Yves Mersch: Virtual or virtueless? The evolution of money in the digital age

Lecture by Mr Yves Mersch, Member of the Executive Board of the European Central Bank, at the Official Monetary and Financial Institutions Forum, London, 8 February 2018.

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European folklore warns of the will-o'-the-wisp, a malignant creature that dwelt in marshes. It would appear as a light in the distance, which a traveller would mistake for houses. As they reached the place where they thought the light was, it would move further ahead, drawing them deeper into the marsh to their untimely death and a watery grave. In some areas, will-o'-the-wisps were said to mark buried treasure. Investigation of the phenomenon found it was related to dissipating bubbles of marsh gas.[1]

With the draining of marshes to make way for agricultural land, will-o'-the-wisps are rarely sighted nowadays. But there remain plenty of distant flashing lights to distract travellers with promises of riches. As with the previous incarnation, these flashing lights often turn out to be just like bubbles of marsh gas – insubstantial and foul-smelling, but also flammable and sometimes able to burn things around them.

The most recent beguiling wisps are named variously "cryptocurrencies" – to denote the use of cryptographic methods and technology – or "virtual currencies" (VCs) – to denote their lack of legal recognition. There are, at present, more than 1,500 VCs in circulation, with dozens of new schemes being launched monthly, including initial coin offerings (ICOs). Most have failed to attract users, in particular in the major currency areas. The total value outstanding has fluctuated sharply, largely from speculative activity.

The global value of all VCs is currently around a fifth of the value of all euro banknotes in circulation and around 3% of the narrow monetary aggregate M1. Of course, these figures are probably already out of date, such is the volatility of the market. Having a million dollars' worth of Bitcoin today would have required the simple investment of three million dollars in mid-December. Because holders can hide their identity and location, it is impossible to accurately analyse VC circulation in the euro area. But euro-related activity on exchanges represents a small share of global activity, and is concentrated on a small number of users.

While VCs remained an esoteric interest, it seemed sufficient for authorities to mostly observe and issue warnings here and there. But it is the dose that makes the poison. Now that VCs may grow to be economically significant, we need to reduce the risk of negative impacts on the economy.

In my remarks today, I wish to explain what it takes for something to be considered "money" – and how VCs measure up. I will then set out what I believe are some of the key regulatory questions that need addressing, and actions that need to be taken to mitigate the potential blowback from VCs to the rest of the financial system.

What is money?

Money has formed an integral part of human economic interaction for millennia. It has appeared in many forms – metallic currency, paper notes, cowry shells, cigarettes and even the great Rai stones of Yap.[2] Are VCs the latest incarnation of money? The answer for now, and indeed for the foreseeable future, is no. Economists generally define money as being a verifiable asset that fulfils three basic functions: a medium of exchange, a unit of account and a store of value.[3] How well do VCs carry out those functions?

Medium of exchange

Some VCs have attained patchy acceptance as a medium of exchange. The current largest, Bitcoin, is accepted by some retail outlets, but on a global scale these outlets remain small in number, and hardly any actual transactions have taken place. On a daily basis, there are around 284,000 Bitcoin transactions globally, compared with 330 million retail payments in the euro area. Indeed, a recent Bitcoin conference stopped receiving payment in Bitcoin because of the cost and time involved in processing the payments.[4]

Bitcoin is far inferior to existing payment options. Bitcoin transactions generally require confirmation from six miners. With each block taking around ten minutes to mine, you would expect transactions to take an hour to process. But with recent network congestion, the average time for one confirmation can easily exceed several hours.

At these speeds, if you bought a bunch of tulips with Bitcoin they may well have wilted by the time the transaction was confirmed.[5]

Bitcoin payments are also expensive. The recent cost of a Bitcoin transaction is €25, the same cost as carrying out 12,500 transactions on the incoming TARGET Instant Payment Settlement (TIPS). Bitcoin is heavily resource intensive, and certainly not a green technology. Bitcoin mining is estimated to currently consume energy at an annual rate of 46 TWh,[6] approximately 35 times the electricity consumption of all Tesla cars in the world.

