

The Future of Payments: A New Engine ?

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1. While preparing these remarks, I heard a wonderful BBC radio programme on Frank Whittle, the inventor of the jet engine. For those that don't know the story, Whittle conceived and designed the aircraft jet engine well before the second world war.
2. Whittle's insight -- and his unshakeable belief -- was that the piston engines and propellers that powered the aircraft of the day were simply too complicated to enable the development of aircraft that could fly faster and higher. Or as he put it:

“reciprocating [ie piston] engines are exhausted. They have hundreds of parts jerking to and fro, and they cannot be made more powerful without becoming too complicated. The engine of the future must produce 2,000 hp with one moving part: a spinning turbine and compressor.”
3. The government at the time was not interested, despite Whittle attracting venture capital and building a working prototype. It was only years later, when it became apparent during the war that Germany was advanced in developing aircraft jet engines that Whittle's invention was taken up in the UK.
4. The jet turbine engine now powers the majority of the world's aviation and has made air transport possible to a degree that was inconceivable when Whittle designed his invention. It does not power all transport, however. For some aviation purposes, reciprocating piston engines are still used. And the turbine engine has proved unsuitable for land and much of sea transport.
5. By this point, you may be wondering what all of this has to do with the future of payments, the subject that I have been asked to talk about today.
6. A payment, essentially, is the settlement of an obligation by the transfer of something of value. It requires both an accepted thing of value – the settlement asset also known as ‘money’ – and the mechanism to transfer it securely and finally between the parties to the transaction.

7. When we make a payment with cash, we use a physical token, a banknote, which represents a claim on the central bank. And we transfer it physically by handing it from one party to the other. That is pretty simple and effective.
8. However, electronic payments are now the dominant form of payment in the UK and many other economies. These use money that is a claim on a commercial bank, our deposit accounts, rather than physical cash. And when we make an electronic payment, by card or bank transfer the process is considerably more complex than a cash payment.
9. An electronic payment in commercial bank money between two parties that use different banks requires at least four sets of bank records to be amended and reconciled. It requires checking in advance that the payer has the funds in his or her bank account. Depending on the method used, although the money is taken for the payer's account at the time of the transaction, the recipient may not get the money for a day or more.
10. A number of electronic signals whizz to and fro between the various parties, their banks and the payment systems to make this happen.
11. The payer doesn't see any of this, of course. We tap our cards, pick up our coffee and walk out not realising everything that has had to happen in the background to make that possible. Domestic payment technology has become faster and faster and invisible to the user.
12. If the transaction is not the purchase of a coffee but of something that requires a change of ownership to be recorded — a car or a house or a financial asset — the process becomes considerably more complicated. More players are involved, more messages go to and fro, more records have to be adjusted and more machinery is needed to ensure changes in ownership of both the money and the asset is final and immutable. And if the payment is cross border, the process and the amount of messaging and adjusting of bank ledgers becomes even more complicated still.

13. The question is how much further these complex systems can be developed to keep up with increasing digitalisation and automation of everyday life?
14. Are they, in Whittle's words, "exhausted" and "too complicated" to be made more powerful? Do newer technologies allow a simpler approach – akin to Whittle's more efficient "one moving part" that will in turn allow much more extensive programming of the transfer of value that is a payment and enable it to be more deeply integrated into other digital processes.
15. By new technologies, I am referring here to developments often loosely referred to as 'tokenisation' that have been pioneered in the crypto world enabling the encrypted representation of money and other assets in computer code to be integrated with code that governs their use, transfer and ownership.
16. One example here would be a recording the transfer of the settlement asset on a single record, a single or 'unified ledger' to which all parties had access and in which all parties had confidence rather than recording and reconciling transactions on multiple ledgers. Such a platform could then support an atomic contract that, for example, locked in simultaneous settlement and delivery processes between two parties – for example delivery versus payment in a wholesale market transaction without using a central trusted intermediary.
17. On the retail side, tokenisation might automate a payment to Amazon so that is guaranteed to be made when the package is photographed by the delivery driver on your geolocated doorstep - but not before, thus avoiding the need to claim refunds for non-delivery. Or automating the payment for a railway ticket so that payment is guaranteed to be made once the train departs on time but is reduced if the train is late or is cancelled thus avoiding the need to for the passenger to claim compensation.
18. If such new technologies can open up new ways of representing money and making payments and new ways of representing many of things we buy and sell, will that be the future for all types of payments?

