

THE FUTURE OF MONEY

BACK TO THE FUTURE – THE INTERNET OF MONEY



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EXECUTIVE SUMMARY

The growth of the digital economy has already disrupted industries as diverse as media, music and transportation. The penetration of thousands of fintech start-ups into all spheres of financial services has now brought this revolution to the disruption of money itself.

It's a development that will increasingly blur the distinction between money and data. To some degree this has already happened. The growth of e-commerce and apps for ordering taxis or paying for restaurants means that the physical act of paying is already forgotten. As the internet of things enables a new round of machine-to-machine transaction growth in the years ahead, payment virtualisation will intensify with the potential for a proliferation of new stores of value to escape the cost, complexity and regulatory rigidity of traditional money.

Regulators, governments and businesses alike have much to gain as the internet of money gets underway. Leveraging low cost, open source technologies – such as cryptocurrencies, the blockchain or other distributed ledgers – opens the door to reaching poorer or excluded customers and serving needs that are not met by existing financial services infrastructure. It could expand digital commerce above and beyond national lines, while allowing new forms of taxation to cater for an expanding mobile workforce.

The opportunities are limitless, but the obstacles to creating, managing and regulating a proliferating array of digital forms of money are substantial. These challenges raise questions that will be difficult to answer until the new reality of the internet of money dawns – questions that will reshape the role of the regulator and, potentially, how governments define themselves before their citizens.

Building the right regulatory template offers the best chance to harness this generation's greatest driver of growth and productivity. In order to create trust in digital money as a safe store of value, while encouraging disruptive innovation will require governments and regulators to work more closely with a wider range of stakeholders – including technology start-ups – than would previously have been thinkable. In those countries that have taken the biggest steps so far, including Sweden, Estonia, the UK and UAE, it's also about a pragmatic response to local dynamics, and an ambition to be at the forefront of the digital economy from the top of government.

As central banks and governments around the world continue to experiment with the new money, businesses of all sizes will continue to innovate to plug digital gaps in service exposed by the analogue rigidity of existing financial architecture. The question is, how, and by whom, should they be regulated?



BACK TO THE FUTURE

Since Richard Nixon's decision to remove the dollar's peg to the gold standard in 1971, the supply of money in the global economy has exploded. Nearly five decades later, as the financial services industry is transformed by a wave of digital disruption, the implications of that decision are still being interpreted.

As the financialisation of the economy took hold during the market liberalisation of the 1970s and 1980s, growth in financial transactions and the availability of credit helped drive massive growth in electronic payments. That detached money from cash and, in turn, made the concept of money increasingly abstract. Money moved from being the physical representation of a valuable commodity to an intangible symbol of trust.

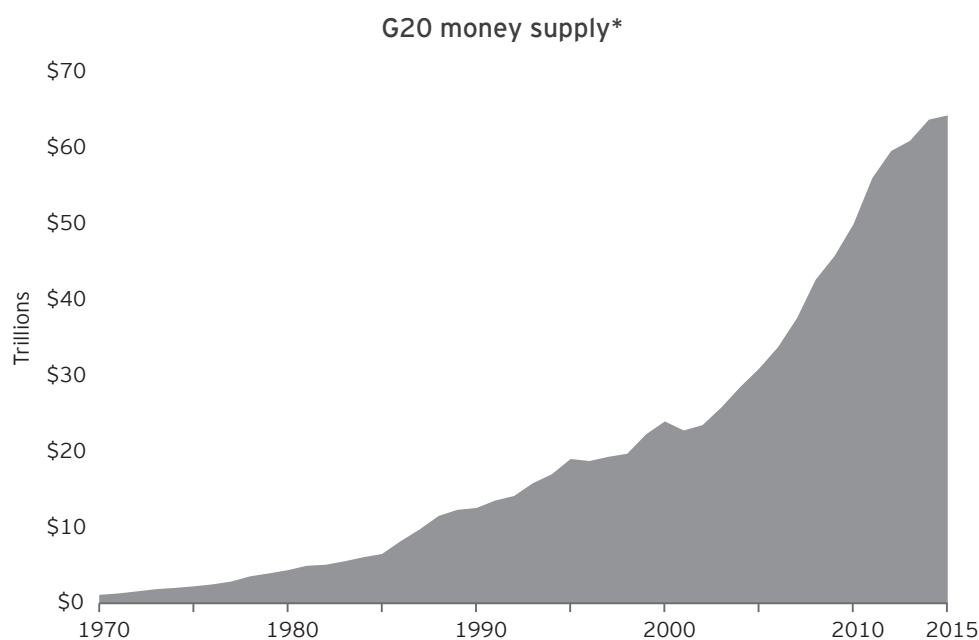
Nearly a decade on from the financial crisis, the collapse in trust and the credit crunch that followed has helped to enable a parallel universe of alternative financial service providers to flourish. There are now an estimated 12,000 fintech companies, proliferating into all areas of the financial services industry from payments to lending, wealth management and capital markets. Once perceived as a threat to the traditional

