Central-bank digital currencies:

The Libra Effect

A *DigFin* report, December 2019

Facebook's Libra project has changed the world of money, regardless of whether it ever launches.

Contents

Introduction

Facebook unveiled a bold plan to launch a form of private digital money in June 2019. Libra, as its coin was to be called, would allow the 2.5 billion users of Facebook's various digital properties to make seamless cross-border payments. A new company, Calibra, would serve other financial services on top.

Facebook argues that today there are still about 1.7 billion people worldwide who are unbanked or badly underbanked. According to the World Bank, the average remittance charge for retail cross-border payments is 7%. This is a large fee for mostly poorer people (and in some markets, the fees are as high as 30%). By leveraging blockchain technology, with the right governance, Libra could solve a lot of the last-mile issues that keep so many people at the mercy of expensive, often predatory remittance services.

The announcement sparked panic across the world's financial regulators and aroused mostly hostile reactions from politicians in the U.S. and Europe. Commercial bankers were equally dismissive.

Libra now faces political headwinds. It might launch, it might not. No matter – the very suggestion of a worldwide corporate currency has shaken monetary authorities to the core.

In fact, it won't matter if Libra never sees the light of day. Facebook has already galvanized a reaction that is spurring direct government intervention into the world of digital money.

This may include China, which has been studying a central-bank digital currency (CBDC, or digital fiat), since 2014. The Institute of Digital Currency is a research arm of the People's Bank of China tasked with this mission. Its current director-general, Mu Changchun, has denounced Libra as destabilizing (while noting that Facebook is banned in China), and unrelated to a digital yuan.

According to *DigFin*, however, in late 2018 the People's Bank of China shelved plans to introduce a digital yuan, because it thought such a move would not have a big impact in a population that was already completely steeped in using e-wallets from internet giants Alibaba and Tencent.

These two conglomerates together now account for 96% of China's mobile payments market. As a practical matter, notes and coins have almost disappeared from circulation in Chinese cities.

But when Facebook proposed Libra, the Institute switched gears. Now it wants to issue a digital yuan in order to serve as a backstop should either Alibaba or Tencent suffer a failure in their payment systems, says Mu.

There is an inconsistency in statements: last year China's internet payment companies rendered digital cash irrelevant – but this year digital cash is vital to manage those same counterparty risks. Maybe the PBoC changed its mind about how to manage the tech duopoly, and the advent of Libra was a coincidence.

Or Big Tech is exerting an influence on questions of money that demands a response from governments worldwide.

This paper will explain what Libra is and how it works – and the design questions this raises for sovereign digital mney; the brief history of digital fiat and its pros and cons; how monetary authorities are likely to respond, particularly China; and implications for companies, markets and policy.

Part One: Libra as i-Money

Cryptocurrencies: Bitcoin and Ethereum

To understand Libra, we need to first revisit the origins of cryptocurrencies.

In October 2008, the pseudonymous "Satoshi Nakamoto" released the white paper describing Bitcoin as a cryptographically generated and protected form of computer money. Nakamoto solved a computer-science problem of how to enable value to be transmitted like a computer file without being copied.

This was called the "double spend" problem. If I message you a photo or an email from my phone, I have only given you a copy of the information; the original information remains on my phone. Nakamoto's protocol transformed files into identities that could be exchanged without duplication.

To make this possible, Nakamoto deployed another computer-science idea called blockchain, which relies on a network of unrelated computer servers to generate, validate and record Bitcoin transactions, using cryptographic methods.

Some notable characteristics of the Bitcoin protocol and the bitcoin units it manages are:

- *Decentralization*. The system's security derives from its decentralized nature: more than half of the network's servers would have to be simultaneously hacked to corrupt Bitcoin instructions. This ensures that no central authority (a central bank, a government, a corporation) can manipulate the "mining", transmission or ownership rights of Bitcoin.
- *Cryptographic security*. All transactions are recorded on the Bitcoin blockchain, for all to see, but owners are represented by hashes – long strings of code – so Bitcoin offers anonymity (although every Bitcoin transaction can be traced, and a well-resourced analysis can piece Bitcoin values to user identities).
- *Immutability*. Once the network validates the creation or transmission of a bitcoin, that history is added to a given bitcoin's identity, and it can't be reversed.
- *Scarcity*. The software behind Bitcoin provides a schedule for mining new blocks of data that concludes once 21 million bitcoins are produced. Miners are people with networked computers who participate in a digital lottery, based on who can solve mathematical problems the fastest; the winner gets a lottery ticket to bid for bitcoins, which are mined as blocks of

data. Over time, the number of bitcoins awarded declines. Theoretically it may take until 2140 to mine the final bitcoin but in reality the vast majority will be in circulation by 2020. Many Bitcoin enthusiasts (although not *DigFin*) equate this scarcity to gold, and therefore believe this confers intrinsic value.

