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**Developments in the Payments
Industry - An International Comparison**

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Introduction

This report is a summary of current events in the Payments Industry based on publicly available information sources. With its focus on key issues and on country/regional comparisons, it provides a useful launching pad for students and working professionals interested in this dynamic industry. Given the rapid pace of change, even those already quite familiar with aspects of the industry may benefit from a broader perspective and from an update on international developments. A cut-off date for new information has to be selected for compiling such a report and the end of May 2021 was chosen.

Each section of the report begins with an overall international perspective and comparison, followed by country/regional updates about a particular topic. Countries with highly advanced financial infrastructures such as the UK, the US and Canada are compared with less financially developed regions such as India, Africa and South America. Also included are Sweden, China and Japan, in an attempt to consider interesting examples while maintaining a broad perspective. Selected topics make clear the rapid pace of change in the Payments industry as well as the presence of significant country/regional disparities. Depending on the interests of the reader, the report could be reviewed by topic or by country/region.

The report begins with the topic of recent accelerated changes in forms of payments transactions including the switch to digital and mobile payments. Here we see that country/regional differences are driven by variations in culture, internet and mobile coverage, and the development level of national/regional banking infrastructures. The extent of financial intermediation, and now disintermediation, hinges in part on these local characteristics. As well, new digital forms of money are arising, including both private cryptocurrencies and digital fiat currencies or “CBDC’s”. Next is the evolution in different countries/regions towards more “open” banking, with customer account access by other payment processors including fintechs.

All such changes in payments systems and modes rely fundamentally on national/regional regulatory frameworks and on the evolving underlying banking/fund transfer systems. Modernization must accommodate new participants and modes of payment, while protecting privacy, providing security of data and property, and protecting against such activities as fraud and money laundering. In recognition of the importance of fintech regulations, some notable examples of recent rule changes in the UK/Europe, Canada and China are highlighted in a brief final section.

For continued updates on important changes in Payments, subscribing to the following two daily newsfeeds is recommended: <https://www.pymnts.com/subscribe/> and <https://www.payments.ca/resources/subscribe>.

Thanks are in order to the Rotman School of Management Finhub for supporting the excellent research assistance provided by Urvashi Jasani, MFin 2021. As well, the Rotman School is in Partnership with Payments Canada in fulfilling their education mandate, developing and delivering learning opportunities about the Payments Industry for students and working professionals.

Cash vs. Digital and Mobile Payments

Advancing technology, fuelled by the Covid-19 pandemic, is causing traditional methods of payment such as cash and cards to lose share. According to the annual Global Payments Report by Worldpay from FIS, which examines current and future payment trends across 41 countries, cash usage dropped by 10% in 2020 to account for just one-fifth of all face-to-face payments worldwide.

The use of mobile wallets exceeded cash for the first time for in-store payments globally. The use of mobile wallets accelerated across all regions in 2020 and now accounts for about 10% of payment methods in North America, 8% in Middle East-Africa, 7% in Europe, and 6% in Latin America.

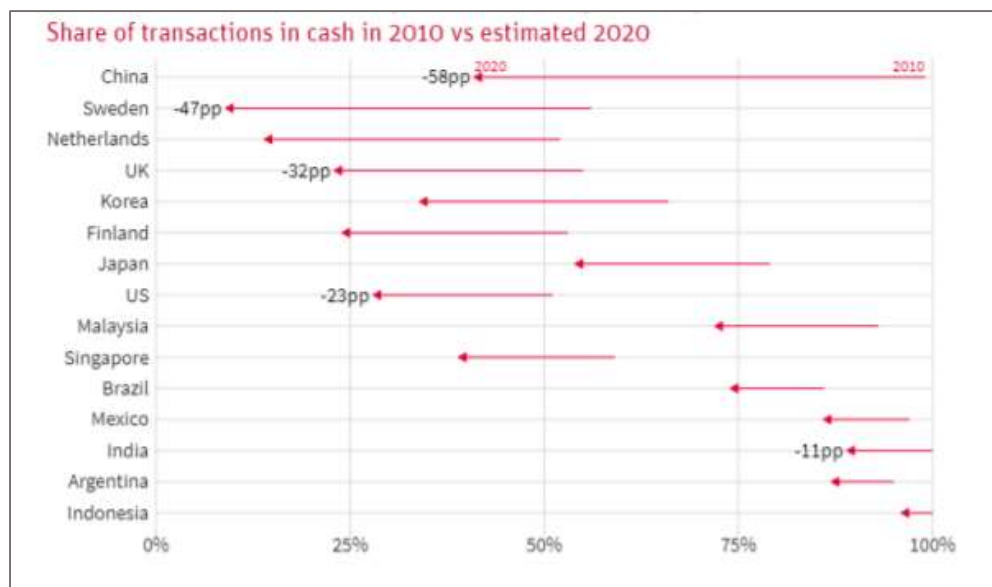


Figure 1: Declining cash usage around the world, Source: Payments Canada

While some countries like Sweden and Canada are on one end of the spectrum, approaching cashless societies, other countries like Africa are in the midst of a sizeable transition in the Fintech space. Below is an update on trends in transaction forms in selected countries and regions.

Canada

In 2011, contactless credit and debit cards started gaining popularity and cash payments have been declining ever since. Payments Canada reported in its 2020 report that cash usage continued to drop by 9% pre-pandemic, making cash payments less than 19% of total volume (number of transactions) in 2019. Consumer check volumes also declined by 12%, while electronic payments represented 77% of total payment volume and 62% of total monetary value in 2019 as more Canadians increase their usage of contactless payments.

Though cash is a dethroned king, it is still involved in a significant portion of Canadian spending in terms of transaction volume and value. Cash use is more common with younger people, particularly those with lower income who do not have debit cards or bank accounts.

Since the pandemic, Payments Canada reports that consumers have increased the use of contactless payments, highlighting the convenience of digital payments. 53% of Canadians reported using card or mobile payments more often than they did pre-pandemic and 62% reported using less cash than pre pandemic levels. This also includes the frequency of accessing money, with 61% using ATMs less than they did prior to COVID-19. Payments Canada is launching a new high-value payment system, Lynx, in 2021 and a real-time payment system, the Real-Time Rail (RTR), in 2022, which will use the existing payment infrastructure by Interac Corp. as the exchange solution provider.

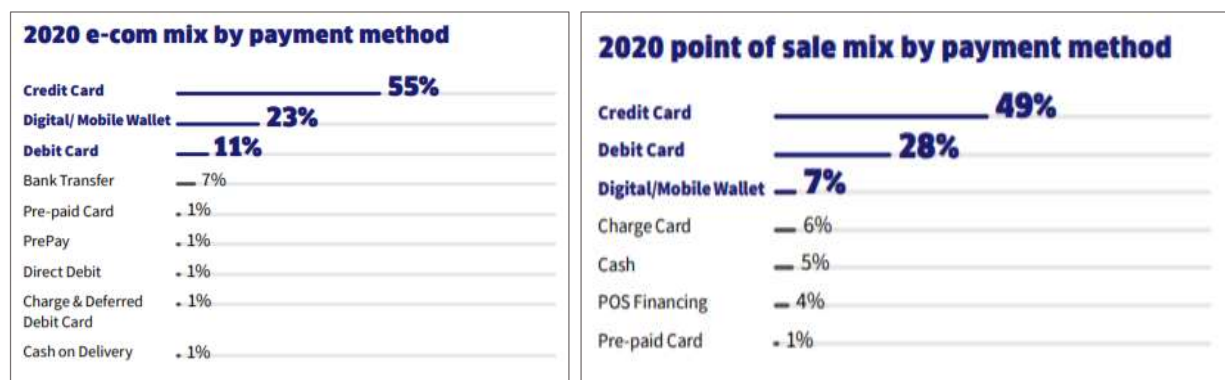


Figure 2: Canada payment channel distribution 2020, Source: The Global Payments Report by Worldpay

The main factors promoting a shift to mobile payments in Canada are the emergence of Open Banking and the development of digital identity solutions. Canadians use both online and offline POS payments. The online POS payments take place virtually in online store fronts and in-app ecommerce by saving a card-on-file. This method is very popular among younger customers (18-24 years of age), who have payment details, most likely a credit card, stored in an app. Even offline, while paying in brick-and-mortar stores, Apple pay has become the most familiar mobile wallet.

The use of mobile contactless payments differs by province and demographics. As expected, usage decreases with age. Of interest, residents of Alberta seem to be more inclined to use mobile contactless payments while Quebecers are more resistant (25% vs 13%, respectively).

Challenges with contactless payments: Among existing users, the most common barriers preventing further usage are that customers can earn rewards by choosing other payment methods, as well as the difficulty confirming whether a merchant accepts this payment method or not. Among non-users, in addition to the lack of perceived need outlined above, security also continues to be a key barrier to migration. This indicates there is a clear need for education and reassurance when it comes to newer methods of payment such as mobile contactless.

United Kingdom

Debit cards already overtook cash as the most used method of payment in 2017, but the pandemic has accelerated this trend, getting the UK closer to a cashless society. The UK government has encouraged people to make card and digital payments to prevent the spread of COVID-19 through exchanging currency.

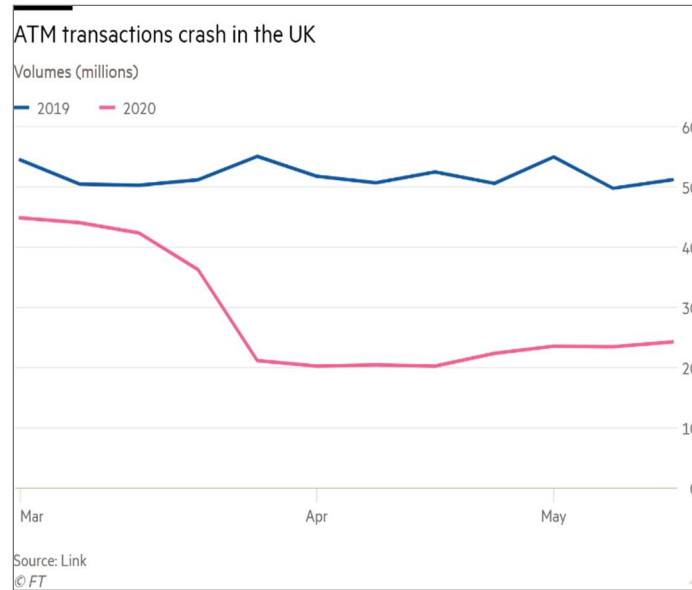


Figure 3: ATM transactions in the UK 2019 - 2020

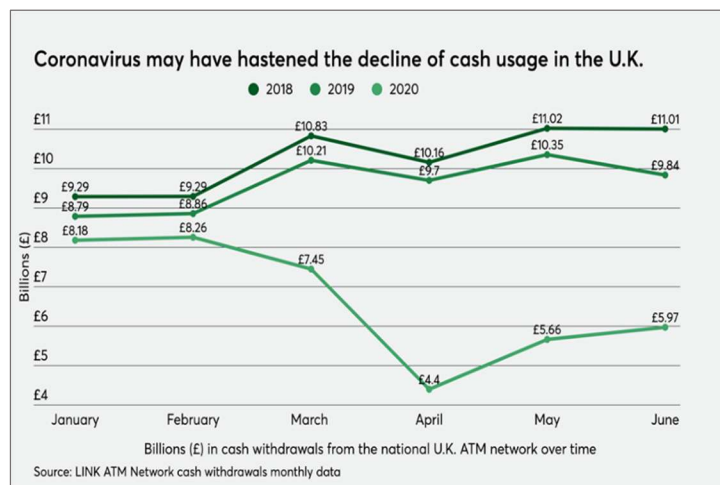


Figure 4: Cash usage in the UK 2018 - 2020

ATM transactions fell by 60% and is expected to recover to about to 30-40%, but more people looked towards online shopping and contactless payments and are more reluctant to use cash. Cash transaction volume also fell to about half of the level a year before lockdowns began in early 2020, although there are concerns that a drop in usage may lead officials to cut cash supply due to financial unsustainability, even though those in unbanked places may still rely on cash to fulfill their transactions.

Apple Pay, Google Pay and Samsung Pay are the most used mobile wallets in the UK, supported by most big banks. The PayPal app also can be used to pay in a selection of stores, though it does not support the direct NFC wireless payments that Apple Pay and Google Pay do. Mobile wallets made up 32% of online purchases in 2020 and overtook debit cards which were at 29%. At the current rate and with a boost from the pandemic, WorldPay predicts that mobile wallets could account for 40% of online payments and 13% of in-person payments in the UK.

