, however there are examples below which show that this is not always necessarily the case. In their 3rd Quarter, 2015 Bulletin, the Bank of England admitted that no more than 50% of notes in circulation is used for legitimate purposes which suggests that there is reason to question the rise in notes in circulation and for what reasons it might be attributed.

3.6.1 The HMRC UK Tax Gap

In the UK, Her Majesty's Revenue and Customs produces a regular report called the 'The Tax Gap' [1045] which analyses the difference between the amount of tax that should, in theory, be collected by HMRC, against what is actually collected.For the tax year 2014/2015, HMRC calculated the tax gap to be c£36bn or 6.5% of theoretical tax liabilities. According to HMRC, "The Tax Gap" is an established report. It includes analytical judgement and is backed up by a Random Enquiry Programme to help with accuracy.

The "tax gap" of £36bn is made up from:

Hidden Economy	£6.2bn
Tax Evasion	£5.2bn
Failure to take care	£5.5bn
Legal Interpretation	£5.2bn
Criminal Attacks	£4.8bn (Organised criminal gangs undertake co-ordinated and systematic attacks on the tax system)
Non-Payment	£3.6bn
Error	£3.2bn
Avoidance	£2.2bn (NB Avoidance is bending the rules of the tax system to gain a tax advantage that Parliament never intended but does not include international transfer pricing)

Table 2: UK Tax Gap Breakdown

Hidden Economy is where an entire source of income is not declared whereas Tax Evasion is where a declared net source of income is deliberately understated. Essentially, evasion comes mainly from people who are on the HMRC radar but who are under-declaring revenue.

HMRC seem to have no figures analysing how much tax is lost using cash rather than more traceable methods of payment, however they acknowledge that the hidden economy is facilitated by the use of cash.

HMRC are not the only organisation to estimate the tax gap for the UK.

A 2014 report published jointly by Tax Research UK, the Tax Justice Network and the Association for Accountancy and Business Affairs, author Richard Murphy [1177] stated that "based on data on missing VAT published by both HM Revenue & Customs and the European Union that in 2011/12 there were £100 billion of sales that weren't declared to the UK's tax authorities. That is one pound in every ten of sales in that year."

As a result, the report estimates that £40 billion of VAT, income tax, national insurance and corporation tax was lost to the UK Exchequer on 2011/12.

3.6.2 The Shadow Economy: Institute of Economic Affairs

In an extensive 2013 report commissioned by the Institute of Economic Affairs entitled the "Shadow Economy"[1178], the definition of the Shadow Economy was broadened as: 'those economic activities and the income derived from them that circumvent or otherwise avoid Government regulation, taxation or observation.'

The report listed estimates of the size of the shadow economy in a number of OECD countries with the following results:

OECD Country	Shadow Economy (% GDP 2012)
Austria	7.6%
France	10.8%
Germany	13.3%
Greece	24.0%
Italy	21.6%
Sweden	14.3%
UK	10.3%

Table 3: Shadow economy in OECD Countries (% GDP in 2012)

Figures for Australia, Canada and USA were not available.

The report further suggests that anecdotal evidence points to low tax morality leading to larger shadow economies.

The Authors do not attempt to calculate a "tax gap" emanating from the shadow economy in the countries above. However, their analysis might appear to be at odds with the level of the hidden economy described in the HMRC report and the subsequent resulting "tax gap".

3.7 Illegal Immigration, Crime and Benefit Fraud

3.7.1 The growth in the demand for cash.

As is apparent from anecdotal evidence and confirmed in the BRC Payments Survey, 2016 [59], the use of cash for retail transactions is reducing rapidly whilst at the same time the Bank of England in its reaction to the demand for cash has increased the Notes in Circulation (NIC) in the British economy (Table below). For this reason, it is worthwhile looking at the reasons for the growth in demand for cash.

According to the Bank of England 3Q 2015 [1080] Quarterly Bulletin:

"The growth in demand [for cash] has been driven by three different markets. The evidence available indicates that no more than half of Bank of England notes in circulation are likely to be held for use within the domestic economy for transactions and for 'hoarding'. The remainder is likely to be held overseas or for use in the shadow economy. However, given the untraceable nature of cash, it is not possible to determine precisely how much is held in each market."

In a paper by Callum Miller of the BoE in 2017 [1172], he explains that: "When considering the drivers of demand, it is helpful to consider where notes might be held and for what purpose. This paper uses the conceptual framework described by Whymark & Fish in 2014, which considers that banknotes are demanded for two uses: (i) as a medium of exchange (for transactional use); and (ii) as a store of value, across three markets: (a) the domestic legitimate economy; (b) overseas; and (c) the shadow economy."

The current figure of £73.2bn for NIC (BoE chart below) represents a surprising £1,100 for every man woman and child in the UK. Given that most people only hold a small amount of cash, there seems to be quite a bit that is being horded either in the UK or overseas.

The Bank of England finds itself in a difficult position. Whilst they acknowledge that maybe 50% of NIC are used for non-legitimate purposes, not to satisfy the demand for cash at banks and ATMs would seriously undermine confidence in the currency and for this reason alone they could not think about limiting the supply of cash without wider government support.

Stock of Notes in Circulation at end-February (value)
(£ millions)

	£5	£10	£20	£50	Other notes*	Total
2004	1,025	5,714	20,070	5,742	3,465	36,016
2005	1,054	5,670	21,649	6,082	960	35,415
2006	1,051	5,591	22,690	6,510	1,071	36,913
2007	1,100	5,886	23,740	6,705	1,018	38,449
2008	1,242	6,115	25,649	7,526	4,447	44,979
2009	1,302	6,304	28,089	8,691	4,222	48,608
2010	1,245	6,399	30,048	9,248	3,280	50,220
2011	1,355	6,493	30,973	9,940	3,433	52,194
2012	1,477	6,841	33,129	9,899	3,575	54,921
2013	1,526	7,234	35,163	10,323	3,776	58,022
2014	1,540	7,182	36,483	11,025	3,967	60,198
2015	1,601	7,371	38,912	11,788	4,118	63,789

2016	1,645	7,767	41,037	13,157	4,212	67,819
2017	1,912	8,006	43,357	15,601	4,322	73,198
* includes higher value notes used as backing for the note issues of authorised banks in Scotland and Northern Ireland						

Table 4: Change in Notes in Circulation (NIC) since 2004

One can see substantial jumps in 2008 and 2009, probably due to the financial crisis and loss in confidence in the banks where people preferred to hold cash for security. However, given the reduced transactional use of cash in recent years, it is somewhat surprising that the value of NIC is still increasing and at an accelerated rate when anecdotally one might expect demand for cash to be shrinking.

In the year to February 2017 the value of NIC rose by 7.9% whilst the value of £50 notes in circulation rose by a massive 18.6%. Given Mr Miller's remarks above and the anecdotal evidence that would suggest that less cash is needed for legitimate transactional purposes, the conclusion suggests investigation is necessary into where that growth in NIC is being used as across:

(a) the domestic legitimate economy;
(b) overseas; and
(c) the shadow economy.

3.7.2 Illegal Immigration

Low interest rates encourage holding money outside the banking system, so this might be adding to the demand for cash, but one wonders if money being stored overseas may not have been accelerated by the June 2016 referendum to leave the EU.

Separately, a question arises if the shadow economy might not have been accelerated by a growth in illegal immigration which thrives on payments in cash as illegal immigrants are now unable to open bank accounts.

According to David Wood and Alasdair Palmer in a report for Civitas [1180], they estimate illegal immigration to be running at around 150,000-250,000 a year, a figure that adds half as much again to the official totals for net migration into the UK.

In their report, they speculatively say: "The Home Office's estimate of the number of illegal migrants being added every year to the number already living illegally in Britain is extremely large. It would almost certainly result in a figure for the cumulative total of illegal immigrants in Britain which would be well above even the estimate of 1.2 million illegal migrants given by Migration Watch in 2010".

Added to this, the UK National Crime Agency has also suggested [1174] that "Modern-Day Slavery" and Human Trafficking in the UK is "far more prevalent than previously thought". Those concerned about illegal immigration into the UK, or indeed in any country might consider if de-cashing might be the easiest way to solve the problem.

In a very informative paper by Deutsche Bank "Cash, Freedom and Crime- Use and Impact of Cash in a world going digital", November 2013 (Author- Heike Mai) [1175], they say "Demand for Euro cash is [also] on the rise. Euro cash in circulation grew to EUR 1.1 trillion by Q3 2016, three times as much as in 2003. Also, cash grew faster than GDP at current prices".

In May 2016, the ECB announced the discontinuation of the production and issuance of the EUR 500 banknote by the end of 2018, "taking into account concerns that this banknote could facilitate illicit activities". However, the ECB assures that EUR 500 banknotes already in circulation will continue to be legal tender and as such will remain a means of payment and a store of value."

Authorities in the UK are unable to stipulate how much of the growth in demand for cash comes from the increase in illegal immigration but it would be difficult not to conclude that a reduction of the use of cash would make it more difficult for illegal immigrants to work and function in the UK and hence might reduce (possibly significantly) the levels. A transition to a Cashless Society is therefore likely to be beneficial in any drive to reduce illegal immigration and "modern day slavery" into the UK.

3.7.3 Crime

In their 2013 article [1175], Deutsche Bank states: "Abolishing cash will not eliminate profit-driven crime. Alternative ways of transferring the proceeds from illegal activities can substitute cash, albeit at higher transaction costs"

They add: "Cash cannot be tracked – which makes cash attractive for transactions related to the shadow economy, bribery, finance of terrorism or the breach of sanctions. "Shadow economy" refers to legal activities conducted off the books as well as to illegal activities. Business dealings and jobs which are legally allowed but not recorded in order to avoid tax and social security payments are part of the shadow economy as are illegal employment and criminal for-profit activities like drug dealing, trafficking, fraud, counterfeiting of merchandise"

This statement supports the widely held view that most petty crime is made easier by the anonymity of cash, although much organised crime has probably already shifted to digital and other electronic payment methods.

Requests made to the UK Home Office for evidence on the link between cash usage and crime were unfruitful and it was suggested that one should ask police organisations, but that also proved unsuccessful. For this reason, we can only conclude that the use of cash does give the oxygen for at least petty crime in the UK, but the level and effect is unknown.

A cashless society would be expected to reduce petty crime, possibly significantly.

The Deutsche Bank report [1175] does try to analyse the relationship between the proportion of cash usage in economies and the size of their shadow economies and their amount of bribery and crime.

"Surprisingly, surveys and estimations for different countries show that a high share of cash in total payments does not always indicate a large shadow sector: Germany and Austria are cash-intensive countries with relatively small shadow economies. In Sweden, cash payments have become rare but the country still has a midsized shadow economy. However, in many cases the degree of cash usage and the size of the shadow economy do seem to be related: Spain, Italy and Greece are characterized by intense cash usage and large shadow economies while countries with relatively low cash usage tend to show low levels of shadow activity (Anglo-Saxon countries as well as Switzerland, the Netherlands or France).

"Similarly, cash cannot be blamed [entirely] for bribery. In many countries, the simple equation of "much cash, much bribery" seems to hold true. However, in countries such as Switzerland, Germany and Austria, low levels of perceived public-sector corruption coincide with a high share of cash in total payments and/or a low number of cashless payments per person.

"By contrast, and less surprisingly, there is evidence of a causal relation between cash and crimes committed to capture cash. A recent US study found that a reduction in cash circulation reduced the overall crime rate, as well as the rates for larceny, burglary and assault. In Sweden, the shift from cash to electronic payments, with many bank branches having reduced or abolished cash services, led to a pronounced decline in the number of bank robberies and security van robberies over the past years. Less cash [inevitably] seems to mean fewer crimes committed to steal cash. However, electronic payment fraud increased in Sweden (see below, "Cashless" Sweden).

3.7.4 Fraud and Error in the Benefit System

The Department for Work and Pensions administers welfare benefits to around 22 million people in the UK. 'Fraud and Error in the Benefit System' a report by the Department of Work and Pensions, estimates overpayments (the total amount of money lost to the department because claimants are paid too much) and underpayments (the total amount of money lost to claimants who are not paid enough).

In official DWP estimates [1176], incorrect benefit payments are categorised into three groups:

- Official error, due to inaction, delay or a mistake by the DWP, a Local Authority or HMRC.
- Claimant error, in which claimants inadvertently make mistakes
- Fraud, where claimants deliberately seek to mislead the DWP or local authorities.

The estimated total rate of overpayments increased in 2016/17 to 2.0% of Benefit Payments making a monetary overpayment £3.5bn of the Benefit expenditure of £174.1bn.

The estimated rate of fraud overpayments in 2016/17 was £2.0bn.

The estimated rate of claimant error overpayments was £0.8bn

The estimated rate of official error overpayment was £0.6bn.

The DWP stated that failure to declare earnings and employment continues to be the main cause of fraud and claimant error overpayments, accounting for £633m of total overpayments. As much of the failure to declare full earnings might come from "moon-lighting" within a hidden economy it might be difficult to assess the figure accurately.

Indeed, when approached, the DWP stated "In relation to the issue of a cashless society, this does not fall within this Department's remit. You may therefore wish direct your query to HM Treasury"

Whilst it seems intuitive that removing notes and coin might reduce the scope of benefit fraud, the amounts saved is unlikely to be more than say, £0.5bn pa and so whilst a useful addition to the argument for a cashless society, would not be large enough to warrant transition by itself.

3.8. Withdrawal of Large Denominational Notes

On the 4th May, 2016, the European Central Bank announced an investigation into the use of the €500 note. In a press release, the ECB said [1164]:

"Today the Governing Council of the European Central Bank (ECB) concluded a review of the denominational structure of the Europa series. It has decided to permanently stop producing the €500 banknote and to exclude it from the Europa series, taking into account concerns that this banknote could facilitate illicit activities. The issuance of the €500 will be stopped around the end of 2018, when the €100 and €200 banknotes of the Europa series are planned to be introduced. The other denominations – from €5 to €200 – will remain in place.

The €500 banknote, like the other denominations of euro banknotes, will always retain its value and can be exchanged at the national central banks of the Eurosystem for an unlimited period of time."

Given the evidence in the paragraphs above, this move by the ECB is not surprising. We are aware of the Indian Government withdrawing the R5,000 and R10,000 notes in November 2016 for similar reasons, although the impact of this in India was far more severe than the withdrawal of the €500 note in Europe.

It is likely that this action will be followed by a number of other governments as moves to reduce crime, illegal immigration and tax evasion is tackled.

3.9 Automated Payment Transaction (APT) Tax

A Cashless Society might have other benefits such as reform of the taxation system. One example might be an Automated Payment Transaction Tax (or APT tax).

An Automated Payment Transaction (APT) tax was a proposal to replace all United State tax with a single levy on every transaction in the economy. The system was developed by University of Wisconsin–Madison Professor of Economics Dr. Edgar L. Feige who first presented the idea of taxing all transactions at the International Institute of Public Finance meetings in Buenos Aires, Argentina in 1989 [1173].

An APT tax would have a number of interesting benefits (see below) but would only be realistically possible in a cashless society as the collection of the levy should be made automatic as transactions made by cash would inevitably be administratively labourious to collect, if collected at all.

The concept is that all taxes such as Income tax, Capital Gains Tax, Sales taxes such as VAT, Corporation Tax, National insurance Tax, Inheritance Tax etc. should be replaced by a small levy on every transaction in the economy. Because every transaction in a Cashless Economy would be made electronically, the levy could also be collected automatically and passed to the Treasury.

The rate of the APT tax could be set at regular intervals by the government and adjusted at ease to meet its budget requirements.

There would be different ways to pay this levy, but the most likely would be either by an addition to the cost of goods and services as is common in the USA or like the UK system of VAT where the price of a product usually includes the tax. The rate of the levy would likely be much less than the current VAT rate prevailing in most western countries, however, unlike VAT, there would be no merchant “input offsets”.

The tax, however is regressive by nature, but in the example below for the UK, it is shown how this problem could be negated.

The advantages of this tax collecting system are palpable:

- The system makes tax easy to understand, collect and adjust.
- Government will have a much greater understanding as to its expected revenue
- Tax evasion is virtually impossible
- There is no need to worry about multi-national corporations using transfer pricing to avoid corporation tax in this country as there would be no corporation tax to avoid.
- There would be no hidden economy so all residents, wherever they are from, would pay their share of tax
- There would be enormous savings from the tax calculation and collection industries. HMRC would cut its costs and the accountancy profession would need far fewer members.
- Certain obstacles to a free market, such as Stamp Duty on property would be removed and the markets made freer.

Of course, there are disadvantages too:

- The tax system may not be able to be used to alter behaviour, such as punitive taxes on tobacco and alcohol, although maybe bar-code technology might be created to provide a different APT levy on different products.
- The same might be available on food to make the tax less regressive.
- There may be certain industries (such as international financial markets) where any tax on transactions would make it globally uncompetitive (but see example for the UK below).

- If a levy were being made on transactions, there would be a risk of alternative, maybe digital payment methods, being adopted which were outside the control of the government. (See threats of digital currencies).

3.10 Worked Example of an APT tax -United Kingdom

Statistics provided from Payments UK [1179] will allow us to get a broad understanding what level the APT tax rate might be for the UK.

- In the tax year 2017 HMRC collected revenues of about £567bn. This does not include revenues collected by Local Authorities.
- Total payments made in the year was c£83.9tn. This might suggest an APT rate of 0.68% on every transaction but the transaction figure includes "Wholesale Financial" turnover of £57.6tn.
- For the sake of this example, it is assumed that a UK Government would not handicap City turnover which works on very fine margins. Removing this number leaves a net transaction figure of £26.4tn.
- This, at first glance would suggest an APT tax rate in the order of c2.2%
- However, much of these transactions already includes sales taxes such as VAT. If we assume that consumers account for 40% of payments (salaries and pensions for example are non-consumer payments) and if say 70% of consumer payments already attract VAT then the figure above becomes c2.3%
- However, APT is a regressive tax as all people pay the same rate on goods regardless of their income. To make it fairer, a Government might allow that the first, say, £15,000 of all purchases for all citizens might be free of APT (probably not a difficult alteration to manage).
- If one assumes a population of say, 65m people then this might cover a maximum of £975bn of transactions if every man woman and child spent their full duty-free allowance of £15,000. This would change the APT rate to c2.4%
- The ONS reports that Housing, Fuel and Power accounts for 14% of consumer expenditure, food and non-alcoholic drinks accounts for 11% and clothing and footwear, 4%. If these items of expenditure were zero rated for APT this would account for 29% of expenditure and the APT rate would change to c3.4%

The calculations and detail of any APT tax are both clearly more complex than depicted above which only just gives an illustration of the orders of magnitude as a guideline. A more rigorous analysis would be envisaged for Phase 2 of our research.

The discussion of NIRP below focuses on the differences between currency today (mix of electronic IOUs and physical cash) and a currency without physical cash (fully electronic or fully cashless). Other aspects of *digital* currencies, such as DLT or cryptography, are only in other sections.

4.1 A quick tour of monetary policy history

The *entire* history of money is immensely interesting, but we'll start here just after World War II [1213]. During the Bretton Woods era, monetary policy was constrained by forcing all adopting countries to maintain fixed convertibility of their currencies to gold within ±1%. Bretton Woods intended to stabilise global macroeconomics by preventing competitive currency devaluation to boost exports. It established the US dollar as global currency. US dollars were convertible on demand for gold at a fixed price. US monetary policy was constrained by the global demand for US dollars and the possibility of redemption for gold.

After 1971, when US President Nixon suspended convertibility of US dollars to gold, the US dollar became de facto reserve currency for many countries and many fixed currencies became free-floating. This freed up monetary policy, most notably for the US. For other countries, monetary policy was constrained by capital flows, trade balances, and the need for essential goods such as oil.

The 1970s and early 1980s were marked by high inflation and a stagnant real economy ("stagflation"). This may have been exacerbated by the commonly held belief that high inflation would mean low unemployment. History proved otherwise, and inflation was then accepted to be caused by monetary inflation, as proposed by Milton Friedman. Monetary policy then switched focus to controlling inflation and stabilising prices. In 1981, the US Federal Reserve raised the federal funds rate to 15% drastically reducing the money supply and quashing inflation. This did, however, cause a notable recession with US unemployment in double digits. From that point on, inflation expectations were anchored to the market's confidence that central banks would intervene to maintain price stability.

Today, central banks use monetary policy to control the money supply thereby targeting stable inflation, stable prices, low unemployment, and predictable long-term interest rates. Inflation targets differ by country, but are currently 2% in the US and UK. Central banks can affect the monetary base via open market operations (buying and selling government debt on secondary markets), via changing the effective reserve requirements for commercial banks, or via the interest rates on offer for those central bank reserves.

Open market operations affect the money supply directly via cash paid for purchased debt (or cash accepted for debt sold) and indirectly via the effects on yields of the purchased (sold) debt and the subsequent effect that these bonds have as reference (i.e. risk-free) rates for other assets. A decrease in reserve requirements may cause a manifold increase in the money supply as the released reserves are put into the economy as new loans or invested in other profitable assets. An increase in reserve requirements reduces the money supply. The interest rate paid on central bank reserves, e.g. the US federal funds rate or the Bank of England's base rate, may affect the economy via the transmission mechanism [1213].

Quantitative easing (QE) may be analogous to open market operations but where the asset market is not limited to government debt. QE used to purchase other types of assets increases the money supply directly via the central banks' QE counterparties.

With large amounts of debt help privately, by corporations and by governments, a large proportional decrease in the money supply would mean that a large proportion of debtors would simply be unable to access the money needed to repay their debts. This is one of the simple, unavoidable issues we have come up against at the interest rate "zero bound". Dipping into negative interest rates while not decreasing the money supply might simplistically and simply address this issue.

4.2 NIRP & the nature of money

In order to understand NIRP, it must be considered with and without a fully electronic currency / monetary system, i.e. removing physical cash entirely or effectively. Understanding a fully electronic currency system entails an electronic currency--something commonplace already--and full financial inclusion. On the fringe, where people do not wish to be "banked", financial inclusion is a euphemism for "forced banking". In order to keep the discussion objective, this shall be termed "compulsory banking". Currently, private banks are required to maintain minimum reserves at their central bank and many private citizens are compelled to utilise a bank account, for example to receive salary. Citizens currently have the option to transact in cash for many types of transaction, but under full obligatory electronic banking, cash would not be an option. Compulsory banking would obviously be facilitated by fully electronic banking.

While there is no guarantee that a concerted NIRP effort would save the economy--QE has saved asset prices, but little has leaked through to the real economy--it is likely that NIRP without compulsory banking would fail to deliver its promised benefits. NIRP without compulsory banking would push banking customers to remove their cash from the banking system, thus withdrawing money from the financial system. Due to the fractional reserve aspect of banking [1186, 1187] and the ability of the banking system to magnify deposits into the money supply via the *fractional reserve multiplier effect* [1188], customers removing their cash would cause a manifold decrease in the money supply (M1 and above), putting stress on the financial system, and potentially causing a fall, of some magnitude, in market values. With large numbers of people withdrawing their cash in response to NIRP, this could cause a systemic run on banks. With many central banks acting as “lender of last resort” to provide liquidity in a crisis, the fall in retail funding (cash on the run) could be replaced with funding from the central bank. However, with NIRP in effect, this could become a semi-permanent measure rather than a temporary, emergency measure. It is unclear whether this would reverse the manifold decrease in the money supply caused by large-scale cash withdrawals. It is also unclear what the macroeconomic effect would be of (semi)-permanently replacing retail funding with central bank liquidity. In layman’s terms, the effect of replacing customer deposits as bank funding (among other sources) with loans from the central bank. The economics are not intuitive.

A bank run can generally be split into "loss of customer confidence in the bank's activities" and the subsequent need to liquidate large sums at a loss. While the cause (loss of confidence) may be rare, the inability to provide liquidity (cash) to withdrawing depositors in excess of the fractional cash reserves (i.e. cash on hand) is always present.