Bitcoin is the world's first cryptocurrency. It is likened to a form of digital money.

A second relevant cryptocurrency protocol is Ethereum. If Bitcoin was the first use case for blockchain, Ethereum was the first for smart contracts: software that can imbue cryptographic units with rules. Money, in other words, can be programmed.

Such rules are limited only by one's imagination. A digital token could be programmed to deliver or charge a yield; to be received or spent by only authorized persons; to follow corporate actions such as a split; and so on.

One of the great hopes for cryptocurrency is to spur *tokenization*: private but regulated issuance of assets in digital form, which could transform asset classes by making them more accessible, liquid, and widely traded over blockchain-based networks.

What is money?

"Money" is an abstract, metaphorical concept. The technical definition involves three features:

- Money is a means of exchange (payments).
- Money is a store of value.
- Money is a unit of account.

Today's fiat currencies provide all of these features, except in cases of hyperinflation. The dollars, euros, yen and renminbi in your pocket, or in your mobile wallet, perform all of those tasks.

More broadly, "money" is the set of rules, written and unwritten, that governs how currency fulfills those functions. Traditionally, governments write these rules, even if innovations in money come from the private sphere.

Bank money

Although governments write the rules, they are not the primary creators of money, even accounting for policies such as quantitative easing. Commercial banks and other lenders create the vast majority of money, mostly in wholesale markets: this is known as bank money. Central banks create relatively little money but they have a great

influence on its price (interest rates). They rely on commercial money markets to communicate their policy wishes.

Electronic money

The first corporate electronic money emerged in 2007 in Kenya, with the launch of M-Pesa, a venture soon taken over by Safari.com, a local telco. M-Pesa allowed money to be transferred over mobile phones, with users topping up accounts in the same way they would buy airtime. In a country lacking much financial infrastructure, M-Pesa was a huge success.

It was later replicated at scale in China by AliPay and Tencent's WeChat Pay, which capitalized on vast customer bases in e-commerce, gaming and messaging. These internet companies engendered trust in making payments for services provided over their private networks. They also prospered in a market in which most people had a bank account but received virtually no banking services, as the banking sector exists primarily to serve state-owned enterprises and the government.

The Kenya and China examples show how popular and successful electronic money can be when it addresses issues of trust, convenience, and access. The money circulating in their systems is conventional fiat, based on what's in a user's bank account or mobile wallet.

But unlike bank money, which enjoys the backstop of a government in times of crisis, e-money systems are only as safe as the corporation behind them. Moreover, these systems are proprietary and incompatible: an AliPay account can't be used to pay for a service on a Tencent platform. These are closed-loop systems.

Cryptocurrencies

Cryptocurrencies, on the other hand, are public networks that aren't backed by any sovereign or corporate authority.

Bitcoin attracts enthusiasts because it represents the complete privatization of a monetary system; anyone with a computer can participate. Private players can write their own rules on other protocols such as Ethereum, via smart contracts. However, because of its lack of an intrinsic value, Bitcoin, Ethereum and other cryptocurrencies have proven too volatile to be a good store of value or a unit of account. Bitcoin is, however, adept as a means of payments, especially cross-border.

States have always been jealous of their monopolies on setting the rules of money. Authorities have been wary of cryptocurrencies since Bitcoin's debut.

But the crypto market had been on the fringe, isolated from the mainstream world of finance and payments. When crypto experienced a massive bubble in 2017, it posed no risk to the rest of the world, although it hurt many individuals.

Since then, the world of classical finance has begun to bleed into the crypto world. The promise of tokenizing real-world assets (securities, real estate, patents – you name it) to make them either more accessible or liquid has attracted Wall Street firms, global corporations and investors from around the world.

This institutionalization is a far cry from the libertarian impulses behind the original cryptocurrencies. But institutional money remains dependent on Bitcoin, because it is by far the most liquid of all crypto assets, and therefore serves as a gateway for fiat money to enter blockchain-based financial systems. Bitcoin also serves as the leading price benchmark for crypto assets.

Despite growing Wall Street interest, the flaws in cryptocurrencies, not least Bitcoin's volatility, meant that regulators could ignore them.