19. Or will the further development of existing systems remain more appropriate for some types of payment in much the same way that, until the development of the electric car, the piston engine has remained the most appropriate engine for road transport?
20. Forecasting the direction and the speed of the development and, perhaps more importantly, the *adoption* of technology is a perilous business and certainly not one for ex central bankers. Great claims have been made for some of these technologies, many of which operate in the crypto world. But there is as not, as yet at any rate, extensive real evidence that they can work robustly at the necessary very large scale and that they can deliver the claimed benefits in the economy at large.
21. Rather than make a prediction therefore about what the future world of payments will look like in the context of these technological changes, I will make a number of more general, and I hope relevant, observations.
22. First, major advances have already been made using technologies that began to be taken up around the turn of the century to automate the process of making a payment using electronic commercial bank money. We already see some integration of the payment process into other digital developments. That is why we can buy our coffee with our phones or watches or hop out of an Uber without handing over cash or tapping our card.
23. Existing payment systems, both wholesale and retail, are being developed further despite their complexity. It is not clear that they are, in Whittle's words "exhausted, any more than the development of the piston engine for many uses was exhausted when Whittle developed his jet engine.
24. Central banks in many jurisdictions, for example, are introducing greater capabilities into existing central payment systems which may support more automation of payments and enable a much wider set of players to interact with the central bank ledger. On the retail side, many jurisdictions now have faster or instant payment systems both for peer to peer and for point of sale.

25. And the development of application programming interfaces (APIs) has made it much easier to make systems talk to each other. This has enabled domestic developments like Open Banking in the UK. It also offers great scope for improving cross border payments by linking payment systems in different jurisdictions.
26. The payments world is already characterised by many different types of payment system. In my view it is unlikely that one new system using new technology will replace them all – or at least do so quickly. It is far more likely that these newer systems will be introduced at different speeds in different jurisdictions and for different use cases. Where they are introduced, they will need to be integrated with existing systems: interoperability will be key.
27. Second, tokenisation of payments requires money to be represented in a different *form* but it does not require new *types* of money – though it may enable them. When thinking of the future and the application of ‘tokenisation to money and payments, we should distinguish, on the one hand, between the type of settlement asset — the type of money used for payments — and, on the other hand, the systems for transferring it and recording the consequent change of ownership.
28. Although tokenisation of money and payments has been pioneered in the crypto asset world for new types of settlement assets or money, such as stablecoins, issued by non-banks, there is in principle no reason why this approach cannot be applied to the types of money currently used in the economy at large - commercial bank deposits and central bank money.
29. The adoption of tokenisation technologies for payment, therefore, does not in and of itself mean the entrance of new, non-bank players or make it inevitable that non-banks will displace banks as providers of money for transactional purposes.
30. Third, and conversely, while such new technologies can be exploited by banks in the provision of commercial bank money, they do also open up the possibility of new entrants with very different business models and the possibility of greater competition and innovation not just in the provision of payment services but also in the issuance of money itself.

31. Whether or not to allow non-banks to issue tokenised money like stablecoins either for general payments use in the economy or for wholesale financial market transactions is essentially a policy rather than a technical question.
32. In the UK, the Bank of England has proposed a regulatory framework for non-banks that intend to issue stablecoins for use in retail payments at systemic scale. This framework is designed to ensure that such stablecoins and the systems for transferring them in payments are well regulated and achieve similar standards of resilience to those that apply to commercial bank money.
33. The framework is also designed to ensure the singleness of money in the UK — that is, to ensure that all forms of money denominated in sterling and used in the UK, whether issued by banks or non-banks, are exchangeable with each other and with central bank money at par and on demand.
34. Other jurisdictions, by contrast, may be less prepared to allow non-banks to issue tokenised money for use in payments. China, for example, has banned crypto assets generally. And different jurisdictions may take different views about whether ensuring the singleness of money requires that all issuers of money in a jurisdiction settle their claims on each other in central bank money across the books of the central bank.
35. Fourth, the area of finance which is most likely to be the first to see the widespread use of tokenisation technologies -- outside the world of crypto -- is the tokenisation of par international wholesale financial transactions in capital and currency markets. It is here, in the trading, clearing, settlement and recording of cross border transactions, that the incentives from efficiency gains and new types of smart contracts look most immediate and powerful. It is also where the regulatory and co-ordination challenges, albeit hard, appear most tractable. There has already been a substantial amount of experimentation and development in this area.
36. But it would I think be wrong to assume that the benefits from the greater simplification and automation of payments will only come in the world of wholesale financial transactions – that the future somehow is tokenisation for wholesale but current technologies for retail or, even, that the current sharp distinction

between wholesale and retail forms of money and payment systems will be maintained.

