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**Government Blockchain Association (GBA)**

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**Tax Working Group**

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## Preface

Why are blockchain and cryptocurrency so popular right now?

From a blockchain perspective, governments understand that the technology can be used to:

- Support public transparency and trust
- Improve accountability
- Promote innovation to foster technical and business efficiencies
- Provide value-added services that were previously unavailable to the general public.

But what is blockchain? Blockchain is a foundation, database, and network that supports the transfer of value and other purposes in a digital format. It is an independent network not owned by any institution, individual, bank, or entity.

How does this relate to cryptocurrency? Cryptocurrency is defined as a digital asset that is designed as an exchange of value operated through the issuing of tokens on a blockchain network. Bitcoin happens to be a blockchain network and a coin token. The token is the transfer of money.

So, again, why is cryptocurrency so popular right now? To answer this question, we must first look at the history of money. The concept of money is the first-use case that is becoming disrupted due to the rapid introduction of blockchain technology.

Money is a social construct that derives its value as a medium of exchange for goods and services. Currency on the other hand is a physical manifestation of money in the form of paper or coins.

### The History of Money

Money has a long and remarkably interesting history. Humans have been exchanging money of some form for tens of thousands of years. The concept is as old as time itself. What is new, though, are the innovations that have been seen in money over time. Over the centuries, the concept of money has mutated, from Yap stones to gold doubloons, to paper dollars. Innovations continue to reshape what we call money, and the most important of these innovations historically have been *accounting*, *currency* and *banking*.

Evidence suggests that accounting predates physical currency by quite a long margin. Records dating back 30,000 years have been found that show evidence of accounting. Wikipedia states that accounting dates back to ancient Mesopotamia.

Following accounting came physical currency, the earliest of which appeared in India, China, and Europe in the 7th century BC. The development of physical currency was a significant innovation that allowed merchants to have common and agreed-upon values of exchange in different locations. One of the largest impacts of physical currency was the move away from bartering.

Next came banking, which allowed merchants to store physical currency in trusted locations. This was a very significant advance.

## The Evolution of Money Innovations

					
30,000 - 10,000 BC <b>Bartering</b> Paleolithic (Old Stone Age) Art	770 BC <b>Currency</b> Ancient Roman Coin	1150 <b>Modern banking</b> began to emerge as traditional Merchant Banks morphed to provide broader modern banking services	1944 - Modern banking going off the gold standard. <sup>†</sup>	2009 <b>Blockchain Technology</b> introduces decentralized, global currency.	10,000 AD <b>AI and Embedded chips</b> for biological IoT banking?

<sup>†</sup> The Bretton Woods agreement of 1944 established a new global monetary system. It replaced the gold standard with the U.S dollar as the global currency. By so doing, it established America as the dominant power in the world economy. After the agreement was signed, America was the only country with the ability to print dollars.

Source: Kathy Dache

Within each of the three categories of innovation, there have been multiple ‘micro’ innovations such as paper money, double-entry accounting, and electronic payments. Each of these have delivered very significant economic benefits.

We then come to the invention of *blockchain* technology, with the first successful implementation of the technology being Bitcoin. The history of how blockchain impacts the world is unfolding as we write this document. It is almost impossible to say what impacts it will have; however, it is almost certain the impact will be massive.

Blockchain technology unifies the three concepts of accounting, currency, and banking, which in itself is groundbreaking. In addition, blockchain introduces decentralization. To date, each of these categories has been dependent on centralization of all these functions. Blockchain completely removes this dependency, the significance of which is astonishing.

The applications of this new innovation are endless, and it will take years to see examples of the full impact of this technology. If blockchain technology was applied to voting systems, could we see a new era of trust in democracy emerge?

## The Alternative that is Bitcoin, Blockchain, and Cryptocurrency

Bitcoin is the first-use case of blockchain technology. There are plenty of other use cases to come in the form of enhanced video streaming, real estate management and other applications.