banking industry, incumbents are increasingly grasping opportunities to partner or forge alliances with newer fintech entrants.

It is against this backdrop that this paper explores the implications for the next phase of the fintech revolution – the future of money itself. At a time when the consumer relationship with cash is more virtualised and abstract, and where use of physical cash continues to decline in many markets, the next phase offers as-yet undiscovered potential for unleashing a new period of expansive growth in transactions, above and beyond the limits of national borders.

The possible applications of the blockchain technology that underpins new currencies such as Bitcoin are endless, but Bitcoin transactions and working blockchain business models have been confined to a limited number of uses so far. At the same time fintech transaction volumes remain small, relative to the size of the total financial services market. Their impact, however, has already demonstrated the opportunity for all sides of the financial services ecosystem to reduce costs, improve efficiency and extend the reach of financial services to underserved customers.

Growth of global money supply



*Broad money, which includes cash and instruments that are near substitutes for cash.

Source: IMF and Elite Economics estimates.

Building the blockchain

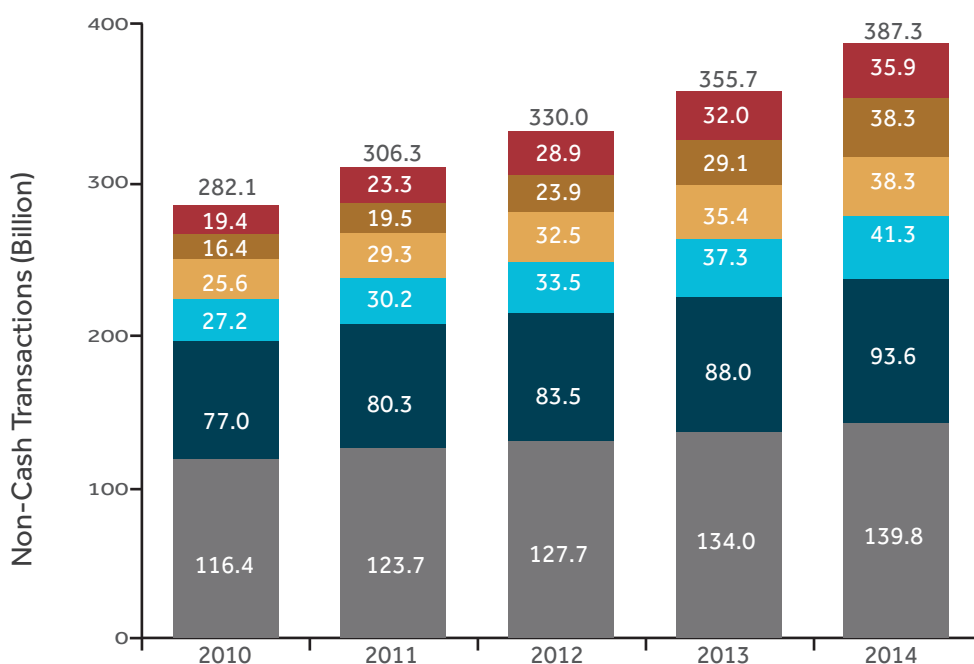
Blockchain is simply a cloud-based ledger or shared database. As the technology that supports Bitcoin, the blockchain has attracted a much wider range of supporters than the varying degrees of suspicion that have greeted the virtual currency – partly because of its association with the dark web.

With no central authority, Blockchain enables any user on the network to make and verify a transaction which is permanently recorded on the ledger. While most blockchain applications so far have been on public ledgers, a proven ability to reduce the cost and time of verifying transactions across wide range of industries and uses is causing a surge in corporate experimentation with private blockchains.