On the other hand, NIRP with compulsory electronic banking maintains the status quo at any level of interest rates. Maintaining the status quo includes:

- Banks' profitability protected: margins between funding and investment are protected
- Financial stability and liquid markets
- Potential continuation of strong financial markets or high market values, depending on your perspective, with gradually falling interest rates
- Continued macro-economic management of aggregate exposures to the risk of increased interest rates, e.g. the debt *roll-over risk* [1189, 1190, 1191] faced by sovereigns and corporates alike following the low interest rate debt binge [1192, 1193] . A great part of the responsibility for managing the economy’s aggregate interest rate risk, rightly or wrongly, falls upon the central bank via their management of interest rates, inflation, and employment.
- Fundamental decision between dealing with difficult issues here and now versus monetising the future or pushing risk “off balance sheet”
    - Debt-funded share buybacks which boost share price but pledge an additional slice of future earnings to debt service and expose the company to the risk of rising borrowing rates in the future (roll-over risk)
    - Auto industry: moving from simple sales to lease with buyback guarantee, where the carmaker effectively sells a “put” on the resale value of the then used car at the end of the lease agreement (usually 3-5 years). This may effectively put a floor on the price of *new* cars sold by those carmakers in the future. Also, given the speed of

innovation in the auto industry, guaranteeing to buy back something which may become obsolete is a major risk. Where lease loans and the corresponding guarantees are securitised, a portion of the wealth is taken by the structuring bank and the risk is passed from the carmaker to the capital markets. This may be good risk management; it may also introduce moral hazard in the running of a business.

4.3 NIRP's avenues into the economy

In order to analyse the "transition mechanism" of NIRP, one must attempt to understand the mechanics with which a central bank's interest rate policy flows through private banks and to the economy. Thus, in assessing the potential effects of NIRP it is worth looking at its main avenues into the economy:

1. Central Bank base rate: the base rate paid by the central bank on required reserves;
2. Interbank lending rates: interest rates among private banks
3. Common rates among the financial sector and companies in the wider economy (swap rates, etc.);
4. Yields on government bonds and corporate bonds on offer to the market (main source of debt funding for businesses in the US);
5. Banks' lending rates for businesses (main source of debt funding in the EU); and
6. Interest rates on retail deposits, mortgages, and credit cards.

The discussion of the effect of NIRP on each type of rate should consider at least the underlying loans, their source of funding, their interest rates and cost of funds as well as the ability and economic need to pass on the costs of a negative interest rate to the borrower.

Negative Central Bank base rate

It is important to disconnect NIRP on central bank reserves and NIRP on retail deposits. Given that central bank reserves are between 1% and 10% of a retail bank's deposits, it may not be necessary to pass on the full negative interest rate charged by the central bank to retail depositors. The rate applicable to retail deposits might be the weighted average of the rate on central bank balances and other investments.

An additional question worth asking, but not easily resolved, is where the proceeds of NIRP eventually flow. When a retail bank charges a negative rate on a customer's account, then this money feeds into two avenues--partially offsetting NIRP charged by central banks and otherwise supporting the bank's profits. When a central bank charges a negative rate on a private bank's reserves held at the central bank, where does this money go? The proceeds of NIRP accruing to the Treasury (such as HMT or US Treasury) and hence to the government and might be used to cancel QE. Depending on the effective ownership structure of the central bank (this differs by country), the proceeds of NIRP accruing to the central bank's shareholders [1194] may insulate those shareholders from the adverse effects of negative interest rates.

Interbank lending rates

"Interbank lending forms a critical foundation of modern financial markets. In normal times, banks lend to each other in large volumes at low cost for periods ranging from overnight to a few months. These interbank loans are the marginal source of funds for many banks. Even for banks that are mostly funded by deposits, interbank loans may be a critical source of additional funds" [1195]. Funding for interbank lending may come from excess retail deposits, non-retail deposits, or of from central bank liquidity. Interest rates on interbank lending should act to pass through rates on the sources of funds—deposits and central bank loans—suggesting that interbank lending rates should be reactive to NIRP and move in parallel. However, as with the 2008/9 financial crisis, times of financial stress or uncertainty may cause the rates on interbank lending to diverge from NIRP central bank policy rates.

Swap rates and other staples

In terms of central bank rates and NIRP, swaps are "pass-throughs". As the central bank sets the short-term interest rate, this should act as an anchor for the short end of swap agreement. The rate on the fixed side of the swap represents the rate that the receiver requires in order to bear the risk and uncertainty of paying the floating side, i.e. short-term LIBOR. Hence, swap rates are informed by expectations of the future levels of LIBOR and the balance of confidence and uncertainty around those expectations. Short-term LIBOR, e.g. 3-month, generally follows the Bank of England base rate. In stable periods, 3-month LIBOR may equal the Bank of England base rate. During times of financial stress or uncertainty, the perception of the risk of lending among banks is higher than the base rate. The following diagram from the UK Office of National Statistics demonstrates the relationship [1196].

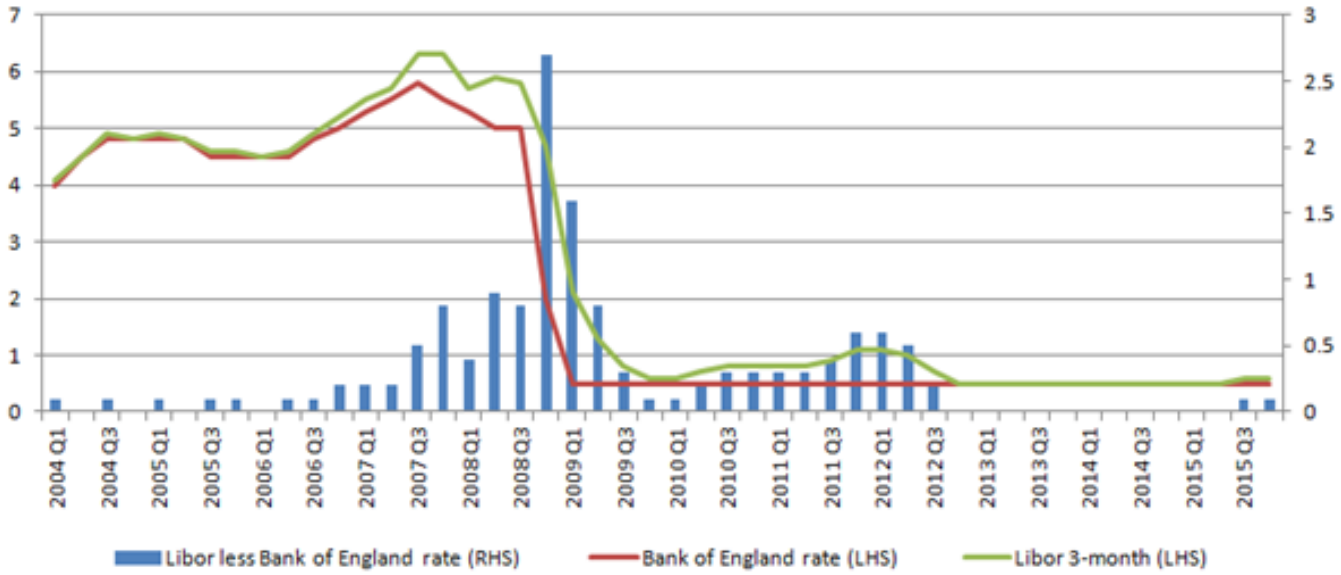


Figure 5: Various historical interest rates

Swaps are not, in themselves, a source of funding. Rather swaps are "the interest rate high-credit quality banks charge one another for short-term financing." [1197] Hence, swaps rates should transmit interest rates from other fundamental instruments or sources of funding. As Credit Suisse notes, swaps have followed central bank policy rates [1198].

From a financial economics perspective (and hence insurer for TVOG), negative interest rates cause trouble using Black-Scholes type formulae to back out option implied volatilities for swaptions and other derivatives where the risk-neutral framework relies fundamentally on the risk-free curve. Difficulties in calculating implied volatilities using Black-Scholes has spawned the use of normal implied volatilities [1199].

Negative yields on government bonds

What does a negative yield on a government bond mean? Government may not need to put their money into a bank that charges a negative interest rate on the balance. Hence, it might represent free funding. In the most naïve example, I buy a government bond today for £105 which will be repaid (hopefully) in a year's time for £100. The government could sit on the money and pocket £5. Being paid to borrow might be a way to ease the burden of debt service.

Negative yields on corporate bonds

What does a negative yield on a corporate bond mean? Avoiding pleasantries, it is effectively giving money to the borrower. For that company, perhaps either costs are too high or revenues are too low,

or the potential for growth is too weak—if the last, is it specific to the company and their past decisions or is it systemic?

In looking at costs, it would be most useful to get a breakdown across the economy of business costs, including costs of sale, wages, executive remuneration, IT costs, etc. This is simply not readily available.

With weaker wages, revenues from the demand-driven engine of the economy (workers) will necessarily decrease and aggregate revenues across the economy will decline insofar as the revenue gap cannot be filled with increased personal, corporate, and government debt.

The main drawback of NIRP on corporate bonds is that it does not address any of the structural economic problems. Rather, it does not require leaders (at all levels) to address those hard questions and it may perpetuate the current stagnation.

Banks' lending rates to businesses

One of the main arguments in favour of NIRP is that negative interest rates on banks minimum reserves should incentivise banks to increase lending to businesses at reduced rates and hence spur on the economy. Perhaps we should accept this at face value: under NIRP, banks will be able to lend to businesses at lower rates. The reality of business lending rates under NIRP will depend on the banks' sources of funding, the respective rates for each source, and the banks' target margins or profits on business lending.

The effect on lending rates to businesses should be similar to retail deposits, discussed in more detail below, but perhaps with interest margins reflecting the level of risk of the borrowers (i.e. businesses).

Interest rates on retail deposits

Retail deposits represent funding for loans or funding for other types of investment. There are many permissible uses for "retail funding". These include minimum reserves at the central bank, additional reserves at the central bank, investment assets such as government or corporate bonds, equities, or short-term household loans, business loans, credit cards, and mortgages. In some jurisdictions, retail deposits may be permissible derivative collateral. Each asset has a different capital requirement and hence cost of capital. The weighted average return on these, less the bank's margin or return on capital, might be a justifiable rate of interest to pay on retail deposits.

Deposits at the central bank earn (pay) the central bank's short-term rate. Cash deposits in collateral accounts may earn interest at the rate offered by the intermediary (clearing house) or if held on account at the central bank earn the central bank's rate. Both of these rates might adjust naturally for NIRP.

For retail funds invested in assets, the yield on those assets should be related to the term structure of the risk-free yield curve and the term structure of risk premiums. If the effects of NIRP seep into longer-term rates, nominal yields on investment assets should be expected to fall with NIRP.

There is evidence that home mortgages and credit cards are not funded by retail deposits, but rather are created on demand by a simultaneous double entry in a bank's books [1211] .

The use of retail deposits for derivative collateral presents a major risk to depositors due to the primacy of calls upon derivatives' collateral which avoid the "automatic stay" should a counterparty—e.g. bank, insurer, or hedge fund—go bust.

Given the complexity of potential uses for retail deposits, it is difficult to predict precisely how deposit rates will react to NIRP.

The "stickiness" of deposit rates

According to the IMF in August 2016, “the downward stickiness of deposit rates could result in a difficult trade-off between effective monetary transmission and bank profitability” [1201]. This assumes that cash is still in use and is referring to the downward stickiness of deposit rates *as they approach zero or peer negatively.* It is worth expanding the analysis of the stickiness of retail deposit rates both historically, well above zero, and as they might dip into negative rates under NIRP.

Anecdotal evidence suggests that retail banking deposit have not been downwards sticky while interest rates have been positive and declining—although deposits may have been transformed to long-term lending in the past at higher rates than at present, in an economy with falling yields, deposit rates also fall (i.e. aren’t “sticky” or don’t reflect the previous long-term rates they’ve been lent at). With the potential to dip into NIRP, will rates on retail deposits be upwards sticky if there’s a return to positive rates? There are two potential explanations of deposit rates not being downward sticky: the maturity transformation is only a minor component of lending or that in a period of falling rates, banks retain and increase and the upside on past loans by lowering retail deposit rates. If the former, then following a dip into and return from NIRP, retail deposit rates should not be upward sticky. If the latter, then retail deposit rates should be upward sticky. Common sense suggests the latter.

Interest rates on retail loans, credit cards and home mortgages

As retail loans, credit cards and home mortgages are not funded in the traditional sense—they may be created on demand—there is no negative borrowing rate on funding by which to lower the rates on these types of retail loans. With no shortage of funding, the main constraints on the amount of lending are likely prudence regarding the affordability of repayment and limited capital needed to back risk capital requirements. Without a source of funding at a negative interest rate, the nominal zero acts as the constraint and does not move.

Unless there is a change in the nature of funding for such loans, rates on retail loans should not be expected to fall in parallel with NIRP. There are two recent examples of changes in funding—namely Funding for Lending in the UK since 2012 and the Small Business Lending Fund in the USA since 2010. Under both schemes, the government—i.e. taxpayer or central bank—provides the funds for lending. In either case, if the scheme allows for a negative interest rate on the funds it provides, then the lending bank may be able to pass on the effects of NIRP to the borrower. However, it is effectively the central bank or taxpayer subsidising banks, via maintaining their margin, and subsidising borrowers via the negative interest rate.

4.4 NIRP and banks

It is impossible to discuss NIRP and a cashless economy without mentioning retail banks. In this section, we try to understand NIRP and the potential move to cashless from the perspective of a retail bank.

Going cashless as risk mitigant

Going cashless is one way to effecting compulsory banking. Compulsory electronic banking may be seen as a risk management tactic for banks facing the myriad risks arising from NIRP, especially that of bank runs into cash. In addition to reducing the risk of a bank run, compulsory electronic banking would also secure demand for retail banking services (recall obligatory purchase annuities). From a profitability perspective, the profit margin on incremental deposits is the product of the interest margin between deposits and assets, the increase in deposits, the effective re-lending multiplier. The re-lending multiplier aims to reflect the permissibility of fractional reserve lending, which does not define today’s banking activities, but rather provides a simplification of reinvestment by deposit-taking banks. At an aggregate level, the re-lending multiplier should be between the ratio of monetary aggregates M1 and M0 and the effective fractional reserving rate. In either case, the aggregate re-lending multiplier should exceed unity, meaning that banks’ profitability is multiplicatively more acutely exposed to changes in the level of deposits. Hence, a fall in demand for banking services, lower retail funding, and bank runs pose serious threats to bank profitability.

With this in mind, compulsory electronic banking may also be seen as risk management of future business levels, again acutely in the face of NIRP. Fenton & Neil provide a useful diagram to visualise cause-and-effect relationships among trigger, control, event, mitigant, and consequence [1202]. NIRP, electronic currency and compulsory banking can be visualised as "controls" which reduce the likelihood of bank runs and reduced demand for banking services (the "events") in the following diagram. The topics under discussion here--NIRP, electronic and compulsory banking--are provided in lighter blue boxes.

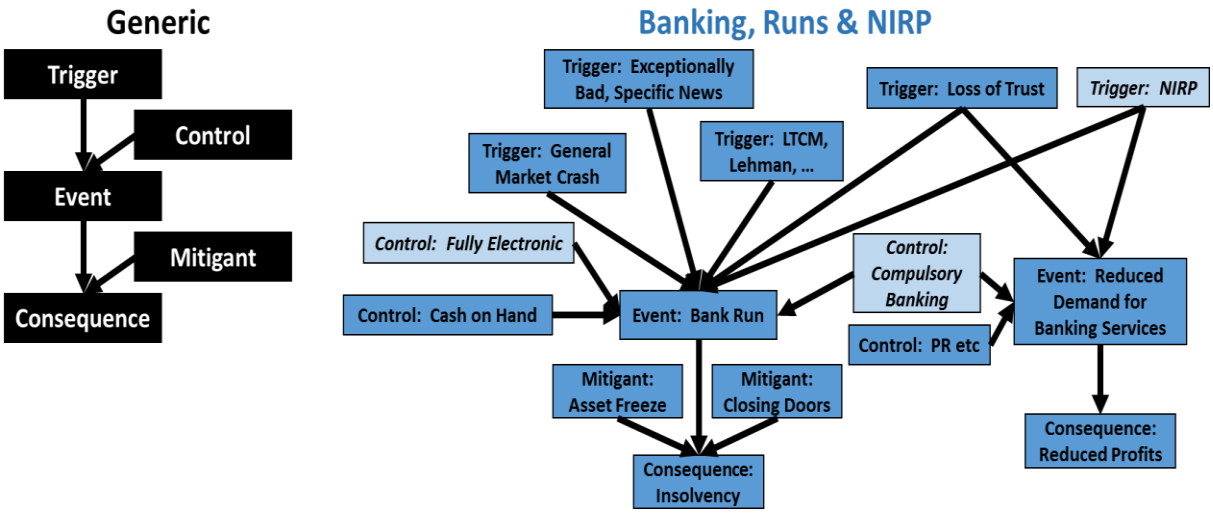


Figure 6: Cause-and-Effect Relationships for Generic (left) and Banking, Runs & NIRP (right)

Removing cash from circulation (going "fully electronic") would largely eliminate the risk of bank run. Customers might still be able to transfer their accounts to another bank, but this takes longer to effectuate and is a less immediate personal risk mitigation technique (the "oh golly, I'd best take out my savings to ensure they're safe!"). In a cashless world, a “cashless bank run” might look very different, but might involve the mass migration of retail deposit accounts from one bank to others. This would likely be much easier to manage than a cash bank run and might be eased with interbank lending until the appropriate level of assets could also be transferred out of the bank experiencing the cashless run to the receiving banks. Insolvency might still occur if the cashless run were big enough *and* receiving banks were not confident in the value of accompanying assets. Hence, while the risk of a bank run event itself is mitigated, the underlying risks potentially caused by banks’ risky lending and risky activities and ultimately borne by customers or taxpayers are largely unaffected. Moreover, removing the risk of a bank run may actually increase the risks due to increased moral hazard—if one views a bank run as a natural society-level risk mitigant against egregiously risky banking behaviour.

What is not pictured in the diagram above is that the combination of fully electronic and compulsory banking enables retail banks to impose NIRP on retail deposits.

Financial compulsion

Separating electronic banking from compulsory banking, an alternative digital banking service could be the emergence of a new type of deposit-taking institution--blockchain'ed and largely cost and worry-free--where deposits do not transfer ownership to the deposit-taking institution and are not leveraged into the financial system via fractional reserving. Essentially, a digital equivalent of cash in hand.

Forced full financial inclusion, i.e. financial compulsion, is necessary to enforce a NIRP through retail deposits. Certainly, *increasing* financial inclusion is likely to bring benefits to people and to the economy. However, when considering financial compulsion coupled with fully electronic money, the costs, benefits and potential risks should be investigated further and from various stakeholders’

perspectives.

4.5 NIRP and a cashless economy

A cashless economy is an effective way to apply NIRP to retail deposits.

Before digging into the potential effects of NIRP on a cashless economy, it is important to observe two fundamental economic axioms. Primarily, the total amount of wealth is finite at a given point in time or over any period of time. Secondly, the total amount of money chasing this wealth directly affects its price. Take as a simple example a world where the amount of wealth is fixed and the money supply is increased. In this situation, prices should increase. On the opposite end consider a world where the amount of wealth increases noticeably but the money supply is unchanged. Prices should decrease.

In a cashless economy, applying NIRP to retail deposits penalises savers who would leave their cash sitting idly in their accounts. Pushing savers to spend or invest their electronic cash is another example of "demand driven" economic policy. Savers would seek out assets which would retain value and escape the penalty of negative interest rates--investment assets as well as physical items of lasting value. In the initial switch from cash-permissible economy to a cashless economy, there would likely be a boom in spending which would support prices of financial assets (investment channel) and would support businesses which produce items of durable value (savings channel). However, at a certain level of negative interest rates, savers will have spent or invested effectively all of their electronic cash and beyond this point, deeper NIRP should not be expected to drive demand further.

One negative aspect is that NIRP might incentivise poor personal risk management as savers do not retain sufficient emergency funds in electronic cash. Rogoff notes this and suggests that there could be a minimum balance below which negative interest rates would not apply [1048].

4.6 NIRP and the economy in general

The nominal zero of the P&L

One of the main sticking points for NIRP in an economy of limited liability companies is the nominal zero of the P&L. In a world in sustained deflation with a parallel money supply, the aggregate result across the economy will be negative. Hence, more companies than not (on average) will be running losses. Countries can run deficits, partly because they can print their own money or otherwise debase their currency. Can a company run a sustained “deficit”? Can a country that cannot print its own money run a sustained deficit (e.g. Greece, albeit only one aspect of the Greek tragedy)?

The nature of money and wealth and of their creation

In order to understand the potential effects of NIRP on the general economy, it is important to include QE, the nature of money, the nature of wealth, and of their creation.

Back to the two axioms, in order to spur sustainable growth in the real economy, the total amount of wealth must be increased. In order to neither inflate nor deflate, the money supply should be increased reactively in a proportionate manner. Nominal illusions of increased wealth may follow periods of disproportionate increase in the money supply. Nominal illusions of increased wealth are often met with welcome (cue the “wealth effect”), while nominal illusions of decreased wealth are often met with protest.

If done correctly, the increase in money supply could maintain price levels on existing goods (benefitting suppliers and consumers) as well as supply money for newly created wealth (assets, goods & services). On the other hand, increasing the money supply without increasing the underlying amount of wealth should cause inflation. We have seen this with global asset markets and QE. If the incremental money supply created by QE leaks out of asset prices into the general economy, then so may inflation. The extent of inflation will depend inversely on how much of that QE leaked into

generating additional wealth. An increase in wealth without inflation is an increase in the average quality of life (more wealth at the same total price).

NIRP increasing the money supply versus NIRP increasing wealth

NIRP will likely increase the amount of money chasing assets, goods and services. This is one desired effect of the demand-driven economy and monetary policy. However, the true measure of success of NIRP will be in increases in wealth arising from improvements in the real economy. QE and falling interest rates have demonstrably failed at this, with QE inflating or supporting global markets and low interest rates failing to spur banks to lend more. Part of the reticence to lend may be due to uncertainty arising from threats of wars, technical innovation and disruption, and political uncertainty and instability. NIRP is unlikely to ameliorate any of these uncertainties.

How might NIRP fuel increases in wealth arising from improvements in the real economy? Credit Suisse summarises the intention of NIRP and QE, "NIRPs were regarded as a complement to the quantitative easing (QE) policies with the intention of stimulating credit creation and thereby boosting growth while reducing deflation risks" [1198]. However, in a system already heavily dependent on credit, the creation of more credit may provide only short-term stimuli to certain sectors of the economy. For those sectors which roll over their debt, the creation of more credit increases the dependence on a regime of perpetually falling interest rates (positive inflation or currency debasement) and otherwise increases the exposure of those firms and the wider economy to debt roll-over risk at higher rates in the future. NIRP, and the consequent sacrifice of cash, may also imperil market stability which many view as "tantamount to improving long-term growth prospects" [1203].

NIRP versus leverage

Most notably, NIRP does not address something today which it will still not be able to address in the future: ubiquitous and expanding leverage. Rather, dipping into NIRP might perpetuate expanding leverage. Leverage has not simply increased in those sectors of the economy where it has been common historically (e.g. speculation, hedge funds, banking), it is also seeping into all sectors of the financialised/commoditised economy.

Leverage is itself not a single, well-defined thing. Various types of leverage exist—operating, financial, composite, leverage arising from derivatives use or misuse [1204], and off-balance sheet leverage ("incognito leverage"). Permeating financial leverage holds monetary policy to ransom—unable to address structural factors, the stakeholders who are not leveraged, and who would survive an increase in rates, are forced to bear the burden and lower returns on capital. Financial leverage magnifies market bubbles. Derivatives and off-balance sheet activities enable companies to reduce operating capital or risk capital, but the protection purchased may prove inadequate if a stress is well beyond the working capital of the derivative counterparty that has sold the protection. Incomplete or inadequate monitoring of aggregate derivatives positions may enable the market to inappropriately remove risks from aggregate balance sheets—risks that may materialise and could not be borne by the market participants. NIRP and monetary policy are unlikely to address any form of leverage and hence reduce aggregate market risk. Insurers are disadvantaged by leverage vis-à-vis returns as they lie on the lower leveraged end of the spectrum and thus have a lower expected RoI. However, lower leverage means lower risk.

