



BANK OF ENGLAND

Speech

The Future of Money

Speech given by

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To the inaugural Scottish Economics Conference, Edinburgh University

2 March 2018

I am grateful to Alice Carr, Wayne Chapman, Victoria Cleland, Ben Dyson, Martin Etheridge, Andrew Hauser, Cordelia Kafetz, Jack Meaning, James Southgate and Iain de Weymarn for their assistance in preparing these remarks.

“Everyone can create money; the problem is to get it accepted” – Hyman Minsky¹

It is a great pleasure to join the inaugural Scottish Economics Conference, which brings together students from six universities with proud intellectual traditions. I would like to congratulate the students who have shown such initiative in creating this event. My only regret is that the ‘#BeastFromTheEast’ has prevented me from joining you in person, though given my topic, there is something appropriate about joining you virtually.

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This £20 note is significant.

Figure 1: a £20 banknote



Significant because it honours Adam Smith, the great moral philosopher and hero of the Scottish Enlightenment.

Significant because it is a significant amount of money, enough to buy you a burger and a few pints at the Pear Tree pub this evening, or if you fancy a quieter but highly stimulating night in, copies of Smith’s *Wealth of Nations* and *The Theory of Moral Sentiments* at Blackwell’s.

Significant because without money the decentralised exchange of Smith’s invisible hand could not operate. Money unlocks the specialism of labour in the pin factory and “the great increase in the quantity of work that results.”² And only money can solve the coincidence of wants between the butcher, the brewer, the baker and the student on a Friday evening.³

¹ ‘Stabilising an unstable economy’ Hyman Minsky, 1986

² This is the quote as abbreviated on the £20. The full quote is “this great increase in the quantity of work which, in consequence of the division of labour, the same number of people are capable of performing”, Book 1, Chapter 1, Smith, A., (1776) *An inquiry into the nature and causes of the wealth of nations*’.

³ “It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest”. Book 1, Chapter 2, *ibid*.

Many of you probably don't see Adam Smith notes too often. Not just because you're impoverished students. Or because you live in Scotland where you're more likely to encounter Sir Walter Scott or Nan Shepherd on a banknote when you do have cash.⁴ But because you use electronic forms of money such as debit cards and mobile phones for your everyday purchases and go online for your larger ones.

A number of you may hold other forms of electronic money – crypto or virtual currencies such as Bitcoin, Ether or Scotcoin. And a few may view paper money – even the Bank of England itself – as archaic vestiges of an old centralised order of payments that will soon be swept aside by a digital, distributed future.

And that's my topic today: the future of money.

Specifically, how developments in money and payments technologies could transform our economy in ways good and bad. And how, for the good of the people of the United Kingdom, the Bank of England is helping to manage the potential risks and to realise the promise of the future of money.

What is money?

In *The Wealth of Nations*, Adam Smith defines money by the roles it plays in society, in particular, how well it serves as:

- **A store of value** with which to transfer purchasing power from today to some future time;
- **A medium of exchange** with which to make payments for goods and services; and
- **A unit of account** with which to measure the value of a particular good, service, saving or loan.

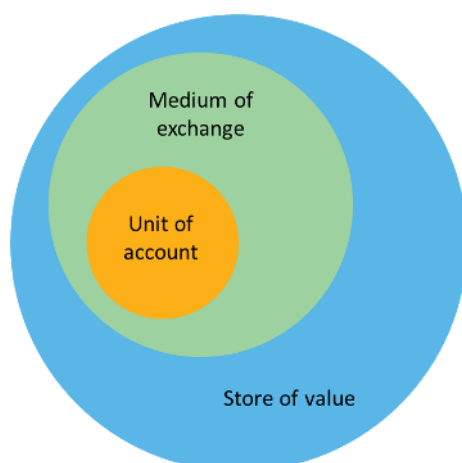
These functions of money operate in a hierarchy (Figure 2). There are many assets that people view as stores of value — houses, for instance — that are not used as media of exchange. By comparison, an asset can only act as a medium of exchange if at least two people are prepared to treat it as a store of value, at least temporarily. And for an asset to be considered a unit of account, it must be able to be used as a medium of exchange across a variety of transactions over time between several people.⁵

The hierarchy points to the reality that money is a social convention. We accept that a token has value whether made of metal, polymer or code because we expect that others will also do so *readily and easily*.