Rightly, the explosion in fintech and the increased virtualisation of money, accelerated by the growth in the digital economy, has caught the eye of regulators and governments across the globe. Understanding the implications of a world beyond physical cash raises important questions for the role of regulators and traditional financial services intermediaries, as well as the limits and the reach of governments over their citizens.

While this paper does not pretend to answer all the questions it poses, it does seek to contribute to the debate around the role of money in the digital era, ensuring that can reach its potential as this generation's greatest driver of growth and productivity.

Non-cash transactions worldwide (billion) 2010-2104



	CAGR '10-'14	Growth '12-'13 '13-'14		
Global	8.2%	7.8%	8.9%	
CEMEA	15.6%	10.6%	12.3%	} Developing 16.7%
Emerging Asia	23.6%	21.8%	31.5%	
Latin America	10.6%	8.7%	8.3%	
Mature Asia-Pacific	11.1%	11.6%	10.8%	} Mature 6.0%
Europe (including Eurozone)	5.0%	5.4%	6.4%	
North America	4.7%	4.9%	4.4%	

Note: Refer to Methodology for details on countries included in each region; Chart numbers and quoted percentages may not add up due to rounding; Some numbers may differ from data published in WPR 2015 due to previous year data updated at the source

Source: Capgemini Financial Services Analysis, 2016; ECB Statistical Data Warehouse, 2014 figures released October 2015; Bank for International Settlements Red Book, 2014 figures released December 2015; Country's Central Bank Annual Reports, 2014

BUILDING THE INTERNET OF MONEY

The growth of the digital economy and smartphone penetration have already enabled an explosion in non-traditional financial services over the last decade, spurred on by the need to service new forms of interaction between individuals. In the decade ahead, as more devices become connected and the internet of things takes off, a second round of machine-to-machine transactions is expected to add to the intensity of transaction growth, further blurring the distinction between money and data.

In this new, digital-only world, the concept of physical money is fast becoming redundant. The transaction – whether a payment or other form of virtual exchange – is increasingly invisible. In real world commerce, too, the ‘act of paying’ is gradually disappearing. Master Card’s Qkr! pay-at-table restaurant app lets customers book a table, eat and then leave in much the same way as Uber allows passengers to get out of the

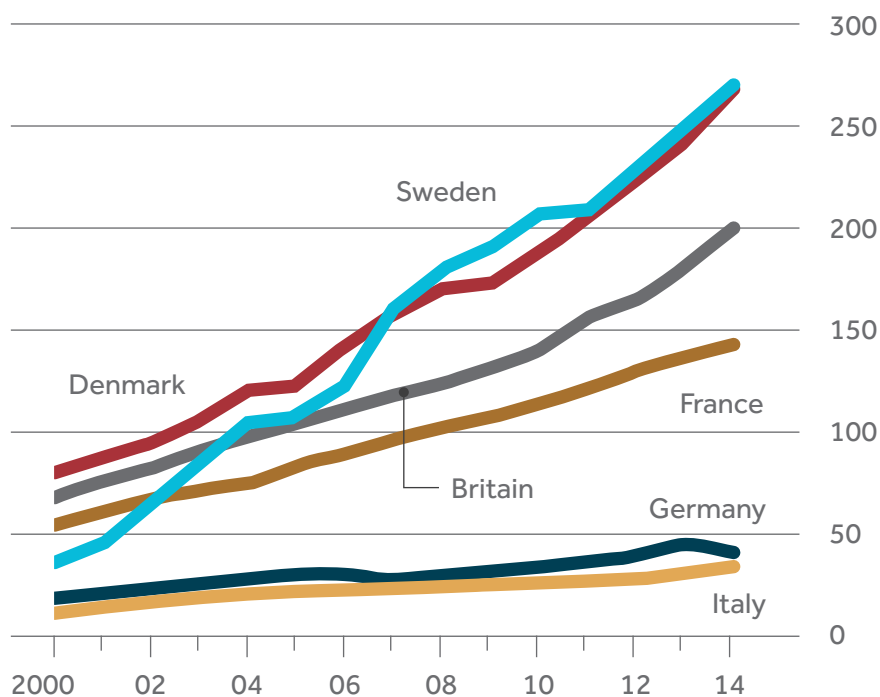
taxi without formally verifying a transaction. Gyft – a partnership between payment industry stalwart First Data and blockchain start-up Chain – lets consumers buy, redeem or swap gift cards for real world stores online or on their phones, while small merchants can create gift card programmes for customers without the heavy cost of investment in development and marketing.