In comparison, traditional payment services have made large strides in innovation. The instant payments scheme SCT-Inst was launched in November 2017 and the Eurosystem will implement the TIPS service in November 2018. A key characteristic of the instant payments scheme is that funds are made available to the beneficiary in, at most, 10 seconds for 0.2 euro cents. In TIPS, we aim to settle those transactions within a fraction of a second, in central bank money, with Europe-wide reach and interoperability. So it is with conventional technology, not with VCs, that genuine progress is being made in payment processing.

Unit of account

The second function of money is acting as a unit of account, without which buyers and sellers would have to know how many chickens an iPhone would be worth, how many iPhones would buy a house, and so forth. Such a system quickly becomes complex: just ten products already have 45 bilateral pairs of prices. Money simplifies the comparisons of value between products. VCs fail this test – none of them are generally accepted as a unit of account. A unit of account is like a flag or an anthem, a representation of commonness backed by assets and values which is even accepted beyond the territory of legal tender.

In part this is due to the lack of widespread recognition. VCs are not legal tender, and are not backed by a central bank. Retailers accepting such assets as payment undertake notable risks, including potential expropriation by hacking or by an enforced rollback.[7] But the lack of acceptance as a unit of account is also down to the final function of money – being a store of value.

Store of value

Wild fluctuations in the value of VCs mean that businesses pricing in VCs could find themselves with a large and detrimental gap between their actual price and their optimal price. A stable value is required to underpin effective pricing. Similarly, households benefit from being able to optimise their spending over time by saving. To do so, they need an effective store of value that they can be sure will enable them to buy goods and services in the future. When there is considerable uncertainty around how many goods and services an asset can buy in the future, or indeed whether it can be used to purchase anything at all, it is a poor store of value.

Traditional currencies have a trusted issuing authority that acts as a guarantor of the stability of the currency, and a legal framework that punishes counterfeiters. The ECB's mandate for price stability, bolstered by the treaty provision for independence, provides consumers with the confidence that the purchasing power of their euro will remain stable from year to year. The political capital the leaders of the euro area's countries invested during the crisis to confirm the integrity of the euro proved all sceptics wrong.

There are no equivalent structures in place for VCs. They have neither intrinsic value, such as the commodity content of gold coins, nor extrinsic value, such as the value assigned to traditional fiat currencies by the trusted public issuing authority. VCs do not even provide the dividend or coupon payments that tie down the prices of equities and bonds. They are in fact a classic Keynesian beauty contest,[8] where investors buy what they perceive others view as the most attractive investment. Like in Mr Ponzi's schemes, those investors hope for future price gains and believe they will find a greater fool to sell to before the inevitable crash. Under these conditions, VCs exhibit wild fluctuations in value, meaning that they cannot be trusted as a store of value.

It is this failure, more than any other, that makes the label "currency" a misnomer.

Public versus private provision of money

Having a widely accepted unit of account and medium of exchange helps smooth economic transactions, reduce costs and enable some interactions to take place that would not be possible under a pure barter system.[9] There are clear network and scale effects with money, which provide one justification for public issuance. Even Milton Friedman recognised this, noting that "*a moderately stable monetary framework seems an essential prerequisite for the effective operation of a private market economy. It is dubious that the market can by itself provide such a framework. Hence, the function of providing one is an essential governmental function on a par with the provision of a stable legal framework.*"[10]

But that does not mean that private sector money is either impossible or undesirable. Forgotten amid the hype surrounding VCs is that a widely accepted form of private sector digital money already exists: bank deposits. This private sector money dwarfs the amount of public sector money – i.e. cash – in circulation. In November 2017, euro notes and coins in circulation amounted to €1.1 trillion, compared with the €17.5 trillion deposited by euro area residents with MFIs.