⁴ These characters currently feature on banknotes issued by private banks in Scotland.

⁵ For this reason, some economists consider the operation as a unit of account to be the most important characteristic of money. Indeed, it is commonly argued that a defining feature of monetary policy lies in central banks' control of the unit of account. See Ali, R., Barrdear, J., Clews, R. and Southgate, J., (2014) 'The economics of digital currencies', Bank of England Quarterly Bulletin, 2014 Q3.

Figure 2: The three functions of money



The tokens representing money have taken many forms over the millennia from cowry shells in ancient times to cigarettes during the Second World War and mobile phone minutes in modern Kenya.

And so it was when the Bank of England was founded in 1694 by a Scot, William Paterson. Originally its mission (“to promote the good of the people”) was fulfilled by issuing hand-written banknotes, backed by and exchangeable into gold, to help finance King William III’s war with France.

By the late eighteenth century, fears of renewed Anglo-French conflict contributed to runs on the Bank which drained its gold reserves and led to the suspension of convertibility of its notes into gold. This prompted an MP to describe the Bank as “an elderly lady in the City who had...unfortunately fallen into bad company”. To this day, the Bank of England is known as the Old Lady of Threadneedle Street.

It was not until the 1844 Bank Charter Act that the Bank of England’s note issuance responsibilities were formalised and the rights of others to issue notes in England and Wales began to be phased out.⁶ Today the Bank is the sole issuer of banknotes in England and Wales, while a number of Scottish and Northern Irish banks can issue notes provided that they are backed by Bank of England notes or funds on deposit at the Bank of England.⁷

Most forms of money, past and present, have nominal values that far exceed their intrinsic ones. And this gap has meant that money has a long and sorry history of debasement. Over the centuries, forms of private money, such as the notes issued by American banks during the free banking of the 19th century, have inevitably succumbed to oversupply and eventual collapse.

⁶ The last private bank to issue its own banknotes in England and Wales was Fox, Fowler and Company in 1921.

⁷ Seven banks in Scotland and Northern Ireland can issue banknotes. The Regulations specify that at least 60% of an authorised bank’s notes in circulation must be backed by Bank of England notes and UK coin and that the remainder, plus all notes with the potential to enter circulation, must be backed either by such notes and coin or by funds placed on deposit in an interest bearing account at the Bank of England.

Adam Smith worried about the potential debasement of public money and for good reason. Throughout history, governments would often betray the trust of their citizens be it Henry VIII reducing the precious metal content of his coins during the Tudor era, Pitt the Younger depleting the gold vaults of the Old Lady during the Regency period, or a pliant Reichsbank financing the government in Weimar Germany.

With the wisdom borne from such sad experience, most countries have now settled on centralised, public fiat money backed by robust institutions in order to provide the public with money that is both highly trusted and easy to use.

To understand the breadth of institutions needed for good money, it is important to recognise that modern money takes three forms that are linked by retail and wholesale payments systems. Each link in the chain is critical to the resilience of money. The first form of money is the banknotes issued by central banks, such as the Adam Smith £20s. These account for just 3% of the stock but 40% of all consumer transactions.⁸ Next is electronic central bank money in the form of the reserves that commercial banks hold with us, including to settle transactions with one another. Finally, and most significantly, the electronic deposits that commercial banks create when they extend loans to borrowers, accounting for fully 80% of money in the system.⁹

The private financial sector cannot create money without limit, but is disciplined by competition, constrained by prudential regulation, and limited by decisions of households and companies that can reduce the stock of money (by, for example, repaying existing debt).