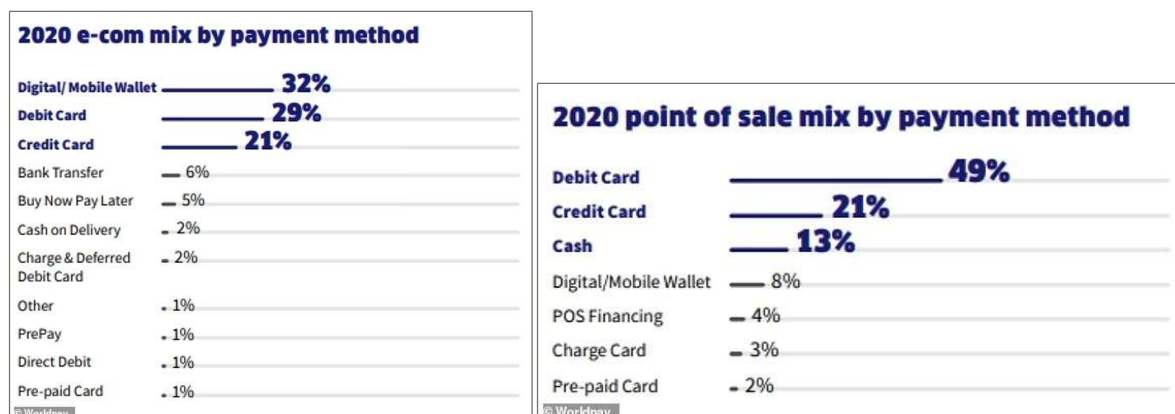


Figure 5: UK payment channel distribution 2020

Source: The Global Payments Report by Worldpay

Other than mobile wallets, buy now, pay later (BNPL) methods like Klarna, Clearpay and Laybuy have also become popular. However, there are concerns that this method will encourage higher than normal debt among the younger population. The British regulators are working to establish related rules and guidelines.

Sweden

Sweden is the world's most cashless society, with only 1% of Sweden's GDP circulating as cash. According to Riksbank, Sweden's central bank, in 10 years, the proportion of Swedes using cash has fallen from 40% to 9%. Most transactions in Sweden are done using credit and debit cards or other digital payment solutions. The use of cash is mostly limited to making small payments and cash use by the elderly.

Swedish customers have broad access to digital solutions such as account information services, payment initiation services, trading and lending platforms, crowdsourcing, and peer-to-peer platforms. As a result, the past years have seen a steady increase in open-banking activities and solutions. The pandemic has further made cash less popular than it already was.

All Swedes are easily identified by their Swedish personal identity number. There is a high degree of consumer trust in financial services and incumbent banks. A typical Swedish consumer does not mind disclosing his/her personal identity number to businesses.

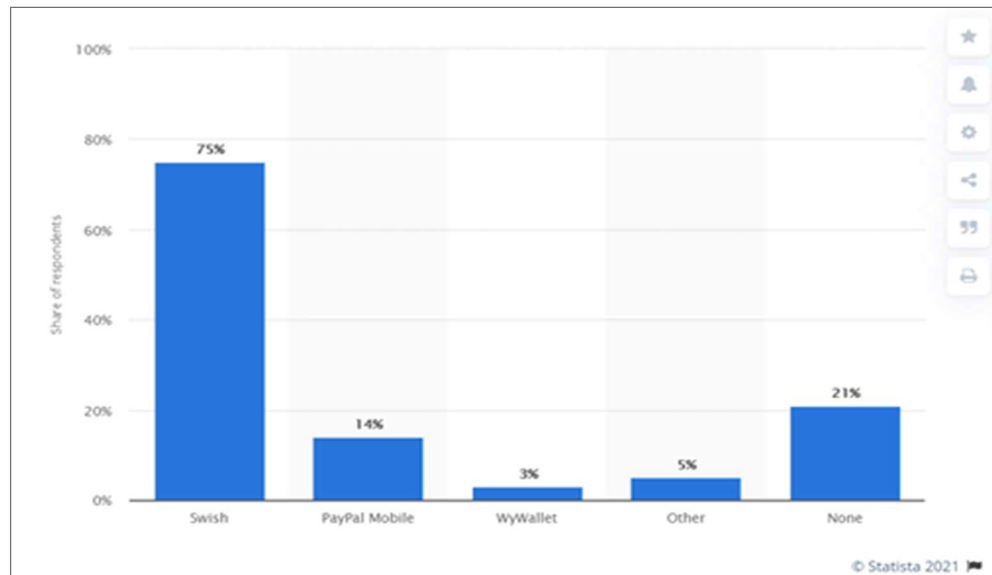


Figure 6: Payment channels in Sweden 2021

One of the last bastions of cash - kids' pocket money, is also dying out in Sweden. Only 16% of Swedish children get regular allowances in the form of actual bank notes and coins, according to a poll by Sifo in June 2020. Svenska Handelsbanken AB, Sweden's biggest lender, has introduced a digital piggy bank to help kids manage their pocket money via their mobile phones.

With almost the entire population of Sweden under mobile coverage, almost all purchases are being paid for either with a debit or credit card, or mobile apps like Swish. Swish payments are settled via a private technical platform and not through the Riksbank's payment system RIX. Another popular mode of payment is Sweden's Buy Now, Pay Later firm Klarna, which allows shoppers to make purchases online via its merchant partners. Payments for products may be settled via easy installment plans.

However, there are concerns about a completely cash-free society. Divisions in the debate have started to emerge along lines of age, wealth and location, with people worrying about forgetting pins, thefts and scams. With the dwindling number of ATMS, people sometimes need to travel over 20 kilometres to visit a cash deposit machine. A cashless society would also cause the central bank to lose its monopoly over cash and it would be difficult to control the circulation of cash. The government is also worried about the possibility of cyberattacks, which will do a lot of damage in the absence of physical cash.

USA

2018 was the first year when cash was overtaken by debit cards as the most used payment method, according to the Federal Reserve. Debit/credit card and contactless payment platform usage have increased for small-value purchases, although cash still dominates as a backup payment option. Cash payments have steadily been decreasing, accounting for 31% of transactions in the US in 2016 but down to 23% according to McKinsey, which argues that the COVID-19 pandemic has accelerated this decline due to concern with contaminated bills and coins. Cash payments in the U.S. made up \$1 trillion of in-store payments in 2020, down roughly 29% from \$1.4 trillion in 2019.

However, obstacles exist to making the US a truly cashless society in the future. The FDIC reported that approximately 14.1 million adults and 6.4 million children (6.5% of US households) are unbanked, which can disadvantage low-income households from making transactions. Major cities such as New York City and San Francisco have even banned merchants from going cashless in 2020, citing that cash must remain as a payment option for all.

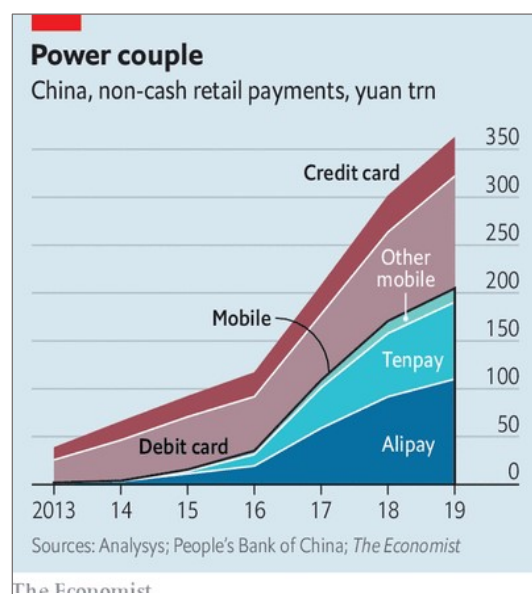
More significantly, consumer sentiment to maintain cash is unlikely to change, with 70% of Americans surveyed to use cash on a weekly basis. This along with hesitance by small business owners to go cashless (83% surveyed to refuse), and cultural customs such as tipping and giving children allowances will make a cashless society unlikely in the US, whereas a less-cash society might be more realistic.

The adoption of mobile payments is slower in the US than in China and this is mainly due to security and privacy concerns. According to Statista, cash and debit cards are the most used payment methods in most offline POS. Some consumers are still unclear on how to set up mobile wallets and some are unsure about where this mode of payment is accepted. The younger generation is quickly adopting mobile channels of payment and the pandemic is further fuelling this adoption.

Some of the most popular mobile payment methods in the US are PayPal, Venmo and Apple Pay. These companies use NFC (near-field communications), which enables data transfers between NFC-enabled devices. Apart from NFC, common mobile payment models include premium SMS, mobile billing, and web-based app payments.

China

China is one of the fastest countries to implement a cashless society, with its reliance on digital payments only intensifying during the COVID-19 pandemic. Approximately 4 out of 5 payments were mobile transactions in 2019, with a survey revealing that 98% of smartphone users in urban areas have used their devices for purchases, leading to problems such as some vendors refusing to accept cash altogether.



In fact, China's central bank fined 16 public and private organizations in 2021 for refusing to accept cash payments for discriminating and denying the customers the right to use cash. There are even instances where credit cards are not accepted by vendors, as two mobile payment platforms, Alipay and WeChat Pay (Tenpay), account for more than half of all non-cash retail payments in China. The convenience offered to consumers, as well as the 0.6% transaction fee for merchants (debit card swipes are 1%) may help to explain why non-cash payment adoption is so high in China.

QR codes are everywhere in China. Unlike Apple Pay, where sellers must buy technology to receive a payment, in China, a simple piece of paper printed with the QR code is enough. QR codes can also be

used in mobile payment apps by consumers wanting to pay their water, gas and utility bills.

Offline mobile payments using NFC, QR codes and facial recognition are often used for small, high-frequency payments such as in convenience stores, restaurants, public transport, and parking lots. They rely on devices such as code readers, POS machines and smartphones.

WeChat Pay and Alipay entered the mobile payment market early and have the biggest market share in terms of users, with the advantages of their own platforms. WeChat pay extends its services to various financial products – from investment funds to insurance within the app. Alipay allows foreign tourists to deposit money into Alipay with international credit cards without Chinese bank accounts. It also has a facial recognition feature.

Other mobile payment platforms have the advantages of platform exclusivity and high user loyalty, such as Meituan's Meituan pay. Meituan has wide offline services and offers discounts to users who choose Meituan Pay at online or offline checkout, which results in users getting accustomed to using Meituan's own payment method directly, instead of third-party payment methods, like Alipay and WeChat Pay.

However, with only 56% of the population having access to internet (772 million), China leaves out roughly 606 million people from being able to make transactions. This not only applies to the less tech savvy elderly population but also short-term visitors, who in many cases lack the domestic bank account or phone number necessary to use Alipay or WeChat Pay.

The government is not unaware of this and have exercised greater scrutiny over the two fintech firms that dominate digital transactions, including limiting the size of the transactions they can handle and mandating the use of a centralized clearing platform, possibly in anticipation of rolling out its own central digital currency and keeping the companies under control.

India

In November 2016, Prime Minister Modi suddenly invalidated most of the country's high-value currency notes — a move aimed at curbing corruption that would also, he later noted, help encourage a move toward digital commerce. Digital payments initially did surge as people struggled to get banknotes, but they reverted to cash as the amount of notes in circulation rose again. Now the pandemic, which has made people wary of close personal interactions, is giving online payments a fresh boost.

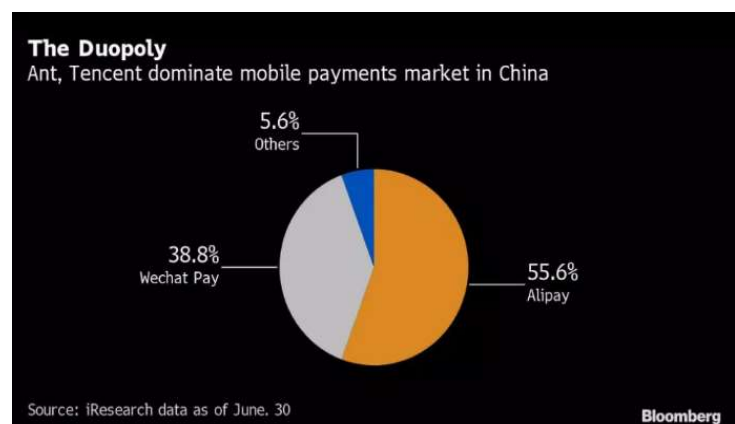


Figure 8: WeChat Pay and Alipay dominating the payments market 2020



Figure 9: Impact of Covid-19 on cash payments in India – Cash still rules

The value of transactions on the Unified Payments Interface (UPI), a platform created by India’s largest banks in 2016, reached an all-time in July as people feared to handle banknotes amid the pandemic. Electronic fund transfers from banks, which had dropped in April as economic activity slowed almost to a halt, have also rebounded.

Popular mobile payments services in India are overlaid on the Unified Payments Interface, a banking industry-sponsored protocol that allows people to link their bank accounts with their phone numbers through apps provided by payments service providers and to make instant fund transfers between bank accounts. Unlike ApplePay or other mobile apps, the Unified Payments Interface (UPI) does not require the customer to link credit/debit cards. People are not always comfortable in sharing their card details and CVV number, which has made UPI widely used in the country for mobile payments, utilities and e-commerce. While UPI Payments did post a slight dip in April to Rs. 1.51 lakh crore, it soon recovered to Rs. 2.18 lakh crore in May; higher than pre-covid levels.