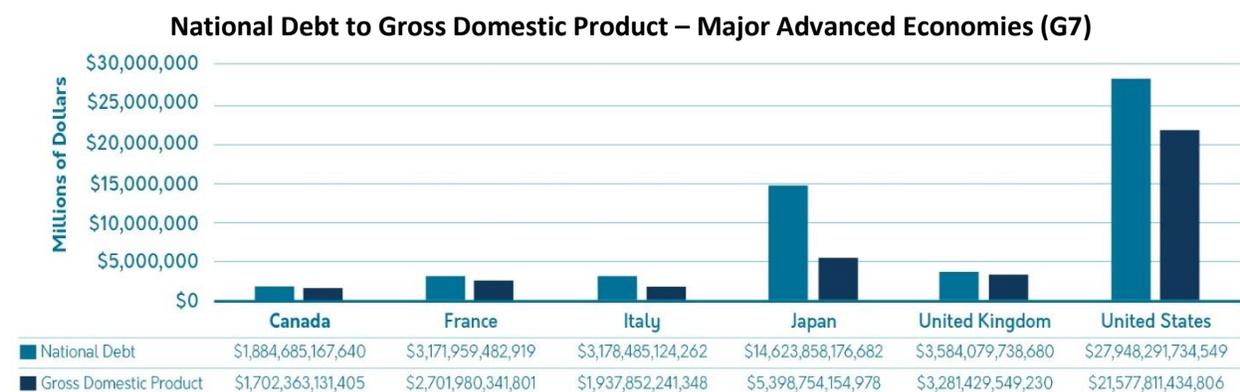
Bitcoin has grown to hundreds of billions of dollars in market capitalization in just a few years. Bitcoin’s total market capitalization has reached US\$1.07 trillion<sup>1</sup> and is trending towards the total market capitalization of the world’s largest technology companies (Alphabet US\$1.2 trillion, Microsoft US\$1.7 trillion<sup>2</sup>).

The only cryptocurrency use case in 2020 that makes practical sense is Bitcoin due to the amount of global monetary stimulus injected by global governments. The uptrend of other cryptocurrencies and their immature fundamentals appears to be supported by Bitcoin growth.

It is important to note that blockchain and cryptocurrencies are an alternative technology and investment asset class. The public needs to understand that they have access to these alternatives, which are not to be perceived as a threat. Access, communication, and education of these options are paramount in the coming decade.

## The Factor that is World Government Debt

Bitcoin’s extraordinary rise may be influenced by the stimulus response by governments to offset the economic impact of the global pandemic. Government stimulus packages have pushed the gross debt of the major advanced economies (G7) to exceed 141% in 2020. The increase in billion-dollar stimulus further devalues government currency and has sparked fears of inflation in economies and asset markets. Investors see Bitcoin as a sustainable investment alternative to the devaluation of fiat and a hedge against inflation.



Source: <https://usdebtclock.org/>

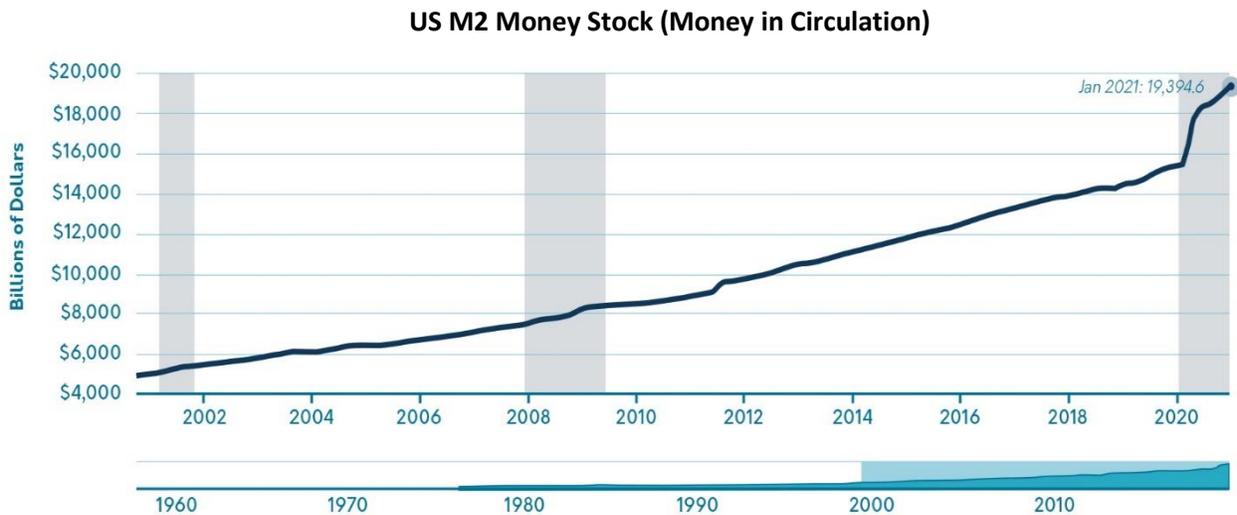
<sup>1</sup> <https://coinmarketcap.com/>