Monetary policy is the ultimate limit on money creation because it directly influences the price of money and other financial assets and therefore the demand for the money created by the private sector.¹⁰

Most of the institutions that underpin sterling's effectiveness as money are now housed in the Bank of England.¹¹ In particular:

- Our commitment to the highest quality banknotes that you and the public can use with confidence. That paper £20 note contains sophisticated counterfeit protections ranging from holographic images to ultraviolet features, which will be further enhanced when we switch to a polymer £20 in 2020;¹²
- The foundation of the payments system, RTGS, which processes over £600 billion of bank-to-bank payments per day to the highest standards of efficiency and resilience;¹³

⁸ The data are for 2016. To note, banknotes accounted for 45% of transactions in 2015, and as such there was a 5 percentage point fall year-on-year which may be related to increased use of cards and online payments.

⁹ See McLeay, M., Radia, A., and Thomas, R., (2014), Money Creation in the Modern Economy, Bank of England Quarterly Bulletin 2014 Q1, which notes that the reality of how money is created often differs from that found in standard textbooks, and rather than banks receiving deposits when households save and then lending them out, bank lending creates deposits.

¹⁰ Although it does not target monetary aggregates per se, the Bank of England conducts monetary policy to ensure the amount of money creation in the economy is consistent with low and stable inflation. In normal times, the Bank of England implements monetary policy by setting the interest rate on central bank reserves. In exceptional times when interest rates cannot be lowered further, the Bank implements monetary policy by purchasing assets, which has the by-product of increasing the central bank reserve holdings of private banks.

¹¹ Other institutions include legal tender status (meaning that you cannot be sued for non-payment of debts if you offer sterling to meet them) and the insurance of deposits of up to £85,000 at banks and building societies backed by the Government.

¹² This will feature JMW Turner. For further information see <https://www.bankofengland.co.uk/banknotes/polymer-20-pound-note>

- The Monetary Policy Committee which conducts monetary policy independently to achieve price stability defined by the 2% inflation target;
- The Prudential Regulation Committee which is charged with ensuring the safety and soundness of the banks and building societies that hold your money;
- The Financial Policy Committee with its wide powers to maintain the resilience of the financial system as a whole; and
- The Bank's powers and facilities that provide a wide range of liquidity to banks and other financial institutions in order to promote the continuous functioning of the financial system during shocks.

The Bank has been given clear remits by Parliament for these responsibilities and has operational independence to use its powers to achieve them. We are accountable to Parliament and the people for our performance.

The combination of this robust institutional framework and the fact that only sterling is legal tender in the UK sets a very high bar for competing forms of money to dislodge sterling.

But at present, more than a thousand virtual or “crypto” currencies are trying to do just that.

The Advent of Cryptocurrencies

In the depths of the global financial crisis, the coincidence of technological developments and collapsing confidence in some banking systems sparked the cryptocurrency revolution.

Its advocates claim that a decentralised cryptocurrency, such as Bitcoin, is more trustworthy than centralised fiat money because:

- Its supply is fixed and therefore immune from the age-old temptations of debasement;
- Its use is free from risky private banks; and
- Those who hold it can remain anonymous and therefore free from the ravenous eyes of tax authorities or worse still law enforcement.

Some also argue that cryptocurrencies could be more efficient than centralised fiat money because the underlying distributed ledger technology cuts out intermediaries like central banks and financial institutions and allows payments to be made directly between payer and payee.^{14,15}

¹³ The Bank operates the Real-Time Gross Settlement (RTGS) service and infrastructure that holds accounts for banks, building societies and other institutions. The balances in these accounts can be used to move money in real time between these account holders. This delivers final and risk-free settlement.

¹⁴ Whereas banks hold records of most fiat money and are entrusted to ensure its validity, with digital currencies, the ledger containing all transactions by all users is publicly available. Rather than placing trust in central institutions – such as banks (and by extension the

In this spirit of dystopian fear and libertarian optimism, the message accompanying the first or genesis Bitcoin block read: “The Times 3 Jan 2009 Chancellor on brink of second bailout for banks.”

How well do cryptocurrencies fulfil the roles of money?

