



EUROPE

*Perspective*

Expert insights on a timely policy issue

# Digital Currency and the Future of Transacting

*Katherine Stewart, Salil Gunashekar and Catriona Manville*

Digital technology has not just changed the way that we communicate with one another, it has allowed new platforms and mediums of transaction to emerge which could fundamentally alter the nature of how we organise the exchange of goods and services. Early message services allowed potential buyers and sellers to connect and arrange offline exchanges; improved encryption methods allowed the direct communication of

bank account details; the growing numbers of web users facilitated websites and services based entirely on online advertising revenue; and improved payment and messaging systems facilitated the online presence of established businesses, the growth of niche online shops able to access a wider market, and dedicated e-commerce giants such as Amazon and eBay. At the same time, innovations in payment platforms have led to a diminishing role for physical currency, even

## **Digital platforms and the future of non-monetary exchange**

The ability of digital platforms to connect people offering goods and services with potential recipients goes beyond financial exchange and commerce; recent years have also seen the emergence of new platforms for non-monetary exchange and bartering.

These include platforms for voluntary donation of goods, such as Freecycle; platforms to exchange services, such as the International Community Exchange System, which connects local timebanking initiatives across the globe to allow international exchange of services; and new platforms to connect willing volunteers with organisations in need, including online or remote volunteering and micro-volunteering (such as the UN Online Volunteers site, hosted by the United Nations).

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## *New platforms and mediums of transaction could fundamentally alter the nature of how we organise the exchange of goods and services*

on the high street. In 2016, 78 per cent of all retail spending in the UK was done via card.<sup>1</sup>

This goes beyond simply changing the way we purchase goods and services. New business and transaction models facilitated by digital platforms could have wider economic and social implications with regard to the extent of government control over the economy; the structure of traditional models of tax, social security and pensions; and the role of individuals and communities in the wider financial system. Because the landscape of innovations in this sphere is broad and fast moving, careful thought should be given to the potential impact of these changes on wider society – and how they could be harnessed by government, communities and individuals for societal good.

### **Emergence of new platforms and mediums of transaction**

Prominent innovations in this regard include:

- **e-money and innovations in value exchange:** Increasing connectivity and better infrastructure have led to the emergence of various innovative platforms for exchange. These include e-money platforms which offer efficiencies in payments, such as PayPal and Venmo; investment apps, such as Nutmeg, which provide a simple interface for individuals; micropay-

ments for IP content, such as songs and articles once only available as bundled content; and cashless operating models, such as Transport for London's move to a cashless bus and tube infrastructure. Meanwhile, connectivity offered by the web has allowed for new business models and market structures to emerge, including the rise of the 'gig economy' and micro-loan and crowdfunding platforms, such as Kickstarter. In the longer term, distributed ledger technology – the technology underlying Bitcoin – could offer a platform for the exchange of information, digital currency or other tokenised assets between individuals or organisations without the need for a central authority.<sup>2</sup>

- **Cryptocurrencies:** Cryptocurrencies are privately governed digital currencies<sup>3</sup> that use cryptography for security and are not backed by a central authority.<sup>4</sup> The majority of these operate via distributed ledger systems, in which transactions are recorded and verified by a network of nodes, meaning past transactions can be searched to ensure that tokens can only be used by the 'true' owner at any point. Owners of the token can use personal keys to initiate transactions. While Bitcoin remains the most prominent cryptocurrency, with between 150,000 and 350,000 transactions taking place on a daily basis in 2016,<sup>5</sup> other cryptocurrencies do exist, including: ether,<sup>6</sup> a currency tied to the Ethereum blockchain platform; Dash,<sup>7</sup>

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*New business and transaction models facilitated by digital platforms could have wider economic and social implications*

a cryptocurrency with no central authority and governed entirely by the votes of owners of key operating nodes; and Dogecoin,<sup>8</sup> which began life as an offshoot of a popular Internet meme and developed into an operational (canine-themed) cryptocurrency that, at the time of writing, is the 17th-largest cryptocurrency by market capitalisation.