Certainly this private sector money acts as an effective medium of exchange and, a few episodes aside, as an effective store of value. But such private sector money is not truly independent; it shares its unit of account with the official currency. The implicit promise underlying bank deposits is that customers can redeem them whenever they wish and one to one with public sector cash, if they need a safe refuge in a time of crisis.

By providing liquidity to the banking sector and acting as lenders of last resort, central banks *de facto* recognise this private sector money, even if it is not legal tender. But that recognition comes with obligations – including regulations on capital, liquidity, anti-money laundering (AML) and counter terrorist financing (CTF). For VCs to cross over into the mainstream, regulatory acceptance is necessary, and that acceptance requires equivalent measures for governance and legal certainty.

Potential impact of virtual currencies

Yet even if VCs are not money, central banks should still be aware of the potential risks they pose for price stability and financial stability. The magnitude of such risks depends on the total value of VCs outstanding, their interconnectedness with the rest of the economy, and the extent

to which investors in VCs are leveraged.

In terms of interconnectedness, the main concerns would be if a significant crash caused losses of wealth that were large enough to affect consumer behaviour, or caused contagion through the financial system. The bursting of the tech bubble in 2000 provides a useful comparison for the first scenario. The market valuation of the NASDAQ fell by around $5 trillion between March 2000 and October 2002, roughly 20 times the current total value of VCs outstanding. How holders of VCs consume out of their perceived wealth and how much is built on leverage are crucial to determining the impact of a crash.

Until recently, VCs have lacked perceptible connections to the financial system. Regulatory requirements on the use of certain types of money or settlements, the high risk of money laundering associated with the lack of customer identification, the speculative pricing of VCs and the limited liquidity are some of the reasons why regulated institutions have refrained from getting involved in this asset class.

Yet there are signs that greed has weakened their resolve and some have begun to form tentative linkages. A number of derivative products pertaining to VCs have recently been launched. There is rising activity in euro at VC exchanges and some jurisdictions are falling over each other to issue licences to largely unregulated platforms and exchanges in a misplaced competitive race.

What happens if this trend continues and VCs become more commonplace as settlement assets in some niches of financial markets? What if credit institutions start developing larger exposures to these assets? What if retail investors take out mortgages to buy VCs?

Amid the growing risks of contagion and contamination of the existing financial system, regional regulatory solutions have to be explored while we await an outcome from G20 discussions. Indeed, we ultimately need global answers in the absence of a defined jurisdiction for VC issuance.

This is crucial to safeguard the integrity of financial sector services, avoid the undue mutualisation of risks, protect investors and consumers and prevent negative spillovers to the real economy.

Resolute ring-fencing measures might be needed. Reviewing and updating legislation in a timely fashion is a continuous challenge, yet inaction could be perceived as condoning VCs.

The four broad areas that require particular attention are:

- VCs themselves;
- the facilitators – VC exchanges, wallet-providers and brokers;
- financial market infrastructures (FMIs); and,
- the banking sector.

Regulating virtual currencies

Beginning with the VCs themselves, it is clear that they cannot be directly regulated or overseen in the absence of a centralised governance and legal framework. In fact, most VCs are “mined” peripherally by a computer programme explicitly to prevent any legal entity being in control. Recognising their limits here, most countries tolerate the usage of VCs, without trying to ban them.

Many regulatory bodies and central banks have issued warnings, and this is certainly important from a consumer protection viewpoint. Retail investors need to understand the predominantly speculative nature of VCs and the risks they entail. Statements regarding returns on investment

in VC-related advertisements targeting potential investors should be under the same level of scrutiny as advertisements for financial products.

In the United States, awareness of the growing inherent risks to investors and consumers is on the rise. The Securities and Exchange Commission (SEC), which oversees the US investment industry, warned in a letter sent last month to two trade groups that, "there are a number of significant investor protection issues that need to be examined before sponsors begin offering these funds to retail investors." The SEC outlined more than 30 questions that had to be answered before it would give the green light to mutual funds and exchange-traded funds (ETFs) that invest in Bitcoin and its peers.