The answer has to be judged against the functioning of the entire cryptocurrency ecosystem (which extends beyond the currencies themselves to the exchanges on which cryptocurrencies can be bought and sold, the miners who create new coins and verify transactions and update the ledger, and the wallet providers who offer custodian services).

The long, charitable answer is that cryptocurrencies act as money, at best, only for some people and to a limited extent, and even then only in parallel with the traditional currencies of the users.

The short answer is they are failing.

Poor Stores of Value

Cryptocurrencies are proving poor short-term stores of value. Over the past five years, the daily standard deviation of Bitcoin was ten times that of sterling. Consider that if you had taken out a £1,000 student loan *in Bitcoin* in last December to pay your *sterling* living costs for next year, you’d be short about £500 right now. If you’d done the same last September, you’d be ahead by £2,000. That’s quite a lottery.

And Bitcoin is one of the more stable cryptocurrencies. Indeed, the average volatility of the top ten cryptocurrencies by market capitalisation was more than 25 times that of the US equities market in 2017.

This extreme volatility reflects in part that cryptocurrencies have neither intrinsic value nor *any external backing*. Their worth rests on beliefs regarding their future supply and demand—ultimately whether they will be successful as money.

Thus far, however, rather than such a sober assessment of future prospects, the prices of many cryptocurrencies have exhibited the classic hallmarks of bubbles including new paradigm justifications, broadening retail enthusiasm and extrapolative price expectations reliant in part on finding the greater fool.

Far from being strengths, the fixed supply rules of cryptocurrencies such as Bitcoin are serious deficiencies. Fundamentally, they would impart a deflationary bias on the economy if such currencies were to be widely adopted.¹⁶ If “those who cannot remember the past are condemned to repeat it”¹⁷, recreating a virtual global gold standard would be a criminal act of monetary amnesia.

centralised authorities like the Bank of England that supervise them) – reliance is placed on the network and the rules to update the ledger reliably.

¹⁵ Satoshi Nakamoto (2008), ‘Bitcoin: A Peer-to-Peer Electronic Cash System’ bitcoin.org, October 2008.

¹⁶ For example, the supply of Bitcoin is limited to 21 million units by 2040. In the long run, a fixed money supply may harm the macroeconomy by contributing to deflation in the prices of goods and services, and in wages. And the inability of the money supply to vary in response to demand would likely cause greater volatility in prices and real activity.

¹⁷ As the Italian philosopher George Santayana famously observed.

In the short run, the fixed supply of Bitcoin has fed a global speculative mania that has encouraged a proliferation of new cryptocurrencies. As my colleague Agustin Carstens has argued, this surge of competitors and the “forking” of Bitcoin echoes the debasement of private monies in the past.¹⁸

Inefficient Media of Exchange

The most fundamental reason to be sceptical about the longer term value of cryptocurrencies is that it is not clear the extent to which they will ever become effective media of exchange.

Currently, no major high street or online retailer accepts Bitcoin as payment in the UK, and only a handful of the top 500 US online retailers do.

For those who can find someone willing to accept payment for goods and services in cryptocurrencies, the speed and cost of the transaction varies but it is generally slower and more expensive than payments in sterling.

That’s because the more heavily used cryptocurrencies face severe capacity constraints compared with other payment systems. For example, Visa can process up to 65,000 transactions per second globally against just 7 per second for Bitcoin.

And if you use a debit or credit card in the UK, the transaction is completed in seconds and without exchange rate risk. In contrast, Bitcoin users can face queues of hours. Those wanting to get to the front to make time-pressing payments – for last orders, for example – need to offer up a transaction fee sufficiently large to persuade Bitcoin “miners”, who verify and process transactions, to do so quickly. The fees paid vary through time, but reached £40 in late 2017. Fees are currently around £2, but even that is expensive relative to cash, cards or online payments which cost the retailer around 1.5 pence, 8 pence and 19 pence respectively.¹⁹