Much of this is not new. Customers have been paying “on account” using card or bank account details stored with a retailer for decades. What’s changing is that the combination of higher volumes of digital transactions and the automation of the payment is converting money from a physical form of exchange into another form of data. In the case of blockchain-based social network Steemit, for example, users are rewarded in virtual but convertible Steem dollars for creating content that helps drive use and interaction on the platform.

Card payments per person in Europe

Card
Number of transactions per person

payments*



Source : European Central Bank

*Using cards issued by resident payment service providers, excl.e-money cards

The potential for transaction growth in the connected economy is seemingly limitless. What's less clear is whether existing forms of payment are adequate to support it or if new digital stores of value need to be created to realise the potential. Certainly, in developed markets at least, the immediate replacement of existing payment systems does not seem to be necessary. Throughout the financial crisis and beyond payment volumes have continued to rise while the ratio of cash to card and electronic transactions has fallen, provoking a concerted policy drive toward realising a cashless economy in some markets such as the UK and Scandinavia.

Replacement of traditional payment rails may in fact never be an option. The risks and costs associated with this – first to design and implement a new system, then to adapt consumer behaviour to meet new rules or protocols – are beyond the steps regulators and banks are prepared to take to accommodate the digital economy. At least in the near term.

Indeed, replacing cash with other means of electronic payment has been less successful than imagined. Although electronic payments continue to grow in dominance relative to the use of cash, the amount of cash in general circulation also continues to grow substantially. In the UK alone the value of all banknotes in circulation jumped from £60 billion to just under £70 billion between 2014 and 2016, according to the Bank of England.

Abandoned efforts to remove checks from circulation in the UK also show that, in future, regulators and governments will be reluctant to reduce choice in the multi-channel payment environment, preferring instead to regulate for multiplicity. While this conservative approach to payment infrastructure prevails, so far it has not proved to be a barrier to innovation. Among the payment fintech that have succeeded – such as Apple Pay and Android Pay for consumers, Square and iZettle for merchants – the key to their success so far has relied on innovation that works with the payment infrastructure that is already in place.

This has been coupled with identifying previously unserved needs. Innovations that introduce proprietary technology to improve the customer experience by reducing pain points – looking for money to pay the taxi driver, or speeding up the process of ordering and paying in restaurants for example – or providing additional data to the merchant to drive take-up of the application or service.

Future innovations for the internet of money will therefore need to concentrate on serving unmet and quite likely still unidentified needs as this borderless digital universe expands, and on exploiting the opportunities it creates. As more businesses straddle both virtual and physical worlds, the potential for creating experiences that can take advantage of this new reality will increase. In some cases, this may need to be complemented by transactions, whether as tokens or other forms of cryptocurrency that can be traded or redeemed in return for a digital good or service.

The success of gaming app Pokemon GO was largely down to its ability to overlay the real world with a virtual game. Similarly, the introduction of gaming-style elements into fintech applications to help customers save or manage their personal finances better is another example of the growing trend of transaction virtualisation.

In such a scenario, the proliferation of stores of value will create new challenges around inter-operability between platforms, tokens and currencies – both real and virtual. The type of technology used to facilitate the transactions between them or to enable convertibility may well be insignificant. Instead, resolving intractable cross-platform challenges will require digital businesses of all stripes to focus on flexibility of architecture and identifying the right form of technology to meet the emerging needs of their customers.

Whether this is a wallet or token for gaming applications, or blockchain and distributed ledger technology for back office and commercial transactions to create an indelible record, the internet of money will be less concerned with creating one coin to rule them all, than it will be about finding one rule to coin them all. Adapting to this brave new world of proliferating virtual currencies will require an open-mind and the institutional framework to adapt to the shifting landscape by banks, payment service providers and regulators alike.

UNLEASHING A DIGITAL PAYMENT DIVIDEND IN THE MIDDLE EAST

The GCC, and the Middle East and North Africa region more generally, has a mixed record in payment virtualisation. The fundamentals are there. A high proportion of the population is under 30 – digital natives whose use of smart phones and social media in some countries is among the highest in the world. The region's e-commerce marketplace is thriving too, but it depends more on cash-on-delivery than on electronic payments. At the same time, a relatively low share of adults have bank accounts, while mobile money accounts have had limited success.