A variant of cryptocurrency called a stablecoin has been developed to address the issue of volatility. Facebook chose a stablecoin model for Libra. And this transformed the regulatory posture, because for the first time, governments faced the prospect of a vast, global corporation writing its own rules for money.

The nation-state is at risk of losing its monopoly over currency.

Stablecoins and i-money

A stablecoin is backed "off-chain" by real-world assets to tie its value to a real-world unit of measure, such as the U.S. dollar, the price of gold, or a basket of currencies or commodities.

In theory, by stabilizing a token's value to, say, the greenback, it becomes a valuable gateway for fiat money entering the world of decentralized finance. It also has the potential to become a payments rail, independent of the traditional infrastructure run by the likes of Visa and Mastercard.

Stablecoins such as Tether, which launched in 2014, have been plagued by doubts. Tether claimed to be backed by $1.00 for each token. It never allowed an audit to support this claim. In 2019 the company added loans to affiliate companies as part of its supposed

collateral base, which should raise governance red flags. Other stablecoins have failed outright to maintain their pegs. Even if these experiments were successful, to remain fully reserved is a very expensive way to manage capital.

Other models have developed models designed purely for "on-chain" collateralization, using algorithms to determine collateral requirements, relying on Ethereum or other cryptocurrences for assets, or even using a "seigniorage" system of smart contracts to continually mint and burn tokens, maintaining its target price purely through supply and demand.

For regulators, the more experimental the stablecoin, the less serious it seemed, except perhaps as a tool for manipulating markets. But at its heart, an "off-chain" stablecoin is similar to how fiat currencies are sometimes pegged to each another.

Facebook's white paper announcing Libra in June 2019 specifically referenced the Hong Kong dollar's peg to the greenback, which has endured since 1972, following America's formal departure from the gold standard. It calls for backing Libra with a basket of currencies and cash-like instruments, in a fund to be managed by the Libra Association, Facebook's proposed governing body for the project. Facebook and over 20 partners will financially back the Libra fund. It is this backing by a pool of investments that sets Libra apart from other stablecoins.

Investment money

This makes Libra a form of investment money (or i-money). I-money is a claim on assets in the reserve fund, and those assets could be risky or illiquid. Even if it's liquid cash-equivalents in the pool, the value of that underlying basket changes every day, minute, and second, based on market movements. Therefore the value of a subscription into the reserve fund will vary from the value of redemptions, giving this claim on assets an equity-like nature.

Similarly, today's money-market or private-equity fund could be tokenized, converting such investment products into Libra-like means of payment. Such a concept has important implications for the asset-management industry, but lies beyond the scope of this paper.

The idea of Libra is to maintain a very safe, liquid reserve fund, to make its token a universal means of payment. To ensure it meets this mission, holders of shares in the reserve fund would be able to convert them to fiat at market-going prices, at any time.

One of the risks Libra presents is that its reserve fund becomes a channel for unfettered capital movements. Another is that its

blockchain infrastructure cannot meet regulatory protections against fraud, money laundering and terrorist financing.

A third is that no one has worked out exactly what it is. Central banks aren't sure if Libra would be a deposit, a security, a debt, or a stored-value facility. Therefore issues around the system's design, controls and safety need to be clarified before authorities accept Libra.

Even once the definitions are set out, there will remain questions regarding a fund-backed stablecoin's exposure to market risks, including foreign exchange and liquidity, as well as governance risks.

The Hong Kong dollar's peg is a worthy model for Libra, but most currency pegs usually break in a crisis (such as the one that Hong Kong narrowly escaped in 1998 only thanks to unusually large foreign-exchange reserves held by its monetary authority). This is not just true of dollar-pegs in emerging markets: sterling crashed out of a managed exchange regime against European peers in 1992, and the Swiss franc's peg to the euro proved short-lived, from 2011 to 2015.

Part Two: Digital fiat

The age of central-bank digital currencies began in November 2017, when the Central Bank of Uruguay (CBU), led by governor Mario Bergara, deployed an e-peso.

The CBU ran this experiment for six months. Its e-peso was not based on blockchain technology. Rather, it relied on mobile phones to enable payments and transfers.

The CBU issued 20 millions of pesos' worth of digital notes to 10,000 users of local telecoms operator Antel. The central bank wanted to test a number of theories. Would digital cash:

- be easier to trace for tax purposes?
- encourage the unbanked to enter the formal financial system?
- help CBU save money from minting banknotes?
- prove safer to use?
- competitively bring down the high fees banks charge for credit cards?