Over time, Bitcoin transaction fees could rise further because the subsidy miners enjoy by being partly paid with rewards of new units of currency, will decline given the total supply of Bitcoin cannot exceed 21 million.²⁰ Furthermore, the costs of Bitcoin mining are enormous. Its current annual electricity consumption is estimated by some to be up to 52 terawatt hours, double the electricity consumption of Scotland.²¹ In comparison, the global Visa credit card network’s energy use is less than ½ of 1% of that of Bitcoin, despite processing 9000 times more transactions.²²

¹⁸ Carstens, A., (2018), “Money in the Digital Age: What Role Central Banks?” See <https://www.bis.org/speeches/sp180206.htm>

¹⁹ Based on the British Retail Consortium’s Payment Survey 2016, which surveys the costs that retailers incur for accepting payments, including bank charges, handling charges, infrastructure costs and write-offs (losses). Link to survey: https://brc.org.uk/media/179489/payment-survey-2016_final.pdf

²⁰ The reward for each new block halves every 210,000 blocks (approximately every 4 years) and currently stands at 12.5 bitcoin per block. This regular halving of the block reward results in an exponential slow-down in the growth rate of Bitcoin supply. It is estimated that by 2040 99.8% of total maximum Bitcoin supply will have been generated.

²¹ For Bitcoin energy usage, see: <https://digiconomist.net/bitcoin-energy-consumption>. For Scottish energy usage, see <http://www.gov.scot/Topics/Statistics/Browse/Business/Energy/EIS2018>

²² For Visa’s energy usage, see their Corporate Social Responsibility Report (2016).

Virtually non-existent Units of Account

Given that they are poor stores of value and inefficient and unreliable media of exchange, it is not surprising that there is little evidence of cryptocurrencies being used as units of account.

Retailers that quote in Bitcoin usually update at very high frequency so as to maintain stable prices in traditional currencies such as US dollars or sterling. The Bank is not aware of any business that accepts Bitcoins in payments that also maintains its accounts in Bitcoin.

The Policy Response

Even though their prospects of replacing fiat money are tenuous at best, cryptocurrencies are of growing interest to policymakers, many of whom prefer to term them crypto-assets expressly because they are not true currencies—a convention I will adopt for the balance of my remarks.

On the upside, as I will come onto in a moment, some of the underlying technologies are exciting. Whatever the merits of cryptocurrencies as money, authorities should be careful not to stifle innovations which could in the future improve financial stability; support more innovative, efficient and reliable payment services as well as have wider applications.²³

On the downside, at present, crypto-assets raise a host of issues around consumer and investor protection, market integrity, money laundering, terrorism financing, tax evasion, and the circumvention of capital controls and international sanctions.

The Bank of England's FPC is currently considering the risks posed to UK financial stability. And internationally the Financial Stability Board (FSB) will report to the G20 in Argentina later this month on the financial stability implications of crypto-assets.

At present, in my view, crypto-assets do not appear to pose material risks to financial stability.

This is in part because they are small relative to the financial system. Even at their recent peak, their combined global market capitalisation was less than 1% of global GDP. In comparison, at the height of the dotcom mania, the valuations of technology stocks were closer to about a third of global GDP. And just prior to the global financial crisis, the notional value of credit derivative swaps was 100%.

In addition, major UK financial institutions have minimal exposures to the crypto-asset ecosystem.

Looking ahead, financial stability risks could rise if retail participation significantly increased or linkages with the formal financial sector grew without material improvements in market integrity, anti-money laundering standards and cyber defences.

²³ Innovations are reducing computational efforts to prove a transaction, such as Litecoin and Ethereum's proposed moves to "proof of stake" from "proof of work".

Authorities are rightly concerned that given their inefficiency and anonymity, one of the main reasons for their use is to shield illicit activities.²⁴ This cannot be condoned. Anarchy may reign on the dark web, but in the UK it's just a song that your parents used to listen to.