NIRP and cash as a safe haven

Since the 1980s, cash in the western world has been a safe haven--an easy way to store wealth as well as transact. It has also been a safe haven for developing countries either officially such as Ecuador [1210, 1211] or effectively as in the case of Lebanon [1209]. Imposing NIRP on cash may destroy trust in the government or in the financial system. At the very least, people will likely seek out new safe havens. Without a durable currency, this could cause systemic rolling bubbles as the masses explore and subsequently abandon different assets as safe havens. With such bubbles, speculation might encroach and there would be natural winners and losers--which might erode social

cohesion. For this reason at least, undermining cash's safe haven status should not be undertaken lightly.

There are other assets, commodities or investments that have historically acted to protect wealth in the short term or the long term, but they have generally not been as easily transferrable as cash. Cash lubricates an economy as do electronic IOUs. Gold has historically been viewed as protection against inflation and the loss of purchasing power of holding cash. This has also been true of other real assets, though gold is more easily portable. A move to NIRP may see a move to gold and hence an increase in the price of gold, though the price of gold has many other potentially larger causal factors.

Historically, currencies have crumbled with or following an effective negative interest rate on cash, though this may not have been the cause, which more likely was the debasement of the currency due to other factors. Given the current situation, QE may debase western currencies and NIRP could be a stealth reversal.

NIRP as a tax or rent on money

If considering NIRP as a tax on money, it should be noted that NIRP should be expected to be a highly regressive tax disadvantaging the poor relatively more than the rich. This is due to the differences in the make-up of personal wealth across the socio-economic spectrum, with the poorer end having proportionally more in cash and bank accounts and the richer end having proportionally more in financial assets and shareholdings.

From another perspective—that of the retail banking customer—NIRP can be thought of as a “rent on cash”. In a world flush with debt, perhaps where the outlook for future increases in the amount of sustainable debt is uncertain, NIRP could be seen as reversing the rules of the game--as a “rent on cash” in a world flush with savings money.

4.7 NIRP considerations for life insurers and pension schemes with long-term ALM

NIRP and protecting long-term wealth—nominal versus real returns

Fundamentally, the challenge of helping customers maintain and protect their long-term wealth and protect their future financial well-being does not change under NIRP. NIRP simply brings the question back to the forefront. For new money, the essential question is one of prudent investment to meet any promises made to policyholders (fixed either in nominal or real terms) and to otherwise act in their best interests, perhaps by aiming to maintain purchasing power over a long period.

For in-force business which bears reinvestment risk, the main question is regarding the overall reinvestment risk given the term of the assets and the term of the liabilities, especially if the latter is longer. This presents two related questions. Primarily, how likely is it that the achieved net yield (yield on existing assets following by unknown reinvestment yields) will be sufficient to meet those promises? What net reinvestment yield is needed and what yield is realistic? Secondly, ignoring the promises made and returning to the basic premise of helping customers manage their assets, what is the best way to help policyholders protect their wealth, protect their future financial well-being and quality of life, and ensure that the funds they have today provide the necessary purchasing power in the future? The first question is a question of nominal returns, the latter a question of real returns or of the maintenance of wealth relative to changes in the real economy. The lower interest rate environment of today as well as the potential for NIRP in the future should be expected to put further stress on reinvestment assumptions, and hence pension valuations and reserves for long-term fixed savings liabilities.

NIRP, money and markets

Investors are often guilty of confusing market values with the value of the market: whereas market values measure the marginal prices at which goods have been sold, e.g. today, the value of the

market is not the sum of the products of current market value and the volume of the market. The market value applied to a set of investments gives a good indication of the marginal sale value attainable today for a fraction of the market in each security. The full liquidation of a given security would likely cause the market value to fall.

For life insurers and pension schemes, a focus on market values and market consistent valuation should not distract from assessing the future purchasing power and the future financial well-being of customers who entrust us with their savings.

NIRP, as it pushes savings out of cash, should further increase asset values across the board, supporting asset management businesses by increasing the fund management charges in nominal terms, to which the customer is largely insensitive. The customer is only disadvantaged if either when they "cash out", it is at a lower market price or due to the loss of purchasing power arising from monetary deflation and the compounding effect of fund management charges. This raises the fundamental question for asset management services: are we doing our best to ensure value for money for services and in protecting customers' future financial well-being?

However, strong and stable market values which diverge from older tools such as fundamental analysis, the discounted dividend model, or earnings per share should be approached with caution when being considered for their long-term potential. QE effectively forced investors out of traditional low-risk investments such as sovereign bonds and into riskier investments such as equities. This flattened risk premiums across the board, but did not change the risks in the underlying companies, and may have increased the risk of a price correction. As falling rates increase all asset values *on average*, so too should dipping into NIRP territory. The main difference to NIRP is that in addition to lowering rates, it urges idle cash to be invested or saved in non-money assets, commodities or commonplace items that otherwise satisfy the desirable aspects of cash—medium of exchange, basic unit of account for other things, portability, durability, divisibility, fungibility, interchangeability, and potentially acting as a store of value [1214]. With the potential cash substitutes which might emerge, it is important but doubtful that they be a basic unit of account by which other products and assets are measured.

Reversing QE coupled with NIRP may provide a way out of QE without causing a market correction. This is not necessarily a good thing for investors across the board. For example, over-inflated asset prices supported by QE are a cost to young net savers and a benefit to older savers who are in the process of selling down their pots.

A return to positive yields could be supported by either an isolated increase in the useful investable universe (wealth) or an isolated destruction of money. Historically, a destruction of money has been caused by large-scale defaults which also destroyed some productive capacity, or by the erosion of inflation. Today, reversing QE looks like the next step in destroying money which may be isolated from causing a proportionate decrease in the productive economy.

For long-term liabilities, another fundamental question is whether buy-and-hold or active trading should produce better returns and hence better value for policyholders. Under stable monetary conditions, it could be argued that you can't beat book values—that for a given portfolio, book value returns (yields at purchase) should be equal to market value returns *on average over the long term*. Under expansionary monetary conditions, does this still hold? Can you beat book values with an expanding money supply? Under contractionary conditions, market values should be affected by a decreasing money supply and book values will be affected by the extent to which the decreasing money supply causes defaults or bankruptcies.

QE, NIRP, and an insurer's nominal guaranteed promises

QE strengthened banks' balance sheets while NIRP should be expected to do the same, but via different mechanics. Both QE and NIRP benefit the banking sector because their assets are of longer duration (or term to maturity) than their liabilities, i.e. they are "long duration". Insurers and pension schemes with long-term *nominal* liabilities are either matched by duration or are short duration (i.e.

duration of liabilities greater than that of assets). Hence, QE comes at a cost to insurers and pension schemes. So should NIRP.

Where insurers and pension schemes are short duration, one of the main risks is reinvestment (the other being longevity). Low yields on high-quality bonds cause strain via reinvestment risk while moving into riskier assets (e.g. equities or infrastructure) bears an increased capital cost. Compared with higher historical yields, attaining a return of 5% today brings a lot more risk and costs a lot more capital. The nominal guarantees—implicit in the historical pricing of long-term savings products, explicit in some with profits products and DB schemes—in a low or falling yield environment increase an insurer's reinvestment risk and put strain on the balance sheet. NIRP should be expected to exacerbate this. While this might urge one to consider offering real benefits, one must recall the runaway UK inflation of the 1970s where inflation outstripped GDP gains significantly. Offering real benefits does not come without risk, though real benefits may *currently* look like a panacea given the current conundrum of nominal promises, negative real rates, and the potential for negative nominal rates via NIRP.

QE, NIRP and deflation

In terms of understanding the long-term prospects for investment, it is worth observing an often abused, but nonetheless inviolable economic corollary to the finite wealth axiom: given the finiteness of wealth, average real investment returns are a zero-sum game once the monetisation of the future has been accounted for. This may be seen as an extension of Walras's Law to include expectations of the future:

$$E(D_{GOODS} + D_{MONEY})_{t\geq 0} = E(S_{GOODS} + S_{MONEY})_{t>0}$$

D and S stand for demand and supply, respectively. The demand and supply for goods also includes services. The "demand for money" is non-intuitive but will be looked at below.

Setting t=0 reduces to Walras's Law and the formal expectations are removed as the current levels of supply and demand are fixed, even if not known with precision. The extended Walras equation may be used to explore potential effects of increasing the money supply in the present at the cost of the future.

NIRP, QE or lower interest rates for borrowing should increase the present supply of money while reducing the future *potential* for increases in the supply of money. The increase in the present supply of money will likely also increase the expected demand for money in the future. This leaves the future potential demand for goods and the future potential supply of goods to balance out the extended Walras equation: the potential for future demand for goods must decrease, the potential for future supply of goods must increase, or both, causing deflation (aggregate future supply exceeding aggregate future demand should put downward pressure on aggregate prices). That is, if the world conforms to the extended Walras equation. It is worth questioning each assertion to see if an increase in the potential for deflation is the correct interpretation. For example, does increasing the present money supply (QE etc) really reduce future potential for increases in the money supply? Or is the potential for the future money supply relative or infinite? These are not easily answered, but conventional wisdom asserts that excess now will come at a cost to the future.

General discussions regarding a Cashless Society has brought concern from many people on how those who are already financially excluded, those who are technically naïve or those less able to react to change would be able to adapt.

In the following paragraphs, we look at the issue from the standpoint of different countries along the payment ecosystem spectrum.

5.1 Different stages of De-Cashing

In their 2013 article "Measuring Progress Towards a Cashless Society", Mastercard (Author: Hugh Thomas) [1116] defined four stages of de-cashing:

1. **Inception:** These are mainly developing countries where cash accounts for more than 90% of transactions. This is usually due to low financial inclusion rates and the absence of a cashless payment eco-system
2. **Transitioning:** This is a mix of developed and developing countries. The high cash usage in developed countries is often because of reasons of local culture whilst the developing countries in this category have a growing middle-class which are stimulating the uptake of cashless technology.
3. **Tipping Point**: The countries in this category usually have all the factors in place to make a substantial move away from cash and may do so at differing rates.
4. **Advanced:** These countries already have cashless solutions readily available to them and nearly all members of the community have debit cards and merchant acceptance is almost universal.

At the time of their article (2013), Mastercard put countries such as Singapore, Sweden and the UK amongst the Advanced category. Interestingly, the USA and Germany were in the Tipping Point category, Spain, Brazil and China were placed in the Transitioning category and Italy, Greece, Russia, India, Kenya and all the developing countries of Africa, Middle East (excluding Israel) and S America in the Inception category.

Given that this Mastercard research dates back to 2013, the pace of change towards de-cashing will mean that a number of these countries will have moved categories. Read 'Cashless World in Motion" for the latest for these countries and more.

5.2. Financial Exclusion and the Effect of Technology and De-Cashing for Countries in the Inception Stage.

In this section, we make use of a paper written in Science Magazine by Tavneet Suri and William Jack in December 2016 entitled "The long-run poverty and gender impacts of mobile money." [936]

In Kenya, there are about 2,700 ATMs compared with over 70,000 in the UK. Banking is difficult, particularly in rural areas and money transfer is often reliant upon the transportation of cash over large distances which is hazardous, time consuming and expensive.

The authors examine the differences that easier money transfer has made. Mobile money was first introduced in South Africa and the Philippines about 10 years ago. In March 2007, these services were followed in Kenya by "M-PESA" (M is for mobile, "Pesa" is Swahili for "money"), which was to become that country's dominant (although not only) mobile money service. M-PESA has been celebrated internationally as an innovation that could bring the unbanked population into the formal financial system, with associated impacts on economic well-being and welfare. We discuss M-Pesa in more detail as a Case Study below.

The authors analyse Mobile Money, a service which they define as allowing monetary value to be stored on a mobile phone account and sent to other users via text (SMS) messages. M-Pesa has been adopted by the vast majority of Kenyan households and has increased per capita consumption levels and lifted 194,000 households, or 2% of Kenyan households, out of poverty.

The authors argue that the impacts are very significant and most pronounced for female-headed households. They argue that the major benefits result from changes to financial behaviour, such as increased financial resilience and saving, especially for women, who have moved out of agriculture and into business. Mobile Money has therefore increased the efficiency of the allocation of consumption over time whilst allowing a more efficient allocation of labour, resulting in a meaningful reduction of poverty.

Basic financial services such as the ability to safely store, send, and transact money, taken for granted in most advanced economies, and which in the form of mobile money have reached millions of Kenyans at unprecedented speed over the past decade, appear to have the potential to boost directly economic well-being. For women, the route out of poverty might not be more capital, but rather financial inclusion at a more basic level, which enhances their ability to manage those financial resources that are already accessible.

Nearly 10 years after its launch, M-Pesa is used by at least one individual in 96% of Kenyan households (with a total of 5 million households in the country, 96% of which have a mobile phone (but not necessarily a smartphone).

It is this aspect, that transfer of Mobile Money can be achieved without the requirement of internet access which makes M-Pesa so appealing to the populations of developing countries.

The rapid pace of change in developing countries compared with that of many developed countries seems to be driven by necessity unlike the change in developed countries which is probably driven more by cost and convenience.

5.3 Case Study: M-Pesa

How and why mobile money (M-Pesa) works in Kenya [936, 1212)

Whilst we in the developed world are used to using our smart phones for money payment and transfer, in many areas around the world, internet connection is far from being widespread and the cost of smart phones just prohibitive.

M-Pesa relies not on the internet nor smartphone technology but by sending SMS messages on devices which our modern teenagers would consider to be Jurassic.

Indeed, these old-style devices would now be cheap to buy and could even be distributed by providers in the same way that our retail banks distribute security devices to enable internet banking.

How does it work?

In simple terms, the user would “top up” his phone account with credit and then transfer it to someone who he wants to pay. This could be a friend, utility company, or shop. One can also go to an outlet and withdraw credit on the phone account as cash.

Whilst this idea of paying for things and taking cash out might sound like a bank, instead M-Pesa is essentially a mobile phone product.

For M-Pesa one needs to obtain a SIM card from a telecommunications company (telco) called Safaricom. The Sim Cards are then topped up electronically or by cash at outlets which are often booths/kiosks that are often found in high streets, supermarkets, pharmacies and the like.

Each user of M-Pesa would have an individual account code and one would enter the code of the person to be sent money a little like an addition to a contact list. When a sum is transferred, the amount of value stored with Safaricom is added or subtracted just like an electronic payment to or from any bank.

To cash-in an amount stored, the user would go to an outlet and transfer the amount he would like to withdraw and the cashier would provide cash in return.

The funds received by Safaricom are deposited in several commercial banks, which are prudentially regulated in Kenya. In addition, the funds are held by a Trust and are therefore out of reach from Safaricom, which cannot access or use them so this differentiates Safaricom from a bank. In the unfortunate event of Safaricom going bankrupt, the creditors of Safaricom would not have access to the M-PESA funds. This is a requirement from the Central Bank of Kenya which oversees M-PESA. The funds remain at all times the property of M-PESA users.

5.4. Financial Exclusion and the Effect of Technology and De-Cashing for Countries in the advanced Stage.

Financial Exclusion has a very different meaning for countries such as the UK in the advanced category to those countries such as Kenya in the Inception category.

In the UK, there has recently been much debate about protecting those in society who are most disadvantaged from financial exclusion. This debate is primarily led by organisations protecting the vulnerable such as Age UK but is being accepted by politicians such as Baroness Tyler, Chair of the Parliamentary Select Committee on Financial Exclusion. Baroness Tyler calls on the Financial Conduct Authority and Banks to give greater priority to tackling financial exclusion in the UK.
“With more than 1.7 million people in the UK without a bank account and 40% of the working age population with less than £100 in savings, the Committee asks them to end the “scandal” of the poorest being excluded from even the most basic financial services.”[551]

Baroness Tyler also said: "The UK financial services sector is a world leader which makes it doubly unacceptable that it is failing those who need it most. Too many people still have no bank account or cannot get access to basic or fairly priced financial services. The 'poverty premium'—where the poor pay more for a range of services from heating their home to accessing credit—contributes to a vicious circle driving people ever deeper into debt and distress.”

Age UK points out the increased difficulties some older people will have with any further move towards de-cashing, in particular those without bank accounts, internet access and forms of non-cash payment systems. However, they acknowledge the reality that de-cashing is happening by stealth and they recognise the problems that lay ahead for those that they are trying to protect.

As de-cashing increases, so the reduction in bank branches will continue, forcing even more people to use alternative payment methods, and creating the vicious circle.

Moreover, as de-cashing increases, the fixed costs such as operating high street bank branches, the ATM network, and other factors, already mentioned in section 3, will rise as a proportion of cash usage. As a result, it is likely at some stage in the not too distant future, that banks might well be forced to start charging for the facility of providing cash, in particular in remote rural areas and those left behind without non-cash modes of payment would be even further disadvantaged.

It is now impossible to halt the march of de-cashing and so what can be done to halt the further inconvenience and exclusion of the unbanked and the technically naïve?

The first and most obvious suggestion is a rigorous programme of education coupled with easy to access bank accounts. This, however, cannot be the full answer. Many of the unbanked or technically naïve are in this category either because they are unwilling or simply unable to embrace

new payment technologies. For far too many, an education programme is likely to fall on unresponsive ears and the gradual de-cashing activity will hurt these people at an increasing rate.

Is there any solution to this problem? Perhaps a forced move towards a cashless society would give those being left behind no alternative but to embrace a non-cash environment? This sounds tough and uncaring, but the alternative outlined above could possibly be even worse.

5.5 Easing the problem of change

If it came to transition to a fully cashless society an advance economy would need to address the problems that would beset those people or businesses less able or willing to adapt in order to make such change politically acceptable.

The required transformations would no doubt be planned over a number of years and the public would be given sufficient time to adapt.

The issues of transition are to be discussed at greater length in Phase 2 of this report and *inter alia* should discuss:

- How payment for small transactions can be made to and by people with no current bank account
- Training programmes to educate new payment methods
- How families can pay pocket money to children or how small payments to sports and social clubs can be made.
- To what extent, and at what cost, vending machines, car parking facilities and any other cash-only receiving machinery must be adapted
- Who should pay for transition

Overview	The topic of a Cashless Society, as is often the case when involving money, polarises opinions. Identifying the main arguments in favour of or against a matter may enable different parties to address the associated emotions, identify solutions or mitigations and open a path towards a possible transition. **This section synthesises the issues that may prevent progress towards a cashless society as a concept, as well as the risks that a cashless society may bring to the ecosystem. References are added to support discussion.** A **risk** as an event that has not yet happened and an **issue** is something that already has happened or is happening. Both risks and issues involve the economic, industrial, financial, political, social, regulatory and technical contexts. We may consider possible avoidance, solution, reduction, sharing or acceptance of each risk. Issues: 1.0 Hidden agendas 2.0 Trust in banks 3.0 Trust in governments 4.0 The economics of money 5.0 Financial exclusion 6.0 Change leadership 7.0 Digital economy readiness 8.0 Security of transactions, data and biometrics 9.0 Social value of cash 10.0 Removing cash may stall the economy Risks: 11.0 A cashless society may not live up to its promises 12.0 Displacement towards alternative means of payment 13.0 Totalitarian regime 14.0 Sovereignty risks 15.0 End to the right of a private life? 16.0 Innovation marketplace and user experience 17.0 Lack of competition on the payments market 18.0 Excessive reliance on technology 19.0 Politics vs Innovation 20.0 Financial stability

Issue 1: Hidden agendas			
Description	Perception that the desire for a cashless society is ultimately driven by the desire by certain bodies to exert maximum economic and social control, “coerce the untamed into the cogs of the financial system”. Would de-cashing be justified as a solution for the ills of society, such as drugs, black/hidden economy, corruption, terrorism, and illegal immigration? Would collusion between banks and governments and other security agencies be blamed?		
References	Reports: 1121; 1033; 1026; 37. Anecdotal evidence: 360; 131; 834		
Discussion topics	Many opponents view the cashless society as a repressive measure and raise the concern of a misplaced or dishonest agenda, rather than an opportunity for economic and social progression/reform. This is related to risk 19 “Politics vs Innovation”		
Solutions/ mitigations		Type	Owner
Communication shift to demonstrate benefits and opportunities for individual “fulfillment”			

Issue 2: Trust in banks	
Description	Loss of confidence in the banking sector due to possible bank failures, with memories of the 2008 financial crisis. A cashless society is an ideal market-dominating position for banks: cash is their biggest competition, and poses operational challenges for them in the handling of cash, maintaining ATMs and branches. A cashless society means: no cash runs and transaction fees compliance.
References	Report: Section 3.1 Anecdotal evidence: 655; 912.
Discussion topics	The more alternative payment methods there are, the more competition and the lower the costs for merchants and consumers who want to make and receive payments at the expense of the banks. Consumer choice to keep away from low interest rates acts as a balance against risky bank behaviour; the balance is removed if everyone must be banked and operate cashless. If the balance is not achieved, a cashless society means no more than a bank-payments society. Would mismanaged cashless economies (e.g. hyperinflation) be more likely to see their electronic money transferred to other currencies, or the adoption of alternatives (i.e. dollarisation)?

Solutions/ mitigations	Type	Owner
Leapfrog into CBDCs for separation of deposits from commercial banks? (see section 2)		
Competition is a key answer to this conundrum		

Issue 3: Trust in governments/ politicians	
Description	Individuals perceive cash as a safety valve that empowers citizens against an omnipotent central bank and government. Specific concerns include: - Dictatorship/ totalitarian state: a possible repressive agenda from governments, - "Theft" aspect of Negative Interest Rates Policy, - Forcing everyone to consume private services might be considered as unethical.
References	See section 3 Reports: 1033; 37; 399; 1024. Anecdotal evidence: 367.
Discussion topics	Cash is anonymous and decentralised enabling freedom. See risk 13 for the concern of totalitarian regime/ Orwellian-type plot. Making negative interest rates work is a fundamental advantage of a cashless society. A negative interest rate is just another interest rate and is a tool for governments.

Solutions/ mitigations	Type	Owner
Legal, regulatory and constitutional frameworks.		
Use of non-governmental agencies to mitigate excessive political power.		

Issue 4: Economics of money	
Description	Economic incoherence between cheap cash transactions and high costs of electronic transactions. Cash is perceived a free public good, as costs are born by banks and the community whereas it is costly yet sustains local money businesses. (See section 3). Electronic transactions are costly for businesses due to complexity of ecosystem and lack of competition. Proceeds of the activity likely do not benefit local communities. The more alternative payment methods there are, the more competition and the lower the costs for merchants and consumers who want to make and receive payments at the expense of the banks. This could however cost business more depending on the IT requirements. For example, for cards, businesses need card terminals and internet connection, for mobile pay a mobile phone number will be required and Internet or phone signal. For other payment methods will other devices be required? If customers have more choice will retailers have to have the capability to support all these payment methods or risk excluding people. Expectation: there should be a free means of payment in the chain. Removing cash as the only free means of payment raises a question of ethics and/or expectations. Cash transactions are free. Only inflation erodes the value of cash. Digital transaction/ banking fees erode the value of every currency unit with every transaction. Cash is the cheapest payment method for small traders who perceive the cost of card readers and transaction fees uneconomic. What is the cost to businesses of handling cash? (See section 3)
References	See section 3.1 Reports: 424; 37; 1024; 64; 1184; 310.

Discussion topics	This is a complex barrier to going cashless, where industrial players have conflicting interests. Electronic payment charges appear to be subsidising the cost of cash but the ecosystem indicates a more complex money flow. Fees are relative to the transaction amounts, and are difficult to compare between markets and merchants. E-payment costs should drop, as the ecosystem is more competitive. Payment technology has to be correctly costed, but costs should be more leveraged. "User pays" model for the change will be seen as government control and may be politically unattainable. It suggests the community pays for the underlying infrastructure for the electronic transfers, but a government-clearing bank sounds a better option. Cash handling costs disperse in the community, though its use is free at point of use. Cash remains (for the moment) the preferred medium across most developed countries for small amounts. What would be the relative cost for low value transactions? Whereas consumers in the western world mostly use cash for small sums, the UK goes against the trend owing to contactless technology. In developing countries, rates of growth in digital transactions match incentives, and reverse after withdrawal (India, Nigeria…). Seigniorage is the difference between the value of money and the cost to produce it. Where seigniorage is positive, the government makes an economic profit when producing money. This profit is reduced when paper currencies are no longer produced. As an example, seigniorage of the amount £506m was paid from the Bank of England to the HM Treasury in 2014-5.