Interestingly, Kirana stores drove essential retail consumption during the lockdown. Their share of digital payments increased from 60% to 75% post-COVID, led by mobile-based payments as consumers prefer non-physical modes. In terms of mobile wallets, Paytm dominates with 50% market share followed by PhonePe and Google Pay. The launch of UPI caused a slowdown in growth of these wallets as funds had to be pre-loaded and customers with different apps could not transact with each other.

Payment companies are continuing to deepen their services with offerings like buying and selling of digital gold. Paytm is trying to develop a bank-like infrastructure and has acquired brokerage licenses to distribute mutual funds and insurance policies. Payment companies are engaging with small merchants by digitizing ledger books of small stores, creating digital fronts for customers to discover them online, using small shops as ATMs to facilitate cash withdrawals for customers and developing visual codes for restaurants that allow customers to scan and browse the menu as well as pay for their orders.

Cash Still King - India’s digital payments per capita have grown more than five times since 2015, to 22.4 transactions per person in the year ended March 2019, Reserve Banks of India figures show. That is still far below China, which saw 96.7 cashless transactions per person in 2017. Because of the ease of usage, widespread availability and acceptance, no cost to the consumer and large number of unbanked customers, cash continues to play a significant role in payments across geographical, socio-economic and sectoral divides.

South America

Latin America has one of the highest rates of smartphone adoption in the world after North America and Europe. However, the country has very low banking penetration. Up to 65% of adults do not use formal financial services, meaning they do not have credit cards, debit cards, and/or bank accounts. Unlike other Latin American countries, Chile enjoys a high level of bancarization, a measure of the level of access to and the degree of use of formal financial services, so most people paying cash online have bank cards. Established startups like PayPal, Venmo, Stripe, Square, and others do not operate in Latin America or do not integrate with Latin American banking systems. If they do work, they function via local services that charge as much as 10% in fees in countries like Chile, Argentina, and Brazil.

In Latin America, 81% of retail spending was still transacted through cash. The two top countries in the region — Mexico and Colombia — had a cash penetration of close to 90% in 2018. Only 39% of the population has a bank account. Cash is still popular for several reasons – lack of banking infrastructure, lack of access to credit, and a mistrust in financial institutions. Even during the pandemic, cash-based alternatives were used to pay for up to 20% of online purchases, according to the [Beyond Borders 2020/2021 study](#).

A common cash-based method of payment is making online purchases with bar-coded paper vouchers called OXXO in Mexico and Boleto Bancário in Brazil that are issued online and can be printed and taken to cash pay-in locations such as convenience stores, lottery agents and bank branches. In Argentina, these cash payments are offered by RapiPago and Pago Fácil.



Figure 10: How OXXO Pay works with Stripe

Pix, an instant, cost-free payments solution is a hit in Brazil with almost a third of transfers between individuals taking place through this system. Mexico's Cobro Digital (CoDi), the instant payment system launched in 2019, is also being explored by retailers, payment providers and fintechs for digital commerce. Thirty-two of the largest financial institutions in Mexico already participate with more adapting their technology to also process payments through CoDi. The system also has more than 150 non-financial participants, from retailers to fintechs. Smart phone penetration and the distribution of emergency aids through digital accounts has given a boost to digital wallets such as PicPay, in Brazil, MACH Pay, in Chile, and Nequi, in Colombia. They have millions of active users and are being widely accepted in physical and digital stores. In Venezuela,

digital wallet provider AirTM continues to gain ground as millions of dollars are being disbursed from Interim President Juan Guaidó’s team to ill-paid healthcare workers.

Africa

Despite country-specific differences, cash remains the leading payment method in Africa. Cash holds its dominant position despite the pandemic causing a dramatic 25.5% reduction in 2020, falling from 70.6% in 2019. As of 2020, cash was the main payment method used in online retail in Egypt, Kenya, and Morocco, accounting for 55 percent, 40 percent, and 41 percent of the total share, respectively. On the other hand, cash was not that prevalent in Nigeria, where 27 percent of e-commerce payments occurred by card, and 24 percent by bank transfer. As per the [Global Payments Report](#) by Worldpay, in Nigeria, cash usage fell from 91% of POS transactions in 2019 to 69% in 2020. In South Africa, cash use dropped below 50% amid the pandemic in 2020.

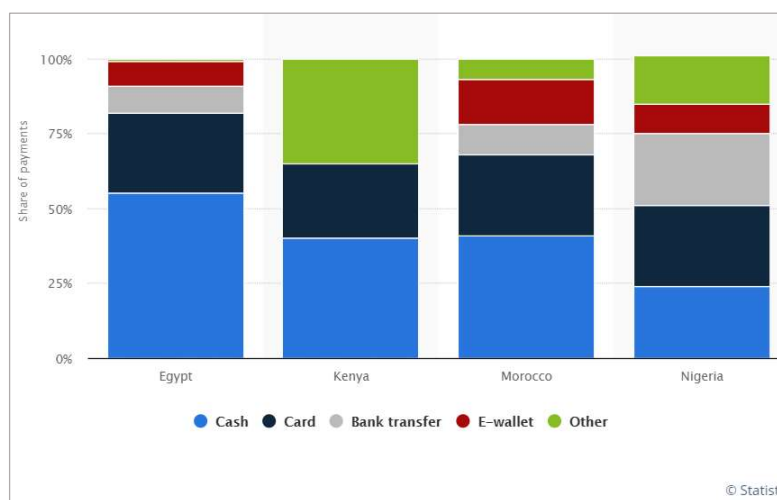


Figure 11: Payment channels in African countries 2020

Replacing cash at the point of sale brought a diverse balance of legacy and contemporary payment methods. Cards and mobile wallets are gaining traction. In Africa, mobile phone penetration is higher than bank account ownership. Mobile providers develop mobile money services for smartphones, as well as feature phones, so people at all income levels in countries, can receive remittance payments and make local payments. The African digital payments evolution has also led to banks adopting a mobile-led digital transformation strategy to reach more customers that could not access their services via traditional models. With light KYC accounts operated on mobile devices, instant mobile payments including the use of QR technology, banks are partnering with telcos to facilitate mobile money transactions.

Each region has their own unique mobile payment systems. Kenya’s M-pesa is extremely popular as it relies only on SMS text messaging without the need for cellular internet access. PesaChoice in Rwanda, which connects prominent utilities providers, companies and government departments to consumers through its innovative bill management technology – helping consumers to make bill payments conveniently and cost-effectively.

Pay-as-you-go (PAYG) business models make products and services accessible to low-income consumers. PAYG utility solutions have a significant social impact by enabling innovative models for energy, water and sanitation services that are affordable, clean, safe and reliable. An example

is KopaGas, which has developed a solution that allows customers to purchase gas in affordable quantities for cooking, via an IoT smart meter on the canister and mobile money pre-payments. Mobile technology is at the heart of the company's operations, supporting agents to register new customers, monitor gas consumption and pre-empt and track gas delivery to households.

Japan

Japan is largely a cash-based society, a close second in a 'competition' with Germany. Despite, at times, a healthy interest in digital cryptocurrencies like bitcoin, consumers rely heavily on physical currency while eschewing electronic payment methods. This is somewhat counter-intuitive, as the country has one of the most advanced regulatory environments in the world about digital assets. A low crime rate, years of ultra-low interest rates, an older than average population and a nationwide network of automatic-teller machines (ATMs) have long made cash appealing in Japan, giving people few reasons to shift to cashless payments. Based on data from a [Frost & Sullivan blog](#), about 75% of Japan's payment transactions were still being settled in cash just before the COVID-19 pandemic struck.

Japan is seeing a steady momentum growth of mobile payment users. The reasons behind the growth are the use of QR code payment systems, the contactless platform where payment is performed by scanning a code from a mobile app, and the government's cashless rebate program, which rewards users making these payments with up to 5% cash back on their transactions. COVID-19 has fueled the push towards cashless payments as consumers avoid the use of cash and plastic cards and with the Olympics pushed back to 2021, we can expect the Japanese government to continue to invest in mobile payment technology as part of its measures to keep the games safe.

Since launching in late 2018, PayPay has clinched the lead in Japan's crowded mobile payments market. The app hit 30 million registered users at the end of June 2020, equivalent to a quarter of the Japanese population. PayPay's distinctive red and white logo is increasingly visible in restaurants, at barbers and dry cleaners, and is now accepted by more than 2.3 million merchants across the country. Over a billion transactions have been processed.

One significant challenge is mistrust and security concerns, especially among the older population. Widespread education initiatives and precise regulations will be essential for both consumer and corporate confidence.

Cryptocurrency

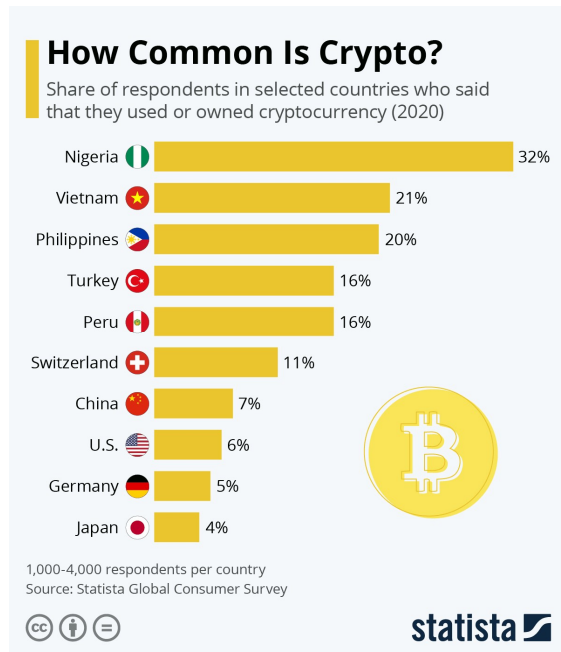


Figure 12: Usage of cryptocurrency by country

Cryptocurrency saw a massive uptick in 2017 but crashed badly in 2018, attributed to international regulation. The 2021 bull market has brought cryptocurrency back into the limelight, as Bitcoin soared to new all-time highs. The global cryptocurrency market is forecasted to grow at a CAGR of 7.1% from 2021 to 2026. Transparency or distributed ledger technology and growth in venture capital investments are the key factors driving the growth of the cryptocurrency market.

Canada

Under the Bank of Canada Act, cryptocurrency is not legal tender and is considered a commodity. However, it is not against the law to buy and sell cryptocurrencies or use them as a method of payment wherever they are accepted in Canada. The top cryptocurrency trading platforms in Canada are Wealthsimple Crypto, Coinsmart, NDAX, and BitBuy among others. Canada also

launched the first bitcoin ETF, called the Purpose Bitcoin ETF (TSX:BTCC.B) on the Toronto Stock Exchange in February 2021.

Regulators have long seen a need to regulate crypto exchanges and trading platforms, especially after the collapse of QuadrigaCX – the largest cryptocurrency exchange in Canada at the time – which resulted in tens of thousands of investors collectively losing \$169 million through fraudulent trading. As of June 1, 2020, all cryptocurrency exchanges in Canada will be required to register with the Financial Transactions and Reports Analysis Centre of Canada (FinTRAC) to be able to continue to serve clients in Canada. The Act has also made compulsory the establishment of a compliance program for observing Know Your Customer (KYC) policies. All platforms that facilitate trades in digital tokens or contracts involving crypto assets are required to register as investment dealers and become members of the Investment Industry Regulatory Organization of Canada (IIROC).

United Kingdom

In 2020, the UK announced that cryptocurrency is property, but cannot be considered as ‘money’. However, because the legal consequences, regulations, and status of crypto assets and currencies can change depending on their nature, type, and usage, the Financial Conduct Authority (FCA) and the Bank of England have issued a range of warnings and guidance about their use. Popular exchanges where crypto can be traded are eToro, Coinbase, CoinJar and Bitpanda.

A task force was set up by the UK government in 2018 to formalize crypto regulation - requirement for additional AML/CFT and taxation considerations. Gains or losses on cryptocurrencies are subject to capital gains tax. January 2021 onwards, all recognized cryptocurrency exchanges,

advisers, investment managers, and professionals, that have a presence or market product in the UK, or that provide services to UK resident clients, must register with the FCA. Effective January 2021, the FCA has also banned the sale of all cryptocurrency derivatives, as it considers them very risky for retail investors.

Sweden

Cryptocurrency is legal in Sweden, but authorities consider it as property. Sweden's financial regulator, Finansinspektionen, or FI, has many times warned consumers against the risks associated with cryptocurrency. The e-krona is a pushback effort from the Riksbank of Sweden to gain a foothold in the digital currency market and defending their national currency. Similar to the UK, crypto can be traded on exchanges like eToro, Coinbase and Bitpanda.