The concerns refer in particular to the establishment of Bitcoin ETFs, some of which even use leverage to amplify the price movements. The extreme volatility in recent months highlights the large degree of speculation involved.

Likewise, the lack of liquidity is concerning. If many investors want to withdraw their money from the ETFs on a particular day, the funds might struggle to meet the redemptions because they would struggle to sell off their atypical assets. And how would such funds deal with cases of market manipulation, as have happened in the past?[11] Clarity on such aspects is vital.

In the same vein, relevant market authorities should monitor, analyse and regulate the use of ICOs. An ICO is a way of raising money from the public, often to start a project or to finance a company, using coins or tokens. In an ICO, an entity issues newly created coins or tokens and offers them in exchange for fiat currencies, such as the euro, but more often VCs. In 2016, the total amount of funds raised through ICOs was less than €82 million. This number has dramatically increased to over €3 billion raised through ICOs in 2017. Potential explanations for the increasing popularity of ICOs is that they allow companies to raise funds without ceding control to venture capital investors, or enduring the rigour and expense of an IPO process involving a legally binding prospectus, among other things.

Depending on their features and characteristics, ICOs can be regarded as either the issuance of VCs, as utility tokens to access or purchase a service or product, or as securities. In the latter case in particular, clarification is needed on the extent to which ICOs should be bound by existing regulations, such as on disclosure and prospectuses. This is particularly relevant when tokens are exchanged for fiat money.

Restraining the facilitators

Let me turn to the facilitators of the spread of VCs.

Vigilance is warranted in view of the repeated incidents, most recently the hack of the Tokyo-based VC exchange Coincheck, where €430 million of virtual currency was stolen. Although there is no specific evidence to confirm the suspicions, security experts are increasingly warning that VCs could offer rogue states a route to circumvent sanctions and gain access to foreign currency and world markets.

The ECB takes an active role within our mandate, for example our opinion on the 5th Anti-Money Laundering Directive, which will extend the scope of obliged entities to cover exchanges and wallet-providers handling VCs, in order to avoid anonymous transfers into fiat currencies. The ECB reminded the EU legislative bodies that they should not be perceived, through regulatory forbearance, to be promoting VCs, and should take VCs' inherent stability risks into consideration.

But we need a broader perspective on regulatory intervention for VC facilitators that extends beyond the fields of AML and CTF. Possible regulatory action should be explored, as well as amending or broadening existing frameworks such as the revised Payment Services Directive

(PSD2) so that the licensing and supervision rules also apply to VC facilitators.

Protecting financial market infrastructures

Third, I would like to cover financial market infrastructure services. One could envisage a major incident involving VCs triggering contagion from the market infrastructure services themselves to their participants, and even beyond. Against this background, we have to review whether the regulatory and oversight tools in the field of trading, clearing and settlement require updating.

One of the key questions is whether VCs could become a settlement asset in payments and settlement services or be used in the clearing domain. Existing standards for FMIs, for example, refer to the usage of "a settlement asset with little or no credit and liquidity risk[12]". While it could be argued that this by and large excludes settlement involving VCs in payment systems, it should be borne in mind that this definition currently does not systematically apply to all FMIs. The situation is similar in the field of securities settlement. The question is whether VCs could be used as an asset for settling securities transactions or constitute a security per se. The answer hinges on whether they could be legally characterised as "financial instrument/financial asset" under the applicable regulation.

Certain authorities have already qualified VCs as financial instruments or commodities and this may prepare the ground for the issuance of some specific VC-related products, including derivatives. VC derivative activities need to be fully transparent and records must be collected, maintained and made available by trade repositories.

The use of VCs at central counterparties (CCP) should also be monitored. The European Market Infrastructure Regulation (EMIR) states that a CCP shall accept highly liquid collateral with minimal credit and market risk to cover its initial and ongoing exposure to its clearing members. While it is doubtful that a VC would meet such a requirement, clear guidelines ex ante would be helpful, and financial stability considerations will need to be taken into account by the relevant authorities.