Solutions/ mitigations	Type	Owner
Ensure there is a free means of payment in the chain		
Leapfrog into CBDCs as means to remodel the ecosystem (See section 2)		

Issue 5: Financial exclusion	
Description	Dependency on access to bank accounts, or mobile/ smartphones with underlying reliable internet infrastructure gradually excludes the most vulnerable in society as they are unable to access goods and services.
References	Reports: 1033; 551; 310; 37; 64; 936; 1024; 1136.

Discussion topics	Is technology a wealth barrier? This is already happening by stealth and will deteriorate if not addressed, so we need to find ways to resolve the issue for long-term inclusion. Digital payment technology is an opportunity to lift the unbanked out of exclusion and even poverty, witness Africa and China where reform is happening out of economic necessity: technology is an enabler of financial inclusion. Innovation always starts with high-end high-value/ margins, then cascades to lower end. We need this curve to happen quicker than usual to deliver accessible phones/devices, which would enable the cashless society. This has happened in Africa, India and China: can this be accelerated in western countries?

Solutions/ mitigations	Type	Owner
Banks (or central banks) may be required to equip the vulnerable with mobile or smartphones to address access to technology.		
Infrastructure readiness is a requirement for progress (rural areas)		
Cash is a public good. Another means of payment needs to be free at point of use.		
Financial inclusion is an opportunity, and a key Critical Success Factor for transition in all countries.		
Financial inclusion can be enforced via regulation, as in the EU, or petitioned by a sizable public.		

Issue 6: Change leadership	
Description	Political silos, ownership and oversight of major societal change, including cost of transition. Transition towards a “cashless” or “less cash” society seems to be happening by stealth, threatening wide-ranging societal disruption if not managed.
References	Reports: 1143; 64; 1024; 474; 424; 310; 399; 311. Anecdotal evidence: 332.
Discussion topics	How can a cashless society work if no one takes ownership end to end and engages the stakeholders at all levels? Who pays for the change? Disjointed approach risks leading to abortion of initiative, as seen in India, Nigeria. The “Catalyst” partnership launched in India for this purpose, in October 2016. Could an earlier engagement have led to a more successful transition in India? Lessons should be learnt from the 2016 demonetisation exercise in India.

Discussion (cont'd)	Recent UK example: The cost of introducing the new £1 coin alone might have been as much as £100m. Then there is the cost of education, withdrawal of notes and coin, and the cost of distribution of the devices that would be needed to ensure the current unbanked could function.		
Solutions/ mitigations		Type	Owner
Transition management ownership and funding, at country and international levels.			

Issue 7: Digital economy readiness			
Description	Various maturity levels for the digital economy mean a cashless drive has different impacts.		
References	Reports: 256; 424; 26; 37; 1024; 64 Anecdotal evidence: 286; 252.		
Discussion topics	What are the dangers to the currency if other countries/bodies produce digital currencies? (See Risk 20) Local development of infrastructure is an underpinning requirement for successful digitisation of the economy, and therefore of payments. Infrastructure must include legal, electrical, network, security and technology infrastructure.		
Solutions/ mitigations		Type	Owner
Transition approach customised to digital maturity levels			

Issue 8: Security of transactions, data and biometrics	
Description	Crime has become digital: Yesterday, your wallet was stolen. Today, your account is hacked. Cynicism about claim that cashless transactions are more secure hinders transition in developed countries. Biometrics security is not a panacea: who controls or has access to our most sensitive data: mobile numbers + bank accounts + national identity + biometric data?
References	1185; 399; 424; 26; 1024; 64 Anecdotal evidence: 250

Discussion topics	This issue is broad and is happening anyway regardless of a more cashless society, and impacts geographies differently: ○ Consumers in developed countries appear more aware of data implications. Many countries have established data protection policies and controls. However, surveys suggest data privacy is a barrier to trusting new technology solutions and providers, especially in Germany. Biometric chips implanted beneath skin are being offered to some employees in Sweden. ○ In China, consumer acceptance of snooping is cultural and historical. However, the country has defensive policies to protect its people's data, including its own payments provider China Union, to keep control within China. ○ In Africa, new payment technology take-up is quick, however security arrangements are immature/ lagging behind other regions. ○ In India, Mastercard designed and implemented biometrics Aadhaar payment solution. How secure is the people's data? Increase in the scope and expansion of cybercrime, from Mobile Operating Systems to payment terminals, live transactions and beyond. Mobile phone malware: How much would fraud increase? In the UK, card fraud reached £88.5m in 2016 attributed to "the increase in online spend and the digital revolution".

Solutions/ mitigations	Type	Owner
Use of offline wallets for digital currencies to reduce exposure.		
Use of various defensive measures (i.e. RFID-shielding or shielding from skimping contactless cards)		
Increased security including encryption, Two-factor authentication, biometrics etc.		

Issue 9: Social value of cash	
Description	Social and educational value of cash, attitudes towards money, and incitation of greater spending.
References	Reports: 355; 310; 1024; 1145; Anecdotal evidence: 75.

Discussion topics	Cash is trust “A key overarching issue in payments (both traditional and digital) is trust and convenience. There must be trust in the community or network (i.e., between the payer and payee), trust in the security of the payment mechanism, trust in the regulatory environment for consumer protection and recourse, and a belief that the method is beneficial.” (1145) Cash is personal: a warm discreet small gift from family member with complicity/ a smile and a hug/ kiss to comfort a loved one. Traditions such as the “tooth fairy” and pocket money. Cash is cultural, a social convention, and a public good. One of the few human artifacts of archaeological value. People of all generations like cash because it helps them budget and stay in control of their finances. Cashless transactions are impersonal; they incite greater spending (removes the pain of parting with physical cash). It can encourage irresponsible spending. This is happening anyway by stealth.

Solutions/ mitigations	Type	Owner
New methods needed to teach about money: electronic piggy banks, new apps, reloadable cards for pocket money.		
App and device enhancements so customers can view their balance without having to log in.		
Smart devices handed out at post offices might be an answer (UK)		

Issue 10: Removing cash may stall the economy	
Description	Removing cash may stall demand for debt, goods and services, thereby choking the economy
References	Reports: 242; 37.
Discussion topics	This should be a temporary, transition management related issue. What effect would there be on lending in the economy if cash were now converted to bank deposits? This issue is most likely with countries with highest levels of cash use before transition. Consensus that India GDP dropped 1% as a result of demonetisation in November 2016. We note that consumers also tend to spend more when provided with cashless payments. The impact on money creation and the demand for debt is a topic for investigation in phase 2.

Solutions/ mitigations	Type	Owner
Thoughtful transition management		

Risk 11: A cashless society may not live up to its promises	
Description	Working assumption: Going cashless would remove anonymity of transactions, so could be suggested as a meaningful tool to reduce the hidden economy, many types of crime, illegal immigration, benefit fraud, tax evasion.
References	Reports: 544 (file download); 748; 1178; 424; 474; 1093; 1045; 26; 1026
Discussion topics	We should consider how removing notes and coin might affect the privacy/secrecy that some may enjoy in using cash and question what alternatives they might find. For example, might those who enjoy the use of cash to hide their activity move to using another currency of value, such as US Dollars or Euros? To consider an extreme case, could the entire narcotics market in any specific territory move all its transactions to USD? Whilst legitimate exchange facilities exist for physical dollars into sterling, or any other currency for that matter, this could be an avenue for anyone involved in the hidden economy to thrive. (see risk 20) Whilst physical cash exists, even if not issued by the domestic central bank but where exchange facilities are available, the hidden economy could transfer much of its activity to that currency and negate many of the advantages of de-cashing that is discussed in Section 3 of this report. For this reason, any move to de-cashing should be combined with a legal and regulatory framework that would prevent this. (A topic for Phase 2 of this research)Anecdotal evidence suggests that organised crime has already moved to virtual currencies/ Bitcoin, although a recent study from the European commission found no evidence of this: are criminals two steps ahead of regulation, or three steps behind technological advances? How would we know? So abolishing cash may impact petty criminals only (targeting cards and phones instead of cash), and might cause major disruption for limited taxation benefits in the area of the black economy. If organised crime has already gone digital, the change in the levels of crime would not justify alone the inconvenience caused by the forceful removal of cash from the rest of the population. Crime alone cannot be the reason to go cashless. Many opponents call a myth that the black economy is fuelled by cash payments. Richard Murphy raises three issues about cash and tax abuse: (See Section 3) - The first is whether or not this is a big issue in tax abuse, - The second is the scale of that abuse and what might be eliminated by going cashless, The third is whether getting rid of cash will solve the tax abuse.

Solutions/ mitigations	Type	Owner
Proponents such as Rogoff: for a less cash economy: phasing out large bills first that fuel illicit activities… as anonymous large scale cash transactions are at root of societal ills		
Legal and regulatory framework		

Risk 12: Displacement towards alternative means of payment	
Description	Use of Gold, digital and virtual currencies, other country paper currencies. Focus on digital/ virtual currencies.
References	230 (file download); 357; 399; 1158; 1101; 424; 1073; 1060; 1056; 430; 404.
Discussion topics	Rising use of alternative or cryptocurrencies such as Bitcoin, some of which make transactions next to untraceable. Their phenomenon alone indicates a public desire for a currency that is neither controlled by the state nor the central bank. The public needs a currency that everyone can trust (i.e. managed well) used with effective payment systems. They differ to alternatives when there are added advantages (i.e. air miles to book for travel, gold for investment diversity or speculation) The population may start using another country's paper or digital currency within the domestic borders, with potential consequences for the financial stability of any country (see Risk 20). Neither IMF nor Bank of England currently considers these as systemic risks due to small scale and limited linkages to the financial system. (See also Risk 20 below). Recent research seems to concentrate mainly on: • What the effects might be if a digital currency were to become widely used in an economy to challenge the usage of the domestic currency, and • What might happen if a central Bank were to issue its own digital currency and how that might affect the financial stability of the country. However, we note the IMF assesses the risk to individual finance as follows: • Third party controlled Digital Currencies may pose non-negligible financial risks to individual account holders and users. Digital market infrastructures have to date suffered disruptions with some frequency, most notably the bankruptcy of the main Bitcoin exchange platform (Mt. Gox). • There may be no Lender of Last Resort (LOLR) facility which could exasperate risk and the possibilities of currency "runs". • Digital Currencies, could be vulnerable to security breaches, operational, credit, legal and liquidity risk. • Large-scale use of digital currencies and greater interconnectedness with other parts of the financial sector could in due course give rise to systemic financial risks • Similarly, the potential widespread use of distributed ledger technology (for example, the blockchain) could have consequences for a wide range of markets and financial market infrastructures, including stock exchanges, central securities depositories, securities settlement systems, or trade repositories. • Risk could arise if widespread use could affect the business of current retail banks, reduce their profitability and jeopardise their ability to lend • In addition, under a tail-risk scenario, some digital currencies could become too big or too interconnected to fail, a problem that could also be difficult to resolve.

Discussion topics (Cont'd)	The ability of any Government to control fiscal and monetary policy within an economy with significant usage of a third party digital currency would also cause concern. A regulatory and legal framework controlling the extent of use of such currencies would have to be considered. Governments will be further required to monitor "data regarding trends in illicit finance, including evolving forms of value transfer such as so-called cryptocurrencies. Risks emanating from a Central Bank Digital Currency (CBDC) are a particular area to consider. We recommend the Bank of England research paper on the primary questions for a CBDC. In summary, de-cashing risks displacing to alternative means of payment, in particular to digital/ virtual/ crypto-currencies. This in turn raises new risks, for individual finance as well as systemic impact on financial stability, which we assess in risk 20.

Solutions/ mitigations	Type	Owner
Legal, regulatory and constitutional frameworks.		

Risk 13: Totalitarian regimes	
Description	Any social or ethnic group may become dissident overnight and frozen out of the economy. For a totalitarian regime, Cashlessness could facilitate ethnic cleansing, social repression or implement dictatorial regime / statism. Internet & Payments close down can be a tool to counter civil unrest
References	399; 26
Discussion topics	The Orwellian plot. Getting rid of cash will not necessarily turn our society into a dystopian world. However, the level of control must be mitigated to avoid such situations. Ethical questions. 1- The legal & regulatory framework needs to provide a solution for this scenario. One could consider a formal separation of powers? 2- Is this only a constitutional matter? Do dictators respect constitutions? 3- Would the state "steal" your money? They can already tax savings with NIRP or by a wealth tax, but will they? There are issues with privacy however, particularly in a totalitarian society. For a cashless or digital economy there must be a full legal and regulatory framework. Internet suspension and payments disruption may be used for maintenance of law and order.

Solutions/ mitigations	Type	Owner
Could Blockchain/ distributed ledgers be an answer to address the individual freedom issues? Fully decentralised blockchain that ensures that every individual has full sovereignty of their own means as well as anonymity if they choose. In a blockchain system, funds are held in addresses and users have keys to those addresses, thereby giving them control of those funds.		
In case of CBDC, could a NGO control access to data?		

Risk 14: Sovereignty risks		
Description	Cash handling benefits multiple businesses in local communities. Electronic transactions benefit out-of-sight and out-of-country businesses.	
References	357; 430; 230 (file download); 26; 399.	
Discussion topics	In the short term, market dominance of large card payment companies (as seen in Africa). Risk of payments systems at the whim of an external power. Direct power over people in a country, from a foreign force. Who needs weapons? This is part of the question of how an economy can prevent foreign digital currencies being widely used locally.	
Solutions/ mitigations	Type	Owner
Country specific/ regional payment body as an accountable partnership may resolve many of the issues raised, including this one: no single bank, government or institution should have power. May stifle innovation.		
The prospect of a worldwide currency?		
Government can help local businesses upgrade to cashless payments. We know that consumers tend to spend more with cashless payments.		

Risk 15: End to the right of a private life?		
Description	Data privacy, snooping, Big Data, Artificial Intelligence- the right to a private life	
References	399; 26; 355.	
Discussion topics	In a digital society, we slowly accept a trade off between convenience and privacy. Are we aware of this? One argument is that only people who have something to hide would want anonymity. There needs to be a strong legal and regulatory framework to accompany a cashless society and is probably necessary anyway. China vs US etc	
Solutions/ mitigations	Type	Owner
Legal and regulatory regime		
Credible enforcement of rules		

Risk 16: Innovation marketplace and user experience			
Description	Interoperability, convenience and customer protection. Trust.		
References	355; 424; 215; 836;		
Discussion topics	Customer financial protection is a must-have in an innovation driven marketplace with many entrants, before consolidation occurs and solid providers remain. The ecosystem has to be sustainable and trusted. Trust matters. Legal and regulatory requirements to be set, including the question of banking licence for Mobile Money Telecoms operators. Interoperability is also a must-have, or consumers stand to lose money through reloadable cards and accounts or wallets that do not interface with each other, and schemes that collapse. If consumers need multiple apps and/or cards to carry out their basic daily transactions instead of the easy cash exchange, they will likely disengage once the hype deflates. Marketplace consolidation with loss of consumer funds may lead to rejection of technology solutions and lead to return of cash. E.g. Private e-wallet companies like PayTM, Mobikwik, Freecharge have certain limitations as they don't allow inter-operable payment solutions. For e.g, a PayTM user can only transfer money to another PayTM user.		
Solutions/ mitigations		Type	Owner
Consumer protection: regulatory and enforcement processes and resources			
Market entry licensing			
Review of scope of banking license to include mobile operators and e-wallets			
Creation of exchanges to allow for the transfer of the same or different currencies between different platforms.			

Risk 17: Lack of competition on payments market			
Description	Risk of a cartel of payment providers holding all to ransom.		
References	424; 1100; 1024; 64; 1050; 836.		
Discussion topics	Three payment providers monopolise credit-type payments. Banks can keep raising transaction fees and keep interest rates low. Is Cash vital to democracy because it gives freedom of choice and also allowed freedom from the dominance of the alternative payment providers i.e. only if there was an alternative would the competition stop payment providers taking advantage? Once cash is out of the way, might they control the market place? Profit margins power innovation: market balance is required.		
Solutions/ mitigations		Type	Group support
Competition against cartel: variety of competition should ensure balance. Mobile to mobile market possible counter power?			
Policies to facilitate competition on payment markets.			

CBDC with deposits at central bank?		
The competition must come from a plethora of new payment providers or facilitators.		

Risk 18: Excessive reliance on technology		
Description	Power fails, networks fail, ePoS machines fail, mobile phones are stolen/ lost/ broken, accounts and transactions hacked into, access can be denied in error.	
References	355; 424; 26; 836	
Discussion topics	The US advises its citizens to keep cash in case of emergencies. The risk is relative to the stability of the infrastructure.	
Solutions/ mitigations	Type	Owner
Less cash rather than no cash?		

Risk 19: Politics versus Innovation		
Description	The economic case for going cashless may stack up given the right approaches, yet political responses, and lagging legal and regulatory frameworks may hinder the change in process, and achievement of its proposed benefits.	
References	399; 26; 424; 1024; 64; 1050; 836	
Discussion topics	There is a delicate balance between regulation and laissez-faire, and is related to issue 1 “Hidden agendas”. There is often political resistance to any change that might not win votes. Often politicians accept a push towards change by stealth that a country may be ill prepared to embrace without organised planning. Consensus between public service bodies that resist the change misses the point as change is happening anyway. Correct engagement can ensure all stakeholders benefit from the evolution. (See SWOT analysis)	
Solutions/ mitigations	Type	Owner
Engagement		

Risk 20: Financial stability	
Description	What consequences a cashless society might have on the economic control and financial stability of an economy?
References	1101.

Discussion topics	The problems that can arise broadly fall within the following categories: 1. Replacement of Cash by a substitute currency. Those seeking anonymity in their transactions that cash currently provides could look towards alternative forms of private payment. This could lead to widespread usage of another physical currency such as US Dollars or Euros, gold or barter, although the second two are unlikely to be sufficiently liquid to cause concern. However, a further and maybe more potent concern could be the widespread use of a third party digital currency. 2. A Central Bank issuing its own Digital Currency. If a Central Bank were to issue its own Digital Currency, that would almost certainly impact on the domestic banking system. Would it disintermediate the current retail banks, reduce their ability to lend and force them to change their business model? What effect would that have on financial stability? 3. Third party digital Currency. Even without a domestic Cashless Society, a Central Bank could be at risk if a Digital Currency issued by a third party were to have a material impact on the amount of transactions. 4. A change of the equilibrium in the money supply and nature of banking risks destabilising financial markets, due to the intrinsic role of banks in the ecosystem.
	In terms of Government control, if a sufficient proportion of an economy were to adopt a currency outside the influence of the Central Bank (be it a physical or digital) then there would be a question as to monetary, fiscal, economic and systemic control that might be exerted by the domestic authorities. These possibilities potentially could cause difficulties for Central Banks in controlling domestic stability, an issue recognised by the IMF and Bank of England, amongst others. Moreover, a move towards an external physical or digital currency might negate many of the advantages of a cashless society reasoned in section 3 of this report.

Solutions/ mitigations	Type	Owner
To protect economies and central banks from these risks, regardless if an economy transitions to de-cashing, there is need for a stringent legal and regulatory framework, the scope of which falls outside this report but which will be revisited in Phase 2 of our research.		

Why does the topic of a Cashless Society polarise opinion? We have already analysed the issues and risks of a cashless society. Strengths, Weakness, Opportunities and Threats depend on each stakeholder's interests.

The challenge of transition will be to reconcile stakeholders' interests as a prerequisite for success. It's a multi-dimensional jigsaw puzzle.

7.1 Stakeholders in a cashless society

Cashless Catalyst (1143) is an initiative that sprung from a partnership between USAID and the Government of India to increase adoption of digital payments in India, using a targeted ecosystem approach, towards an inclusive digital economy. Catalyst defines the ecosystem as including the following stakeholders:

- Low income consumers,
- Fintech providers,
- Financial institutions,
- Consumer product companies,
- Regulators,
- Policy makers,
- Governments,
- Knowledge partners,
- Donor and development agencies,
- Small merchants.

Our SWOT analysis simplifies to five stakeholder groups:

- The public (including low income consumers),
- Non-financial businesses (Consumer product companies and small merchants),
- Governments and central banks,
- We have separated (traditional) banks from……
- The payments ecosystem/ Fintech, as they are competitors in this economic context.

Knowledge partners and donor/ development agencies may be considered in our phase 2 study. We broadly include considerations for Policy makers and regulators with government.

7.2. SWOT: The Public

The Public	
Strengths	**Weaknesses**
• Convenience: Integration of wallet into digital devices/ services, • Consumer and political power, • End of cash making/ handling costs on taxpayer, • Perceived social fairness if tax, • Compliance may improve, and frauds may reduce.	• Financial exclusion, some will have difficulties with transition, • Potential unreliable access to infrastructure and technology (physical and cognitive), • Financial and technological literacy, Inc. budget management, • Hidden agendas (suspicion), • Mistrust in banks, • Attachment to social value of cash.
Opportunities	**Threats**
• Financial inclusion, • Financial and technological literacy, • Bank competition may mean lower consumer costs, • More payment choices, inc digital currencies, • New payment methods may dis-intermediate banks.	• Financial exclusion / unaffordable technology, • Loss of freedom, digital enslavement, dystopian world, • Loss of free means of payment/ Forced consumption of private services, • Hidden agendas (repression), • Change won't live up to promises, • Mistrust in banks, • Negative Interest Rates and wallet erosion through fees, • Money loss through collapsing schemes, • Security of transactions and data (Inc. biometrics), • Increased debt, • Lack of interoperability, inconvenience, • Loss of sovereignty.

Figure 7: SWOT Analysis for Public

7.3 SWOT: (Non-Financial) Businesses

Non financial businesses (In addition to the Public)	
Strengths	**Weaknesses**
• Digital business = leaner, more efficient business, • Reduced transaction fees.	• Business revenue erosion through transaction fees, • Tax compliance, • Refusing cash locks out some customers (choice or necessity).
Opportunities	**Threats**
• Decreased costs of handling cash, and dealing with changes in legal tender (new/ withdrawn coins and notes), • Potential reduction in bank and payment charges, • Decreased risks of robberies and violent crime, • Increased sales (decreased pain of spending), • New business opportunities & innovation.	• Changes in payment ecosystem will disrupt business operations, • Transition time in technology, business processes and customer relationships, • Cybercrime can devastate business quickly, • Increased bank and payment charges (fee compliance), • Increased red tape (business responsibilities on fraud detection and reporting), • Decreased discretion in customer relationships, • More technology risk= increased business continuity requirements, • Loss of local cash handling business.

Figure 8: SWOT Analysis for Businesses (non-financial)

7.4 SWOT: Governments and Central banks

Governments and Central Banks	
Strengths	**Weaknesses**
• Popular support for fight against shadow economy (UK, Eastern Europe), • Control of legal and regulatory regime, • Power to decide on strategic changes.	• Public resistance to change, • Ethics: loss of free means of payment (public good), • Perceived hidden agendas of repression, threat to democratic values, • Loss of seignorage, • Lack of public ownership of transition, • Eroding trust of politics/ conflicts of interest, • Relationship with banks, • Underlying readiness for digital economy, Inc. legal and regulatory frameworks.
Opportunities	**Threats**
• Financial education for inclusion, • Economic and social progression/ reforms, • Central Banks Digital Currencies: safety net against other digital currencies, • Negative Interest Rates Policy, • Maintenance of law and order through infrastructure shutdowns, • Tax compliance, • New forms of tax (such as APT), • Improved Business Intelligence through data collection, • Reduced tax exposure of cash making and handling, • Minimum income/ Welfare distribution, • Reduced hidden economy, tax evasion, crime & frauds.	• Cash is a safety valve: country continuity plans, • Power of banks and payment providers, • Popular trust/ suspicion of repression/ dystopian world, • Risks of payment ecosystem changes on financial stability, • Sovereignty risks with data and payment providers, • Cybercrime impact over short space of time, • Displacement to other currencies, other countries' paper currencies, • Transition: Temporary reduction of economic activity.