Moreover, structural vulnerabilities in cryptocurrencies mean that they are inherently risky compared with traditional financial assets. The risks include extreme price volatility and poor market liquidity due to fragmented markets and highly concentrated holdings, which in turn facilitate manipulation and misconduct. These vulnerabilities are compounded by operational and technological weaknesses, as evidenced by a series of major crypto-asset heists.²⁵

In addition, there is unease that the combination of these vulnerabilities and widening retail participation could damage the reputations of those financial intermediaries connected to crypto-asset markets. In extreme circumstances, it could even undermine confidence in the broader financial system itself, particularly if people held an unfounded belief that authorities had legitimised these activities.

To isolate, regulate or integrate?

Authorities need to decide whether to isolate, regulate or integrate crypto-assets and their associated activities.

A few jurisdictions have banned crypto-assets outright.²⁶ And some regulators have sealed off crypto-assets from the core of the financial system in order to curtail risk of contagion. Most prominently, China—which had been one of the most active crypto-asset markets—recently banned exchanges, financial institutions and payment processors from handling them.

If widely adopted, however, isolation risks foregoing potentially major opportunities from the development of the underlying payments technologies.

A better path would be to regulate elements of the crypto-asset ecosystem to combat illicit activities, promote market integrity, and protect the safety and soundness of the financial system.

The time has come to hold the crypto-asset ecosystem to the same standards as the rest of the financial system. Being part of the financial system brings enormous privileges, but with them great responsibilities.

²⁴ The proportion of crypto-assets used for illicit activity remains hard to quantify. One academic study suggests that about a quarter of Bitcoin users and one-half of all Bitcoin transactions are associated with illegal activity. Sean Foley, Jonathan R. Karlsen, and Tālis J. Putniņš (2018), 'Sex, Drugs, and Bitcoin: How Much Illegal Activity Is Financed Through Cryptocurrencies?' available at <http://dx.doi.org/10.2139/ssrn.3102645>.

²⁵ In February 2014, MtGox, the largest Bitcoin exchange at the time, revealed that around 850,000 of customers' Bitcoins, then valued at around \$450 million, were missing and had likely been stolen. In 2016, 120,000 units of Bitcoin valued at \$72 million were stolen from Bitfinex's customer accounts. In January 2018, \$530 million of cryptocurrency "XEM" was stolen from Japanese exchange CoinCheck. In all cases, funds were stolen from "hot wallets", where the private key is stored on a computer or device that is connected, directly or indirectly, to the internet.

²⁶ Cryptocurrencies have been banned in Bangladesh, Bolivia, Ecuador and Morocco.

In this spirit, the EU and the US are requiring crypto exchanges to meet the same anti-money laundering and counter the financing of terrorism standards as other financial institutions.²⁷

Conduct and market regulators are considering how to classify crypto-assets, in order to secure market integrity and determine the appropriate type and level of investor protections. In my view, holding crypto-asset exchanges to the same rigorous standards as those that trade securities would address a major underlap in the regulatory approach.

And as the SEC and FCA have argued forcefully, so-called initial coin offerings will not be allowed to use semantics to avoid securities laws designed to protect retail investors in particular.

Prudential regulators, like the Bank's PRC, are in the process of clarifying how the existing regulatory requirements – including for capital – which institutions at the core of the financial system must meet, apply to any future crypto-asset activity undertaken and exposures acquired.

Recently in the US, the regulated exchanges CME and CBOE have started to offer Bitcoin futures. Having derivatives traded and cleared on exchanges could, in time, raise standards in them and mean that regulators have better information about how the underlying markets function.

The discussions at the FSB and the G20 will be valuable given the diversity of possible approaches and the decentralised and cross-border nature of crypto-assets.

Pointing to the Future

I trust you have gathered by now that for many reasons the crypto-assets in your digital wallets are unlikely to be the future of money.

But that is not meant to dismiss them. Their core technology is already having an impact. Bringing crypto-assets into the regulatory tent could potentially catalyse innovations to serve the public better. Indeed, crypto-assets help point the way to the future of money in three respects:

- By suggesting how money and payments will need to adjust to meet societies' changing preferences, particularly for decentralised peer-to-peer interactions;
- Through the possibilities their underlying technologies offer to transform the efficiency, reliability and flexibility of payments; and
- By the questions they raise about whether central banks should provide a central bank digital currency (CBDC) accessible to all.