- **Central bank-issued digital currencies (CBDC):** CBDC<sup>9</sup> refers to models of digital currency in which the currency is controlled and maintained by a central bank, with no physical cash equivalent. Issuing currency in this manner could involve the central bank producing a fixed quantity of currency and allowing interest rates to be set by market activity, or setting a fixed interest rate and allowing the market to set the quantity of money by buying and selling with existing assets.<sup>10</sup> While CBDC could, in theory, be operated as a centralised model,

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## Increasing connectivity and better infrastructure have led to the emergence of various innovative platforms for exchange

with transactions verified and processed by a central authority, a working paper by Bank of England staff has noted that the status of CBDC as national infrastructure entails that any practical implementation could benefit from the resiliency and security afforded by a distributed ledger (albeit one controlled by trusted nodes).<sup>11</sup> While a number of central banks have shown interest in options for digital currency – including pilots in China and the Netherlands and a research drive by the Bank of England<sup>12</sup> – no G20 CBDC is currently fully operational.<sup>13</sup>

### Data as currency

While online advertising has been a fixture of the web from its early days, a greater personalisation and targeting of online advertising has been facilitated by improvements in the ability of websites to track visitors and their usage (and, in some cases, wider browsing habits). This has resulted in an increasing number of firms relying on a business model in which services are provided free at the point of use in return for user data – and a concurrent rise in the number of adtech firms.

While data may not be a replacement for traditional currency in this sense – the business model, after all, relies on the expectation of being able to monetise said data through targeted advertising – the popularity of such platforms as Facebook and Google provides an indication of the increasingly central role of data-for-services models in daily life – as does the recent valuation of Snap, parent company of social media platform Snapchat, at the point of its March 2017 initial public offering (IPO) at \$24 billion on the basis of its potential as an advertising platform, despite posting a loss of \$515 million in 2016.

*Source: BBC News 2017*

## What the future might look like

Adoption of these innovations will ultimately depend on local factors, notably the position of governments in relation to the legal and regulatory aspects of innovative value exchange. However, the impact of these innovations on the future of transacting and commerce could be wide ranging:

### New platforms for value exchange could lead to a more globalised – and decentralised – exchange system

The widespread adoption of digital currencies and cryptocurrencies could lead to significant efficiency gains in global payments and associated reduction in transaction costs, with payments able to be made and cleared through use of distributed ledger technologies (DLT) without the need for verification by a third party.<sup>14</sup> While the focus of much of the literature has been on the opportunities of DLT and digital currencies for the financial services industry,<sup>15</sup> individuals – such as those sending remittances – could also benefit. However, the resulting speed and ease by which cross-border transactions can be made may also decrease state control over currency flows, with associated consequences for tax collection and sanctioning powers.<sup>16</sup>

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## Adoption of these innovations will ultimately depend on local factors

### Distributed ledger platforms could offer new opportunities for peer-to-peer exchange and change the nature of markets

The ability of distributed ledger technology to facilitate peer-to-peer exchange of currency, information or goods without the need for a central authority could lead to new, decentralised models of exchange and governance – with a consequent impact on structures of authority and trust within society itself. Meanwhile, an introduction of a CBDC that would allow individuals to store deposits directly with central authorities (thereby depriving commercial banks of deposits) could have implications for the role, business model and services provided by high street banks and other traditional financial institutions.<sup>17</sup>

The **Bristol Pound** is a local currency, launched in 2012, which aims to encourage consumers to keep money circulating in the local economy. The currency is managed by a dedicated community interest company and backed by sterling deposits, at a rate of £1:£B1. In addition to paper notes, it has launched a text-based payment service, with account holders able to initiate cash payments at point of purchase via text message, and plans the launch of contactless cards in 2017.