That could be about to change. New fintech entrants are playing their part in helping drive payment digitisation. Egypt's Payfort has successfully helped smaller merchants accept electronic payments, and offers instalment payment options to help merchants improve sales. In the GCC, Dubai-based bank EmiratesNBD partnered recently with Open Bank Project on a fintech hackathon to identify new financial start-ups.

The Dubai government has also taken up the potential of next-generation e-commerce. The Global

Blockchain Council, founded in 2016 by the Dubai Future Foundation, a government initiative, is bringing together public and private sectors to identify test cases for new blockchain business models. Similarly, Dubai's smart government initiative aims to record all government transactions on the blockchain – an initiative which could amount to savings of over \$1.5 billion in document processing and more than 25 million hours in lost productivity.

While these pockets of progress are encouraging, a coherent plan is needed to harness the open source approach to the development of financial services, and reap the rewards offered by the digital and demographic dividend. The natural place to start is installing the flexible but robust regulatory infrastructure needed to leverage mobile money.

Africa transformed global perceptions of the potential of mobile financial services by using them to leapfrog its missing payments infrastructure. With the right approach, the UAE and the wider Middle East could do the same with the next generation of money and the blockchain.



RE-TOOLING THE REGULATOR

Establishing the right regulatory template for the advent of digital money is crucial. The implications of this complex, multi-party world of digital financial services for banks, governments and regulators are far-reaching. Indeed, regulators everywhere are concerned about the systemic impact of non-regulated entities that operate in parallel to established banks, particularly for retail financial services customers. As non-traditional methods of payment and virtual currencies proliferate, and issuers of digital currencies get closer to real money in the decade ahead, their cries will get louder.

Although too early to determine exactly how such a template should look some governments are taking the steps to lead the way. With blockchain technology and cryptocurrencies turning value into just one more type of data, enabling money to flow as freely as data in the process, it's hard to know where the regulator's line should be drawn and which parts of the existing financial services industry should be protected.

As the internet of things gets underway, unleashing a potential surge in machine-to-machine transaction growth, the perception of value may be transformed and moved around in fundamentally different ways. Quite possibly, in the not-too-distant future,

consumers may be buying devices for the home that make purchases on their behalf without any secondary configuration by the house owner. If that machine automatically performs the transaction and transfers the funds, who is responsible for them? Should standard forms of regulation apply – such as know your customer, anti-money laundering and consumer protection? And if so, how?

The problem is compounded in the digital universe where value is increasingly likely to come in multiple forms in order to take advantage of greater flexibility and lower costs than processing transactions in national currencies. While regulators understand their place in regulating fiat currency, what skills are required and how much regulation is needed for these new forms of money, and the proliferation of them, in the decade ahead?

In the case of distributed ledger (or blockchain) technology, which allows a direct transaction between two entities, the traditional transfer of value within an economy could be disrupted. A transaction and a medium of exchange can occur without the need to use regular money, reducing costs and improving transaction times at a stroke. Such transactions have already been piloted by global financial institutions,



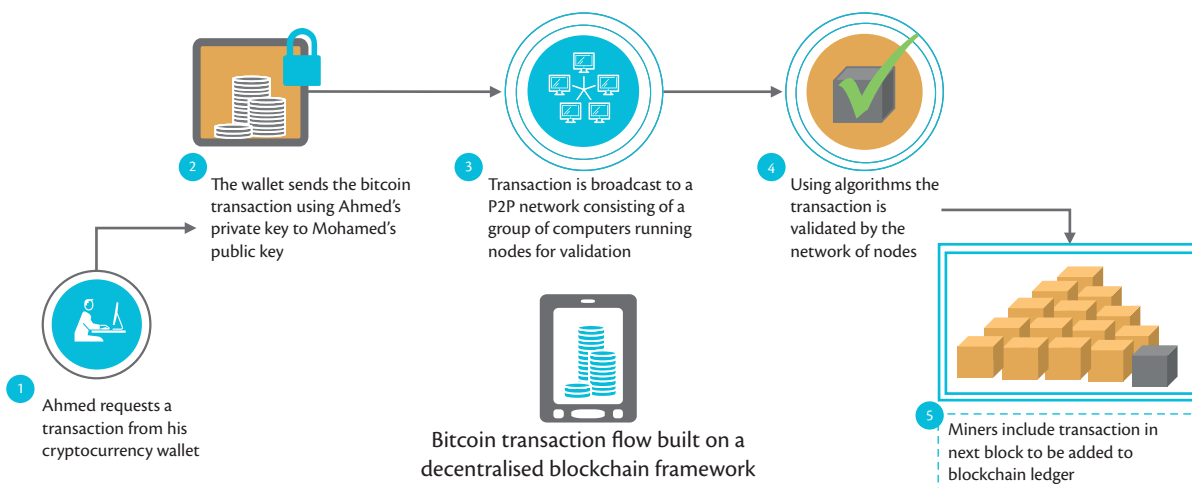
including Barclays, Goldman Sachs and UBS, for transaction settlement and corporate trade finance businesses. The World Economic Forum estimates that four-fifths of the world's commercial banks will have initiated projects using the technology in 2017.