Figure 9: SWOT Analysis for Governments and Central Banks

7.5 SWOT: Banks

Banks	
Strengths	**Weaknesses**
• Position of power in current ecosystem. • Control over distribution of main competitor: cash, • Reduction in costs of cash handling, • A cashless society is an ideal situation for the banking industry.	• Trust in banks, • Legal and regulatory constraints, Changes in banks' business models.
Opportunities	**Threats**
• Financial Inclusion broadens customer base, • Technology investments for financial inclusion, • Destroy cash as key competitor, and key interest rates low, • Reduce distribution of cash: no ATMs, branch closures would make banks leaner, • Restore trust, • No cash runs, transaction fees compliance, • Lead in development of Digital currencies	• Cash hoarding abroad (displacement in other countries), • Legal limits of transaction fees, • Political agendas and repressive actions, • Competition from alternative payment methods, • Forced change in business model: CBDC, • Legal push to provide mobile devices for financial inclusion, • Cyber-security: payments and data, • Impact of interoperability requirements.

Figure 10: SWOT Analysis for Banks

7.6 SWOT: Payments Ecosystem (ex-banks)

Payments ecosystem (excluding banks)	
Strengths	**Weaknesses**
• Payments compliance, • Global innovation enables financial inclusion.	• Trust in banks, • Ecosystem depends on readiness to digital economy, • Interoperability/ user experience, • Internal risk of fast moving innovation to financial stability.
Opportunities	**Threats**
• Financial Inclusion broadens Ongoing scope for innovation, • Financial inclusion opens further markets, • Transaction fees compliance, • Mistrust in banks.	• Political interventions to manage financial stability, • Legal and regulatory constraints Inc. transaction fees, • New types of competition: CBDCs, Digital currencies, • Banks and/or CBDC may shift business model to compete with ecosystem, • Ecosystem may have to provide mobile devices for financial inclusion, • Cyber-security - data and transactions, • Eventual industry consolidation and consumer confidence.

Figure 11: SWOT Analysis for Payments Ecosystem (excluding banks)

2017: the ATM is 50 years old. Is cash old money? In this section, we review online cashless society news and related topics from February to July 2017. A “library” of reports and articles published over this period is now available from the IFoA and references to that library in this report are shown in square brackets.

Demonetisation events in India raised interest in the Cashless Society from late 2016. Emotions ran high in the national press, and developments were closely watched and commented on internationally. See enclosed case study on India’s demonetisation.

Emotions also run high in Australia for the debate on the welfare card trial, aiming to restrict cash use and retail purchases from benefit recipients away from gambling and alcohol. Australia’s New Payment Platform draws less attention, yet is a more fundamental technology development. Elsewhere in Asia Pacific, China frantically embraces mobile payments, notably through QR codes. See enclosed case study on China.

M-Pesa celebrated its 10-year anniversary in Kenya, with more payment innovations developing fast on the back of mobile technology spreading across the African continent, with varying levels of success. See enclosed reports on Kenya and Nigeria.

Meanwhile, the UK developed its digital economy bill, and numerous countries in Asia and South America launched working groups and strategies to develop their digital economies with a focus on cyber-security.

Digital transformation requires a shift in mind-sets, including from the financial industry, likely to face substantial disruption from multiple types of payment innovations; the friction is already visible in India.

Payment/ credit card companies have launched commercial offensives to develop and protect their markets. Yet, anecdotal evidence from India, Nigeria and Australia suggest transaction fees and affordable or free access to mobile devices are barriers to the cashless transition.

Payment automation is driving pragmatic changes in western countries, such as payments for motorways, bridges, vending machines, and leveraging mobile apps for car parking and restaurants. Yet the paradox of rising cash in circulation remains unsolved. The UK mourns closing bank branches, yet launched a new £1 coin whilst South Korea became coinless. See enclosed report on the western world.

Behind the scenes, a bigger story looms: digital currencies are the political talk of the spring, on a background of dramatic market events for Bitcoin. A quick online content review shows different approaches: Japan makes Bitcoin legal, India warns its citizens off, US ponders about tax avoidance through Bitcoin investments, Russia U-Turns to plan to make Bitcoin legal by 2018; China looks to protect personal data for its citizens. Nigerians debate on Bitcoin vs Gold. Israel allows banks to refuse customer accounts if they suspect any Bitcoin connection. In the UK, it is now possible to buy theatre tickets with Bitcoins.

We observe a fascinating range of attitudes towards crypto-currencies more generally, from US denial of its money definition, via APAC countries looking at regulations, with some of these joining African countries in planning to generate their own national digital currencies. South Korea steps up the thinking on a dual currency regime.

Are virtual currencies the new “cash”? We observe the same themes emerging in the digital currencies world, including financial inclusion, security, crime, tax etc.

Yet the spectre of cyber-security draws attention back to one of the biggest issues and risks of the cashless society and digital economy at large.

(Analyst opinion) Will the question shift from the Pros and cons of the cashless society to: Should we take a leap of faith from Cash to digital currencies? If so, we should ensure we address the old cash issues in order to avoid displacing the cash problems into digital currencies. Would this help restore the western world lead in cashless payments?

A few figures …

According to the World Payments Report [215], Global non-cash transaction volumes grew 11.2% during 2014–2015 to reach 433.1 billion, the highest growth of the past decade, and slightly above the year's prediction. This growth was driven to a large degree by developing markets, which recorded a 21.6% increase in 2015 while mature markets grew by 6.8%, a nominal rise over the 6% recorded in 2014. Within the top-10 markets for non-cash transaction volumes, China climbed to third place with 38.1 billion transactions, surpassing 2014's number three market, Brazil.

Debit cards and credit transfers were the leading digital instruments in 2015, while cheque usage continues to decline globally. Debit cards accounted for the highest share (46.7%) of global non-cash transactions followed by credit cards with 19.5% in 2015. Although credit cards volume grew 10% globally in 2015, growth rates across regions declined or grew marginally, except in Emerging Asia. Owing to growing usage of electronic payment methods, the volume of cheques continued to fall in 2015 as well, by 13.4% globally.

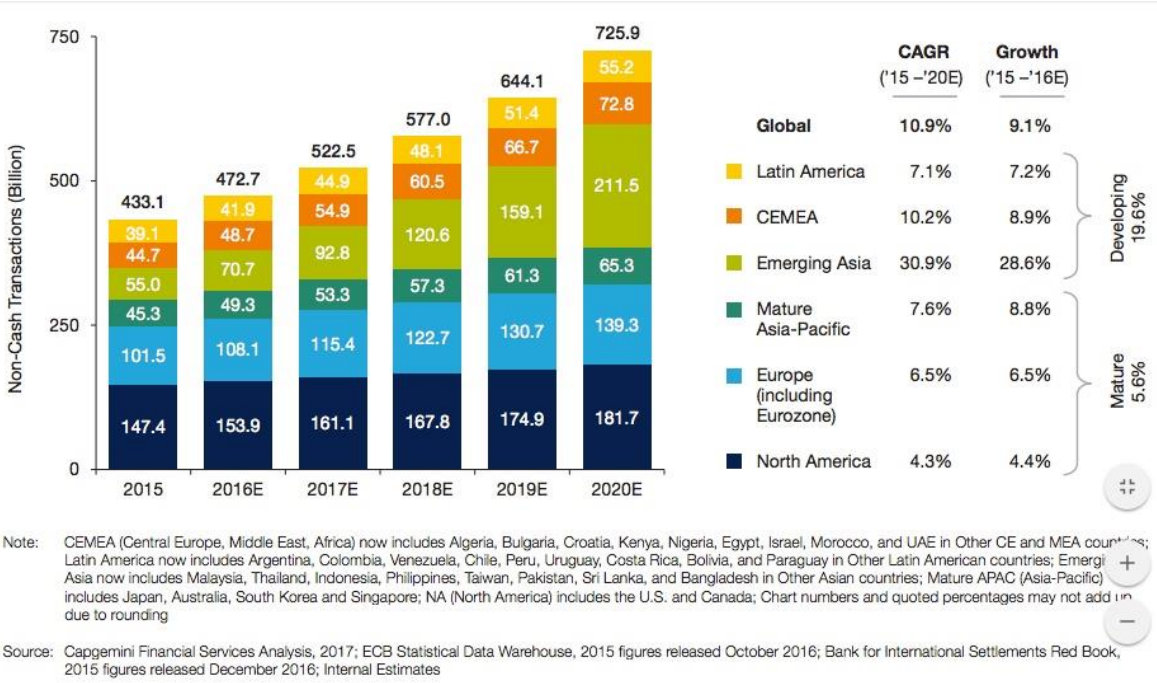


Figure 12: Number of worldwide world non-cash transactions (Billion) forecast by region [215].

8.1 The Cashless Society in the Western world

8.1.1 Case Study: Sweden, an Early adopter

Many observers have predicted Sweden to become one of the world's first cashless societies. [1114][1049] Compared to its European neighbours and other developed economies, Sweden has

been experiencing a decline in notes in circulation [1062]. In fact, cash transactions made up less than 2% of the value of all payments made in the Scandinavian country in 2015.

Figure 13: Average growth in Notes in Circulation (NIC) 2005-2015 [1062]

Sweden's transition to a cashless society

On 23rd September 2009, three masked men landed a stolen helicopter on the roof of a cash depot in Stockholm. Freshly stocked with cash for an upcoming payday, they pulled off a major heist at the depot and got away with bags full of cash on their aircraft. Although seven men were later caught and sentenced, the stolen cash of 39 million Swedish kronors from the Västberga heist has still not been recovered [1156].

A further string of other high-profile robberies eventually led to entities such as the Swedish Bank Tellers' union to lobby against cash handling. Similarly, public transport unions declared that handling cash had become a "work environment problem" after bus drivers were attacked for their fares. Cash was banned on public transport in Stockholm shortly after. [1119]

During this period, Swedish financial institutions realised that it was more profitable to use fee-inclusive transaction technologies than to handle cash. By quantifying the threshold cost values between transacting in cash, debit and credit cards, they have observed that:

- Transaction costs by debit card is cheaper than credit card;
- It is cheaper to pay by cash than debit card if the amount is 20kr.
- It is cheaper to pay by cash than credit card if the amount is 450kr.

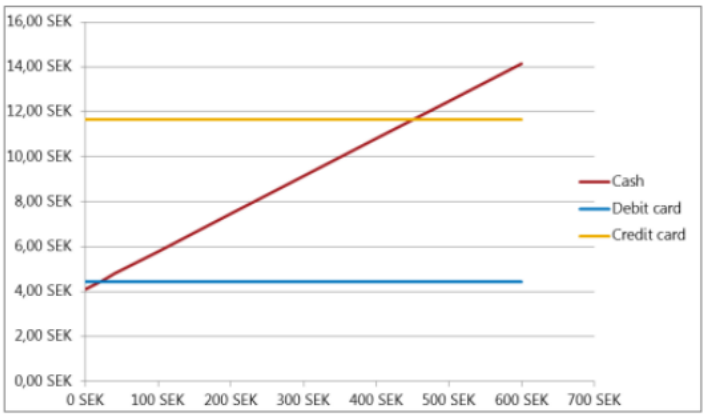


Figure 14: Threshold transaction values under which cash is socially preferable to debit cards and credit cards.

As a developed country with a vibrant digital sector, Sweden had already embarked on cashless payments with the popularity of e-commerce and new payment innovations competing with cash. Its younger generation also grew up using little cash. [1062]

Banks and stores are now less inclined to use cash due to increased risk and associated costs. The results of this cashless transformation speak for itself. [1062]

- About a quarter of all payments at point of sale are made in cash. However, given the small size of cash payments, they represent only 10% of total payments.
- Debit cards surpassed cash and credit cards as the primary method of payment.
- Cash transactions are expected to drop to 0.5% in 2020.
- 900 of Sweden's 1600 bank branches no longer handle cash or take cash deposits.
- The circulation of Swedish krona has fallen from 106bn in 2009 to 80bn in 2015.

8.1.1.1 Robberies and Fraud

Although the number of armed robberies has reduced, cases of fraud have tripled in the last 10 years to 2015. Based on the Swedish Crime Survey, the most common form of fraud is via the Internet (46% of cases). 41% of cases are in the form of bank or credit card fraud via skimming. [1098]

8.1.1.2 Financial inclusion

A EU directive taking effect in September 2016 gives every individual the right to a payment account with basic features. [1124] Sweden's central bank, the Riksbank, has taken the directive further by proposing to Parliament to a legal requirement for banks to maintain a cash service.

Such services are particularly important not only in sparsely populated areas, but also for the elderly and small businesses. The proposal addresses the issue of financial inclusions for those unable to adapt to cashless payments due to a lack of skill, equipment or internet access. Currently, many bank branches are cashless and do not provide cash handling services. [1125]

This has prompted a strong response from the Swedish Bankers' Association, citing that many banks only offer online banking services and that the proposal would totally change their business model. [1122]

As a further support of cash, the Riksbank launched new coins and bills in 2016.

8.1.1.3 Observations

In an article by Chris Weller for Business Insider Nordic, he attempted to find the reasons why America, which is technologically on par with Sweden, have not gone cashless as much as the Swedes. He highlighted trust as the critical reason - Swedes trust and have been trusting of their government for decades, whereas Americans' trust of the US government has diminished over time. [1041]

Sweden's transformation into a largely cashless society has been a bottom-up process with practical considerations through a confluence of events. Workers' safety, transaction costs along with digital infrastructure and innovation have allowed it to be at the forefront of the cashless rat race. Even then, the Swedish central bank continues to support cash and advocate for financial inclusion, perhaps a reflection of trust that Swedish institutions continue to enjoy from its citizens.

8.1.2 Ecosystem and attitude challenges in the USA

The USA is classed as one of the countries that would benefit most from a cashless world [1055]. Is it happening?

8.1.2.1 Trends

Over the past three years, total digital media usage has increased by 40%, with total monthly mobile usage hitting the one trillion minute mark in March 2016. Mobile devices now account for seven out of 10 minutes spent in digital media [516]. This is equivalent to every American spending three hours a day on their smartphone.

The trend is towards the USA going cashless [32], yet the picture is more subdued [1141]. 32% of all transactions are cash. This has reduced from 40% in 2012. [437]

- They used debit or credit cards for 48 % of purchases.
- 70 % of boomers and those in the 72-and-older age group still use paper currency or coins to pay for items that cost $5 or less
- They used debit or credit cards for 48 % of purchases.

8.1.2.2 Ecosystem

Interoperability and user experience appear to be the key issues.

Contactless cards have not taken off in the USA. Mobile wallets are slow taking off too. The payment market and geography at stake is different from other western countries [1141]: there are not enough contactless or wallet payment terminals; the payment ecosystem is too diluted to encourage investment. “It’s a whole lot harder to wrangle this ecosystem to the ground given the diversity of merchants and the engrained plastic card habits honed by consumers over the last 50 or so years.” [1141]

The result is “a small number of people today have a small number of places to use their mobile wallets.”

However, this may be changing rapidly in 2017: [253] several of the nation's largest banks — JPMorgan Chase, Bank of America, Wells Fargo, US Bancorp — have teamed up to launch a new payments network called Zelle, which allows millions of customers to instantly send money to each other via their smartphone. The idea, of course, is to challenge the increasingly popular mobile payments app (Paypal owned) Venmo, a free P2P payments digital wallet.

8.1.2.3 Payment automation

The USA has however made progress in automating payments where cash handling slows the process or causes inconvenience. Examples include:

- Toll payments on highways and key bridges have been automated in many states [17, 514, 692, 694, 822],
- Isolated reports of restaurants going cashless as a crime prevention measure [587, 939], as are some events [722], Walmart retail outlets [693], and university campuses [515],
- Vending automation through USA Technologies innovations (see next section),
- JP Morgan Chase no longer accepts cash [1083, 1085].

8.1.2.4 USA investments in cashless payment businesses

Home grown USA Technologies has been investing in and exporting cashless vending machines that integrate card payment technology into vending machines. This has been a strong stock in the first 2017 semester. [438, 545, 691, 823, 898]

American firms have been investing in cashless technology:

- Blackstone CVC invested in Paysafe [200]
- Visa and Mastercard have been investing and partnering in Africa (mVisa) and India (Mastercard: Aadhaar), thereby enabling financial inclusion.

Apple Wallet appears to make better progress globally than at home. [1141]

8.1.2.5 Attitudes towards cash and security concerns

Although 38% of Americans would go entirely cashless if it were up to them [1055], there is anecdotal evidence for pushback in various quarters [899,288], some openly because of the cost of transactions [33,188].

System outages such as a Bank of America instance in July 2017 [127] fuelled caution towards the war on cash.

However, the key concern is about security/ safety [253, 305] as inhibitors.

"56% of US adults feel mobile payments increase the chances of fraud and theft. Only 5% think mobile payments *reduce* the chance of fraud and theft, while 13% say it makes no difference."

According to the IPSOS ING report [355] on attitudes towards cash, cash is considered safer (62%) than non-cash payments (48%). Only 36% say privacy is "high" or "very high" with non-cash payments, compared with 69% with cash. 18% consider that removal of higher denomination notes would affect their finances. 75% say they will never go cashless [1055].

8.1.3 Caution in Germany and Europe

Three Quarters of Eurozone payments are made in cash [507].

8.1.3.1 Trends

General trends [355] seen in the USA also apply to Europe, emphasised in Germany, where 80% of transactions are cash [1092, 250], with only 10% of the sample "rarely" carrying cash and 95% rejecting an EU proposal to limit upper cash payments [206, 819, 1026], although we understand many EU countries already have upper limits in place [1091, 1092].

We note that Spain, Austria, Romania and the Czech Republic are more likely to carry cash than the UK and Italy. However, Poland, the Netherlands, Belgium and France are less likely to carry cash, and more open to go cashless. This trend matches the cash use of these countries, and attitudes towards privacy of transactions and larger banknotes. [355]

80% of those who stated they did not reduce their cash use in the previous 12 months said they had no plans of doing so in the next 12 months. [355]

88% in Europe usually choose cash if paying €1-€10 [355, 303]. About half say they opt for cash for €11-€50 sums, with the share choosing physical money falling to 12% if spending more than €100.

However, higher shares in 2016 (85%) and 2015 (84%) than in 2017 said they would be likely to use less cash in the next 12 months. [355]

Although more than half (55%) of people believe there is a "high" or "very high" level of security when paying without cash, almost a third are ambivalent about the security on offer. Compared with non-cash, higher shares (59%) in Europe say cash is secure: is there comfort in the physical payment?

Germany is the most surprising country in Europe regarding de-cashing. A perceived reduction in privacy concerns some societies more than others. Is it possible that Germany's recent history is a pointer as to why cashlessness is treated with more suspicion there?

Will a rise of counterfeit Euros trigger a change of mind in Germany? [194]

Yet, Mastercard's survey in Eastern Europe [69] unveils a different perspective, rooted in attitudes towards the shadow economy: over 80% of Romanians are prepared to pay cashless to fight the

shadow economy. Some 93% of respondents from Bosnia and Herzegovina urge their government to fight the shadow economy, versus 92% of Bulgarians and Romanians.

The ING report [355] concludes that a cashless society would not only be possible but would be accepted in part of the population in most European countries, although 76% of the population say they would never go completely cashless. (Analyst opinion: not sure the evidence from this and other reports supports this conclusion)

8.1.3.2 European Union approach on cash, means of payment, and digital currencies

"Even in this digital age, cash remains essential in our economy," Mr Draghi (President of the ECB) said in a statement on the issue of a new 50€ banknote. [507]

The EU interest in de-cashing seems to be mostly related to criminal activity, especially the funding of terrorism. This has led to the removal of new 500€ notes.

However, the EU seems more interested in risk management, and steers the payments ecosystem through its regulatory framework:

- European Union, Directive 2014/92/EU of the European Parliament and of the Council of 23 July 2014 on the comparability of fees related to payment accounts, payment account switching and access to payment accounts with basic features [1105]
- Payment Services Directive (PSD) in place, with PSD2 due to become effective in 2018 [1100, 1075], shape the payments ecosystem. We understand PSD2 will have the effect of challenging the card payment cartel, a requirement for further research in Phase 2.
- The Interchange Fee Regulation (IFR) implemented to reduce payment card handling costs has now been implemented.

The EU is taking a cautious approach towards virtual currencies [1081]:

- Commissioning research concluded that digital currency use by organised criminals is currently rare [13],
- Backing a project to curb crimes using Bitcoin or other virtual currencies [228],
- Launching a blockchain observatory [391],
- Investigating the money laundering potential of new means of payment [1106],
- Addressing the potential money laundering through digital currencies [563] (Directive EU Directive 2015/849).

Mr Draghi concluded [181] that digital currencies have no significant impact on the economy. He adds, though, that there could be a ‘build-up of risks’ coming from digital currencies in the future, in which case a ‘direct regulatory response’ would be required ‘from a financial stability perspective’.

In parallel, the EU is focusing its resources on harmonising rules for the digital economy [888], with corporate tax reform in its sights [101], as well as the General Data Protection Regulation (Regulation (EU) 2016/679) becoming effective from May 2018.

8.1.3.3 Significant Ecosystem moves

Leadership for the cashless drive in Europe originates from the European Payments Council, an organization made of 75 mostly bank members, separate from European institutions, to harmonise payments in the Single European Payments Area (SEPA). It deals with mobile payments, including Person-to-Person, e-invoicing-related payments, payment security and cards standardisation. It is a founding member of the European Cards Stakeholders Group, the multi-stakeholder association promoting card harmonisation in SEPA (1157).

Alipay seeks to expand its cashless payment service in Eastern Europe [128]: Alipay, operated by Ant Financial, is now available to over 20,000 business owners in 13 European countries, including the Czech Republic. Ant Financial will continue to offer payment services to Chinese tourists in the Czech Republic and local business owners in order to help them appreciate Chinese visitors.

BNP Paribas buys “Compte Nickel” [508]: Bankless account Fintech “Financiere des Paiements Electroniques” that provides a simplified bank account accessible through a (non banking) retail network.

A French cashless payment startup raises €2.5m. With a contactless chip, PayinTech [684] allows users to pay directly at concerts or events by passing a bracelet or card by a cashier. The startup claims to have over 3.2m users in France and abroad.

8.1.4 Spotlight on: The UK

Will the UK be cashless in 2043? [723] George Osborne planned to scrap 1p and 2p coins before phasing cash out altogether [320]. David Cameron vetoed the attempt, a year before the cashpoint turns 50 [216]. What is the future of cash in the UK?

In 2016, the UK government and Bank of England’s announced interest in the future role of digital currencies [1056], arguing the introduction of an official crypto-currency could increase economic output [1052, 1053], as well as opening up communications on the opportunities for Fintech [1050, 1069, 1064, 1101, 1102]. A Welsh based Fintech industry is developing [565].

Early 2017, The BoE announced a Blockchain trial [646, 727] as the technology is predicted to be a fast approaching disruptive force in London’s reinsurance markets [402]. The Poland/ UK Blockchain payment startup Billon group secures funding from EU’s Horizon 2020 research fund [201]. Meanwhile, Bitcoin becomes available to retail investors [330] as well as in some ATMs [56], and can be used to buy theatre tickets [505]. The Gibraltar DLT (Distributed Ledger Technology) working group proposes a regulatory framework for crypto-currencies [404]. What will be the next challenge for the Payment Strategy Forum? [1039] (Analyst question: does Bitcoin now qualify as money, as holder of value and used for transactions?)