In my view, it should be examined whether any VC activity carried out by FMIs must be ring-fenced from their other activities. The enforcement of segregated accounts and liabilities could be discussed. FMIs play an important role in financial markets, and any liquidity support offered by central banks should be to mitigate shocks emanating from the real economy, not from gambling in risky assets. Certainly, FMIs should not be obliged by legislation to provide settlement services for VCs and VC-related products. In the same vein, the Eurosystem market infrastructure services – TARGET2 and TARGET2-Securities – cannot grant access to VC business according to their existing framework.

Regulating credit institutions

Finally, we need to look at the banking sector, whose profitability and stability might be impaired by VC activities. EU credit institutions are already required to have adequate frameworks in place to assess the capital they need to cover the nature and level of risks they are, or might be, exposed to. Given the volatile nature of VCs, it could seem appropriate that any trading in VCs would be backed by adequate rates of capital, and segregated from their other trading and investment activity.

Any VC business of credit institutions needs to be rigorously supervised to ensure that risks emerging from such activities are contained. This includes ensuring that proper protocols are in place to meet obligations under AML and CTF regulations. Furthermore, given the risks posed by leverage, credit institutions should not accept VCs as collateral, or only accept them with haircuts that appropriately reflect past volatility, liquidity, and market and operational risks. Likewise, limits on leverage could be examined.

Central bank issuance of digital currency

The advent of VCs has triggered suggestions that central banks should provide central bank digital currency, or digital base money (DBM), as I have previously called it.[13] DBM already exists in terms of the reserves of the banking sector held at the central bank, but the more recent question is whether central banks should make DBM more widely available.

As with every central bank policy decision, any such move would need to be both necessary and proportionate. There would need to be a clear motivation within our mandate to issue DBM, and such issuance would need to be done in a way that did not bring about risks and costs that exceeded the benefits. It is important to avoid being beguiled by the flashing lights of novelty and assuming that, just because a technology is new, it is also better.

There is no material evidence that abolishing cash will inhibit crime. Electronic storage and transfer may well prove easier for criminals than banknotes. I'm also uncertain why cash is being singled out; mobile phones and cars are also used in crime, but there are no calls for their abolition.

Moreover, there does not appear to be a global trend towards a cashless society. A recent study conducted by the ECB finds that around 79% of all payments at point-of-sale were made with cash. Indeed, the demand for cash in the euro area currently outstrips the rate of nominal GDP growth. And people who currently prefer electronic payments already have a wide range of options available, without needing the central bank to provide the digital money.

A further argument for introducing DBM and abolishing cash is framed in terms of monetary policy. Several authors have proposed DBM as a way to eliminate the effective lower bound on interest rates, and impose much more negative interest rates than are currently possible. But such rates are not necessary; the unconventional measures put in place by central banks over the past decade have proven sufficient to meet the challenges of the crisis. And while sharply negative interest rates may work well in some macroeconomic models, unforeseen changes in real-world behaviour by households and businesses could inhibit the effectiveness of this tool and achieve nothing more than the destruction of confidence in central bank money. Whether this would work to the advantage of private moneys with large disorders in exchangeability remains to be seen from a social welfare point of view.

The decision on issuing DBM also needs to be assessed in relation to the impact on the financial system. During a systemic banking crisis, holding risk-free central bank issued DBM could become vastly more attractive than bank deposits. There could be a sector-wide run on bank deposits, magnifying the effects of the crisis.

Even in the absence of a crisis, readily convertible DBM could completely crowd out bank deposits – putting the existence of the two-tier banking system at risk. In this situation, the efficient flow of credit to the economy would likely be impaired. The central bank – now holders of deposit funding – would have to decide which projects were financed, either directly by replacing commercial banks, or indirectly by deciding which banks received funding. This is an undesirable situation for European central bankers for two reasons:

1. Legally, the Treaty provides for the ECB to operate in an open market economy.
2. And, by the same logic, we are well aware of Friedrich von Hayek's warnings about "the pretence of knowledge".[14] Decentralised market decisions are the "first choice" when it comes to allocating resources in an optimal way. This includes the allocation of credit.