With central banks around the world also exploring the use of blockchain for creating their own digital currency this raises fundamental questions around who should have access to central bank money and what it means when they do. They will also be forced to address the implications for the wider economy of the return to a (digital) gold standard, and where they sit in regulating money, both old and new.

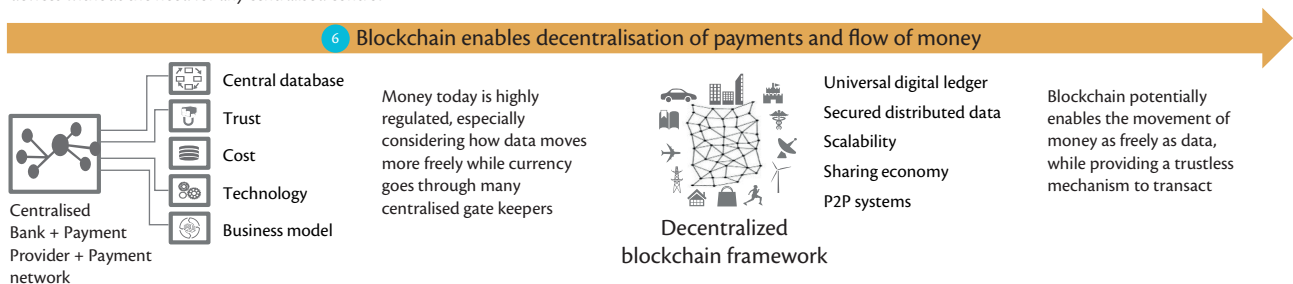
Regulators will need to be innovative in their thinking and tread a careful line to avoid the creation of a parallel financial system that might later pose a risk to consumers, at the same time making sure they don't stifle innovation just as the digital age reaches its height. The approach of governments in Sweden, Estonia and Dubai, among

others, toward blockchain shows how an enhanced role for regulators in the digital economy might look. Cracking the right regulatory code will require a progressive approach that involves closer collaboration with a broader range of stakeholders – including banks, businesses, start-ups and national government – than previously necessary. It will also have to acknowledge consumer preferences for existing payment channels and reassure them that new channels are robust enough to withstand being hacked.

The clock is ticking. Although low consumer tolerance of software bugs in money movement might slow adoption of new forms of currency a little, the proliferation of fintech start-ups over the last eighteen months into all areas of financial services, shows the speed at which consumer perceptions of what it means to be a bank can be transformed. Regulators will need to pick up the pace if they want to lead the market rather than follow the fintech herd.



Bitcoin which is on the blockchain framework can facilitate scalable, secure and efficient cryptocurrencies by enabling peer-to-peer (P2P) communication among devices without the need for any centralised control



EXTENDING THE REACH OF GOVERNMENT

For regulators with a lighter touch there is a lot to play for. Despite the significant challenge of re-defining their role in the digital era, uses for technology that can authenticate, trace and record digital assets are potentially limitless, creating substantial opportunities for governments everywhere that surpass the shorter-term, one-off advantages of cash replacement.

The breadth of possible applications goes far beyond the conversion of physical currency into digital money. Opportunities to drive efficiencies in public service delivery, reduce costs and improve transparency have caught the attention of national governments. Pioneering governments are experimenting internally to improve public procurement, contracts and administration and introducing new blockchain-supported programmes to their citizens.

A particular area of interest for governments is the potential for currency virtualisation to make ultra-low value payments economically viable by enabling payments in smaller denominations of currency than is currently possible. Protecting transactions at much smaller levels will also help to accelerate the transition to a cashless society and drive financial inclusion – especially in poorer, rural economies.