Laws and regulations for crypto are likely to develop soon as trading in Bitcoin, Litecoin and Ethereum has steadily increased. FI has declared that cryptocurrency regulation falls under their authority. Individuals must declare all of their transactions made through the use of cryptocurrencies on an annual basis. Trading of crypto assets attracts a capital gains tax of 30%.

USA

Purchase and trading of cryptocurrency is legal in the United States. The country accounts for nearly a quarter of worldwide trading of Bitcoin. Popular US crypto exchanges are Coinbase, Robinhood, Kraken, Binance and Gemini. Conversely some people prefer to use peer-to-peer cryptocurrency exchanges where customers in a specified region trade with each other directly. Unlike in Canada, you can even use a credit card to buy cryptocurrency in the US, making it even more accessible.

Customers of some U.S. banks will soon be able to buy, hold and sell bitcoin through their existing accounts, according to crypto custody firm NYDIG. In March, Morgan Stanley was first among banks to offer bitcoin funds to its clients. Goldman Sachs quickly followed with an announcement of its own, and JPMorgan is reportedly looking at its own product in conjunction with NYDIG.

Some companies that have started accepting bitcoin as a mode of payment include Tesla, Microsoft, Whole Foods, Home Depot, Overstock, AT&T and Starbucks. Most of these companies have partnered with crypto exchanges like Flexa and Bakkt which facilitate easy and secure acceptance of payment via cryptocurrency. PayPal has also launched a crypto checkout service.

Each state has its own decision to make regarding its treatment of digital currency, though many have yet to make this decision. Rhode Island and Arizona impose sales tax on all cryptocurrency transactions and development. Hawaii requires exchanges to have their entire cryptocurrency balance backed up by traditional currency. The state of Wyoming is the most crypto-friendly state as it has passed legislation to create a new type of bank or special purpose depository institution which will allow businesses to hold digital assets safely and legally. Colorado passed a bipartisan bill exempting cryptocurrencies from state securities regulations. Ohio became the first state to start accepting taxes in cryptocurrency. New York has eased its laws on attaining a Bit License to attract businesses that previously exited.

The Eliminate Barriers to Innovation Act of 2021, if passed by the Senate and enacted into law, would create a digital asset working group between the Securities and Exchange Commission (SEC) and Commodity Futures Trading Commission (CFTC). The working group would be

responsible to provide a report on the legal and regulatory frameworks related to digital assets, including the impact that a lack of clarity of digital assets has had on primary and secondary markets. The group would also examine the impact of the regulatory regime on our competitiveness of the U.S. versus other countries.

China

In 2017, China banned initial coin offerings (ICOs), which allowed crypto companies to raise money by issuing digital tokens and it also shut down crypto exchanges. Onshore investors could trade bitcoin on platforms owned by Chinese exchanges that have relocated overseas, including Huobi and OKEx. China-focused cryptocurrency exchanges are not licensed on the mainland, but individuals could easily open accounts and trade online if they upload details of their Chinese identity cards. Exchanges such as Binance and MXC bar the use of yuan and only allow trading between cryptocurrency pairs, such as bitcoin versus the dollar-linked stablecoin tether (USDT). Chinese investors could use peer-to-peer markets to buy USDT using yuan, with payment made via bank cards or online transfers. This process did not violate Chinese laws.

In May 2021, China banned crypto exchanges and initial coin offerings but did not bar individuals from holding cryptocurrencies. The directives were made in a joint statement from the National Internet Finance Association of China, the China Banking Association and the Payment and Clearing Association of China. Financial institutions and payment companies have been banned from providing services related to cryptocurrency transactions such as registration, trading, clearing and settlement. Investors have been warned against speculative trading. The institutions must not provide saving, trust or pledging services of cryptocurrency, nor issue financial product related to cryptocurrency, the statement also said.

India

The cryptocurrency industry is booming in India, with trade volumes soaring, more than 300 crypto businesses hiring and up to 10 million investors pouring about \$1.5 billion into cryptocurrencies. As cryptocurrency has gained global momentum, it has also become extremely popular in India. With most of the population comprised of young, digital-savvy people and with cheap internet, the enthusiasm for cryptocurrency is very high and is growing. With over 190 million unbanked adults, the establishment of a sound blockchain network will also foster financial inclusion. For these reasons, many experts are of the opinion that the Indian government should regulate crypto, rather than ban it.

The three largest crypto exchanges in India are WazirX (bought by Binance in 2019), Unocoin and CoinDCX. Crypto exchange Unocoin raised \$5 million from investors like Tim Draper in October 2020, while CoinDCX raised \$14 million in a third venture round led by Block.one in late December 2020. U.S exchange Coinbase has hired a Google Pay India engineering lead to build an Indian operation.

In May 2020, the Supreme Court of India overturned the cryptocurrency ban which was levied by the Reserve Bank of India (RBI) in 2018. There is still a lot of confusion and a lack of clarity with respect to crypto regulation in India. The Government of India is proposing banning cryptocurrency. A bill is being formulated to give holders of digital assets six months to liquidate them, or else be penalized. The finance ministry “will allow certain windows for people to do experiments on blockchain, bitcoins, or cryptocurrency,” Finance Minister Nirmala Sitharaman

said. Cryptocurrency entrepreneurs are creating an industry association that will lobby the Indian government to fend off a potential ban.

South America

Latin Americans are among the fastest adopters of cryptocurrency in the world. Especially in countries with tight capital controls, like Argentina, Venezuela, and Brazil, Bitcoin and other cryptocurrencies often provide more stability and freedom than local currencies. Buenos Aires is considered one of the most Bitcoin-friendly cities on earth.

Cryptocurrency adaptation in Latin America is driven by factors such as lack of banking access, remittance needs, and the devaluation of local fiat currencies. Argentina is a poster child for crypto because of its economic downturn with high inflation, a deflating currency, and a shortage of US dollars to invest in. Argentina has been in recession since 2018, with inflation averaging 45 percent over the last three years, and a GDP contraction of 9.9 percent in 2020.

People are holding cryptocurrencies, particularly Bitcoin, as a store of value while their currency depreciates. Some online companies in Latin America like Whole Foods, Microsoft, Newegg, MercadoLibre and some online casinos have started accepting cryptocurrency as a form of payment.

There is also a robust trading scene, especially in Brazil and Venezuela. In the past year, Latin American countries have sent \$25 billion worth of cryptocurrency. In that same time, they received \$24 billion worth of cryptocurrency. This represents between 5 and 9 percent of all cryptocurrencies in the world.

Crypto regulations in Latin America vary by country. Some jurisdictions have no specific laws governing cryptocurrency trade beyond the scope of existing legislation. Among other countries, there is a spectrum of legislations. In Mexico, Argentina, Brazil, Venezuela and Chile, cryptocurrencies are commonly accepted as payment by retail outlets and merchants. Bolivia has comprehensively banned cryptocurrencies and exchanges, and Ecuador has issued warnings on the use, investment, and circulation of all cryptocurrencies apart from the government-issued “SDE” token (a form of e-money pegged to the USD).

Brazil’s Federal Revenue Service (Receita Federal) requires residents to report transactions involving cryptocurrencies. They are generally viewed as an asset class, and capital gain taxes must be paid on them. In Argentina and Brazil, they may be categorized as income tax, depending on the volume. Mexico’s Bill, “Law, To Regulate Financial Technology Companies,” requires companies to comply with anti-money laundering laws concerning Bitcoins and other crypto currencies by registering and reporting them. Apart from regulation, governments across the region are increasingly using blockchain tech and cryptos to improve accountability.

Africa

The catalysts for cryptocurrency adoption in Africa are growing remittances from diaspora abroad, currency devaluations in many countries, and a lack of banking infrastructure. In 2020, Nigeria generated more than \$400 million in transactions, third place after the US and Russia, especially after the naira was devalued in March 2020. South Africa and Kenya are also powering through cryptocurrency use. There is a growing generation of adaptable young professionals and would-

be entrepreneurs. Also, high unemployment in many African countries means young people are avoiding traditional sectors and exploring new ways to make money.

There are also a lot of challenges for Africans investing in crypto. Inadequate internet and electricity coverage is a major roadblock. Uneducated and non-tech-savvy investors also face the risk of falling into a number of prevailing crypto-scams or investing in the wrong markets.

The South Africa based Luno exchange, established in 2013, has 1.5 million customers in over 40 countries. By far the most ambitious project is the Rap Artist, Akon's 'Akoin'. The futuristic city in Senegal is expected to have low tax levels, in a bid to attract foreign companies and capital investment, with Akoin serving as the default currency. Abra in Malawi and Morocco, GeoPay in South Africa, BitMari in Zimbabwe, and Kobocoin throughout Africa are other crypto-based remittance services.

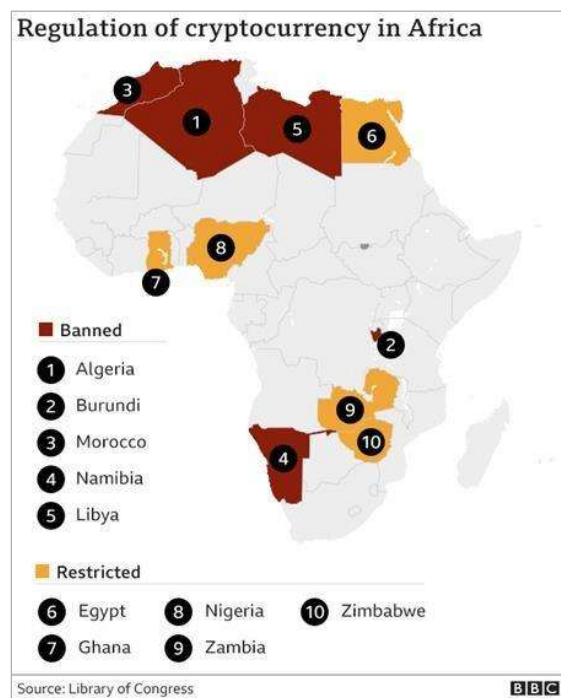


Figure 13: Cryptocurrency Regulation across Africa

Many regulators are seeing cryptocurrency as a threat to the economic soundness of the country. In Feb 2021, the Nigerian Central Bank instructed the commercial banks and other financial institutions to close accounts dealing in cryptocurrencies, citing them as a threat to the Nigerian financial system. Many Nigerians have reported that their bank accounts have been frozen due to cryptocurrency activity. Nigeria will further explore the associated risks to determine regulation for the future.

South Africa's Financial Sector Conduct Authority (FSCA) has expressed enthusiasm regarding crypto's potential and have published a draft declaration of crypto assets as a financial product. However, there is still a lot of confusion and uncertainty in rules, which is forcing a lot of crypto exchanges to move their headquarters abroad. South Africa is notorious for its long history of pyramid and Ponzi schemes and crypto regulations need to be sound enough to protect investors from such risks.

The Central Bank of Kenya has restricted other banks from dealing in cryptocurrencies due to safety issues, which has acted as a big hurdle to crypto acceptance. The decision about cryptocurrency acceptance and legalisation is still pending.

Japan

Japan is one of the countries that is leading the way for cryptocurrencies. Japanese traders, being more risk averse, tend to invest in major tokens like Ripple (XRP) and Cardano (ADA). There are many cryptocurrency exchanges in Japan and customers can choose one based on their preference of transaction fees, withdrawal limits, reputation, and ease of use. The most popular ones are Paybis, bitFlyer, Coinmama, Coincheck. There are also nine bitcoin ATMs in Japan, where a debit card can be used to anonymously obtain tokens. However, these have high transaction fees of around 5-10%. LocalBitcoins is a peer-to-peer (P2P) exchange, where you

can buy and sell with another individual using a wide range of payment methods from bank transfers to gift cards.

There are a lot of avenues where bitcoins can be used for purchases. In 2017, Coincheck partnered with Recruit Lifestyle to enable Bitcoin acceptance across 260,000 retail locations in the country. Some other companies that accept bitcoin as a mode of payment are Bic Camera, Yukizaki, ZenMarket, as well as many hair salons, bar, restaurants and cafes.

The Japanese legal and business environments are highly conducive to blockchain technology. In April 2017, Japan passed a law that recognised bitcoin as a valid form of payment. However, cryptocurrency is classified as an "asset" and is NOT a legally recognized currency or legal tender. They also removed the 8% consumption tax on Bitcoin. The Payment Services Act (PSA) and the Financial Instruments and Exchange Act (FIEA) cover the legislation on cryptocurrencies in Japan. Crypto assets taxation can be classed as 'miscellaneous income', which means that gains or losses made from the sale of crypto assets cannot be offset by other income streams.