In order to encourage adoption of its e-peso, the CBU enabled its digital fiat to bear interest – something physical cash can't do. But in the end, the CBU didn't activate this feature.

The pilot program concluded in April 2018. It suggested digital cash works well among the banked and digitally connected. There was some evidence it began to seep its way into the more remote parts of the country. Uruguayans quickly found ways to arbitrage transactions across platforms for the best deals.

The short period of circulation meant other questions were not answered, such as its impact on tax evasion or how people would respond to interest-bearing cash.

It's important to recognize that the e-peso was not based on blockchain. The CBU's own servers ran the program, using mobile connectivity to circulate the currency.

Other monetary authorities have been experimenting with blockchain-based means of cross-border payments. Singapore's Project Ubin is one such project, which envisages using distributed-ledger technology to supplant correspondent banking networks, as well as to handle cross-border securities settlement. The Monetary Authority of Singapore continues to develop prototypes with Canada's payments body.

Saudi Arabia and the United Arab Emirates have also been experimenting with using blockchain to support a bilateral payments corridor. There are several similar examples around the world.

Digital-currency design

All of these projects show that digital fiat can take many forms, depending on how it is structured. And that, in turn, depends on what governments want to get from digitizing their currency.
These goals may include:

- improving interbank payments and settlement
- substituting for physical cash (perhaps to foster interoperability among payment technologies, e.g. mobile wallets)
- expanding monetary policy options, such as by giving or charging a yield
- sharpening supervision/surveillance, either for financial stability, for taxation, or combating money laundering

Some of these objectives are difficult to reconcile. There is no perfect, all-encompassing version of digital fiat. Among the design aspects to be considered are whether the digital coin will circulate everywhere or just within a proscribed market (such as the interbank market); whether users (savers, spenders) are identified or anonymous; and whether the coin can provider holders with a yield (or charge them for the privilege).

These choices in turn will determine the impacts of digital fiat. Will everyone have access to the e-currency? Does that necessitate giving citizens or e-money operators their own accounts with the central bank...and does that imply commercial banks have to compete against the central bank for retail deposits? (And if so, will a market panic lead to total disaster if deposits flee commercial banks for the safe harbor of central bank money, thus crippling lenders' ability to extend credit?)

If e-currency retains the anonymity of physical cash, will it be of any use to supporting payments and funding activities in the economy?

How will central banks supervise disclosure of risks to custodians, clients, and e-money issuers?

Synthetic CBDC

The prospect of central banks issuing digital versions of fiat currency brings potential benefits, but also risks, not least how to manage giving e-money operators access to accounts at their central bank.

For example, will the central bank insure those deposits in the event of a corporate bankruptcy?

Are the deposits and transactions of an e-money operator essentially liabilities of the central bank?

If the answers are 'yes', this implies a huge burden on the central bank: to operate and supervise the entire network, its technology, settlements, and disputes. Such responsibility also would accrue massive public expectations of the central bank's ultimate role as backstop.

More likely, central banks will issue a synthetic CBDC, or derivative digital fiat, in which they only ensure settlement for e-money players and access to central-bank reserves. Responsibility for all the rest is privatized.

This approach deputizes approved e-money operators as surrogates for digital fiat. One way to think of this is as the financial equivalent of a "public-private partnership" model used to build and operate physical infrastructure. It acknowledges that e-money operators will become increasingly important financial institutions, possibly supplanting commercial banks. It lets them innovate in pursuit of their own business goals.

Partial privatization also means less efficiency (separate, competing payment rails will endure), possibly slower adoption of financial-inclusion goals, and new risks around private e-money providers—not least moral hazard and the creation of a new set of companies "too big to fail".

Private cross-border payments initiatives

In the past two years, banks, payments companies, and technology companies have launched their own projects in electronic money. These are primarily aimed at improving cross-border payments and settlements.

The legacy infrastructure for wholesale cross-border payments is the correspondent banking system, in which commercial banks in multiple countries represent senders, receivers, and also serve as interbank dealers. SWIFT, a bank-owned utility, provides the messaging protocol and sets related standards for managing this process.

At the retail level, money operators such as Western Union and Moneygram handle remittances among a plethora of smaller service providers and informal networks.

Hundreds, if not thousands, of fintechs are now attempting to compete in the remittance space. Some are using cryptocurrencies including stablecoins to facilitate transfers.