Overall, there is currently no convincing motivation for the Eurosystem to issue DBM to the general public. It is unnecessary at present and, when the likely negative impacts on the financial system are taken into account, such a move appears disproportionate to the aims put forward by

its proponents. There is no need to fix something that is not broken.

If anything, one could imagine a digital representation of cash that replicates the features of cash in the reasonably distant future, if citizens demanded it. Such an approach seems more appropriate for jurisdictions whose currencies face domestic regress as they are also not widely accepted beyond their territory – which is certainly not the case for the euro.

Conclusion

Let me conclude.

Virtual currencies are not money, nor will they be for the foreseeable future. Their market share is still small and their ties to the real economy are still limited.

But this can be subject to change. Regulators and legislators on all levels should therefore urgently pay close attention to mitigating the potential risks that could stem from growing VC business.

It is not unknown for new innovations to bring about euphoria and hype, which in turn fuel bubbles that eventually burst. And indeed, the hot air is already escaping from some of these bubbles.

But just because the initial euphoria and hype subsequently fade, it does not mean that the innovation is without virtue, even if early market leaders may not last the distance.

Despite the many defaulted railroad bonds, railways are a common mode of transport today. From London you can even take a train directly to many parts of Europe through the Channel Tunnel – whose now profitable operator filed for bankruptcy protection in 2006. Netscape and AltaVista were titans in the early days of the internet. Web browsers and search engines are still with us, but those names are no more. So it may well prove with VCs. The technology may in time become widespread and useful, but early versions of it may fade from view.

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1 L. Blesson (1832), "Observations on the ignis fatuus, or will-with-the-wisp, falling stars, and thunder storms.", The Edinburgh New Philosophical Journal, 14: 90.

2 Friedman, M. (1991), "The island of stone money", Working Papers in Economics, The Hoover Institution, E-91–3.

3 Jevons proposed a fourth function: being a standard of value (see Jevons, W. (1875), Money and the Mechanism of Exchange, Chapter 3). But that fourth function is generally considered nowadays to be subsumed into the other three.

4 See news.bitcoin.com/miami-bitcoin-conference-stops-accepting-bitcoin-due-to-fees-and-congestion/

5 Also bearing in mind that settlement finality in Bitcoin is probabilistic and therefore not certain.

6 digiconomist.net/bitcoin-energy-consumption

7 For example, the rollback of Ether in 2016 following the DAO platform being hacked.

8 Keynes, J.M. (1936), The General Theory of Employment, Interest and Money, London: Macmillan.

9 See, for example, Kiyotaki, N & R. Wright (1993), "A search-theoretic approach to monetary economics", American Economic Review, 83(1): 63–77.

10 Friedman, M. (1960), A Program for Monetary Stability, New York: Fordham University Press.

11 See Gandal, N & Hamrick J & Moore, T & T Oberman (2018), "Price manipulation in the Bitcoin ecosystem", Journal of Monetary Economics, forthcoming.

12 Principle 9 of the CPMI/IOSCO Principles on Financial Market Infrastructures

(PFMIs); www.bis.org/cpmi/info_pfmi.htm

[13] The issues surrounding the design and issuance of DBM are discussed in much greater length in Mersch, Yves (2017), "Digital Base Money: an assessment from the ECB's perspective", speech at the Farewell ceremony for Pentti Hakkarainen, Deputy Governor of Suomen Pankki – Finlands Bank, European Central Bank, 16 January.

[14] Hayek, F.A. (1974), "The pretence of knowledge", Nobel Memorial lecture, 11 December. Published American Economic Review, 79(6):3-7, 1989.