Central Bank Digital Currency (CBDC)

Central Bank digital currencies (CBDCs), also called digital fiat currencies, are digital banknotes issued by central banks using a blockchain financial infrastructure. The concept of CBDC is being explored to counter private cryptocurrencies which are gaining immense popularity but are decentralised and unregulated. The interests of central banks in CBDC fall into two broad categories: addressing present-day challenges like inefficient payment systems, weak banking infrastructure, or declining cash use; and exploring future capabilities such as potential payments innovation and financial inclusion. Some of the benefits of CBDC include:

- **Safe and resilient payment infrastructure:** CBDCs can help solve problems of concentration or monopoly of payments by certain key players in the industry. It can also aid PSPs by increasing their adoption and fostering healthy competition in the payments sector.
- **Peoples' confidence in money:** A retail CBDC could provide enhanced visibility and traceability of transactions, unlike cryptocurrency. It would also have an effective fraud prevention mechanism. Each digital bank note will have its own unique identity code.
- **Maintaining price stability:** CBDCs can be used as a tool to support monetary policy decisions. If this currency is interest-bearing, it could act as an instrument to reinforce interest rates set by the central bank to the wider economy.
- **Increased financial inclusion:** CBDC deployment would minimize the amount of infrastructure and third-party involvement needed to successfully drive towards a fully developed economy. This would be particularly helpful in emerging economies that have large unbanked populations and weak financial infrastructure. A CBDC could also improve fiscal stimulus distribution by making it quick and convenient to transfer funds to the eligible parties.

Where does the world stand on CBDC?

According to a 2021 BIS study, 86% of central banks are actively researching the potential for CBDCs, 60% were experimenting with the technology and 14% were already deploying pilot projects. The BIS is supportive of CBDC development by national governments and could some day serve as a global super central bank to ensure future interoperability of CBDCs.

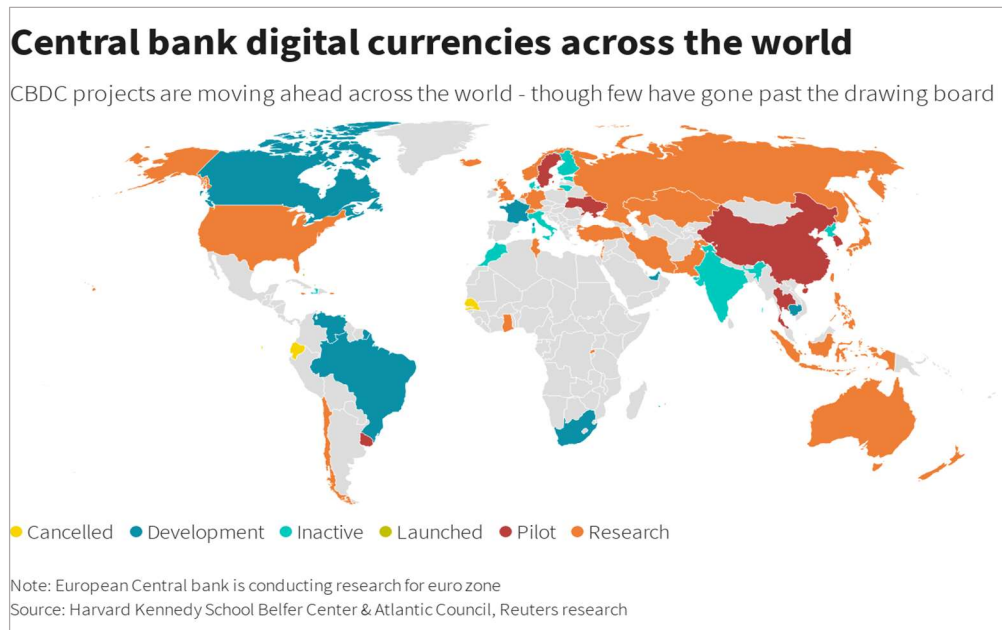


Figure 14: CBDC progress around the world

Canada

Canada is still in the exploratory stage when it comes to CBDC, which is being developed as a contingency plan. Two possible scenarios that qualify as contingencies are (1) the rise of alternative digital currencies like Bitcoin and Ethereum as well as stable coins, that will undermine the central bank’s ability to effectively implement monetary policy and (2) decline of cash to a level where it would no longer be a competitive offering to businesses and retail.

The fast-evolving online payment system and increasing need to streamline cross border payments is prompting discussions around CBDC in Canada. The BoC says that it still has a lot of work to do before it decides to launch a CBDC. Investigations are still under way. While practical policy analysis and applied technical experimentation has already started, the speed of innovation in payments and money-related technologies requires the prioritisation of collaborative experimentation.

As the Bank of Canada explores the design for a secure digital currency, it has received design proposals from the University of Calgary (Lehar, Choi, Henry, Reardon and Safavi-Naini), McGill University (Trinn, Dubach), University of Toronto and York University (Park, Veneris, Long and Puri). The Bank will use these reports to ‘inform its thinking and advance public conversation on a central bank digital currency design.’

United Kingdom

A Central Bank Digital Currency (CBDC) would be an electronic form of central bank money that could be used by households and businesses to make payments. The Bank of England’s primary objectives are to maintain monetary and financial stability. UK’s finance ministry recently announced a new taskforce between the Treasury and the Bank of England to coordinate exploratory work on a potential central bank digital currency (CBDC) ‘Bitcoin’.

It is not presumed any CBDC must be built using Distributed Ledger Technology (DLT), and there is no inherent reason it could not be built using more conventional centralized technology. However, DLT does include some potentially useful innovations, which should be analyzed when considering the design of CBDC. Distribution and decentralization may enhance resilience and availability but could have a negative impact on aspects such as performance, privacy, and security.

Reasons that are driving the UK to build and introduce a CBDC are:

- To keep up with a period of significant change in money and payments. The use of banknotes - the Bank's most accessible form of money – is declining, and use of privately issued money continues to increase, with technological changes driving innovation. These developments provide the public with new ways to pay for goods and services, which support and enable the digital economy, but also present new risks.
- New forms of money and payments are also emerging, such as stablecoins- privately-issued digital currencies (cryptoassets whose value is linked to another asset) which could transform the way people store and exchange their money, making payments cheaper and faster.

Features of CBDC in UK

- A UK CBDC would be a new risk-free form of (digital) pound sterling, issued by the central bank, and would therefore perform all the essential functions of money.
- A CBDC would be equally safe and have no credit risk, and similar usefulness as a means of payment to an ordinary current account.
- If a CBDC were to be introduced in the UK, it would be denominated in pounds sterling, just like banknotes, so £10 of CBDC would always be worth the same as a £10 note.
- Any CBDC would be introduced alongside – rather than replacing – cash and bank deposits.
- All CBDC payments would be settled immediately ('real time') in central bank money.

Functioning of the CBDC

There are two key elements of the proposed platform: (1) a core ledger, provided by the Bank, would record CBDC and process payments, and (2) private sector 'Payment Interface Providers' would handle the interaction with end-users and provide additional payments functionality through overlay services.

- The Central Bank would build a fast, highly secure, and resilient technology platform— the 'core ledger' — which would provide the minimum necessary functionality for CBDC payments. The core ledger would be accompanied by an API (Application Programming Interface) to allow third-party Payment Interface Providers to securely send payment instructions and ask for updates from the ledger. To ensure resilience, security, and integrity, only entities approved by the Bank, such as Payment Interface Providers, would be able to connect to the core ledger.
- The core ledger would serve as the platform on which private sector firms, called Payment Interface Providers, could connect to provide customer facing CBDC payment services. These firms might also build 'overlay services' — additional functionality that is not part of the Bank's core ledger, but which could be provided as a value-added service for some, or all, of their users.

Payment Interface Providers would need to meet criteria set by the Bank and relevant regulators before they start to offer CBDC-related services and be supervised on an ongoing basis. The Bank could impose standards for these overlay services, alongside wider regulation, to ensure that they were secure, resilient, and interoperable with the wider CBDC payment system.

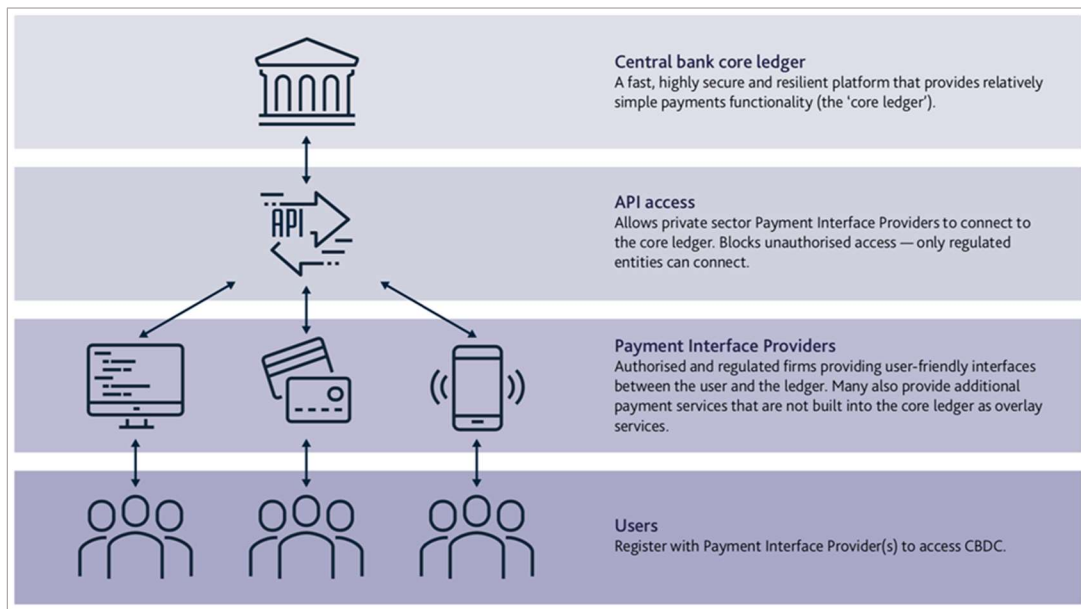


Figure 15: Structure of CBDC in the UK, Source: Medium

Legal and regulatory:

- To ensure financial stability, the Bank of England regulates and supervises systemically important payment systems (the core infrastructure that undertakes the activities of authorization, clearing and settlement) and designated critical providers to them.
- To ensure consumer protection and resilience, payment service providers are subject to regulation by the Financial Conduct Authority (FCA).
- The Payment Systems Regulator (PSR) is the economic regulator for the payment systems and their participants in the UK.
- Payment Interface Providers would need to meet three principles that payments regulation should aim to achieve outlined by Financial Policy Committee (FPC) and any other criteria set by the Bank and relevant regulators before they start to offer CBDC-related services. This would include a requirement that entities have the appropriate regulatory authorization(s) and would be supervised on an ongoing basis.
- The Bank (and relevant regulators) would also need to set standards to ensure that the CBDC payments system was resilient and reliable, open and interoperable.
- A CBDC payment system would need to be compliant with anti-money laundering (AML) and combating the financing of terrorism (CFT) regulations and requirements.

Sweden

Sweden's Riksbank is developing a technical solution for a central bank-issued e-krona, which would be a complement to cash. The e-Krona is currently in Phase 3 of its pilot, an effort that began in February 2020 and is expected to run until February 2022. The bank is employing the services of Accenture to focus on performance and stability of the new currency. The first three phases are testing various functionalities of the e-Krona such as making payments, deposits and transfers within the Riksbank provided e-wallets. As of now, the testing is only limited to Riksbank's private network, without involving any end-users or intermediaries.

Sweden's motivations to introduce a CBDC:

- Sweden is said to be the world's most cashless society, making it a prime candidate for the introduction of CBDC.
- Concentration of payment services by third party PSPs like Swish are rising in popularity in Sweden. Nearly 80 percent of the Swedish population used Swish for payments, and as of July 2020, averaging around 50 million transactions a month. As Swish is on the path to creating a payments monopoly, the ability of the central bank to ensure a competitive and innovative market for payments becomes hindered.
- With low cash usage, introducing a CBDC will enable the central bank to continue to maintain the sovereignty of the monetary policy transmission and act as a lender of the last resort.

Commercial banks of Sweden are having some concerns about the e-krona. If Swedes moved their money out of deposit accounts and into e-krona, this would potentially deprive banks of funding and leave them reliant on wholesale markets for liquidity. It would make banks take on more debt and impact their profitability. There is also a question of whether the Riksbank would lend funds to banks to make up for the lack of deposits, which would mean that mortgages and corporate loans may depend on the Riksbank's appetite. Issuing a CBDC which does not bear interest would limit a central bank's ability to impose its policy rate.

Functioning of the e-krona

The proposed platform of the e-krona is decentralised and two-tiered. While the CBDC has a direct claim on the central bank, the bank is not responsible for consumer facing operations.