Sources: *Bristol Pound 2017*; *Sánchez & Moreno 2016*

## Meeting local market needs: Kenya's M-PESA and BitPesa

Since its launch in 2007, Kenyan mobile-money provider **M-PESA** has grown into the world's largest mobile currency. It is used by 17 million Kenyans to transfer one third of Kenya's GDP each year, an amount credited by observers to be in part the result of M-PESA's utility as a de facto banking system and, consequently, of network effects. Operated by local mobile network provider Safaricom, which charges a tiered fee for transfers, M-PESA allows users to deposit and withdraw money at a network of agents, often local shops. This is then credited to their accounts, which users can then use to transfer funds by text. M-PESA now operates in 10 countries including Romania, Albania, Egypt and India.

More recently, Bitcoin-based start-up **BitPesa** launched in 2013 to provide low-cost business-to-business (B2B) transactions and remittances across borders and currencies. The platform, which converts local currencies into Bitcoin to benefit from Bitcoin's efficient cross-border transactions without the need to purchase foreign currencies, currently operates across Kenya, Nigeria, Uganda, Tanzania, the Democratic Republic of Congo, the UK and Senegal. A \$2.5 million funding round was held in January 2017 to fund a planned expansion across western and southern Africa and Europe, although 2016 also saw legal battles between BitPesa and Safaricom over the right of BitPesa to use the M-PESA platform.

*Sources: Financial Times 2013; International Finance Corporation 2010; Lawrence 2016; OECD 2015; Quartz 2015; Economist, 2015.*

## The level of anonymity – or transparency – offered by digital currencies and exchange platforms will have consequences for tracking money flows

While Bitcoin has become notorious in part for its connection to the online black market Silk Road,<sup>18</sup> the immutability and transparency of a digital currency ledger could – if managed and governed carefully – provide opportunities to reduce fraud and error in payments.<sup>19</sup> However, the anonymity offered by cryptocurrencies may raise other questions as to the extent to which financial institutions and businesses are able to undertake due diligence and anti-money laundering efforts.

## Digital currency could facilitate a greater understanding of money flows

The ability to clearly track digital currency flows in real time and the visible and immutable record of transactions could provide government, researchers and the public with better – and bigger – data on the overall amount<sup>20</sup> and use of money in the system. As well as providing broader benefits for transparency and research, this could also facilitate the management of macroeconomic stability by central banks; a clearer picture of the immediate market reaction to particular policies or changes in economic conditions; and a better understanding of overall system connectedness (Barrdear & Kumhof 2016).

## **New exchange platforms could extend the reach of financial markets**

The ability to transact with only an Internet connection or mobile network and without the need for an extensive financial infrastructure could broaden financial markets, making transaction and other financial services available to populations currently dependent on cash exchange. However, any move towards greater use of digital currency by government or wider society should be cognizant also of social groups who are not active Internet users. As of 2016, this included 12.1 per cent of UK adults (rising to 38.7 per cent of those over the age of 75) and almost 30 per cent of disabled adults.<sup>21</sup>

## **Despite the opportunities, some challenges remain**

Notwithstanding far-reaching predictions about the potential of cryptocurrencies and the underlying Blockchain technology for social change, such change is by no means inevitable. Key concerns remain, which may affect the extent to which digital currencies become established currencies of preference for individuals. These include:

### **Public trust and confidence in innovative methods of transaction**

The security of online transactions is (understandably) a prominent concern for individuals and organisations, and the ability for platforms to grow may depend on the extent to which they – like PayPal – can be seen as a trusted intermediary. Similarly, the development of methods to track user activity and target advertising

has also led to concerns about the role of user understanding and awareness about the way data is collected and used, and the extent to which users are able to provide informed consent, or even to fully understand the potential consequences of their decision.