In the wholesale space, notable projects that compete with the SWIFT-backed correspondent banking system include:

- Ripple, a real-time gross settlement system, currency exchange and remittance network; it transacts using its own cryptocurrency, XRP;
- Visa B2B, the credit-card company's network to allow financial institutions to process cross-border payments among corporations, leveraging Visa's vast roster of relationship banks;
- IBM World Wire, a near real-time settlement platform for clearing and settling cross-border payments, by using the network of Stellar, a open-source protocol for converting between digital and fiat currencies; its token, Lumen, serves as the means of transfer among World Wire participants.
- J.P. Morgan's JPM Coin, which the bank is using to facilitate cross-border payments among corporate clients within its correspondent network.

These initiatives have yet to gain scale, and seem to be used now by corporate customers as contingencies should SWIFT's service come into question.

Those using underlying cryptocurrencies, such as XRP and Lumens, anticipate the arrival of digital fiat. Central-bank digital currency would give such payment businesses a massive shot in the arm—except in the case of the U.S. government issuing its own "FedCoin", which would probably render these initiatives redundant, given today's overwhelming role of the dollar in global payments.

Part Three: Monetary authorities' response

Monetary authorities such as the People's Bank of China and the Bank of England have been studying digital currencies since 2014, but largely as a theoretical exercise. The June 2019 announcement by Facebook of its Libra project has galvanized regulators around the world.

Libra has shot to the top of the agenda at international bodies such as the Financial Action Task Force (to combat money laundering and terrorist financing), the International Organization of Securities Commissions, the Bank of International Settlements, and the Financial Stability Board.

Many regulators do recognize that Libra and its ilk can address real pain points in cross-border payments and foster financial inclusion.

However, their list of concerns is long, including:

- the asset-backed arrangement of stablecoins
- the impact on monetary policy and financial stability of Libra's replacing cash
- money laundering
- data protection and cybersecurity
- investor protection
- how governments will cooperate to regulate a private, cross-border currency backed by a corporation of Facebook's reach.

This last one is particularly sensitive: the Libra Association, which will govern Libra, has been registered in Switzerland, despite its backers mainly coming from the United States—a move that has raised fears of regulatory arbitrage.

No government has the legal framework to grapple with Libra. Some capitals, such as Berlin, have been outright hostile to the idea. Facebook's clumsy public relations around the launch (and a growing distrust of Facebook in general) sparked a political firestorm in the U.S., prompting big Libra partners such as Visa and Mastercard to quit the project.

This has changed the political pitch by Facebook, which is now casting Libra as a response to Chinese e-money operators such as WeChat Pay and AliPay.

China hasn't officially opposed Libra because it bans Facebook, so Libra adoption within China isn't going to happen.

But the PBoC fought a long, hard campaign to get the renminbi accepted as a reserve currency in the basket underpinning accounts at the International Monetary Fund, and it views Libra, with its

basket of currencies (which pointedly excludes the renminbi) as an unwelcome competitor.

China's digital renminbi

Libra may never see the light of day, but the prospect of such a currency appears to have convinced China to push ahead with its plans for a central bank digital currency—a prospect that could reshape global payments and finance over time.

But China has its own reasons to issue digital fiat, which it terms "digital-currency electronic payment", or DC/EP. Mobile payments have become so ubiquitous in China that banknotes and coins have largely disappeared from use in urban areas.

Initially conceived as an alternative to Bitcoin, the PBoC now wants its digital renminbi to serve as a backup in case of failure at either Tencent or Alibaba, whose payment rails now handle 96% of mobile payments in China.

These are China's "too big to fail" companies, but they could be impacted by a financial crisis, a cyber attack or a strike against their service providers.

A second motivation for China is to enable interoperability among its mobile payments providers, so that no individual or company is completely tied to just one payments rail.

China's goal is therefore to provide a universal replacement to M0, the supply of banknotes and coins in circulation (not counting those held on deposit).

The government is targeting retail users, but via a tiered system in which PBoC will issue its DECP (digital renminbi) to commercial banks and e-money operators, which in turn will put it into public circulation.

Because the e-RMB is a cash replacement, the PBoC will not offer a yield. It doesn't want to impact monetary policy, inflation, or stability. Nor does it want to disrupt how AliPay and WeChat Pay function: users' accounts with Alibaba and Tencent hold and transact traditional renminbi ultimately sourced from commercial bank deposits. The DC/EP will convert the underlying payment instrument from deposit-based renminbi to digital central-bank money. It's not meant to impact company services, but it does tie Alibaba and Tencent directly to the PBoC.