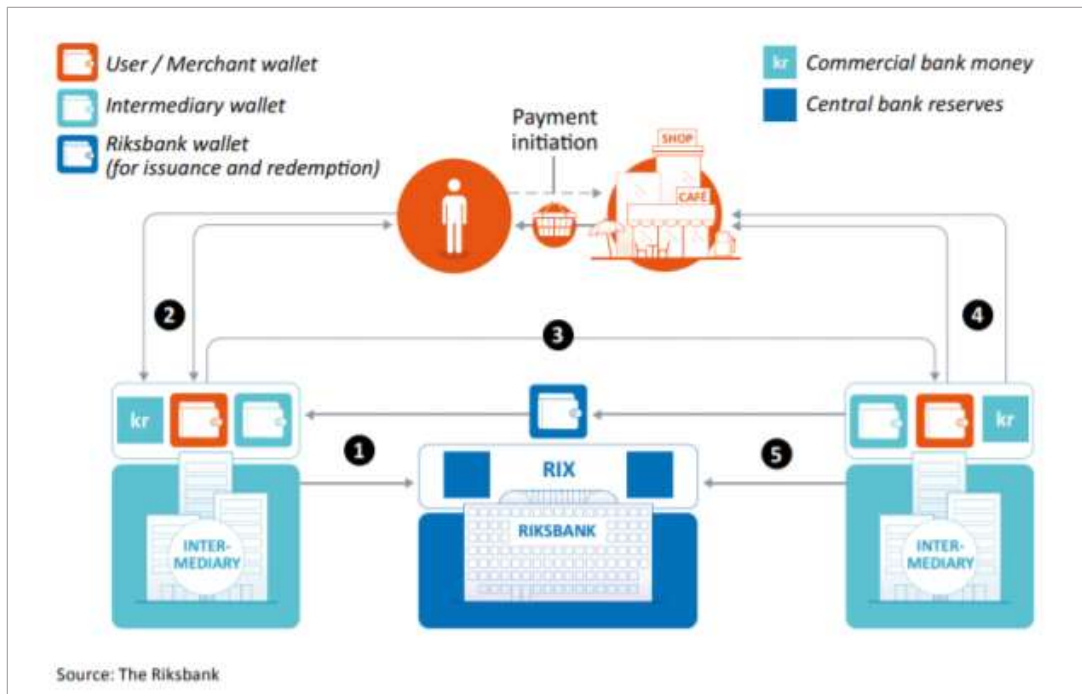


Figure 16: E-krona model

The first tier will involve the Riksbank issuing e-Krona to incumbent financial institutions and intermediaries. The second tier allows the financial intermediaries to disburse the e-Krona to end-users, facilitate the onboarding of users and carry out KYC/AML due diligence. Notably, the e-Krona uses R3’s Corda as the base DLT for transactions, which was specifically created to target financial institutions as an alternative to permissionless DLTs like those used by cryptocurrencies like Bitcoin. The Riksbank has limited visibility of transactions, maintaining the privacy and anonymity typically attributed to physical cash and coins.

United States of America

The US is also in the exploratory phase, currently evaluating the opportunities and challenges related to a CBDC. The Federal Reserve Bank of Boston is collaborating with researchers at the Massachusetts Institute of Technology in a multiyear effort to build and test a hypothetical digital currency and work on architecture, scale, security, speed among other factors.

The US has a competitive payments market with fast and cheap services, particularly in comparison to other nations exploring a CBDC. The Fed believes that many of the challenges that a CBDC addresses including disuse of physical cash, narrow reaching or high concentrating banking, or poorly developed payment infrastructure do not apply to the US.

The Federal Reserve has a few pre-conditions before it will issue a digital dollar.

- **Clear policy objectives:** For the United States, whatever specific objectives may arise for a CBDC, they should be consistent with the Federal Reserve's longstanding objectives of the safety and efficiency of the nation's payments system, as well as monetary and financial stability.

- **Broad stakeholder support:** Key stakeholders include government bodies, end users, financial institutions, technology and infrastructure providers, academia, and standards development organizations.
- **Strong legal framework:** A principal role of the Federal Reserve in the U.S. financial system is to be the guardian of public confidence in money; thus a sound legal framework is a key precondition.
- **Robust technology:** Fed noting that distributed ledger technologies (DLT) would “require further advances” to operate at the scale required. The same “further advances” might be required of digital wallets to meet operational standards. Also, there is the need for secure hardware to enable a digital dollar to work offline.

The need for **market readiness** which is a matter of timing. The Fed notes that contactless payments and QR code payments are not yet universal in the United States.

China

The People’s Bank of China (PBOC) been working on its digital yuan programme since 2014 and it is already in the pilot stage. In addition to the above discussed benefits of CBDC, China also had a few specific reasons to develop their own DCEP (Digital Currency Electronic Payment):

- Cope with the demand for payment services in the Chinese capital for Beijing 2022 Winter Olympics, as this will draw many domestic and foreign spectators, as well as thousands of athletes and officials.
- Compete with WeChat Pay and Alipay that have broad penetration.
- Solve increasing difficulty of monitoring for anti money laundering.
- Increase the circulation of the RMB and international reach – with eventual hopes that the RMB will reach state international reserve status like the US Dollar.

Features of the Digital Yuan

- DCEP is a currency created and sanctioned by the Chinese Government and is the only legal one.
- It is designed to replace cash (direct replacement for currency currently in circulation) - pegged to the RMB in a 1:1 ratio - will not inflate the amount of money in circulation.
- It has “controllable anonymity”- when trading with DCEP, both parties can be anonymous to protect the public’s privacy, but when it comes to combating corruption, money laundering, tax evasion, and terrorist financing, the state banks can still track the trading information.
- A two-tier system so that the central bank does not directly interact with consumers which reduces the burden on the PBOC to perform due diligence, revamp IT systems and answer client requests.
- The digital cash does not require a bank account and can be transferred peer to peer even when there is no network signal.

Launching the DCEP

The PBOC is launching ‘internal tests’ with 4 major state-owned banks, namely China Construction Bank, the Agricultural Bank of China, Bank of China and the Industrial and Commercial Bank of China to validate network and security.

A few cities like Shenzhen, Suzhou, Chengdu and Hongkong and companies like Didi Chuxing, Bilibili, JD.com, Starbucks and McDonald’s are participating in the tests. The intermediaries have been tasked to distribute the digital yuan to the citizens through a lottery system. The funds would then be deposited in an e-wallet and could then be used in participating purchases through QR codes. Payments can also be made or received directly with anyone else who has a digital wallet.

Both commercial bank distributors and the central bank will keep databases tracking the flows of digital yuan from user to user, something that they cannot do as effectively with coins or banknotes. Digital cash would have to be kept separate from regular savings, because it represents money in actual circulation (known in central banking parlance as M0).

Participants of these trials, especially in Shenzhen, showed little interest in switching from the mobile payment systems that they were already using. People are also hesitating from using the digital yuan because they believe it might give authorities easier access to real-time data on their financial lives. Incentives for making a permanent shift to e-CNY are lacking given China’s existing digital payment options are reliable and work seamlessly with other app-based services from social media to e-commerce platforms.

Legal and institutional catch-up

- October 23, 2020, the PBOC published the revised draft of the People’s Bank of China Law, laying the legal foundation for sovereign digital currency. The draft law proposed that legitimate currency can be digital currency, giving digital yuan the same legal status as physical yuan, and any institution or individual must not produce or sell digital tokens to prevent risks associated with virtual currencies.
- At the end of October 2020, the Chinese Communist Party’s recommendations on the long-term plan for the economy through 2035 emphasized again to “steadily advancing digital currency research and development.”

India

The Reserve Bank of India (RBI) is still exploring whether a CBDC is required to be introduced in India. While there has been no official release date for the proposed CBDC, the RBI is currently finetuning the technological and procedural protocols of the sovereign digital currency system. The RBI sees a central bank digital currency (CBDC) as a double-edged sword that could promote financial inclusion but also undermine commercial banks’ role in the economy.

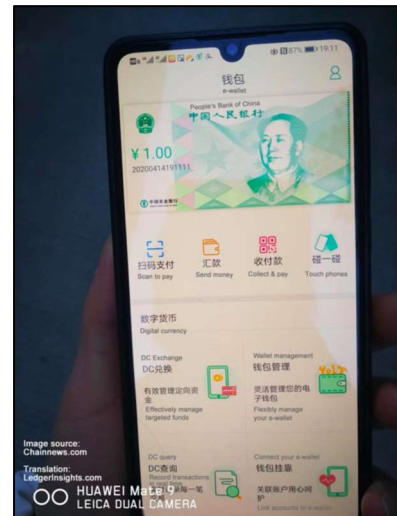


Figure 17: China's CBDC application interface

A CBDC could help promote non-anonymity at the individual level, monitor transactions, and promote financial inclusion by direct benefit fiscal transfer. An interest bearing CBDC could improve the economy's ability to respond to changes in the policy interest rate and enhance monetary policy transmission. On the flipside, it could also lead to banking sector disintermediation. The public may hold large sums of an interest-bearing CBDC, forcing commercial banks to raise interest paid on deposits to retain customers. In turn, banks would either experience tightening of margins or have to charge higher interest rates on loans.

South America

Brazil: The Banco Central do Brasil has set up a study for the possible issuance of the digital real. The digital currency would mainly be used in foreign exchange transactions, both nationally and internationally. The bank plans to facilitate CBDC through the Pix, which is a new federal digital payment system that allows instant money transfer and QR code scanning. With a widespread, intuitive, and low-cost payment method, not only will digital payment adoption rise in Brazil, but the unbanked population will also be encouraged to participate in the financial system. The bank's president, Roberto Campos Neto, said the country could meet all the requirements and conditions for introducing the central bank's digital currency in 2022.

Bahamas: The Bahamas launched the world's first-ever central bank digital currency, the Sand Dollar. In 2019, the CBB began piloting the Sand Dollar on the islands of Exuma and Abaco and released the first nationwide retail CBDC in October 2020. The Sand Dollar has a direct claim on the central bank and financial intermediaries are responsible for its distribution. There were \$130,000 USD worth of Sand Dollars in circulation as of December 2020.

The Sand Dollar is issued directly into digital wallets facilitated by financial intermediaries. It is also available in an offline physical format as a payment card that is linked to an associated digital wallet. Mastercard also recently issued a Sand Dollar prepaid card in collaboration with Island Pay, a Bahamian PSP, that allows users to convert Sand Dollars to traditional Bahamian dollars. End users can use the physical card, QR codes or a unique alias to access funds.

Africa

The development of CBDC varies from country to country within Africa, because of the diversity in banking advancement. A few highlights are mentioned below.

Ghana: Ghana's central bank is considering the issue of a digital currency to complement the growth in electronic payment systems, such as mobile money. The central bank of Ghana has launched a fintech regulatory and innovation live testing pilot that will give preference to projects using blockchain technology. The sandbox is in line with the bank's pledge to drive financial inclusion through innovative digital financial services. It will be available to banks, payment service providers and deposit-taking institutions.

Morocco: Morocco, which is the fifth-largest economy in Africa continues to maintain its place as one of the top digital currency hubs in Africa. Morocco's central bank, Bank Al-Maghrib (BAM), is considering launching a central bank digital currency (CBDC), according to CoinDesk. BAM has set up a committee to identify and analyse the advantages and drawbacks of CDBC's for the Moroccan economy. Also, this committee will thoroughly review all consequences of a CBDC on a monetary policy, the structure of banking intermediation, financial stability and legal framework.

Kenya: The Kenyan central bank showed more willingness to adopt cryptocurrencies. In a historical decision, they decided to switch to use Bitcoin as a Reserve currency in order to resolve growing financial problems in the country. Central Bank Governor cited numerous factors for the adoption — including a shortage of foreign currency reserves, an increase in the velocity of money, and to shield Kenya from exploitative loans that threaten national sovereignty. The Central Bank Governor reportedly said that they intend to use Bitcoin to reduce their growing foreign exchange losses and help them reduce their national debt.

South Africa: The South African Reserve Bank (SARB) initiated the Project Khokha in 2018 that simulated a “real-world” trial of a distributed ledger technology (DLT)-based wholesale payments system. In February 2021, Project Khokha 2 was launched to explore the policy and regulatory implications of innovation in financial markets driven by distributed ledger technology (DLT). It explores the use of both a wholesale central bank digital currency (CBDC) and a wholesale settlement token, for interbank use.

Accenture will be responsible for tokenizing the wholesale CBDC on Corda, Block Markets Africa will help with distributed ledger technology (DLT), tokenizing the bonds and the wholesale payment token using its custom Cosmos-based solution, and Deloitte will document the insights. Other participants in the trials will include commercial banks Absa, FirstRand, Investec, Nedbank, and Standard Bank, the Johannesburg Stock Exchange (JSE), and Strate, South Africa’s central securities depository.

Due to the lack of regulatory clarity, several high-profile start-ups are threatening to relocate to other digital currency havens. The South African Reserve Bank, on its part, has expressed its plan to formulate regulations but has yet to move ahead.

Japan

Japan’s three biggest banks have set up a study group that will look at possibly building a common settlement infrastructure for digital payments, an initiative backed by the central bank and the country’s financial regulator. Mitsubishi UFJ Financial Group Inc., Mizuho Financial Group Inc., and Sumitomo Mitsui Financial Group Inc. as well as East Japan Railway. and several other non-financial firms will participate in the group. Representatives from the Bank of Japan, the Ministry of Finance and the Financial Services Agency will attend as observers.