The blurring of online and offline commerce is also increasingly matched by the shifting working patterns of the mobile workforce. With employees tied neither to one physical location or even one employer, the limits of national taxation policy are being stretched further and further. There are some experiments already under way. The government of Estonia's e-Resident identity card programme, for example, has been launched to leverage the benefits of the blockchain to encourage 'digital migrants' to set up businesses there. As working patterns evolve in the future, it's not inconceivable that such programmes could be extended to help governments collect taxes from overseas citizens, or that taxes on goods and services are controlled using a traceable register.

For employees in the digital workforce and migrant workers, the process of getting paid immediately or sending money home without incurring hefty transaction fees is often impossible. Cryptocurrencies could help reduce the costs of these monetary flows, and ultimately amplify the supply of goods, services and labour across national borders.

As the pressure for digital money builds, creating widely accepted, fully convertible cryptocurrencies could be a process managed in the private sector, challenging the role of the state in managing money. In order to improve transaction transparency and reassure consumers that virtual currencies are safe, however, governments need to provide firm foundations – such as digital identities, legal standing and the right kind of regulations.

The opportunities are limitless and without precedent. For those countries with the boldness to pursue it, the internet of money presents an invaluable tool to unleash the potential of this powerful driver of growth and productivity. The challenge is to encourage and harness that potential without stifling it.

YOUR GOVERNMENT. POWERED BY BLOCKCHAIN

A series of innovative pilot programmes in Sweden, Estonia and UAE indicate the potential for governments to leverage the power of blockchain in a way that redefines their role and their relationship to businesses, citizens and even the rest of the world.

Estonia, for example, introduced a blockchain-supported virtual residency card, open to anyone who wants one, that extends the definition of what it means to be a national citizen in the digital age. The idea is to encourage entrepreneurs to set up businesses in the country, with the goal of creating 10 million e-residents by 2025 – 10 times the country's current population.

The Dubai Government plans to run all its transactions on the blockchain by 2020, but it is also trying to position the government and the emirate at the forefront of technology development. The aim is to create an environment in which government departments naturally work with established businesses and start-ups to tackle specific challenges, while creating the infrastructure to allow Emiratis and expatriates to start new blockchain-based businesses. Where solutions would previously have been developed in isolation, the digital age and the agility of start-ups to innovate faster than institutional peers has encouraged the government to develop new relationships.

One project, for example, works with a local telecom provider to test the use of blockchain as a protocol for sharing health records in real time between doctors and patients. The sea-change in institutional innovation is opening doors for start-ups like Dubai-based BitOasis, a local bitcoin exchange, to work with regulators and banks to educate them about the potential of the technology and reduce regulatory resistance.

The biggest leap yet toward the brave new world of digital money is likely to come from Sweden. The country is already testing use of blockchain for recording land registry transactions in conjunction with a start-up and telecom operator Telia. A sharp drop in the use of physical cash (notes in circulation have fallen 40% since 2009) to cards and other forms of electronic payment is adding pressure on the world's oldest central bank to issue its own digital currency.

Being a pioneer will carry its own burden – with no regulatory template to borrow from, the regulator will need to work in concert with banks, business and the country's ample pool of fintech start-ups to make the world's first publicly controlled digital currency a success for its citizens and a beacon for other governments.



EY PUTTING CRYPTO CURRENCY INTO PRACTICE

As of January 2017, clients of EY Switzerland will be able to settle their invoices for auditing and advisory services using Bitcoin. The advisory firm today put into operation a Bitcoin ATM at its publicly accessible office building next to the Hardbrücke train station in Zurich. This ATM can be used by EY employees as well as passers-by to exchange Swiss francs for Bitcoins and vice versa. Employees will be provided with a secure digital wallet (EY wallet app) that enables them to pay for products and services using Bitcoin. The digital wallet offers excellent protection against unauthorized access within the EY system environment and can be topped up by employees very easily on their company smartphone.

The new Bitcoin ATM is part of an internal EY Switzerland digitalisation program and is intended to make employees more familiar with the topics of blockchains and cryptocurrencies. "We don't only want to talk about digitalisation, but also actively drive this process together with our employees and our clients. It is important to us that everybody gets on board and prepares themselves for the revolution set to take place in the business world through blockchains, smart contracts and digital currencies. Blockchains

are a very quickly developing technology that can permanently change many sectors. In Switzerland's role as an important financial and industrial center and to further its development as a digital hub, it is essential that it be a pioneer in this area," says Marcel Stalder, CEO of EY Switzerland.

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