Similarly, the PBoC doesn't want to force a solution on the retail space: it sees its role as providing a backup and interoperability should Alibaba or Tencent fail.

Instead it will be up to market competitors to drive adoption. The PBoC will leave it to commercial banks and e-money operators to come up with the most compelling tech and service—while complying with the same rules for cash management and foreign exchange—to get citizens to use e-RMB and abandon the physical stuff.

This way, the PBoC is "technology neutral", although it has also developed its proprietary tech for how it connects to commercial banks and e-money operators.

Because this is centralized, the system is fast, already reaching 1 million transactions per second, according to Mu Changchun. That's incredibly fast, way faster than any credit-card company, let alone slow protocols like Bitcoin and Ethereum. China is getting ready to handle huge volumes.

The PBoC is still working out how to deploy this. It is likely to start with pilots, perhaps both in coastal cities where cash is already hardly used, and in rural areas or places where many people remain unbanked.

An important feature of the e-RMB is that it is not reliant on a bank account. Nor is it a blockchain-based project. Rather, it is a mobile solution, likely to use near-field communication to enable peer-to-peer communications, even should the telecom or internet system fail or be unavailable.

The e-RMB abroad?

Another feature is that China is not targeting wholesale or cross-border payments—not today.

Outside observers can see, however, that China is laying the foundation that will let it push for international adoption of the e-RMB, for example as the preferred payments currency for projects involving its Belt and Road initiatives.

The idea that China will launch the e-RMB just to replace M0 is unlikely because it's such a massive project for such a relatively modest goal.

M0 represents the total circulation (that is, not held on deposit) of physical notes and coins. China's M0 had been steadily rising since records began in the 1980s, on the back of its growing economy. But something remarkable has happened: this year, China's M0 has actually shrunk—presumably because of the increasing use of mobile payments (more money is being held in deposit to fund payments through Alibaba and Tencent).

China's M0 peaked in January, 2019 at Rmb8.7 trillion, and by October 2019 had fallen to Rmb7.3 trillion (according to TradingEconomics.com). That's more than a 16% decline in cash and coins, in just 10 months.

China's M0 is large in comparison with other markets (see figure 1). But it's small change in the context of China's overall monetary system: it's smaller even than the PBoC's foreign reserves. It is one-eighth the size of M1, which includes money held in commercial checking deposits, as well as other instruments that can be readily converted to cash, such as money-market securities or mutual fund investments.

Most economists look at M0 and M2 as the most important yardsticks. M2 includes the long-term but convertible savings of corporations and state-linked entities held at banks and non-bank financial institutions. At Rmb195 trillion, China's M2 is vast (see figure 1), and involves its capital markets and trade financing as well as deposits and payments.

Therefore it's not an easy jump for an e-RMB to go beyond M0. In an M0 context, in which 100% of deposits are held at the central bank, the e-RMB is just a substitution of coins and notes. But once an e-RMB extends to M1 or M2 money, then e-RMB deposits are held with commercial banks, which can lend them out. This creates a money multiplier, just as happens with traditional credit creation, but would the PBoC be able to maintain the reserves to meet demands on digital-currency deposits?

Over time, however, China's DC/EP project is unlikely to remain limited to M0, particularly as use of Chinese mobile payments spreads internationally.

Consider that Alibaba, through stakes in many e-commerce and other companies around the world, has built a latent tech stack that can support ubiquitous use of AliPay. Tencent, meanwhile, continues to expand WeChat on the sheer volume and wealth of Chinese individuals and businesses operating abroad, and the desire by foreign companies to access WeChat's lucrative user base.

So there will be pressures to extend the e-RMB to overseas users, and Chinese commercial banks will no doubt lobby for the ability to extend credit in e-RMB.

Finally, China is vocal about seeking to balance the overwhelming use of the U.S. dollar in global trade and settlements: the dollar accounts now for about 86% of all trade-related payments, even in cases when no party has any tie to the U.S.

In this context, the idea of Facebook competing for payments among users in third countries with an attractive system over which China has no influence is obviously a threat to Beijing. A likely bet is that once it has tested its e-RMB at home, it will look to have it adopted as a means of cross-border payments.