²⁷ In the EU, the revision of the 4th AML Directive will bring exchanges and wallet providers in the scope of the anti-money laundering and combatting the financing of terrorism rules. In the US, virtual currency exchanges are regulated as money transmitters and required to abide by Bank Secrecy Act obligations.

Let me take these in turn.

First, crypto-assets are part of a broader reorganisation of the economy and society into a series of distributed peer-to-peer connections across powerful networks.²⁸ People are increasingly forming connections directly, instantaneously and openly, and this is revolutionising how they consume, work, and communicate.

Yet the financial system continues to be arranged around a series of hubs and spokes like banks and payments, clearing and settlement systems. Crypto-assets are an attempt to create the financial architecture for peer-to-peer transactions. Even if the current generation is not the answer, it is throwing down the gauntlet to the existing payment systems. These must now evolve to meet the demands of fully reliable, real-time, distributed transactions.

Second, the technologies underlying crypto-assets, particularly distributed ledger, can:

- Increase the efficiency of managing data;
- Improve resilience by eliminating central points of failure, as multiple parties will share replicated data and functionality;
- Enhance transparency (and auditability) through the creation of instant, permanent and immutable records of transactions; and
- Expand the use of straight-through processes, including with “smart contracts” that on receipt of new information, automatically update and if appropriate, pay.

These properties mean distributed ledger technology could transform everything from how people manage of their interactions with public agencies, including their tax and medical records, through to how businesses manage their supply chains.

Third, crypto-assets raise the obvious question about whether their infrastructure could be combined with the trust inherent in existing fiat currencies to create a central bank digital currency (CBDC).

Currently only banks can hold central bank money electronically in the form of a settlement account at the Bank of England. To be truly transformative a general purpose CBDC would open access to individuals and firms.

The Bank has an open mind about the eventual development of a CBDC and an active research programme dedicated to it. That said, given current technological shortcomings in distributed ledger technologies and the risks with offering central bank accounts for all, a true, widely available reliable CBDC does not appear to be a near-term prospect.

²⁸ See Fergusson, N., (2017), ‘The Square and the Tower: Networks, Hierarchies and the Struggle for Global Power’.

Moreover whether it is desirable depends on the answers to a series of big policy questions. While these are largely for another speech, I will note that a general purpose CBDC could mean a much greater role for central banks in the financial system. Central banks may find themselves disintermediating commercial banks in normal times and running the risk of destabilising flights to quality in times of stress.²⁹

There are also broader societal questions (that others would need to answer) such as how society balances privacy rights with the extent to which the information in a CBDC could be used to fight terrorism and economic crime.

A CBDC shouldn't be a solution in search of a problem or an effort of central bankers to be down with the kids.

Especially because there are more immediate ways to give you what you want.

The Foundation of Better Payments

So while our research on a possible future CBDC will continue, we're more excited by the opportunities to transform digital payments now.

In particular, the combination of the Bank's overhaul of RTGS and new technologies promises a world where payment systems can better meet societal demands for fully reliable, real-time, distributed peer-to-peer transactions.

RTGS is already pretty awesome, settling over £600bn of payments in real time each day, while eliminating settlement risk and with an extremely high degree of resilience, all at a cost – to direct participants – of less than one ten millionth of the value of the average payment.

But RTGS is also the same age as most of you and so we are renewing it.³⁰

What could this rather technical sounding development mean for you? More than you might think.

²⁹ See Broadbent, B., (2016), "Central Banks and Digital Currencies", a speech given at the LSE <https://www.bankofengland.co.uk/speech/2016/central-banks-and-digital-currencies>

³⁰ See "A Blueprint for a new RTGS service for the United Kingdom", May 2017.