There are no plans to issue a CBDC at present, but the bank will begin with an “initial experiment” or proof of concept phase, which is scheduled to begin in April 2021.

Open banking

Open banking is now being viewed as an essential path to innovation. Open banking uses Application programming interfaces (APIs) to share financial information held by different financial institutions based on the transactions they have had with customers. The customers and businesses authorize the third parties to distribute their information through secure digital channels. Open banking enables aggregating customer data to establish marketing profiles and tailor products based on customers’ financial situation. It can also help customers understand their own financial habits before opting for a loan or a big expenditure. It allows for lower fees due to increased transparency and could level the playing ground between big and small organisations.

Currently, screen scraping is the foundation of data access. Technology companies can scrape any data they want and there is no official relationship with the institutions they scrape data from. By contrast, sanctioned API channels allow financial institutions to limit the fields they want to share, which can result in consumers losing out on the ability to access the data that is most useful to them in an aggregated experience. Open banking is a positive step forward, as it is expected to make Application Programming Interface (APIs) or secured interfaces available to fintechs, significantly reducing the reliance on screen scraping and the need to collect customer credentials.

Though open banking has been around for a while, it is only now that regulations are starting to develop around it, led by the UK, EU, and Australia. The pandemic has given open banking a major boost. It has made FIs, and regulators realise the need for faster digital connectivity, more data availability and the need for applications focusing on financial management.

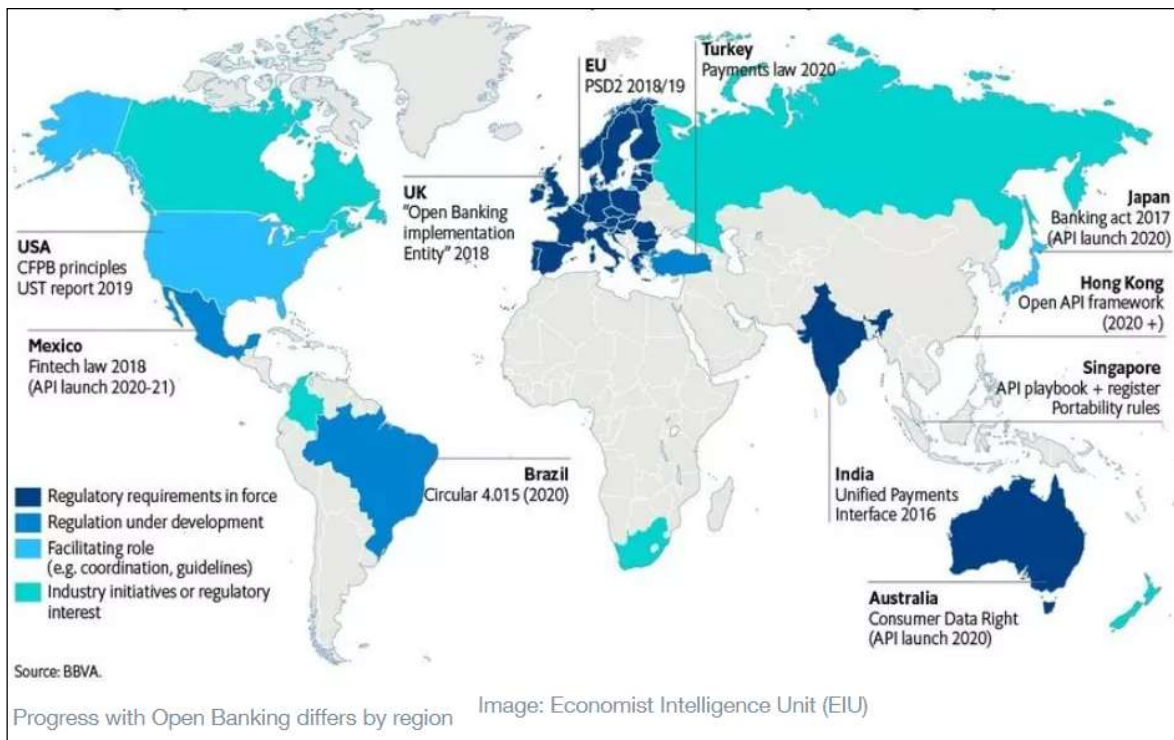


Figure 18: Open Banking progress around the world

Canada

Canada’s open banking ecosystem is set to launch in 2021, establishing a framework between fintechs, banks and regulatory bodies. The concept of open banking is also called Consumer Directed Finance (CDF) in Canada and aims to put consumers in the driver’s seat. Open Banking Initiative Canada (OBIC) is a not-for-profit organization that aims to develop a sound and competitive open banking infrastructure in Canada.

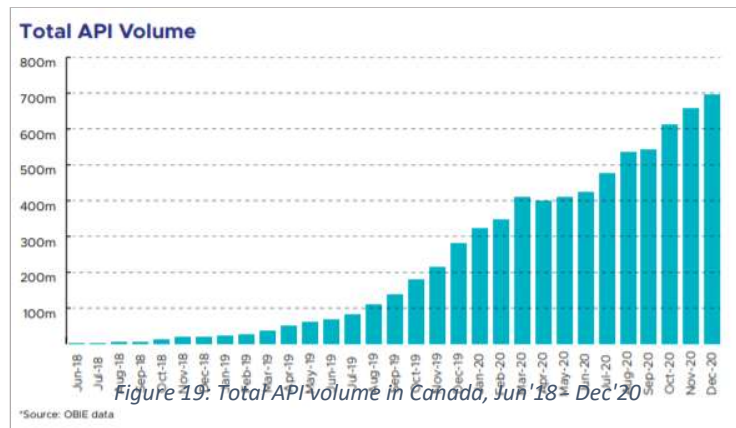


Figure 19: Total API volume in Canada, Jun '18 Dec '20

OBIC is taking lessons from the UK. They have found that integrating mobile into open banking from the beginning is important and will result in a faster adoption and that screen scraping must continue until APIs are fully available. They believe that the legislation should have a broad focus, and that the implementation body should have the mandate to drive phased and continued implementation that can adjust to meet evolving consumer needs.

The implementation of the open banking framework is expected in early 2021 or 2022. OBIC has realized that implementing Consumer Directed Finance (CDF) needs to have separation of the governance bodies from the accreditation bodies. Any standards developed under CDF should be Open Source from the start as it makes public review and adoption easier. They are looking to bring out Write Access, which will allow third parties to initiate payments on behalf of utilities and services, and this will boost competition for card payments.

Canadian Fintech start-ups are still looking for a stable open banking framework from the Ministry of Finance. However, the pace for the development of financial innovation and the introduction of a regulatory framework for open banking in Canada is slower than fintech players are hoping for.

United Kingdom

Open banking is a direct mandate from the Competition and Markets Authority (CMA) in the UK. In 2016, the CMA outlined a package of remedies that required the nine largest UK banks to adopt “open API banking standards, and to make data available using these standards.” The CMA also established the non-profit Open Banking Implementation Entity (OBIE) to create software standards and industry guidelines that drive competition and innovation in UK retail banking. OBIE would also help integrate open banking and make it possible for fintechs to test their products and services based on the data. Fintechs would be required to be regulated by the UK Financial Conduct Authority (FCA).

Open banking in the UK uses Read/Write APIs with standards and specifications defined by OBIE. To securely access and share data, participating banks develop an API endpoint on which fintech developers can build applications. The use of APIs allows consumers to retain full control over their account information. Consumers must give explicit consent before using any fintech applications and are redirected to their FI’S login screens to enter their login credentials.

Consumers determine which information can be accessed, for how long and for what purpose and can revoke their consent at any time. Shared data is encrypted, usage is tracked, and only regulated persons can access it.

OBIE said more than 4 million open banking payments were made in 2020, compared with 320,000 in 2018, and nearly 6 billion API calls were made to servers in the UK, compared with just 66.8 million in 2018. They also said that about 300 fintech firms currently offer open banking services and 2.5 million consumers use them, with hundreds of thousands of new users added each month.

USA

The complex and fragmented banking system in the US makes it difficult to implement an open banking system. Though there is a market and demand for open banking, the current regulatory structure prioritizes consumer protection and regulators are taking a hands-off approach.

The FIs and technology companies are driving open banking in the US by enhancing and expanding digital services for customers. Industry groups such as the Financial Data Exchange (FDX) have aligned a cross-section of FIs, fintechs, and financial services groups around a single data-sharing standard to accelerate the adoption of open banking API frameworks and to standardize the transfer of data.

US FIs are facing a lot of challenges because of legacy mainframe systems which are not supported by most Fintechs. Another challenge is the acceptance of open banking. Consumers preferences for open banking are mixed. Many are concerned about safety and privacy issues. According to a 2019 Deloitte Open Banking Survey, consumers seem receptive to the concept with one in five U.S. consumers finding open banking valuable with more interest among millennials (22-36) and Gen Z (18-21) populations.

Sweden

The EU was the first to institute open banking in January 2016. The initial system was overpopulated by thousands of payment providers of various sizes and sophistication levels, domiciled across 28 member states, each with its own unique regulatory and market context. PSD2 made space for non-traditional financial service providers to join the payment services market. This allows consumers and sellers to use third-party service providers (“TPPs”) such as fintechs to manage their finances. This was achieved by introducing the AISPs and PISPs into the scope of PSD2.

The Act of Payments Services regulates open banking in Sweden. This also includes the main body of EU’s implemented Payments Services Directive Two (PSD2). Under these rules, banks and other FIs are obliged to provide third parties access to payments systems and account services.

China

Banking in China is a highly controlled operation and the only perceptible move towards open banking is regulators examining possibilities of enacting new privacy laws. China has an organic open banking framework, which is not mandated by legislation. The financial services industry uses open APIs since there are no mandatory API specifications. Despite there being less data protection and nascent regulation, consumers are comfortable sharing data.

In the last 2 years, API development has been growing tremendously in China, with Alipay and WeChat Pay leading the way. The APIs are being used not only to connect to other banks and fintech, but also to merchants and corporates to enable smooth B2B, B2C, C2B, P2P transfers. China's Ping An, Tencent and Ant Group are also building their own API-driven fintech businesses.

Ping An's Gamma O is essentially an intelligent open platform for financial institutions, aiming to connect them with technology service providers. It aims to create an intelligent and open fintech ecosystem to enable the growth of open banks. Tencent's WeChat App has expanded to mobile and online payment services. Ant Group launched the popular mobile wallet, consumer loan, investment, and insurance platform Alipay. It is used by over 1 billion people and captures over fifty percent of China's 29\$ trillion digital payments market.

In April 2021, China's central bank told some of the country's biggest financial technology firms, including Tencent Holdings Ltd., Didi Chuxing Technology Co. and JD.com Inc. that their apps should no longer provide financial services beyond payments. They believe that the bundling of several financial services within a single platform obscured how much money was flowing into the various products, creating risks for the broader financial system. Ant is already revamping Alipay to delink these financial services from its core payments service and is discussing with regulators the possibility of transferring some of its app-based financial services to another of its apps, Ant Fortune. This unbundling could almost certainly deal a blow to the future profitability and valuation of these big tech companies.

India

India has a more hybrid approach to open banking, where both the market and regulators are playing an active role in developing a framework. There is a visible transition from a product-centric approach to a consumption-based consumer focused approach. Pioneered by BFSI players like Yes Bank and Kotak bank, NBFCs and other tech players are also creating partnerships within the system.

The Unified Payments Interface (UPI), which allows an individual to access his bank accounts from registered apps (such as Google Pay) and make transactions to any other bank or individual, has been a huge driver in the evolution of an API based collaborative model. Larger players like ICICI have also joined the game through the release of their developer portal which consists of over 250 APIs. Embedding of banking services on SaaS (Software-as-a-Service) based accounting platform is a classic use case of Open Banking. This allows SMEs/MSMEs to fulfil their core need of managing customer receivables and payable on their accounts and allows them to make payments to partners and collect money from customers.

There are 5 broad categories in the Indian open banking network. The bottom layer consists of banks and NBFCs which provide APIs powered by technology stack providers, for payments, lending, and collection services. The requests sent to these banking APIs are further filtered by the API Gateway players such as IBM or Redhat, who provide an additional level of security through data validation and analytics. The next layers within the ecosystem consist of enablers powering new solutions around Open Banking.

Open Banking cannot be truly achieved without the democratisation of the customers' financial data. With the RBI's directive giving customers the control to share their financial data via NBFC AAs, they enable customers to view all their financial information in a single platform and allow

consent-based sharing with third parties. The effectiveness of this network has led to the rise of several use cases like neobanks, digital banks, and big tech players who use bank APIs for their underlying operations and provide highly specialised services to solve the specific pain-points of their respective segments. The ecosystem is also supported by investors.