37. The risks and challenges involved may be greater, but provided there is both competition and interoperability between new and existing forms of money and payment systems, it is in my view likely that we will see the development of the tokenisation of money for general purpose use in the economy alongside existing systems. We may well continue to see such innovation happen fastest in emerging market and developing economies where financial systems are less developed and the incentives to innovate are more immediate.
38. And so to my last observation. Public authorities, whether by their actions or by their lack of actions, will have a very major impact on the future of payments. This impact will be through regulation (or the lack of it), through the provision of public infrastructure and publicly issued money and through public authorities' convening and coordinating power.
39. Regulation is not simply a question for new tokenisation, related, approaches to payments.
40. In many economies, the growth of digital economy in recent decades and the take-up of digital payments has not only made digital payment systems systemic but has also led to cross border trade in the provision of domestic as well as international payment services. In many jurisdictions, the regulation and supervision of these systemic payments systems, crucial to everyday life, has lagged behind the increasing use of digital payments in the economy.
41. And, by extension, the development of robust international standards for payment systems has lagged behind the increased cross border provision of payment services. This has made it more difficult for jurisdictions to defer to each other when it comes the regulation of payment firms that provide services in more than one jurisdiction. Absent robust international standards and competent national authorities, regulatory frictions in the cross-border trade in payment services are likely to increase as digital payment systems become increasingly systemic in jurisdictions.

42. These considerations apply a fortiori to the development of tokenised payment systems and new types of money for payments. Although, substantial work has been done in this area both by the Financial Stability Board and by standard setters like CPMI-IOSCO, many jurisdictions remain at an early stage of thinking about the domestic regulatory framework – including the allocation of responsibilities to regulatory authorities – that should apply. Again, this will increase the frictions in the cross-border use of such payment systems.

43. Regulation in these areas is not only a matter of managing prudential or operational systemic risk or protecting consumers. How jurisdictions approach the question of competition will also shape both the degree and the nature of innovation in payments. Again, this is not just an issue around tokenisation. One interesting observation is that the take up of faster payment services appears to be stronger in jurisdictions that allow non-banks direct access to central bank payment rails.

44. This brings me to the provision of and access to public payments infrastructure and publicly issued money.

45. In nearly all jurisdictions, the central bank provides the central payment system through which transactions between commercial banks are settled in central bank money. These systems play an important role both in ensuring the singleness of money and also in requiring participants to use technical and other payment related standards that contribute to interoperability.

46. Whether and, if so, how these central bank systems are developed to accommodate tokenisation will help to shape the adoption of tokenisation in wholesale financial markets where settlement in central bank money is desirable to reduce financial stability risks. This is likely to be particularly true for cross border transactions.

47. There are many different approaches to this issue – from, at one end, the central bank or a group of central banks providing a new system, both tokenising central bank money and operating the tokenised ledger on which it sits, to, at the other end, central banks not developing tokenised systems themselves but rather

synchronising transactions on privately operated tokenised ledgers with their existing RTGS systems.

48. Whether the central bank should also offer the general public a digital form of central bank money – ie digital cash, otherwise known as retail CBDC, is a hotly debated issue.

49. This is not simply a question of whether investment is better done by the public or the private sector or where the boundary should lie between public and private provision of services. (Indeed, publicly issued money in the form of cash has existed alongside and ‘in competition’ with private, commercial bank money for centuries and until relatively recently dominated retail payments transactions in the UK and other advanced economies.)

50. There are more fundamental issues in question. Should the public, as cash use declines, continue to have a right to the safest money in the economy, central bank issued money, for general purpose use? Does the ability of all citizens to exchange privately issued monies they hold for central bank money, at par and on demand, play a role in anchoring public confidence in money, especially in times of stress, and does it help to ensure the singleness of money. And would a publicly operated CBDC platform open to bank and non-bank payment services providers alike, stimulate competition and innovation in payments.

51. The answers to this question, on which jurisdictions may well differ, will have a material impact on how retail payment systems develop in different jurisdictions.

52. And finally, the public sector - government, central banks and regulators - have an important role to play using their convening power at the centre of the economy to resolve coordination problems, not just between private sector actors but also between jurisdictions when it comes to the governance and oversight of interlinked or shared cross border systems. Indeed, experience with linking up faster payments systems in different jurisdictions suggests that the governance and oversight of interlinked public/private payment systems is a more difficult nut to crack than the technical challenges. And political and geopolitical

considerations inevitably come into play in such decisions and may well influence the way the future develops.

53. I started this talk with the story of Frank Whittle and the invention of the jet engine. Although Whittle, albeit with great difficulty, secured private venture capital to develop his invention, a lack of interest from the government, military, and industry of the day meant that the invention was only taken up in the UK years later, under the pressures of war.
54. In that regard, the future development of payment systems is very different. There is enormous attention and engagement by policy makers throughout the world which is mirrored by the interest and in some areas, investment, in the private sector.
55. I have tried to set out some of the considerations that are likely to shape the future payments landscape rather than trying to forecast any particular future. There is one thing, however, that I think I can predict with some certainty. More, and more extensive, change is coming.
56. Thank you.