The Digital economy bill, an underpinning regulatory structure for the digital economy with a code of practice for data sharing passed through the Lords [380, 510], after criticism over provisions for cyber-security [685]. The UK decides to appoint a chief data officer [796]. A government report recommends a move to a cashless economy, to tackle tax evasion [110, 58, 82], despite claims that the tax gap has been fallen to 6.5% [1045, 1093, 81, 1065], although this is open to debate [1046]. The bill aims to leave no one behind: “Every individual and every business should have the skills and confidence to make the most of digital technology” [687]

The UK government also announced a crackdown on "Rip off" card fees for consumers, which will be banned from 2018 as the Government has announced that paying by card will be free for consumers from next year, as businesses also prepare for the EU’s second Payment Services Directive (PSD2) [1054]. [217] (Analyst opinion: surely, the fees will just be added to business overheads, thus indirectly paid by all customers?).

How are local and other currencies regulated [648, 644]? Start-ups and Barclays call on regulator guidance for Bitcoin [275, 431], but appear to fall on deaf ears. Based on the policies involving crypto-currencies and Blockchain technologies, UK moves to liberalisation of crypto-currencies while the US looks into more regulations [177].

UK ranks 4th in the list of countries most ready to go cashless, but even in the most ready countries such as the UK, the unbanked and underbanked are still being left behind [639]. Access to financial services and technology risk excluding part of society: a specific concern rising from digital evolution and its impact on privacy [131] rather than the cashless society per se [551]; MPs question the agenda of banks in the threat to cash machines [919]. Would a cashless society prevent exploitation including so-called modern day slavery? [1032]

This occurs as competition heated up on the payments ecosystem. New entrants such as Handepay [301] and iZettle challenge the cost and performance of transactions, whilst Israel’s Colu launched digital currencies Liverpool [648] and the East London Pound [296]. ApplePay gained ground with AIB

customers [115] and Thyngs [512], while GoCashless and Barclaycard device compete in the charity donations market. Some cafes and restaurants go cashless, maybe under influence from recent aggressive drives from Visa? [4, 43, 116, 213]

Yet the big stories are with major payment players, such as the acquisition of Worldpay by Vantiv. Disruption reaches further as banks challenge the Link network machine charges [931, 932, 933]. Are banks using this issue to push for a cashless economy, as bank branches disappear [591]? [919] Digital disruption is fast impacting financial services [654]

The momentum of payment automation seems strongest in the transportation sector, with many public car parks embracing mobile app payment through RinGo [513, 890, 449] and MiPermit, usually as an additional convenience, with Snap Account offering a HGV parking and expense reporting service [724]. Removal of cash payments in Cambridge caused dismay [569, 570]. Bus operators continue rolling out contactless journeys to slash journey times [938, 1070] although this seems inconvenient to unprepared visitors [1103]. Jaguar Land Rover, in partnership with Shell, unveiled a new app that allows for fuel payment from within the car [511, 889].

Meanwhile, a new £1 coin was introduced. Cash is still in, for now.

8.1.4.1 Attitudes towards cash and cashless payments

YouGov's report on the UK attitudes towards cash [327] highlights:

- 34% of the population of Great Britain believe a fully cashless society will be in place within 20 years
- Cash is still king for in store payments (82%, followed by debit cards- chip & pin and contactless)
- Only a quarter of the population uses cash every day
- 17% of the GB population are early adopters, i.e. only using cashless in store. They most likely live in London and have a monthly disposable income of £1,250 to £1,499.
- 65% feel that using mobile/cashless payments increases the chance that someone will suffer fraud/theft. These security concerns stop the wider adoption across the population
- Explaining the basics about mobile payments would help engage consumers: 24% don't see the point in mobile cashless payments, 19% don't know what mobile cashless payments are or how they work
- 56% who don't use mobile payments say they won't in future
- The 26% who still use cash every day will need further convincing: they are skeptical of new ideas and are often late to the party.

Issues relating to security are therefore a key barrier to adoption in the UK, in line with attitudes in other European countries.

8.1.4.2 Trends

Yet other trends show the evolution of cashless payments, though not necessarily through mobile applications. In the UK, contactless payments are successful.

Numerous reports and data were released for these trends in early 2017. Although they would warrant in depth analysis, the key points are:

- For the first time, more than half retail purchases are made by card [59]
- UK card association report- card purchases in 2016 amounted to £647bn of which £186bn were on credit cards and £461bn on debit cards. [79]
- retail transactions using card exceeded cash last year, by volume [214]
- while almost eight in ten (78%) of those who have travelled abroad in the last 12 months used a foreign exchange, fully 16% exclusively used their credit or debit cards to pay for things when abroad [754].

It also appears that Brits are still stashing away cash under the mattress [328, 335]: why does the volume of banknotes keep increasing? The BoE suggest half may be used to fund the shadow economy, worth (unofficially) £115bn [1076, 1117, 82]. Would going cashless reduce that gap? [73]

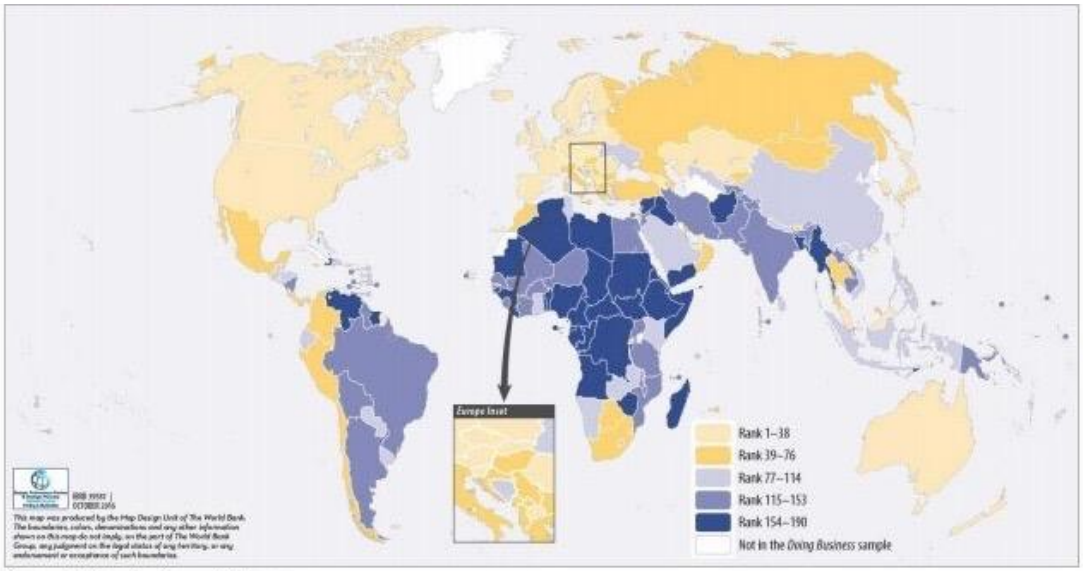
8.2 Africa and Middle East: leapfrogged into a mobile innovation powerhouse

Online content observations revealed movement in the cashless theme in the following countries, in addition to the (ex-Israel) Middle East: Egypt, Ghana, Kenya, Malawi, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Tunisia, Zimbabwe.

In this section, we will introduce some key topics for Africa, then main developments for the quoted countries before focusing on Kenya and Nigeria.

8.2.1 Key topics for Africa and the Middle East

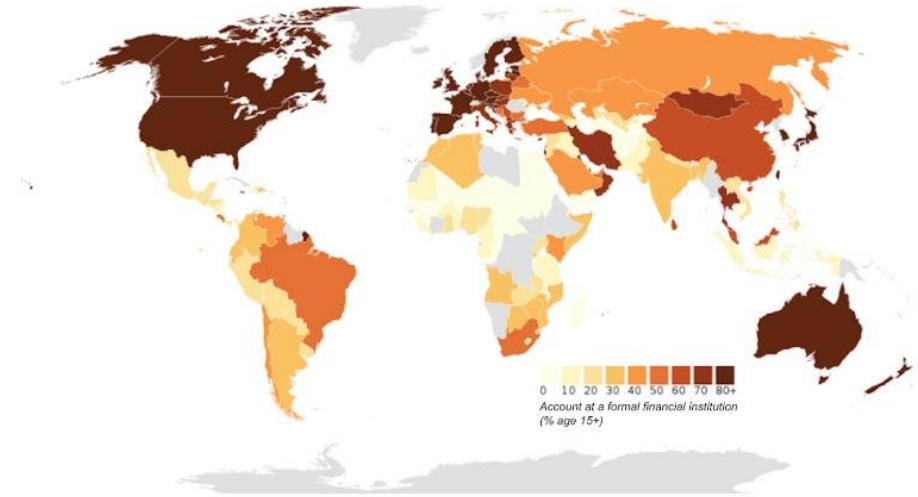
The World Bank maps the African continent as the most difficult in which to do business. [37]



Source: *Doing Business* database.

Figure 15: World Map on Doing Business

Let's Talk Payments [1042] reports that 39% of the World population does not have a bank account.



Source: Mapping the Invisible Market, Center for Financial Inclusion

Figure 16: World Map on Bank Accounts

Financial Inclusion has become a necessity for economic development in Africa and the momentum towards cashless payments is borne out of necessity rather than convenience, as is the case in developed nations. (See section on Financial Inclusion and M-Pesa Case Study)

Most of the countries named above are members of the Better Than Cash alliance [1121], a UN based organization that:

- Advocates for the transition from cash to digital payments in a way that advances financial inclusion and promotes responsible digital finance,
- Conducts research and shares the experiences of its members to inform strategies for making the transition,
- Catalyses the development of inclusive digital payments ecosystems in member countries to reduce costs, increase transparency, advance financial inclusion– particularly for women– and drive inclusive growth.

Such transition requires a strong underlying infrastructure. The WSIS (World Summit on the Information Society) forum summarises the progress of readiness for the digital economy: [256]

- Companies are going digital, yet face the following challenges:
    - Lack of an international e-payment system,
    - Many SMEs are unable to deliver products cross-border by themselves, and 63% outsource customer clearance procedures.
    - Accountability across the whole supply chain is needed to improve customer satisfaction
    - SMEs need more training, capacity programmes for ICT.
    - Internet penetration rate is 29% (2016)
    - Digital divide between men and women on the Internet as well as between cities and rural areas.
    - Lack of online content in local languages

- Political support requirement:
    - Having stable governments that will attract investors. There is a need to increase public-private partnerships across Africa. Rwanda, Senegal, and Nigeria are good examples of countries in which investors feel their investments are secured.

- Support local innovation especially those driven by young people, those creating solutions to local problems through technology and countries such as Rwanda and Tunisia are again good examples.
- Many African countries have developed their ICT strategy plans, but close to half of them fail to give more details on their investments needs.

Cyber-security commitments [26] are also closely linked to the sustainability of African digital economies.

Figure 17: World Map on Cyber-Security

- The top 3 ranking countries in Africa are Mauritius, Rwanda and Kenya [26], noting Mauritius features in the list of leading countries.
- The maturing list includes: The Ivory Coast, Ghana, Israel, Kenya, Morocco, Nigeria, Qatar, Rwanda, Saudi Arabia, Senegal, South Africa, Tanzania, Tunisia, Uganda and the UAE.
- Zimbabwe, Malawi feature in the "initiating" list.

The steep structural challenges demand a solution to move the continent forward. Africa is responding, probably out of necessity and becoming a hotbed for mobile payment technology.

8.2.2 The African story in 2017

In the Middle East, financial inclusion is also a key theme [378]. Multiple announcements in the **UAE** to launch mobile payments (Emcredit) [3, 255], and the UAE Banks Federation launched a digital wallet [478], NEC payments [884] announce a new product, and a contactless card-like solution is announced for fuelling stations [677]. SamsungPay [524] and Visa [91] and Mastercard [638] make industrial moves in Egypt. **Israeli** companies enter Russia's cashless vending market [289] and develop digital money in the UK [such as Liverpool Pound], whilst the Israeli Supreme Court takes a stance towards Bitcoin activity [315]. **Malabar**'s economy wobbles in the wake of a demonetisation exercise [886].

A number of announcements took place in **Ghana** in the spring. The National Digital Address System aims to improve access to financial services [560], as well as a project aimed at farmers in Tamale for financial inclusion through mobile money payments in remote regions [682]. The Co-op Union goes cashless with the New Payment Platform, that bypasses the traditional banking system yet is

supported by the Ghana Interbank payment and settlement system [882]. Ecobank launches MasterPass QR merchant solution [637]. The Royal Bank was rewarded for its lead on cashless services through Automated Clearing House (ACH), Hybrid point of sales, E-commerce and Ghana Instant Pay (GIP) [207]. There is talk about mobile money security concerns [44].

Malawi reports a sudden take off in cashless transactions, attributed to dynamism and strength of the financial sector in the country, thanks to innovative banking, money literacy, trade and capital flow [881].

Rwanda envisions becoming a cashless economy by 2020, with all government financial transactions done electronically and via mobile phones by 2018 [557]. The government considers financial inclusion as an integral enabler for achieving its development and poverty reduction objectives [636]. The Banque Populaire du Rwanda (BPR) launched a campaign to create awareness and educate the public on financial literacy to contribute to efforts geared at driving the country toward becoming a cashless economy [941]. The Government of Rwanda and Mastercard announce they will work together on developing digital platforms for e-government [376]. Elsewhere, with the Ecobank Mobile App, Ecobank customers can now make and receive instant payments and can pay in store with their mobile phones [813]. The AuraSoft RIHA mobile wallet, an electronic payment platform, will also boost Rwanda's drive to become a cashless economy [169].

Senegal, with 3.3% of its GDP from internet-related activities leads the region in building its digital economy [66], and launches eCFA, digital currency. [488]

South Africa launches its cashless bus system [561]: The Connector card can be bought from and loaded at various places [562]. MobileData, a South African technology company, has announced the introduction of its next generation service delivery platform TradeSwitch® to help companies across Africa successfully transition to digital business models underpinned by mobile and online presence [812]. Elsewhere, Yoco gets US funding to promote the cashless economy: Yoco, which competes with Standard Bank-owned Snapscan and iKhoka, enables SMEs to accept card payments and provides card readers, and free point-of-sale and business intelligence tools to its 6 500 South African merchants [683].

However, the uptake is slow: until consumers start feeling comfortable with using payment features on their phones, mobile and other electronic payments won't see widespread adoption [317].

South Africa is a market (1145) in which smartphone adoption has grown 30% year-on-year from 2012-2016, reaching 30 million smartphones in a country of 55 million people. Although 78% of all internet traffic takes place over mobile channels – one of the highest rates in the world – only 15% of South Africans reported making a purchase on a mobile

phone in the preceding month when surveyed in 2016, indicating a large opportunity to expand digital payment access. Moreover, although South Africa is WhatsApp's strongest market in terms of penetration with over 10 million users, WeChat had reached 5 million users in 2014 by establishing linkages with Standard Bank and SnapScan, a popular retail payments app. Linking more retail points and financial services to these growing networks could enable millions more South Africans to gain access to digital payment channels.

Although we see some talk about QR codes [883], and rumours on South Africa looking at launching a national digital currency [487], we sense doubts from the online content: is government control a barrier to success? [811] The Free Market Foundation highlights concerns that the policy is, in effect, sanctioning the nationalisation of the sector. For the digital economy to thrive, competition needs to be encouraged, with new entrants, knowledge and funds stimulating innovation and development.

In **Tanzania,** three telecommunication companies have embarked on a joint drive to market their interoperability product and boost cashless transactions [477]. A new cashless payment platform enables cheaper healthcare. [705]

The **Tunisia** digital plan, included in their five-year development plan 2016-2020, is not making progress for reasons related to financing, governance and implementation tools [699].

In **Zimbabwe**, Ecocash reduced their Merchant fees to boost cashless transactions [54], as data reports an increase in plastic money transactions by $55 million [293]. However, disputes over means of payments are arising with a television channel service provider [148] that does not accept direct payment. Meanwhile the government has shown interest in digital currency [364], and admits "printing money" in this form. [394]

8.2.3 Spotlight on: Nigeria

In 2012, Nigeria set ambition to be amongst the top 20 economies by 2020 [474]. The national strategy was clearly set and communicated. A new cash policy was introduced for a number of key reasons, including:

- To drive development and modernisation of the payment system in line with Nigeria's vision 2020 goal of being amongst the top 20 economies by the year 2020. An efficient and modern payment system is positively correlated with economic development, and is a key enabler for economic growth.
- To reduce the cost of banking services (including the cost of credit) and drive financial inclusion by providing more efficient transaction options and greater reach.
- To improve the effectiveness of monetary policy in managing inflation and driving economic growth.

It implemented a 13 million-person pilot of national identity card, powered by Mastercard, combining both biometric verification for state services and a prepayment wallet aimed at bringing financial services to the poorest, in 2014 [1104].

A new policy on cash-based transactions introduced a cash handling charge on daily cash withdrawals that exceed N500,000 for Individuals and N3,000,000 for Corporate bodies. "The new policy on cash-based transactions (withdrawals) in banks, aims at reducing (not eliminating) the amount of physical cash (coins and notes) circulating in the economy, and encouraging more electronic-based transactions (payments for goods, services, transfers, etc.)"

The government published the strategy and engaged the various stakeholders [521, 522]. Google provided digital training to 500,000 people.

In 2017, it implemented a cashless policy, introducing new charges [670, 880], applicable April 01. Yet, precisely 21 days later after some protest from SMEs [548] and chaos at airports [700], the cashless policy was suspended in all 30 states [475], citing the need for proper preparation [676]. Cash fees charged the previous two months were reimbursed [439, 440]; in May, a new e-payment pricing scheme was agreed with stakeholders to boost card issuance.

Transaction fees are widely cited as a key issue in the withdrawal, as well as the lack of banks readiness for mobile platforms [138], especially as low cost smart phone maker AfriOne targeted the Nigerian market [441].

Despite Nigeria's 7th place in electronic PoS transactions in Africa, the country's infrastructure seemed insufficient, with networks and data centres quoted as main issues [676, 634, 473, 332, 138]. The ecosystem is simply not in place to support a cashless economy in Nigeria yet.

8.2.4 Case study: Kenya

Kenya and Nigeria are on a race for the highest level of mobile transfers [679, 257]: Kenyans moved a record $33 billion via mobile money platforms such as Safaricom (M-Pesa), Airtel or Mobikash in 2016, up from $27.8 billion from the previous year, the latest data from Central Bank of Kenya has shown. In contrast, Nigerians moved N756 billion or $2.4billion.

Fast pace mobile payment system innovation is driving this race, leading the country's banks (UBA, Barclays, Bank of Africa Kenya) to move away from brick and mortar branches [195]. Innovations in sale of bonds, such as M-Akiba [555] are disappointing so far [193], but expected to set ground for further financial innovation.

It all started with M-Pesa 10 years ago [476, 870, 871, 1073, 1142]. A record 614 million M-Pesa transactions were processed during December 2016. [1142]

Vodafone now offers M-Pesa services in 10 countries: Albania, the Democratic Republic of Congo, Egypt, Ghana, India, Kenya, Lesotho, Mozambique, Romania and Tanzania.

As of the end of December 2016, M-Pesa served almost 29.5 million active customers, through a network of more than 287,400 agents.

M-Pesa has been celebrated for lifting Kenyans out of poverty [935, 872, 936], enabling new schemes such as the basic income scheme pilot [727], enabling financial inclusion. (See case study on M-Pesa)

8.2.5 Challenges to M-Pesa monopoly

Substantial announcements took place in Kenya in the run up to M-Pesa's anniversary, denting Safaricom's celebrations.

Banks have finally resolved to do the inevitable: move most of their services to mobile phones [702]. Kenyans now can not only choose from a wide range of financial institutions catering to the lowest of income customers, but the big banks have also been forced to go down-market [681]. This came about as a result of the rise in micro-finance institutions and savings and cooperative societies, but in most part due to innovations in technology and digitisation of financial services.

M-Pesa's Safaricom, mostly owned by UK's Vodafone, narrowly avoided regulatory pressure to split its M-Pesa from its telecom business [704, 388]. Although a report (looking into competition on the Kenyan market) commissioned by the regulator recommended separating the operator's M-Pesa unit from its telecoms business, the authority's chairman Ben Gituku confirmed that it had no intentions of following this advice.

> *"I wish to allay fears that the authority is planning to split the business of some market players or take such drastic actions that may destabilise dominant market players," said Gituku.*
>
> *Kenya's ICT Minister Joe Mucheru lent his support to Gituku, saying that breaking up Safaricom would deter investors and "punish operators for innovation".*

The Central bank of Kenya looks more likely to focus its regulatory attention to Bitcoin and virtual currencies for now [388].

Safaricom hopes its pioneering new international payment platform [202], an international business-to-business cash transfer service, will gain approval of the Kenyan Central Bank, which would enable local companies and importers to pay for goods internationally. It "learnt from Chinese mobile money product, Alipay, which does not depend on agents to run its business but creates a payment platform, using mobile phones, mostly smart phones and cards to facilitate payments, the Kenyan firm would improve its customer experience". M-Pesa is currently in talks with businesses around the world for its business partnerships and especially with Chinese companies, as China is a growing trade and investment destination for Kenyan businesses.

Safaricom also launched the M-Pesa card [352]: Safaricom's move to ease M-Pesa payments through the cards is an attempt to grow its income from retail payments and boost mobile money revenue which stood at Sh55.1 billion in March (2017), a 32.7% year-on-year growth.

However, Safaricom faces future competition from local telecom provider Jamii [85] and Liquid Telecom partnering with hospitals [556], yet established and new payment providers now challenge their position.

Alipay, one of the world's leading payment platforms, has plans to enter the Kenyan market. [202]

Global payments firm Visa [84] was the latest to take the competition for mobile money service a notch higher with the launch of mVisa that enables Kenyans to use mobile phones to transact cash and make payments:

> *"The rollout of the service will enable Kenyans to make free domestic mobile money transfers using mVisa. The daily limit for person to person transfers will be Sh250,000 with the per transaction limit being Sh100,000. This is in comparison with mobile money services whose daily transaction limit is Sh140,000 while per transaction limit is Sh70,000.*
>
> *Visa has not placed a limit on personal transfer to a merchant but the transactions might be subject to limits imposed by the different banks on the platform. The firm is coming to terms that not all Kenyans swipe cards as a payment method. This is despite the infrastructure including the availability of thousands of merchants with point of sale devices and the millions spent per year in marketing card payments in Kenya. The company has instead taken up the mobile cash transactions, which it hopes to 'cash in' on mobile penetration in its latest onslaught in the market to gain acceptance. Payment for goods or services with a card has largely been a preserve of the rich and swiping a card had been restricted to high-end establishments. This is as the vast majority of Kenyans prefer making their payments in cash and now mobile money. The firm is however courting Kenya's low-end market with its new mobile-based mVisa service. The service will enable every day Kenyans to make payments using their mobile phones to their regular service providers including Boda Boda, the neighbourhood kiosk and even the mama mboga.*
>
> *The firm [..] announced free person-to-person money transfers on its mVisa service that enables one use the mobile phone instead of a debit or credit card to move funds from their bank account in to another person's account or pay for goods and services, with the money going into the merchant's bank account. The service uses the same concept that mobile money services use. They use their bank's mobile phone applications to make the transactions. Visa said it is scrapping fees charged for person-to-person transfer in a bid to popularise the service. The mVisa service will also enable individuals to pay for goods and services by keying in mVisa merchant identity numbers or scanning a QR code that gives the merchants details. The new Visa service will be competing with M-Pesa, Airtel Money, Equity Bank's Equitel and the recently launched Pesalink owned by Payment Services Ltd, an affiliate of the Kenya Bankers Association. mVisa has the advantage of not having to deal with interoperability issues that has been cited in the mobile money sector as being a hindrance for smaller players, who may not have the numbers that the likes of Safaricom have - with over 22 million customers on M-Pesa.*
>
> *Visa East Africa General Manager Sunny Walia said cash is his biggest competitor and having mVisa is meant to wipe out the large amounts of cash in circulation and instead get Kenyans to take up electronic payments, which are more secure. He observed that despite having over 145,000 outlets that accept Visa in Kenya and over 10 million Kenyans holding debit and credit cards, only 10 per cent of the card holders use cards to pay for goods and services.*
> *Kenyan consumer: Walia said the launch has been necessitated by huge number of Kenyans who use mobile payments. "Collectively, the Visa ecosystem has more than 10.5 million cards in this market but only about a million are active at the point of sale. The Kenyan consumer is mobile savvy and prefers mobile transactions," he said. Among the factors that have limited use of cards include fear of fraud among Kenyans, who according to Walia are 'not sure what's beneath the POS terminal that they are about to swipe their card'.*
>
> *ICT Cabinet Secretary Joe Mucheru noted that Visa had in the past imposed solutions that worked elsewhere, without regard to the uniqueness of the Kenyan market. "The hook they (Visa) have used in other markets may not necessarily work in our market," said Mucheru.*

"From what they have demonstrated with mVisa, they appear to finally understand our market. They have taken into account the customers and merchants by removing the barriers enabling them to use their phone and do not need to use your card. They have understood and grasped the market." mVisa has been piloting the service in Kenya since September last year with nine Kenyan partner banks that have either enabled mVisa on their mobile banking applications or have acquired merchants to be able to accept mVisa. The move is expected to bring droves of users looking for cheaper alternatives for transferring funds. "This is a significant move, especially when you consider how much Kenyans spend on transaction fees for mobile money transfers annually," said Visa Sub-Saharan Africa Group Country Manager Andrew Torre. "With 38.9 million active mobile phone subscriptions and Sh515.9 billion in person to person money transfers within the last quarter of 2016, mobile payments have become an integral part of Kenyans' lives." "There is a strong sense of community here with people often sending funds to family, friends and even strangers in times of need, celebration or crisis. We hope to enhance this by eliminating barriers such as transaction costs, while giving customers a convenient, secure and affordable experience," he further noted, adding: "We are excited to continue to build momentum around mVisa to digitise payments with a scalable and interoperable solution that is not limited by the mobile network, bank, or type of handset used." The firm has also converted many of its existing merchants into accepting mVisa. It said plans are underway to have the service accepted at thousands of merchants aggregated through Direct Pay Online and Jambo Pay, enabling an even easier e-Commerce experience for Kenyans.