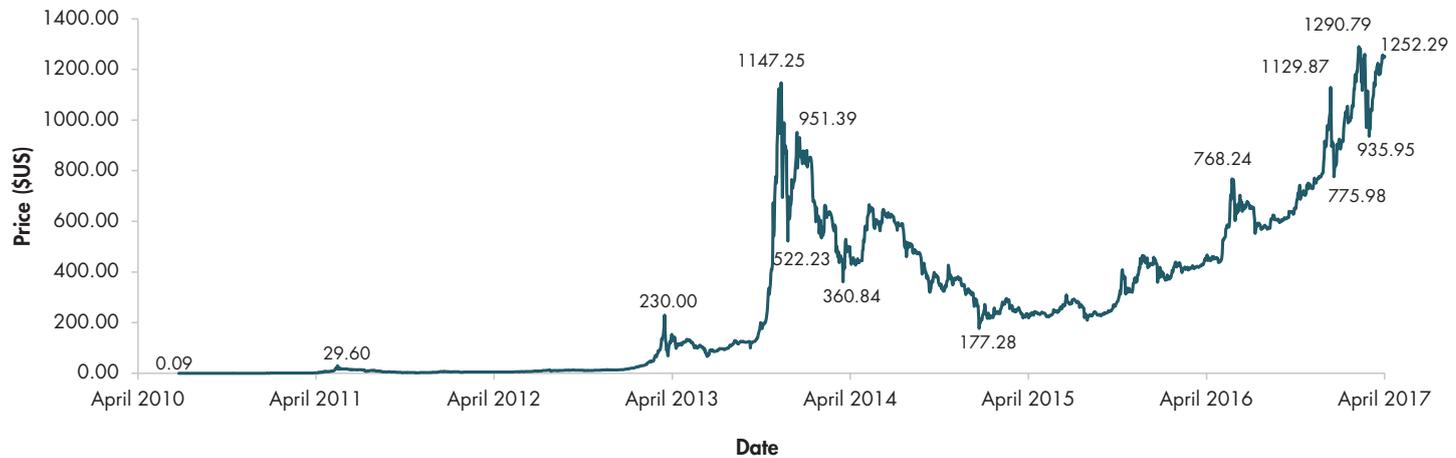
### **The need for a clear reason to change transaction practices**

The banking and financial services sector in the UK is well established and far reaching, and it has a comprehensive existing digital infrastructure, with customers able to access cash and exchange value across a network of bank branches, ATMs, secure digital platforms and card payment points. While digital currencies may offer additional gains in efficiency and transparency, it remains unclear whether they offer sufficient benefits for users to merit their adoption, given their associated drawbacks – which, for individuals, may involve taking responsibility for security, and, for businesses, may involve overhauling or adapting existing business processes.

### **Lack of clear governing infrastructure and central authority**

New transaction platforms and cryptocurrencies often operate in an unclear regulatory environment, leading to volatility in price and a lack of clarity over the legal status. The lack of central control over the quantity and price of cryptocurrencies (or the equivalent of guarantees for deposits) means that they are governed primarily by market dynamics; the price of Bitcoin has fluctuated significantly in recent years, from lows of less than \$100 in 2013 and \$200 in 2015 to peaks of more than \$1000 in 2013 and again in 2017 (Figure 1).<sup>22</sup> This may make it an attractive option for investors and currency speculators – but less so for use by ordinary consumers. As the Bank of England notes, the popularity of cryptocurrencies has been driven in large part by their use as an asset to store and accrue

Figure 1: Bitcoin price in USD, January 2013–April 2017



Source: <http://www.coindesk.com/price/>

value, rather than as a medium of exchange, and it notes that they are in this sense closer to commodities than to currencies.<sup>23</sup>

### Security and safety of cryptocurrency and digital platforms

The storing and transacting of money online has the effect of transferring responsibility for securing the money from the bank to the owner – who must be able to safely navigate the online environment, understand potential threats and ensure adequate software protection against viruses, fraud and intrusion. Meanwhile, the decentralised nature of current cryptocurrencies means that there is no central authority to arbitrate in the case of disputes or to whom to appeal in the event of theft or loss. By some estimates, up to 30 per cent of existing Bitcoins are inactive, possibly due to key loss or death of the owner.<sup>24</sup>

### Network effects and uptake of particular platforms

The extent to which a particular currency or transaction platform becomes a viable mechanism of exchange will depend in large part on the dynamics of adoption and interoperability with other models of exchange. Although the UK has reached a ‘tipping point’ and become to a large extent cashless, 85 per cent of global consumer transactions are still made in cash, in part due to inadequate access to financial services; macroeconomic and cultural factors, such as the size of the informal economy; lack of uptake by large-scale merchants; and lack of access to technology.<sup>25</sup>