Figure 1
Global M0, October 2019

Country	US$ (bn)
USA	3,253
China	1,044
Japan	939
S. Korea	95
Australia	78
Indonesia	44
Singapore	35

Source: TradingEconomics.com

Figure 2
China's money supply, October 2019

Type	Rmb (bn)	US$ (bn)
M0	7,340	1,044
M1	55,810	7,941
M2	194,560	27,686
Forex reserves		US$3,100

Other official responses

China's digital renminbi is the most advanced scheme by any big economy. But other central banks are experimenting with digital currencies. Some are doing so in collaboration with others, while others are more focused on domestic projects.

There is a crying need for standards and best practices in this new world, and many authorities will wait for bodies such as the Financial Stability Board, BIS and IOSCO to weigh in before they go too far on their own.

Nevertheless, some bilateral "corridor" projects are underway, such as the "Aber", a digital currency under discussion between Saudi Arabia and the United Arab Emirates for wholesale payments.
But perhaps the most interesting of these corridor plays is a project between the Hong Kong Monetary Authority and the Bank of Thailand.

Thailand's central bank had been studying a digital currency for wholesale payments, but the advent of Libra prompted it to change tack, and it is now looking at a more universal approach, according to assistant governor Vachira Arromdee.

BoT's e-baht will begin as a blockchain-based currency to be used at the wholesale level with eight commercial banks. The intention is to test whether this arrangement, called Project Inthanon, can replace the existing domestic payment system for real-time gross settlement.

Even domestic projects have cross-border implications, however. In August, one month following Facebook's announcement of Libra, the BoT and HKMA said they would test using CBDCs to facilitate wholesale cross-border payments.

But this is not the focus of all central banks. The National Bank of Cambodia, for example, is exploring a digital currency to enable interoperability among all the bank- and corporate-backed mobile wallets proliferating in the country.

Cambodia is developing a distributed-ledger platform with Hyperledger Iroha to enable its central bank to issue a wallet to all of its citizens, turning banks and payment providers into agents that circulate the NBC's tokenized riels.

It's a more ambitious version of what Uruguay tested in 2017. But many details have yet to be worked out. Firstly it assumes widespread connectivity via APIs to the NBC's platform. Secondly it assumes the NBC will be able to serve as a clearinghouse, managing liquidity among all parties.

Serey Chea, assistant governor at NBC, notes that as many as 70% of Cambodians are Facebook users. Many of these people, when they work overseas, are also paying 10% to 30% on remittance fees. So Libra is a welcome initiative, she says, but with caveats. Cambodia is already a dollarized economy, so it worries about losing its control over its money supply. And like most central banks, NCB relies on the commercial banking system to transmit its monetary policy, and it would not welcome digital currencies that undermine local banks.

Part Four: Monetary policy and financial markets

Technology is reshaping the future of money. Most notably it is allowing all sorts of players to bypass the commercial banking system, be it domestically or with regard to cross-border payments. These issues have been bubbling away ever since Bitcoin appeared, but it is the prospect of Facebook's Libra that has shocked central banks into action.

China versus the dollar

China's response will be the most important by a government player because it is the only major power that has the will and the means to disrupt the current, U.S. dollar-dominated status quo. So far, efforts to internationalize the renminbi have completely failed, other than PBoC's winning inclusion of the yuan in the basket of currencies that comprise the International Monetary Fund's internal means of account.

Yet that is merely a symbolic victory for China: the U.S. dollar continues to underpin global payments and trade finance far in excess of America's actual participation in commerce.

Today's financial infrastructure dates largely back to the Bretton Woods agreement of 1944. It is a successful model that has supported global economic growth and trade, facilitating the rise of China and other Asian economies. But the U.S. increasingly relies on the overweening power of the dollar to pursue foreign-policy aims, such as sanctions.

It's not just China that would welcome new means of addressing this imbalance. Different stakeholders in the European Union are also looking at the potential of a blockchain-based digital euro to overcome some of their internal failures and contradictions, and reestablish Europe as a global leader in international finance.

Those efforts, however, are still speculative. China has been actively studying this for five years and now looks ready to launch pilot tests in Shenzhen and Suzhou. Its top four state-owned banks and three telecom companies will participate, accepting digital yuan from the PBoC and disseminating them to consumers.

The DC/EP will not replace cash deposits at banks or with e-money operators. It is a long way from being used in capital markets or trade finance.

For China's internet companies, this should look like business as usual. The PBoC is not trying to compete with Alibaba and

Tencent. Its push for making the currency operate across both platforms could pose competitive challenges, but both companies already operate in analog renminbi, so the principle hasn't changed. If anything, this should help them, if the DC/EP draws the country's cash holdouts into the electronic world, making them more likely to use the payment rails of superapps.