"Smaller merchants in particular, have realised that they no longer have to invest in expensive point of sale infrastructure as mVisa enables bank to bank payments in a convenient, secure and affordable manner," said Torre."

Mastercard launched Masterpass QR platform: [873, 21] More than 150,000 micro, small and medium enterprises (MSMEs) in Kenya will be able to accept in-store mobile payments using QR code technology in 2017. The mobile solution is available via various mobile banking applications in Kenya. Consumers are guaranteed the security of being able to pay for in-store purchases by scanning the QR code displayed at the checkout on their smartphones, or by entering a merchant identifier into their feature phones. Masterpass QR is currently being rolled out in Nigeria, Ghana, Rwanda, Uganda and Tanzania.

Pan-African banking group Ecobank [873, 878, 21] signed a memorandum of understanding with Mastercard to roll out Masterpass QR mobile payments across 33 African countries in October 2016. The Ecobank Masterpass QR service was launched in Nigeria in September last year. RBL Bank launched Masterpass QR in India in November 2016.

The launch of Masterpass QR in Kenya follows the Central Bank of Kenya's authorisation to allow six banks to launch a mobile money transfer platform set to rival Safaricom's M-Pesa

The Huduma card [815, 817] (Mastercard powered) is part of Kenya's Vision 2030 plan that calls for reforms in public institutions with a view of enhancing accountability, transparency and efficient service delivery, with focus on developing a cashless economy.

"The Huduma Card is a prepaid card with chip and PIN technology that will connect all Kenyans to the formal financial sector by providing a secure, reliable and flexible payment option. The Huduma Card, powered by Mastercard, is currently being issued by Commercial Bank of Africa (CBA), Diamond Trust Bank (DTB), Equity Bank and Kenya Commercial Bank (KCB), with no bank chargers being allocated to citizens when registering for the smart card.

Kenyans will be able to pay for an array of Government services such as the National Hospital Insurance Fund (NHIF), National Social Security Fund (NSSF) amongst others. Citizens issued with the smart prepaid card will automatically be enrolled in vital government services such as the National Social Security Fund and the National Hospital Insurance Fund, ensuring all Kenyans benefit from these initiatives.

> Cardholders are assured that regardless of how they use the solution their funds will be secured by the Mastercard multi-layered approach to protecting payments. EMV chip and PIN technology is a global payment standard to ensure that funds are protected even if the card is lost or stolen. This layer of protection ensures beneficiaries can receive their funds conveniently and securely.
>
> Once funds are loaded to the prepaid card, cardholders can use their Huduma Card to pay for goods and services in store, online, by phone or to withdraw cash from ATMs – anywhere Mastercard is accepted locally or at millions of locations worldwide. The prepaid card ensures flexibility, convenience and security and is easily obtained from one of the issuing banks. Applicants do not require a credit check or bank account to apply."

The Commercial Bank of Africa [703] announced the launch of a new digital banking solution based on a mobile app named Loop, making it the first of its kind in Kenya and in the region.

> "Tieto has developed and delivered the digital and mobile payment solution that allows easy card issuance for MasterCard. With this initiative Commercial Bank of Africa aims to serve 1 million currently unbanked Kenyans.
>
> The concept of the Commercial Bank of Africa's digital bank is unique as it focuses on high online availability in order to become more relevant to the younger clientele. This will help the company to serve unbanked Kenyans. It will also ensure the availability of all necessary transactions on a private smartphone, making appointments at a bank branch unnecessary."

Pesalink launch [707, 875, 876, 877]: Kenya Bankers Association launched PesaLink, a new digital payments platform that enables to make real-time person-to-person (P2) payments from KES 10 ($0.10) to as much as KES 999,999 ($9,650) across the banking system at any time without having to go through intermediaries. Pesalink can also be utilised through Internet banking, ATMs and agency banking. The product will incorporate a solid e-government payment engine that will support public sector payments.

Managed by KBA's subsidiary Integrated Payment Services Limited (IPSL), it is "expected to cut the cost of transactions and transform the way consumers interact with their banks". The implementation is beginning with 12 banks that have completed a pilot exercise and received product approvals.

"PesaLink is proof that the banking industry has embraced the technology revolution sweeping across the payments industry… Currently, the platform offers P2P bank transfers — in the second phase of the PesaLink roll out, KBA will be looking to enter into merchant payments as well as paying utility bills"

IPS said it will charge banks between Sh10 and Sh12 per a transaction as operational fees for using the PesaLink switch, with expectation that individual banks will pass the low cost to customers. Fees for transactions valued up to Sh500 will, however, be waived.

KBA chief executive Habil Olaka said the banks are expected to pass on the low fees to customers. "The pricing has taken into consideration that we are driving our financial inclusion agenda," Olaka said. "There's a deliberate decision at the switch level to waive the fees at the lower end of the consumer public."

Is this a competitor for M-Pesa? It should not slow down revenues from Safaricom's M-Pesa: A significant number of close to 25 million customers do not hold conventional bank accounts. The revenues that are generated from M-Pesa to bank transactions are insignificant. Most of the M-Pesa revenues come from person-to-person transactions.

About 12 of the industry's 42 banks have received the Central Bank's approval to roll out PesaLink. They are Standard Chartered, Co-operative, Barclays, Diamond Trust, I&M, and Gulf African Bank.

Others are Middle East Bank, Victoria Commercial Bank, Guardian Bank, Credit Bank and Prime Bank.

Business Daily Africa [942] concludes: the 4th Industrial revolution, the Internet of Things, is upon the march, yet the tax regime is yet to follow in order to formalise Kenya's Silicon Savannah plans.

8.3 APAC region

Alongside Africa, we observed APAC as the other most active region for the cashless society theme in the period Feb – July 2017. Australia, China and India present us with ground-breaking developments.

8.3.1 Key topics for Asia Pacific

The APAC region generally focuses on the digital economy (908, 945), with infrastructure (525) and mobile payment technology (324, 408) featuring as key topics throughout the period.

The Frost Report (756), an essential resource on the topic for the region, concluded on the status of the cashless society in APAC:

- Asia- Pacific is transitioning to cashless societies: Some are front runners, some have just started,
- Different approaches are being used to achieve the same goal: All countries need to find an approach that works for them as the benefits are common to all,
- Mobile payments are spearheading the transition to being cashless: It is likely to be the underlying driver behind Asia-Pacific's successful transition due to the high smartphone penetration,
- Removal of cash will aid the transition to a cashless economy: however, this needs to coincide with the availability of alternative solutions such as cards and mobile payments,
- A cashless Australia is likely as soon as 2022: Australia may be the 1st country in Asia-Pacific to achieve a true "cashless society" status.

Above all, financial technology (Fintech) adoption is highest in China and India, and underpins the cashless drive (203). Is the region about to take a leap into digital currencies?

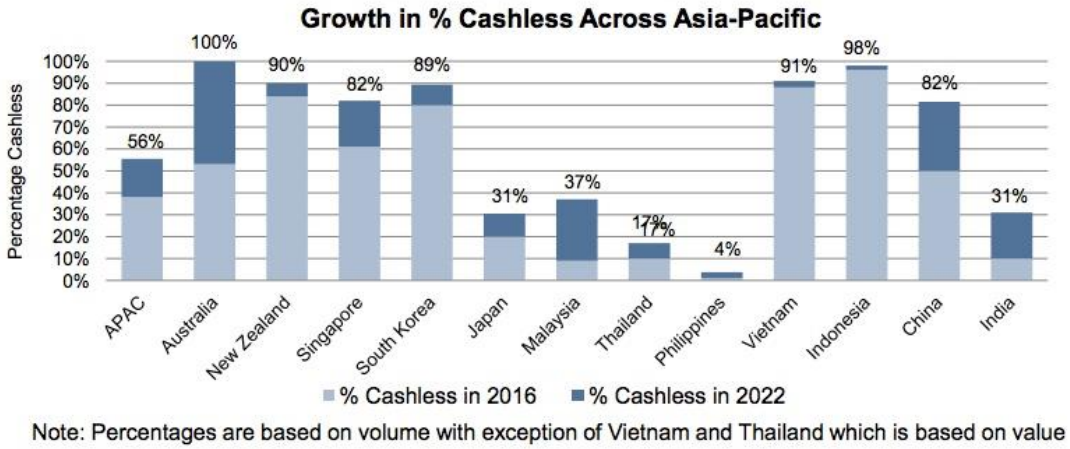


Figure 18: Growth in Percentage Cashless Across Asia Pacific

8.3.2 The Asian story in 2017

In **Cambodia**, cash is King with a low bank penetration rate, yet e-commerce is rising, with new mobile apps for restaurant food orders [586]. Government actively engages with consumer protection

through a legal and regulatory regime that requires e-wallet companies to have a minimum $2m in capital, and measures to protect consumers' data and privacy [536].

Hong Kong keeps pace with the rest of China (see case report) with mobile payment development joining the Octopus card and credit cards, to offer a plethora of payment options [585, 626, 902]. The territory is researching its own digital currency, exploring the feasibility of a central bank-issued digital currency in performing domestic inter-bank payments, inter-corporate payment in the wholesale market and delivery versus payment (DvP) debt securities settlement. The proof of concept should be completed in the fourth quarter of 2017 [486, 541].

Indonesia hopes that home talent will repatriate to power the large number of e-commerce firms rapidly expanding [903]. Transaction fees become a sensitive topic as banks discuss mechanisms to charge transaction fees in addition to the toll charge, for the cashless road tolling system due in October 2017 [302]. Notably, the new aid/ welfare "Combo card" is first targeting 1.4 million people in 45 cities and six regencies from a total of 15.5 million aid recipients nationwide to receive cashless aid, to be swiped at designated "e-warungs" (e-shops) to buy staple foods such as rice and eggs [770].

Indonesia was the fastest-growing e-commerce market in the world in 2016 [1145], expanding 155% from January 2016 to January 2017.26 Some of this growth may be due to the release in 2015 of BBM Pay's Instant Mobile Payments. The popular BBM chat app has over 55 million users in Indonesia, and BBM Pay had previously allowed those users to transfer money just as they would photos or files. The Mobile Payments function allows them to pay for goods and services with participating merchants, and was directly inspired by the ecosystem that WeChat has built in China.

Beyond embracing mobile wallets such as PayMaya [447], and the vending park gradually moving to cashless technology [752], **Japan** fast-forwards to virtual currencies, legalising Bitcoin as a method of payment whilst initiating the regulatory framework for consumer protection [61, 446, 504] and collaborating with Australia on the same. Also, a consortium of Japanese banks is experimenting on a new fund transfer system based on blockchain [389].

Malaysia invested in incubators for the digital economy [669] such as the Multimedia Super Corridor [628] whilst turning toll-roads cashless. The security sector, the gateway to Islamic finance and an e-commerce boom [629, 668, 806] are hailed as key enablers to the "Year of the Digital Economy". In a payments survey, 66% state that carrying less cash is a key reason for using debit cards [96], especially amongst foreigners although Chinese tourists started to use Alipay [630]. Only 11% cite faster transactions [96].

In **New Zealand**, banks get ready for a cashless future, with customers preferring online banking, and a reduction of counter services [239, 295]. However, they observe the paradox of increasing Notes in Circulation.

Pakistan is embracing the Global Digital World economy, with its China-Pakistan economic corridor (CPEC) a showcase of public private partnerships that include higher education engagement [448, 802]. The mobile wallet SimSim is an example of digital transaction tools.

The **Philippines** embarked on an exchange of old bank notes that completed in the spring, in a drive to tackle forgery [627, 707, 647]. A cashless drive is also on the way, with a system launched for government fees [338], whilst the country moves towards a biometric government ID that can also be used to pay for taxes, goods and services [170]. It is also concerned with the use of digital currencies for money laundering purposes and terrorism financing in its under regulated financial market. As a result, it takes a position against endorsing any virtual currency [236]. Sixty-nine percent of Filipinos were underbanked as of 2015, but the country also has the fastest-growing smartphone market in ASEAN, with e-payments spurring faster growth [537, 538]. The combination creates an interesting opportunity for fintech entrepreneurs [663].

Building strong digital capabilities is at the core of **Singapore** vision for the Future Economy [809], in addition to reshaping the tax system [535] and updating data privacy laws [153]. Its other goal of developing a vibrant and connected city of opportunity, a vision of modern urban spaces, seems to be materialising fast with the launch of the first unmanned store [160], QR codes being rolled out to Singapore taxis [119, 158, 542]. Innovative Texcent with Peycent seem poised to be global payment leaders. Cashless options receive mixed responses at hawker centres [666, 719]. Miscalculated rollout of prepaid wristbands and underestimated supplies lead to audience discontent at the Changi exhibition centre as customers were unable to redeem their credits. Refunds and apologies were later issued [665, 720]. Meanwhile, cash and cheques remain main modes of payment [718].

In April, **South Korea** launched a pilot project to become coinless, all change returning through debit cards at selected stores [237, 442]. The purpose is convenience, the cost of doing business as well a government's own cost management, as these coins are of low value. In parallel, South Korea is preparing for digital currencies, openly exploring the prospects of a dual currency regime [357], highlighting symbiotic relationship between economies due to the cost of using digital currencies [396]. Blockchain tests are starting, with insurer Kyobo selected for a pilot experiment on the government's Blockchain platform. The government also takes a stance towards regulating businesses using virtual money rather than regulating the use of virtual money itself [123].

Convenience drives cashless partnerships with DHL Express, as Hatton National Banks keeps adding new payee partners to its Point of Sale solution in **Sri Lanka** [2].

Mobile payments are a key area of **Taiwan**'s digital nation plan, part of larger ambitions to move towards a cashless society. But how can the smaller Taiwanese players compete with China's big boys? [42]

Thailand pushed the agenda, as the Digital Economy Minister announced that the creation of a full-scale, digitally driven economy must take place in Thailand within a decade if the country wants to escape from the middle-income trap. This starts with the requirement for a broadband network [807]. QR codes [339] progress whilst the Thai e-wallet startup T2P helps Myanmar go cashless [808]. Promptpay, a national digital payment system is launched, allowing someone to transfer sums of less than 5,000 baht to accounts of other banks for free, as opposed to the 25 baht fee usually levied by banks [944, 632]. OmiseGo is another promising innovation to make Thailand cashless, as a network that allows electronic wallets to be interoperable through Blockchain technology, also targeting solutions for the unbanked [48].

Vietnam is moving forward in reducing cash transactions and formalising electronic payment methods. Deputy Prime Minister Vuong Dinh Hue signed a plan that ensures that the country has the infrastructure and equipment that it needs to progress toward a cashless economy by 2020 [904]. Investments in infrastructure are positive steps; however, politics, including media censorship with strict digital surveillance laws may limit the uptake [631, 904].

8.3.3 Spotlight on: Australia

Australia is listed as a leading country in the race towards a cashless society. What are the facts?

The march towards a cashless society seemed to be gathering momentum, with a rise in digital wallet use prompting more companies to offer online only products and services [805].

ATM use hit a 15-year low. According to Reserve Bank of Australia figures released in March 2017 [706], the number of ATM withdrawals in January fell by 7.7 per cent compared to last year. The total value was down by 3.9 per cent. It follows two consecutive years of ATM withdrawals falling by more than 6 per cent. The RBA has opened a new super vault to store more cash [532].

However, the rate of growth of cashless transactions has actually halved in the last two years from its peak of 12 per cent growth in 2015 to under 6 per cent growth this year, according to the National Australia Bank [94]. The slowdown in growth of cashless payments is likely to continue as the

penetration of contactless payment systems reaches a limit, reflecting minimum spend requirements for cashless transactions, and the existence of a proportion of merchants who deal only in cash, possibly due to transaction fees [469].

Australians still favour credit cards, yet the payments industry growth has attracted unprecedented competition in Australia over the last 12 months across online, mobile and in-store payments [583]. Digital wallets appeared, with ZipMoney, as well as a move from a Tencent licensee to roll out "WeChat Wallet" in Australia, a cashless payment system using the popular social media application WeChat and is in the midst of obtaining an Australian financial services (AFS) licence [143].

The key technology development this year has been the New Payments Platform [573], in order to achieve interoperability: In 2014, 12 financial institutions signed up to build the NPP, partly as a way of bringing Australia up to speed with other countries that are ahead in the race to becoming completely cashless. The NPP means money can be transferred almost instantaneously, even when the payer and payee are members of different banks. The technology will also support "overlay" services, meaning banks will be able to create their own payment services to entice customers. It will enable payments through banks, emails addresses, phone numbers or ABN, for total ease of payment.

The cashless welfare card, piloted in Ceduna, South Australia, and Kununura in Western Australia, gave rise to eloquent media coverage. The card is intended to limit welfare benefit recipient's access to cash (as 20% percentage of sums received) and prevent purchases of alcohol and gambling services. Early government reports hailed the trial a success [365, 711, 713] and a decision to continue with the scheme soon followed [709, 710]. Opponents challenge the positive results, citing that simultaneous social programmes [527] may have contributed to some of the positive results, as well as not taking into account qualitative effects, such as the psychological side effects [232], inconvenience to welfare recipients [712], the effects on local businesses who did not sign up to the scheme, as well as doubts on the integrity of social security official decisions and engagement, implementation [526, 622]. Aside from emotive statements [660, 659] and fears about Big Brother welfare [367] throughout the spectrum of opinions, two issues arise: a rapid rise in crime and prostitution [234], as well as the scheme running costs [368, 369], although leverage would be expected if deployed on a larger scale, and software use to block products may prove more adequate [231]. The alcohol industry backs the scheme, calling for a further trial before a decision on tougher liquor laws are made [623].

Has the welfare card given a bad name to the cashless society? The transition is certainly under way, with much commentary on charitable donations [9, 576, 662, 574]. Key concerns include privacy [577], cybercrime, financial inclusion for the elderly [579, 581], the needy [661], and financial education for the young [167, 173].

Australia is also taking interest in digital currencies. The RBA has been studying developments in the financial systems architecture [483], and the implications of Blockchain technology [482]. It considers regulating Bitcoin exchanges and virtual currencies in collaboration with Japan, and seeks to resolve Bitcoin related double taxation issues [196, 386].

8.3.4 Case study: China

This case report is based on selected extracts from the "Better than Cash' Alliance full report on China, release May 2017 (1145).

> *"Until recently [1145], China remained a heavily cash-based society. In 2010, nearly 61% of China's retail consumption was still transacted in cash, even as debit card penetration reached about 1.8 cards per person. A number of factors account for this reliance on cash, including high levels of perceived trust and convenience for cash, and habit. However, the payment landscape is changing rapidly as cards and digital payments have grown in importance, with the proportion of retail consumption transacted in cash falling to 40% in 2015. Compare this to the UK where in 2016, cash accounted for 45% of all transactions.*

During that same 2010-2015 period, mobile and internet payments grew from 3% of retail consumption to 17% in China.[…]

In September 2016, G20 Heads of State and Government recognised the capacity of digital payments to improve lives by endorsing the High-Level Principles of Digital Financial Inclusion (HLPs) at their meeting in Hangzhou, China.

Putting these principles in practice is a complex task. One approach that has been successfully adopted in China is to bring together key public- and private-sector players to grow digital payment ecosystems, using existing e-commerce platforms and social networks as their foundation. These electronic payment networks are used by governments, businesses and consumers to buy and sell physical goods as well as make payments and transfers. To help businesses and policymakers in other countries learn from these experiences in China, this report focuses on two major Chinese companies that have built on their existing e-commerce platforms and social networks to drive the uptake and usage of digital payments significantly, and support broader financial inclusion and economic activity:

- *Alipay was first launched in 2004 as an internet-based payment service using the e-commerce platform Alibaba and then further developed for mobile with the Alipay application (app) in 2009. By 2016, Alipay was processing 175 million transactions per day, 60% of which were completed through a mobile phone.*
- *Tencent was founded in 1998 and now provides digital payment options utilising its two major social apps, QQ and Weixin (WeChat, as it is known in English), which have a combined monthly active user rate of 846 million as of 2016.4 QQ is an online communications platform with both chat and email functions. WeChat is similar in some respects to Facebook and WhatsApp. The success of WeChat has been rapid: Since just 2012, active daily users have grown from 195 million to approximately 806 million in 2016, a 43% growth rate.*
- *In 2015, Alipay had 450 million monthly active users, who each spent US$2,921 on average. By comparison, WeChat had 697 million users in 2015, who spent $568 on average, although in 2016 this figure grew 168%, to $1,526 per user.*
- *Together these two companies have dominated the digital payments space in China, and have seen dramatic growth in digital payments over the past few years:*
- *Alipay payments (by value) have risen from less than RMB 0.5 trillion (US$70 billion) in 2012 to an estimated RMB 11.5 trillion (US$1.7 trillion) in 2016 – a 23-fold increase in four years.*
- *WeChat payments (by value) have risen from less than RMB 0.1 trillion (US$11.6 billion) in 2012 to an estimated RMB 8.5 trillion (US$1.2 trillion) in 2016 – an 85-fold increase in four years.*
- *Combined Alipay and WeChat payments (by value) have risen from less than RMB 1 trillion (US$81 billion) in 2012 to an estimated RMB 20 trillion (US$2.9 trillion) in 2016 – a 20-fold increase in four years.*
- *In 2015, non-cash payments accounted for nearly 60% of retail transactions in China. Of all non-cash payments, Alipay and WeChat Pay captured 28% of all retail transaction fees; effectively what would have been nearly US$20 billion in payments fees on transactions had they been processed on traditional card payment networks.*
- *Digital payments as a whole have grown rapidly from about 3.5% of all retail transactions in China in 2010, to about 17% in 2015."*

8.3.4.1 Better than Cash Alliance key findings (1145):

- New financial services have proven highly popular, delivering benefits to large numbers of people.
- Digital finance has dramatically increased economic activity and e-commerce among merchants and consumers.
- Effective incentives and demonstrable utility are key factors in stimulating initial use and cultivating customer loyalty.

- New credit scoring services are becoming available which are increasing access to credit, particularly for people on low incomes and small businesses.
- The major digital payments providers are rapidly expanding beyond China, and investing in new financial technology companies.