### The road ahead

Digital technology has changed the way we purchase goods and services in profound ways. While predictions have been ventured

about the disruptive and striking potential of such innovations as cryptocurrencies and distributed ledger technologies, the impact of digital platforms on the way we transact has, to date, been one of incremental progress. Nonetheless, it remains early days for cryptocurrencies: Bitcoin and the underlying blockchain were first ventured in 2008.<sup>26</sup> The wider ability to connect business and consumers, develop new and niche markets, and commodify new activities merits some thought about the way in which this may affect traditional labour market and social structures, state influence over the economy, and our understanding of what constitutes the ‘commercial sphere’. As forms of transaction become more

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technically complicated, ensuring that the public understand the risks and impact of various forms of digital transaction – and are able to provide adequate and informed consent when interacting with transaction platforms – will be a key consideration.

## Endnotes

<sup>1</sup> UK Cards Association 2016

<sup>2</sup> For further details on the current business environment and potential of distributed ledger technologies, see Deshpande et al. (2017) and <https://www.rand.org/randeurope/research/projects/blockchain-standards.html>.

<sup>3</sup> The term digital money is defined by Investopedia as ‘Any means of payment that exists purely in electronic form... [and] is accounted for and transferred using computers.’ <http://www.investopedia.com/terms/d/digital-money.asp#ixzz4ede6VBm0>

<sup>4</sup> However, some authorities have taken steps towards regulating cryptocurrencies. See, for example, the New York BitLicense, which was introduced to regulate organisations trading in virtual currency (New York State Department of Financial Services 2017). See also map on BitLegal (2017), and Helms (2017).

<sup>5</sup> See article on Coindesk (2017).

<sup>6</sup> See Ethereum (2016) homepage.

<sup>7</sup> Dash, formerly Darkcoin, has laid claim in this regard to being the first true decentralised autonomous organisation (DAO). For more information, see Dash (2016) blog.

<sup>8</sup> See Dogecoin (2017) homepage and CoinMarketCap (2017) graph.

<sup>9</sup> This acronym has not yet gained widespread acceptance, but it is used by the Bank of England. We adopt it here to make the distinction among various forms of digital currency.

<sup>10</sup> Barrdear & Kumhof 2016

<sup>11</sup> Barrdear & Kumhof 2016

<sup>12</sup> See Das (2017) and Peyton (2016). The Bank of England (n.d.) has also published a set of research questions.

<sup>13</sup> Some countries, including Barbados, Ecuador and Tunisia, have introduced public digital currencies (De Meijer 2017).

<sup>14</sup> See Mills et al (2016) for an overview of the potential application of DLT to payments.

<sup>15</sup> See, for example, World Economic Forum (2016).

<sup>16</sup> See He et al. (2016).

<sup>17</sup> Speech by Ben Broadbent (2016), Deputy Governor, Monetary Policy, Bank of England.

<sup>18</sup> See, for example, Hern (2014).

<sup>19</sup> See Walport (2016).

<sup>20</sup> House of Lords Economic Affairs Committee (2015) hearing on distributed ledger technology.

<sup>21</sup> Office for National Statistics 2016

<sup>22</sup> Figures taken from Coinbase (2017).

<sup>23</sup> McLeay et al. 2014

<sup>24</sup> Ratcliff 2014; Larsen 2015

<sup>25</sup> Thomas 2013

<sup>26</sup> Nakamoto 2008

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## About the Digital Society Thought Leadership Programme 2017

This Perspective explores the emergence of new platforms and mediums of transaction. The authors discuss prominent innovations in this space, and the potential benefits and challenges of wide-scale adoption and implementation. This perspective is part of a series of four exploring the opportunities and challenges that digital technologies are creating within society, written ahead of the 2017 Thought Leadership programme at St George's House, Windsor, which has been designed and will be delivered by RAND Europe in conjunction with the Corsham Institute.

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