The presence of state-owned banks in the DC/EP pilot, however, suggests Beijing is keen to ensure its banks remain relevant in payments. China's banks are fighting to regain some relevancy among consumers and small business owners who see no point in using a bank other than as a vault. Chinese President Xi Jinping recently blessed all things blockchain, which should be read as encouraging projects among banks and other state-owned entities (and not confused with DC/EP).

One possibility: Beijing is preparing its big banks to deploy a digital yuan in international settings. The presence of the big banks is another hint that the digital yuan will extend beyond merely replacing physical cash.

If (or more likely, when) the digital yuan begins to be used internationally, this will create a new set of challenges for international monetary authorities, one as important as Libra. Central banks at smaller countries in China's sphere of influence will have to decide to what extent they will allow users of Chinese e-money operators to transact in their countries with e-RMB (which bypasses their domestic payments infrastructure and commercial banks).

They'll also have to weigh the pros and cons of their own companies or governments transacting in e-RMB, for, say, paying for Chinese companies building infrastructure on their territory. Does this imply foreign governments end up with accounts at the PBoC? What happens if there's a financial crisis when local citizens, banks, or companies can choose to put all their money into the safety of the e-RMB?

Or, what happens if foreign entities wished to exchange their e-RMB for another currency: do they risk running up against China's capital controls?

And if the e-RMB takes off internationally, what regulatory agreements will China accept? Will Beijing serve as the lender of last resort in the event of a crisis, as the Federal Reserve did in 2008? What kind of data and information sharing can be expected?

Payments

For now, the PBoC is focused on domestic, retail-focused issues. Other central banks are looking immediately at cross-border cooperation. They understand the appeal of making international payments as easy as sending a WhatsApp message is incredibly powerful, and not something they should block.

But moving money isn't the same as moving other kinds of information, particularly when there's no standards or regulation involved. Moreover, the underlying distributed-ledger technology has yet to be proven, particularly in terms of speed and scalability. But the benefits to supporting commerce are potentially massive: companies could bypass correspondent banking altogether and use a CBDC to transact on a peer-to-peer basis.

This is basically the same thing as what Ripple and other SWIFT-challengers have developed, but it's likely a central bank's version would win trust. Central banks will have to be cautious, therefore, about designing the technology, the rules of supervision beyond their own borders, and how they communicate their willingness to provide backstops.

Moreover, the very fact that there are a variety of such central-bank projects in progress means they will have the same challenges as users of Ripple, which must build digital payments corridors institution by institution. In other words, a private company may not be as trusted as a central bank, but it's a neutral broker, which gives the private sector an advantage is developing the most popular standards.

The implication for central banks is clear: privately issued stablecoins and the like are going to remain in the picture, even once central banks reclaim power over specific bilateral cross-border relationships.

If these arrangements soon narrow down to a handful of accepted, global players, the outcome could be very positive for everyone. But if it results in an endless brawl, central banks will exercise whatever powers they have to bring private players to heel.

Credit

Commercial banks represent the thorniest issue. The role they play as correspondent agents for cross-border payments can be replaced, and over time, may well be. But banks serve other functions that could also be disrupted by digital fiat, but at greater risk.

Central banks rely on commercial banks to transmit their wishes, particularly with regard to the price of money. CBDCs could enable central banks do to this much more efficiently, by allowing all kinds of companies, and even individuals, to hold accounts at the central bank. Theoretically, commercial banks aren't required here either.

But the history of finance is one of commercial banks' leading role in money creation. The act of accepting deposits and making loans is what makes the world go round. Digital fiat, designed poorly, puts this system at risk.

Central banks will therefore tread cautiously: hence China's focus on using an e-RMB to manage its mobile-payments duopoly, the emphasis on cross-border payments by HKMA and the Saudi/UAE authorities, Cambodia's desire for making mobile wallets compatible, and Thailand's look at domestic interbank payments. They all have different goals but they are all quite limited.

Yet none of them really addresses the challenge of Libra. None have yet to come up with a response that would make their fiat regimes able to provide the kind of global, universal payments channel that Facebook is proposing.

Some governments like China can ban it, but bans won't work in countries where Facebook's various properties are widely used. Nor should Libra be opposed simply because it challenges the status quo: if done right, it can solve meaningful cross-border payment failures. What "done right" means, however – in terms of standards, safety, governance, and accountability, not to mention the fact that we are really just at the early stages of digital financial innovation – looks likely to remain a point of contention.

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This paper is a publication of Digital Finance Media Limited, Hong Kong.

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