8.3.4.2 The key lessons learnt from China: key success factors: (1145)

- For payment providers, e-commerce firms, and social networks:
    - Attracting users by building on existing e-commerce platforms and social networks, using strategic incentives to deepen usage.
    - Making platform tools openly available to innovators for seamless integration.
    - Enabling universal access for users and businesses by developing ecosystems that function across various platforms.
- For governments:
    - Developing a supportive regulatory environment that strikes a careful balance between encouraging innovation and managing risk.
    - Setting public investment priorities that encourage digitization.
- For both businesses and governments:
    - Encouraging public-private partnerships (PPPs) to develop an ID verification system or similar method to identify payers and payees accurately.
    - Incorporating lessons of successful business models in payments over messaging platforms to drive adoption of digital payments in their own markets.

All of these success factors have been integral to developing inclusive digital financial ecosystems in China, and merit consideration by government, businesses, and other stakeholders outside China seeking to develop digital payments and digital payments ecosystems in their own countries. They have also played a part recently – along with many other factors – in the remarkable success in tackling poverty that China has achieved, having reduced the number of people living in poverty from 755 million in 1990 to 25 million in 2013. Clearly this large-scale improvement in the lives of millions of Chinese has many causes, but by expanding the opportunities available to people – particularly those on low incomes – to participate more widely in economic life, digital payments can rightfully claim an important role among them."

8.3.4.3 Conclusions:

The report concludes:

"A key overarching issue in payments (both traditional and digital) is trust and convenience. There must be trust in the community or network (i.e., between the payor and payee), trust in the security of the payment mechanism, trust in the regulatory environment for consumer protection and recourse, and a belief that the method is beneficial.

An examination of the China experience demonstrates that robust digital payments ecosystems can address all of these concerns and are, therefore, a useful way to accelerate the acceptance and use of digital payments. Despite the benefits, there are challenges.

Regulators are still figuring out the right balance between innovation and regulation. China's financial institutions are still working out their fintech strategies. Alipay and Tencent are expanding faster than many other similarly sized global tech companies. And we are still very much in the early days of fintech both inside and outside China. How this all plays out remains to be seen, but the initial impact of digital finance on China is difficult to over-exaggerate.

There are significant benefits of convenience and utility to be achieved by integrating payments functionality in existing e-commerce platforms and social networks. But even greater benefits of financial inclusion can be reached when robust digital payment ecosystems are developed around those networks and platforms. As China's experiences illustrates, being able access vital financial services in an easy and convenient way increases the likelihood of their use. Digital payments

ecosystems, therefore, can be a powerful catalyst to accelerate digitisation and increase financial inclusion."

8.3.5 Case Study: India

India was the scene of most dramatic moves towards a cashless society in at the turn of 2017.

On November 8, 2016, the Government of India (GoI) announced that the high denomination notes of R500 (US$7.80) and R1000 (US$16) would no longer be valid legal tender (215), and imposed caps on daily and weekly cash withdrawals. The invalidated notes were required to be exchanged or deposited in the banks by December 31, 2016. The Government of India expected the move would help to check the rise in the hidden economy, counterfeit currency, and, ultimately, reduce terrorism financing activities. The government has set a target of 25 billion electronic transactions to be achieved by March 2018.

The sudden announcement gave rise to general chaos during the period November 2016 to January 2017.

As official data is still unavailable as of July 31, 2017 as monetary reports are regularly revised and may not be final yet for the first semester in 2017, this study chose to share observation of events through the media. Hindsight with reliable data will hopefully be available in time for the full report. At this point, an analysis would be partial, although it will become critical for global lessons on transition towards a cashless society.

The overall picture points to short term pain to restructure economic fundamentals such as tax collection and push towards digitisation for the long-term modernisation of the country.

Notes from the Interim report from the committee of digital payments, in January 2017, as the only reliable status for the progress of demonetisation in India.

8.3.5.1 Digital payment modes in India:

- AEPS (Aadhaar Enabled Payment Systems) [1119]:
    - Smart phone, biometric device (only for merchant) & Aadhaar linked bank Account
    - Aadhaar enabled MicroATMs across all banks business correspondent (BC) agent points
    - Seeding of bank accounts with Aadhaar bank wise - Public & Private banks.
- Mobile phone based:
    - Feature phone: Simplifying USSD using Aadhaar number.
    - Smart Phone: UPI - Common interoperable QR Code
- Swiping: Rupay, VISA, Master Card – Requirements – ePoS, mPoS, microATM and ATM

8.3.5.2 Constraints:

- Attitudinal change and training
- Hardware including acceptance infrastructure
- Connectivity and data architecture
- Fintech and cyber security
- Digital transactions costlier than cash
- Appropriate digital payment mode for high transaction value
- Lack of interoperability

8.3.5.3 Proposed actions from key stakeholders:

- Government to lead the way, giving overall direction, policy decisions and execution, formulate Incentive Structure & Remove disincentives to make digital payments more attractive than cash,

- Financial and telecommunications to strengthen security, expand & Strengthen Origination, Acceptance, Connectivity and Hardware Infrastructure,
- Financial and telecommunications to expand infrastructure, create Authority & Formulate policy, Regulatory changes that promote adoption of digital payments,
- Microfinance institutions, NGOs, Fertilizer Corporations, PSUs & Corporates, Panchayati Raj institutions, etc. to create awareness.

8.3.5.4 Early 2017 events

The events as our group saw them unfold, from **late January 31 to late July 2017**. This summary was compiled from more than 300 references, of which we only list the key announcements, reports and reliable sources of data in the references section.

India dominated the demonetisation news on **January 31st**, as budget day unveiled the impact of the currency reform over the previous quarter. Quoted in numerous articles over the period were:

- Societe Generale forecast four consecutive quarters of sub 7% growth,
- Shrinking factory output, consumption and rural demand (worst hit),
- Poor labours, farmers, daily earners and small business owners were the worst hit. Reports of reduced activity and profits in cash rich industries such as real estate, agriculture, jewellery and the fashion industry,
- Banks to face difficulties,
- Job market under pressure,
- Tax collection rises,
- Marital discord over stashed cash.

The daily cap on ATM withdrawals was lifted on **February 01**, though the weekly cap remained in place. Fiscal stimulus would be expected in the new budget. Should cashless transactions be incentivised with a lower tax rate?

Decision-making, implementation, as well as corruption of banking officials seemed the most criticized aspects of the reform so far, leading to some expected parliamentary turmoil. Comparisons were made with a similar failed demonetisation effort in 1978.

On **February 01**, as part of Budget 2017, Government removed all taxes on Point of Sale machines to push cashless transactions, and additional steps to promote digital economy. Anecdotal reports included:

- Automotive market slow down but signs of general manufacturing rebound,
- Apple saw no impact, with all-time record revenues in India,
- Suggestion that one of the aims of demonetization is reduction of real estate prices,
- Benefits for the grocery/ retail industry.

On **February 02nd**, budget week still dominated the headlines. The finance minister expected the negative effects to be temporary, amidst opposition that slammed the budget for ignoring the negative effects of demonetisation. The budget steered further towards a digital economy, pushing infrastructure investments.

In a move to encourage digital payments, the government removed all duties on devices used in the process of cashless transactions and capped cash transactions.

On **February 03rd**, post budget activities kicked off, with the Specified Bank Notes (Cessation of liabilities) bill due on the Lok Sabha. State elections are to start Feb 11.

The **04-11 February** period brought a reality check on the economic figures published on various media articles: following the demonetization move, the government has not yet released any official statistics, and has set expectations of such report in June 17, or soon thereafter. Media explored

possible reasons on the whole scale of the emotive spectrum. Company and industry specific statistics and anecdotal evidence would be a better indication at this time.

The media reported on increasing numbers of regions and industries going totally cashless, while the government directed further through:

- Passing the cessation of liabilities bill for the old notes, and introducing fines for holding old notes,
- Changing the law governing wage payment to make it possible for employers electronically or by cheque without gaining employee decision (see article on Kolkata swapping cash for cheques),
- Preparing draft rules for digital payments,
- The RBI imposed restrictions on the use of cash as well as providing incentives for cashless transactions, inc reduction in debit card charges,
- The RBI also warned against the use of Bitcoin,
- The government announced upcoming regulation for cashless aid debursements.

The lifted cap on daily cash withdrawals and issuance of new bill appeared to correspond to a drop in 10% of electronic payments. Some blamed this reversal on the cost of transactions and suggest addressing infrastructure and fees issues. The challenge of rolling out 30,000 Point of Sale terminals per week is a clear barrier to progress, as well as network connectivity in the North East region. MoneyOnMobile reported 119% increase in transactions post demonetization. Are people shifting to cheque books? Delays in their issuance caused uproar.

Economic performance appeared to be holding up with encouraging signs for tax collection, and only a 0.4% drop in industrial production in December, with some strong company reports, and early success stories. Global investors and economists took a positive view on India.

Given the cultural and political impacts, demonetisation was heralded as Modi's make or break time in the state elections. Concerns included:

- Banking officials' corruption,
- Lack of transparency on the decision-making. Stakeholders only know consultations started with RBI in February 2016,
- Fingerprint payment prompted data privacy fears, esp in the context of international politics with USAID involvement,
- Anger rising and congress suggested failure over black money and corruption objectives,
- The long-term impact sounded uncertain.

The period **11-18 February** saw the media comment on the first 100 days of demonetisation. Impacted by the note ban, retail inflation fell to multi-year low of 3.17% in January.

The Union Budget for 2017 clearly signified the efforts of the Indian Government to push for digital payments in the country with the launch of schemes to incentivize digital payments. More than 8 lakh people won Rs 133 cr under the digital payment incentive scheme.

India has become one of the top markets for digital economy and ranked fourth in terms of active Internet-users across the world. The digital transactions are expected to boost India's GDP. Payoneer CEO Scott Galit explained India is a great destination for building digital economy infrastructure.

Despite constant efforts to push the Indian economy to 'less-cash' economy, India was still highly dependent on cash transactions. India has been largely a cash-driven economy and taking away cash meant that economic activity would be impacted. Most banking and economic indicators were 'blinking yellow' post demonetisation. News had it that in the month of January 2017 the Income Tax Department issued notices for enquiring the source of deposit of SBN and some cases had been investigated. All eyes were on the after effects of Demonetisation, from an income Tax perspective, a well as negative impacts on illegal migrant workers.

While speaking on the impact of demonetisation, Urjit Patel, Governor of RBI said that owing to the speed with which the central bank has been able to replenish the economy with new currency notes, any negative impact on growth would be short lived. Some of the other benefits would include higher savings in financial products and increased impetus on digitization, he added.

RBI proposed to link MDR charges to merchant revenue in an attempt to increase the incentive on cashless payments.

Airtel payments bank enabled over 200 villages across India to go cashless.

From **February 18- to 24**, India saw an increasing popularity and usage of cashless transactions on the back of stakeholder's campaigning and aggressive efforts by businesses and government to entice people into non cash payment methods through various incentives.

Government has been constantly taking new measures to encourage cashless payments. Government has launched BharatQR code, which it said is the world's first inter-operable payment solution. Moreover, the government extended the Credit Card Fee Waiver and Cap Interest Rates and NITI Aayog-powered cashback scheme to promote their wider usage for a cashless India. With cash still being the preferred mode of transaction for a large section of Indians, there was still a greater need to popularize the cashless transaction model in a big way. Digital India is a Stepping Stone Towards Digital Economy & Financial Inclusion.

According to a report by Assocham and EY - Demonetization was to have positive impact on the long run. Meanwhile, Deloitte study found potential in digital payment products with emerging middle class focus. Moreover, electronic payments gained pace.

The retail electronic payments rose up to 37.7% in December 2016 as compared to 22.7% in October 2016.

According to the IMF, demonetisation would pull down India's GDP by 1%. On this, the Reserve Bank of India (RBI) Governor Urjit Patel said the impact is going to be a sharp "V", resulting in a downgrade of growth for a short period of time focusing on inflation control as the main objective of the Monetary Policy. In separate updates, DBS Bank and Nomura said digital transactions were up, deposit growth stable and bond yield rose from low levels.

Many initiatives were taken to move people living in rural areas towards digital payments:

- IIT-G Students Raised Awareness About Cashless Transaction in Rural Schools,
- Bharat Financial Inclusion on Wednesday launched Aadhaar-based instant and cashless loan disbursal. It took less than seven minutes for 30-year-old Guddi Devi to apply and receive ₹29,565 loan for a new grocery shop she intends to set up,
- A major problem in shifting to cashless society was that only 30% people have access to internet services. So, to boost connectivity the government has increased the outlay for BharatNet— touted as the world's largest rural broadband connectivity project — to Rs 10,000 crore in 2017-18. The project will help deploy high speed connectivity across 1.5 lakh gram panchayats. RailTel Wi-Fi, the Indian Railways project with Google to deploy free Wi-Fi, is live at 110 stations and shows ample appetite for online transactions. Building inclusive digital economies requires the collective action of governments, industry, financiers and civil society.

However, India was still facing a lot of hurdles as the economy was reported as remaining crippled by demonetisation. Till now, not all limits to withdraw cash have been taken off. As the limits to withdraw cash have been easing, the increase in the use of digital methods of payments has also slowed down.

On **13th March**, after re-election of the Modi government, all limits were taken off and the comfort of hard cash came back. Also, the cashback schemes offered by government were announced to end in April. In the future, it will be interesting to see whether the government is able to achieve its target of Rs. 2500 crore transactions to be clocked on digital payment platforms like UPI, USSD and Aadhaar Pay, along with debit cards.

In **April**, we noted a possible displacement towards Gold being measured, rising industrial friction between the traditional banking sector and Fintech, as well as the amazing figure of 60,000 identified potential money launderers now identified.

In **May**, the 6 months' anniversary looms. Will we finally see some meaningful economic data release? Data is announced by early June.

- Mixed results with a reluctance to open bank accounts in Chittoor, and rise in use of Cryptocurrencies.
- When will India's first cashless island truly go cashless? Reality does not match the media headlines.
- GST is due to simplify procedures when launched in July, improve tax collections.
- Reports that cash rules again in Kolkata's, as the first cashless transactors have gone back full circle, and some headlines "India gives up giving up on cash".
- Looking on from abroad, the Irish Examiner comments on the democratic aspect of the trend.

In **June**, the India demonetization data that was expected this month is now announced for December, although the RBI states that 83% of the currency has been remonetised (108% in volume terms), and electronic money transactions have gone back to pre-demonetization levels.

The Worldbank still concludes it was a positive move, although it affected unskilled workers and poor households the most. Ongoing concerns about cybersecurity. Content trends indicated ongoing issues in the farming sector, with cattle farmers staring at ruin. A French economist concluded it was a successful political coup, though it failed to meet the objective of weeding out corruption.

The focus was now on the rollout of the GST, on July 01. Telcos rushed to rejig IT, Billing systems for GST.

8.4 South America

Our phase 2 study will expand on South America, however these are some extracts from the Better Than Cash Alliance (1145) report. Many South American markets have the infrastructure necessary to build payment ecosystems similar to those seen in China.

59% of the South American population uses social media, and 52% connect with social media over their mobile phone.

75% of the population has access to broadband, and 57% of all connections are smartphones, far higher than Africa or South Asia.

Yet the digital payments space remains fractured, and no payments provider has linked their service to these platforms in a significant way, or vice versa. With Facebook, Facebook Messenger, and WhatsApp the dominant platforms in South America (Brazil alone makes up 10% of all Facebook usage globally), attention will be focused on whether payments integrated into those networks will emerge as a viable point of entry. Facebook's recent announcement that it has acquired a payment license in Europe points toward eventual integration of payments into one or more of its platforms.

Whether this will impact countries in South America, where traditional banks and card companies are well established, remains to be seen.

9.1 Conclusions

Our major conclusion is overwhelming. The move towards less use of cash around the world is "in motion" and happening at a rapid pace. It is our belief that this direction will not alter and there is no reason to believe that it can be, or if there is sufficient desire for it to be halted. The inevitable conclusion is that, in due course, cashless societies are likely to evolve; the question just arises as when this will happen.

Our research has looked at this pace of change in many different jurisdictions and has concluded that the fastest rate of change is happening in the developing countries; there they are moving towards de-cashing out of necessity whilst countries in the developing world are changing more out of convenience and by stealth.

Our paper has attempted to be impartial in its research, showing with even emphasis on the advantages and disadvantages of a Cashless Society. We have drawn up a Strengths, Weaknesses, Opportunities and Threats analysis together with defining twenty different strategic risks and issues to balance our analysis.

We also have witnessed that much of the movement has been by design although in the developed world, it is happening more by stealth. Our risks and issues section demonstrates the requirement for governments, central banks, regulators and politicians to take control and plan for further transition rather than allow the stealth to continue unplanned.

9.2 Further Research-Phase Two

We also conclude that our paper is by no means definitive and has highlighted many areas of further research which includes, *inter alia* the following important areas:

- A fuller understanding of what a cashless society would mean to the economics of a society,
- A fuller understanding on the financial stability of an economy as it progresses towards de-cashing,
- The possibilities and consequences of central bank digital currencies (CBDCs),
- More detailed analysis of the effects on crime, tax evasion, illegal immigration and the costs of handing cash,
- A case study on QR codes,
- An analysis of a programme towards any transition towards de-cashing, including costs, logistics and exclusion,
- Investigation into a Legal and Regulatory framework that might be required as domestic and other economies transition towards electronic and digital currencies.
- An analysis into the political willpower towards de-cashing,
- The effects on Life Assurance and Pension Funds and other ALM managers.
- Further analysis and practicalities of an Automated Payment Transaction tax
- Wider geographic analysis, in particular of South America,
- Pragmatic solutions to the Risks and Issues.

Section 10: Approach, Methods and Acknowledgements

IFoA research groups/ working parties consist of volunteers recruited from the membership base as well as occasional external contributors. All IFoA research is for non-commercial purposes only.

After advertising for volunteers, the working party set off through mapping and documenting terms of reference through multiple feedback loops that led to a number of work-streams initiating research activities on the following topics with the view to gain a holistic perspective on the research matter. The research fell broadly into the following workstreams although there was a fair level of cross-over:

- **Workstream 1**

  Considered the level, if any, in the reduction of tax evasion. The workstream researched work done into the size of the "Hidden Economy" and how much tax evasion might emanate from it.

- **Workstream 2**

  The reduction, if any, in the levels of crime including counterfeiting that might result from a cashless society.

- **Workstream 3**

  The reduction, if any, in the levels of illegal immigration. It considered how illegal immigrants might be able to circumvent a cashless society.

- **Workstream 4**

  The reduction, if any, in the levels of benefit fraud that might result.

- **Workstream 5**

  The costs involved from the minting, printing, handling, insuring and transporting of notes and coins. It considered relative costs to merchants and consumers of cash and electronic payments.

- **Workstream 6**

  The general effects on economic activity and management without cash. The WP considered if economic activity would be increased or reduced from a cashless society. It looked at a Negative Interest Rate Policy and alternative taxation regimes.

- **Workstream 7**

  Social questions such as the plight of the "unbanked", the elderly, the vulnerable and the technically naïve were examined. It considered if a new, safe and easy to understand payment system could ease transition for these groups and also how financial inclusion was relevant to economies in different stages of development.

- **Workstream 8**

  The working party looked at the technology and equipment needed to replace cash in society and the difficulty of rolling it out across an economic territory.

- **Workstream 9**

  The Working Party examined how other forms of monetary transfer such as Dollars, Euros, Gold, other physical assets or digital currencies could be used instead of “cash” and how this might be minimised and what affect this might have on financial stability.

- **Workstream 10**

  This workstream considered political issues, including how such a possible fundamental social change might be accepted within a political manifesto: How a Cashless Society might help a totalitarian government to control or even punish its “dissidents”?

- **Workstream 11**

  This workstream looked at experiences gained and advances made from a large list of other countries and regions. For a select list of countries, it analysed their level of maturity, whether economic, social or political, towards a cashless society and appraised the Strengths, Weaknesses, Opportunities and Threats in each country.

The working party agreed the following countries were of prime interest: India, USA, Sweden, China, South Korea, Kenya, France, Germany, Australia, Venezuela, Argentina.

Each work-stream listed key questions to research, and identified potential stakeholders or other relevant contacts to explore relevant issues and questions.

The IFoA and working party volunteer team thank the following organisations for their constructive and generous inputs: Bank of England, HM Revenue & Customs, Age UK, Tax Research UK, British Retail Consortium, Link, Barclays Bank, McKinsey &Co.

Building awareness of the international momentum on the topic, workstream 11, focused on international developments, elected to use Google Alerts to monitor online content over a 6 month-period for the following search strings:

> “Cashless, cashless society, cashless transactions, china and cashless, America and cashless, Argentina cashless, Australia and cashless, demonetization, demonetization, digital economy, Ecuador cashless, Euro cashless, Europe cashless, France cashless, Germany cashless, India and cashless, Kenya and cashless, Kenya and mobile payments, Philippines cashless, South Korea cashless, Sweden and cashless, USA cashless, Venezuela cashless”

The workstream team reviewed and analysed content to draw out key events and trends. Regular communications were shared with the other workstreams, partly to enrich the debate, and to facilitate discussions with various stakeholders.

As research activities spread into the topic of digital currencies, the following search strings were added in May 2017, although stricter relevance standard was given for library purposes, as the working party does not aim to study digital currencies per se:

“Blockchain, digital currency, virtual currency”

Articles and references sources collected through specific research between January and July 2017, and used for references with the interim or final report are also recorded in the working party library, available from the IFoA. The archive of all Google alerts is available through the IFoA.

These methods presented several limitations:

- Stakeholder engagement in the research may not have been representative of all interests. Balance may be better achieved in the full research report.

- The Working Party library is not a log of all published resources hence it cannot be used to draw statistical conclusions:
    - It bears the analyst bias in selecting relevant content, and is not exhaustive.
    - The alerts archive is available for further research, tracking or quality control. The archive is only available in Apple Mail format version 10.3 (3273)
    - It follows the level of awareness from the working group: from May 2017 onwards, only resources that added knowledge were added to the library.
    - Google alerts monitored the content published in the English language.
- Monitoring news is one possible research method, yet has qualitative limits, such as a restricted scope of research. It does not consider the social, economic or political background that may be relevant and necessary to make any recommendation for any given country. It may or may not refer to related events in the periods previous to and following the monitoring period.
- The working party has discretionary power whether or not to make use of any or all of these references in the research interim or final reports.

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References and Bibliography

The following resources, made of articles, books and papers, are cited within the text of this paper. We have split these references by section and so those used in more than one section will be repeated. The full bibliography/ library comprises over 1,200 references and is available upon request from the IFoA.

Due to publishing restrictions, some resources may not be accessible from all geographies or devices. Some require registration, or subscription, although we have avoided the latter. Although all content has been verified as available prior to publishing in September 2017, some resources may become unavailable over time. This is unavoidable, however a new link is often found when a title is searched for.

Section 1; Section 2; Section 3; Section 4; Section 5; Section 6; Section 7; Section 8- exc India; Section 8- India.

Section 1- Introduction

Ref number	Author	Organisation	Title	Link	Date
1206	Alex	The Telegraph	Used at the end of the introduction	N/A	Jul-17

Section 2-Background to a Cashless Society

Ref number	Author	Organisation	Title	Link	Date
158		Digital news Asia	DBS introduces QR code payments for Singapore taxis	Link	Jul-17
221		Wikipedia	Cryptocurrency tumbler	Link	
222		Coindesk	Bitcoin price	Link	Jul-17

223		Investopedia	Seigniorage	Link	Jul-17
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937	Titcomb, J.	The Telegraph	Rise of contactless charity box as Barclaycard study shows members of public will give 3 times as much	Link	Jan-17
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1064	Ben Broadbent	Bank of England	BoE deputy governor speech on digital currencies	Link	Mar-16
1072	Ben Dyson & Graham Hodgson	Positive Money	Digital money: why central banks should start issuing electronic money	Link	Jan-16
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1080	Tom Fish and Roy Whymark	Bank of England	How has cash usage evolved in recent decades	Link	Jul-15
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64		GSMA	GSMA: sub saharan Africa driving global market for mobile money	Link	Jul-17
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355		ING	ING IPSOS Key study re attitudes to cash	Link	May-17
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1033		Better than Cash alliance	Eight years of progress of financial inclusion	Link	Dec-16
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Section 8- The Cashless World in Motion-India

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