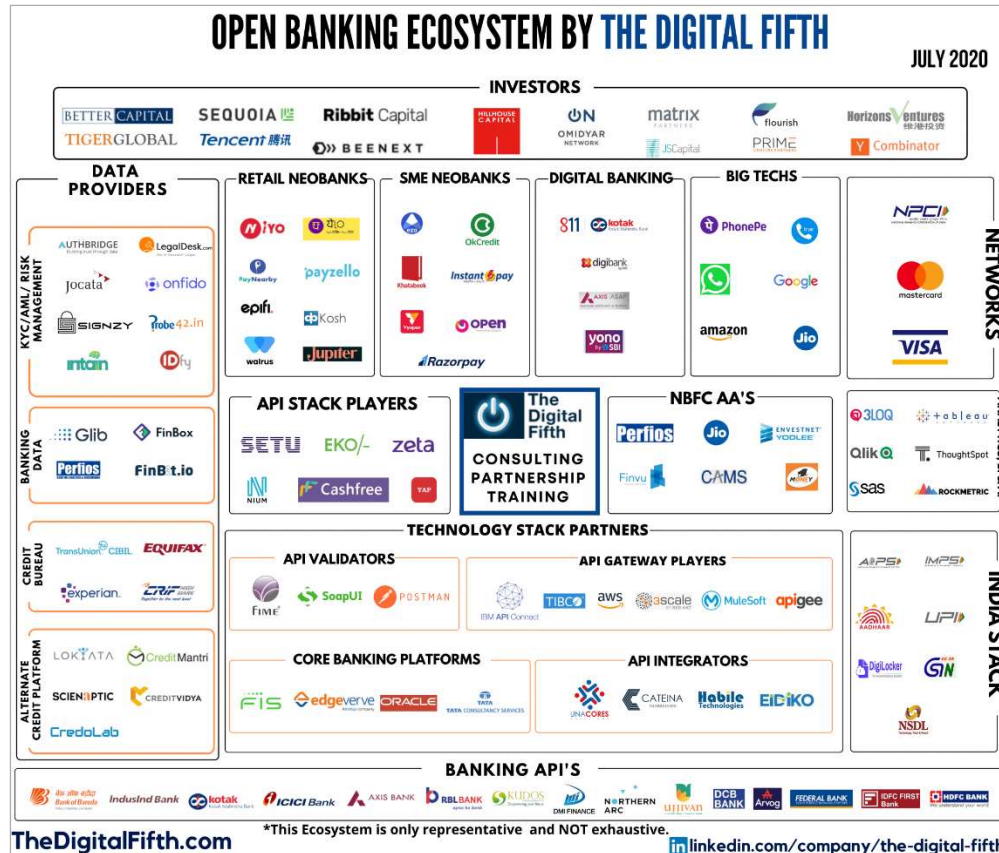


Figure 20: India's Open Banking ecosystem

South America

Open banking in Latin America, like most other countries, seeks to achieve payments modernization and financial inclusion. Mexico and Brazil, which have a majority of fintechs, are the two countries following a top-down approach. The Central Bank of Brazil (Banco Central do Brasil) has announced a four-stage rollout of open banking standards set to take place in 2020 and 2021. The pandemic has fuelled the use of digital channels and the regulators are modelling their open banking rules around this. The first stage of the four-step plan, launched in November 2020, details how FIs, payment institutions, FinTechs and others can collect or share consumers' transactional data, setting the stage for the next three phases, covering other aspects such as sharing of data, payments initiation, foreign exchange information, investment products and loan data. Stage 4 is expected to be completed in Fall 2021.

Banxico (the Central Bank of Mexico) in March 2018, passed laws governing FinTechs and in June 2020, CNBV (the National Banking and Securities Commission) also strengthened the regulation paving the way for next steps. Mexico's financial authorities have also updated their country's 2018 law, making shifts that allow financial companies to connect with larger financial

institutions (FIs) and other business partners more easily via application programming interfaces (APIs). This focuses on data about services and products offered by financial institutions in the country and includes the location of ATMs and bank branches. This stage is called 'Open Data'. Aggregated Data by the institutions and Transactional Data of the clients will be addressed in 2021.

In other places like Peru, Argentina, Chile, Colombia, and Bolivia, there are some conversations around open banking and some businesses focused on the API economy are taking shape, but there is no clear direction stated by their local authorities. The biggest challenge for these regions is transforming the banking culture by generating more awareness.

Africa

Open banking is particularly welcome in Africa to increase financial inclusion in the country where a large proportion of the population is underbanked. Given the diversity in the continent, a single approach to open banking is impossible. No African country has clear legislations for open banking yet, but there are notable developments in some countries.

The National Bank of Rwanda (BNR) has acknowledged that fintech and more particularly increasing the availability of digital customer data can revolutionise financial markets. The growing fintech market in Rwanda already supports the availability of digital customer data that can be mined and analysed to gain a better understanding of customer needs, but the BNR has now also published a regulation to formalise the approach and the publication of standards is imminent. Rwanda has modelled its open banking framework based on EU's revised PSD2. Nigeria is currently developing its API specifications to allow third parties to access customer data and to build mobile and web applications for them.

South Africa's banking and financial markets are highly regulated, with financial institutions having to comply with an array of financial, consumer protection and data legislation. South Africa is more likely to take a regulated and mandatory approach to Open Banking. Fintech companies in South Africa are already implementing Open Banking concepts with corporates that allow controlled access to their clients' data through APIs and will continue to do so absent clear policy guidance and regulation.

The challenges in South Africa and elsewhere will be to ensure that Open Banking is implemented in a way that (i) improves financial inclusion and (ii) does not cause banks to be in violation of their statutory duties in relation to consumer protection, treating customers fairly, and privacy and data protection. The South African Reserve Bank has started industry consultations with a view to safeguard consumer data and manage cyber security risks specific to open banking payment solutions, particularly in the e-commerce environment.

Japan

Japan established an open banking framework as early as 2015. In the next few years, there were a lot of regulatory changes in banking regulations. In 2017, it changed the ownership banks must have in Fintech and it also issued regulations for e-payments. In 2018, the Financial Services Agency (FSA) opened the Strategic Development & Management Bureau to devise a new financial services strategy with fintech as the “driving” initiative. Banks were required to publish their affiliation and cooperation with PISPs & AISPs, and a deadline for the conclusion of commercial contracts between the parties and implementation of Open Banking services was set as May 31, 2020. FSA took advantage of the pandemic to extend the deadline to September 2020 and has continued to permit use of screen scraping in the meanwhile. There have also been collaborations between banks and national and regional partners without API portals. Efforts have been made to establish a universal QR code payment system.

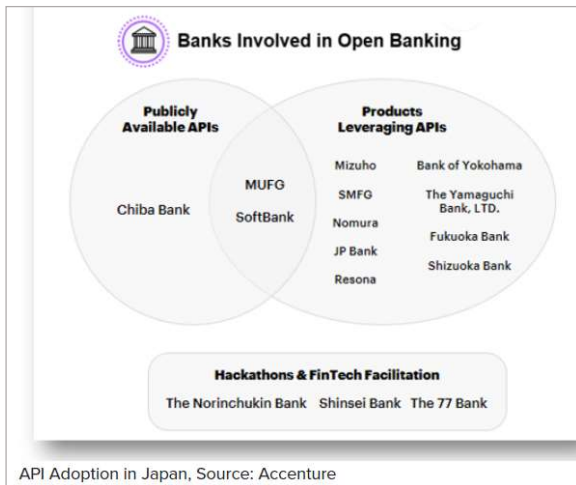


Figure 21: Open Banking participation in Japan

Notable Fintech Regulations

UK and Europe Open Banking and Anti-money laundering

The UK's financial services industry is the world's leading innovation hub. UK fintech firms have grown by 500 per cent in the past three years. The Financial Conduct Authority (FCA) run sandbox initiatives that allow companies to test innovative propositions under regulatory conditions. The FCA's 'Project Innovate' helps tackle regulatory barriers to innovation and enables policy changes to give businesses the flexibility to disrupt in the interest of consumers. This highly collaborative approach has propelled the market, as well as the opportunity to prosper internationally – even in the face of the global Covid-19 pandemic.

The revised Payment Service Providers Directive (PSD2), 2013 is the European regulation for the payments industry. It is by far the most sophisticated legislation which aims at enabling a single digital market and making payments more secure, promote financial inclusion, boost innovation and competition. It also governs Application Program Interfaces (APIs) which are the heart and soul of the Fintech industry.

PSD2 widens the scope of PSD1 by covering new services and players as well as by extending the scope of existing services (payment instruments issued by payment service providers that do not manage the account of the payment service user), enabling their access to payment accounts. The new Directive also covers the "payment initiation services" addressing issues which may arise with respect to confidentiality, liability, or security of such transactions. PSD2 will help lower charges for consumers and ban "surcharging" for card payments in most cases (including all popular consumer debit and credit cards), both online and in shops.

The PSD2 has also set the foundation for open banking in Europe by providing third-party payment providers access to bank infrastructure and account holder data. The two types of third-party service providers are Account Information Service Providers (AISPs) which aggregate personal financial data and Payment Initiation Service Providers (PISPs) which 'push' payments from customer bank accounts to merchants. PSD2 Access to Account—also known as XS2A, mandates that financial institutions must provide authorized AISPs and PISPs controlled and secure access to customer accounts. It also stresses that financial institutions must block and prevent XS2A access to unauthorized and malicious entities until the identity and regulatory authorization of the third-party service provider is validated. That validation is done through Public Key Infrastructure and digital certificates.

PSD2 has an AML and CFT mechanism through Secure Customer Authentication (SCA). Electronic payments must go through a 'two-factor identification' system, verified by any two of the following identifiers – knowledge, possession and biometric. Many businesses and issuers of systems have had to dedicate their resources to provide new compliant SCA customer authentication solutions and update their systems with new authentication.

The new PSD2 directive was originally due to take effect on the 14th of September 2019. However, the European Banking Authority (EBA) granted an extension to the PSD2 deadline to 31st of December 2020. With UK leading the way, other countries like Sweden are not far behind in embracing this regulation.

European Union's Sixth Anti-Money Laundering Directive (AMLD6) came into effect in December 2020 for all member states, to be implemented by June 2021. The AMDL6 is said to be the strictest AML-related measure imposed by the EU. It expands the scope of the current legislation, by closing loopholes, strengthening definitions of money laundering, and introducing tougher criminal penalties.

Open Banking is not a European initiative anymore. Other countries like Hong Kong, South Korea, Australia, Singapore, Japan, India, Brazil, the United States, and the United Arab Emirates are becoming Open Banking friendly. While some of them have already developed their Open Banking regulations, some are in the process of building their Open Banking ecosystem or adopting an organic approach to Open Banking. Because there are no global API standards, there are some challenges to process international transactions across countries. A single API worldwide will create better, more inclusive access to Open Banking on a global scale.

Canada – Slow and steady progress

The Canadian Securities Administrators (CSA) has initiated a CSA Regulatory Sandbox to support and encourage Fintech businesses in Canada. It allows both start-ups and well-established companies to register and/or obtain exemptive relief from securities laws requirements, under a faster and more flexible process than through a standard application, to test their products, services, and applications throughout the Canadian market on a time limited basis. Firms need to be able to provide live environment testing, a business plan and potential investor benefits. Firms authorized to operate in the sandbox would remain subject to all applicable regulatory requirements, subject to any exemptive relief granted.

There are significant implementation barriers to open banking in Canada, which can be attributed in part to regulations which are lagging, compared to countries like Europe and Australia. Fintech experts and start-ups are still waiting for a formal open banking framework to take shape.

Financial Transactions and Reports Analysis Centre of Canada (FINTRAC) is making significant changes to Canada's AML regulation to bring cryptocurrency under the remittance of reporting obligations. Foreign Money Services Businesses (MSBs), which had not previously been obligated to report under the FINTRAC legislation, will now have to do so. This will significantly increase reporting obligations and associated risks for foreign fintech firms operating in the Canadian market.

China – Stricter control

The Chinese regulatory bodies are tightening Fintech regulation to ensure innovation remains competitive. Fintech companies will no longer receive special treatment and will have to comply with capital adequacy requirements. Regulations on bank internet loans require a minimum capital contribution and state that internet banks must be regulated in line with financial regulations. This transition must occur within two years. The CBIRC has also required small and medium-sized banks and others to refrain from making cross-regional internet loans. Ant Financial's IPO was halted in November last year due to regulators' announcement of additional regulations to raise standards for online lending as well as company structure. Ant Group is in the process of restructuring, to be compliant with the new requirements.

There are a lot of regulations being discussed to ensure greater data security and privacy protection. While China's legislature has already passed a Civil Code to generally protect

individual consumers' data, there remains a great deal of concern about what type of data exits the country and how cross-border data flows can be properly managed. Some technology experts have even recommended that a national data bank be established and run by a special agency to properly collect, store, and transmit data. People's Bank of China has issued the "Measures for the Management of Credit Investigation Services (Draft for Comment)," which would prevent credit collection firms from collecting information from illegal channels or through deceptive means, collecting fees from individuals or firms, or otherwise violating the rights of the information subjects.

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