Currently when you pay for your burger and beer in the pub, or your books in Blackwell's, you probably use a debit card, a credit card or digital wallet on your phone. These need to be routed through the card provider's network. Over the past four years, the payment-related costs that your publican or bookseller pay (and ultimately pass on to you) have come down by 40% to around 8 pence per transaction. While these are small – and much better than Bitcoin – they remain non-negligible. That's partly because there is limited scope for them to be competed away by innovators offering lower costs, faster speeds and more convenience, due to rigidities in the existing payments landscape, including restricted access to the UK's major bank-to-bank payment system, Faster Payments (FPS). To put a number on it, indirect members of FPS face relatively high fees of around 37 pence per transaction.³¹

In 2016, the Bank announced arrangements under which non-bank payment service providers (PSPs) could access RTGS, and therefore FPS directly, and we expect the first will join this spring.

PSPs that make the most of this development and reach critical mass could see their per transaction costs fall below those of debit and credit card providers. And the competition provided by the PSPs should incentivise existing providers to innovate as well.

Moreover, innovative PSPs could deliver a world where you can split a round in the pub electronically and instantaneously, needing nothing more from your friends than a QR code on their phone or their phone number. By so doing, electronic money will become more like its physical relative, allowing genuine, immediate peer-to-peer transactions, without the need for a middleman.

Our overhaul of RTGS is helping to reduce complexity and costs in other areas as well.

Take cross-border payments, where the Bank is leading by the adoption of emerging global standards for payments messaging and by working with other central banks and the private sector to explore the scope for cross-border payments in central bank money through synchronised national RTGS systems. This all could increase the speed and safety, as well as lower the costs, associated with cross-border transactions to support purchases and travel overseas.

When coupled with the capture of richer payments data made possible by its renewal, RTGS will help support innovative services for the more effective management of personal and company finances. These benefits will be amplified by the UK's ambition in implementing the Open Banking standard – under which the largest banks will be required to make customer data available to other existing firms and innovators, if the customer demands. In turn, this will help improve aggregator, comparison and switching services.

Taken together, these advances will support innovation that allows you to manage your finances seamlessly, from tracking how much you spend on beer and books, to managing your future savings and current loans.

³¹ PSR indirect access market review, <https://www.psr.org.uk/sites/default/files/media/PDF/MR1512-indirect-access-market-review-interim-report.pdf>

Finally, at the wholesale payments end, we've already explored whether the core of the new RTGS system could run on distributed ledger to discover that the technology is not yet sufficiently mature or reliable to run a system that settles the equivalent of a third of the UK's annual GDP each day and requires 5-sigma performance.

Nonetheless, the Bank believes that distributed ledger technology could over time significantly improve the accuracy, efficiency and security of processes across payments, clearing and settlement.

Securities settlement in particular is ripe for innovation. Transactions that take nanoseconds to execute, currently take days to settle along a chain involving many intermediaries. At stake, are the tens of billions of pounds of capital that are tied up while settlement completes.³² The best in the private sector are working hard unlocking this value. That's why the Bank is building the new RTGS so that new forms of securities settlement that meet our standards of resilience (including those using distributed ledger) will be able to plug in directly.

Ultimately this combination of new technology and direct access to RTGS could be applied to other assets such as helping make the payment, registration and Stamp Duty processes involved in house purchases quicker and more efficient.

The Future of Money

While Adam Smith was cautious about the role of the state, he recognised it should furnish the rules and conditions within which private innovation can flourish.

In the monetary sphere, this means providing money which citizens can use with confidence and ease.

The Bank of England delivers just that through the quality of our banknotes, the stability of UK inflation, the resilience of our financial system, and efficiency and reliability of our core payment systems. We are overhauling our system, RTGS, so that private innovation can flourish. Bringing crypto-assets onto a level regulatory playing field could also catalyse private innovation to create a more resilient, effective payments system.

With these foundations in place, the scene is set for better payments, a better economy and a better Friday night out.

³² Oliver Wyman and Santander estimated that distributed ledger technology could reduce banks' infrastructure costs attributable to cross-border payments, securities trading and regulatory compliance by \$15-20bn per annum by 2022. See: <https://santanderinnoventures.com/fintech2/>