<sup>2</sup> <https://finbox.com/NASDAQGS:MSFT/explorer/marketcap>

The US has the highest national debt in the world, at US\$27 trillion, exceeding gross domestic product by US\$6.3 trillion with a debt to GDP ratio of 129.89%.

Per the above graph, it is important to note the following:

- From 2000 to 2008, the M2 USD circulation of money increased by US\$3–4 trillion.
- From 2010 to 2020 (pre-COVID-19), the M2 USD circulation of money increased by US\$7–8 trillion.

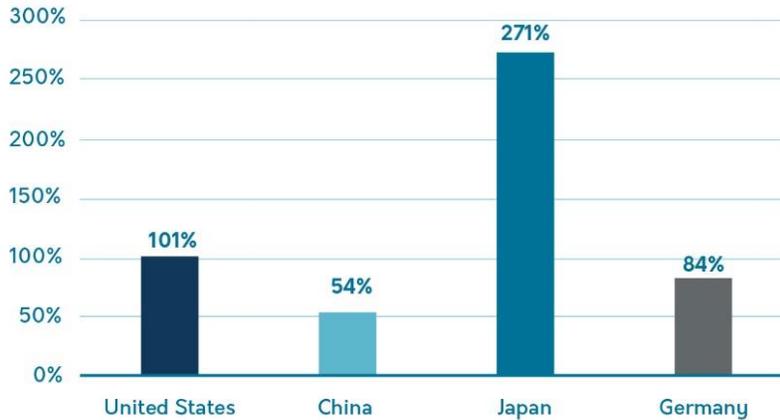


Source: Board of Governors of the Federal Reserve System (US), M2 Money Stock [M2SL], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/M2SL>, March 10, 2021

The global financial crisis created an immediate need to inject stimulus into the economy but was perceived to be a short-term solution. It appears this was not the case, and Reserve Bank stimulus injections into the US economy have become the norm, with the doubling of the money circulation flow compared to the previous decade post-global financial crisis.

US\$5 trillion was injected into the US economy in one year, in 2020, due to COVID-19 – basically a whole decade’s stimulus over 12 months. Quite extraordinary.

**Public Debt to GDP Ratio, by Percentage**

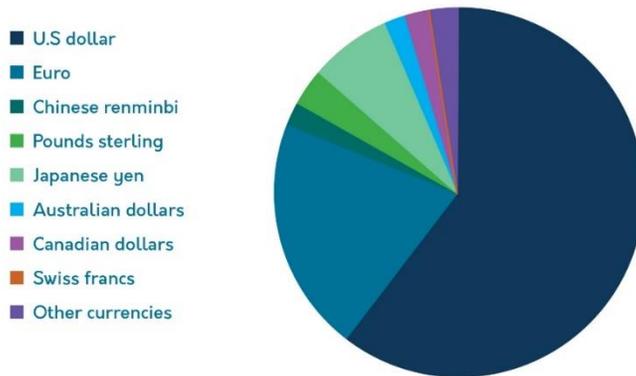


Source: <https://usdebtclock.org/>

## The Impact of Inflation

Due to the US stimulus response, US inflation has further devalued the USD in the global currency markets. The USD fell from 94.64 in September 2020 to 90.21 in February 2021. The USD makes up over 60% of the world’s allocated reserves as shown in the following graph.

**World – Allocated Reserves by Currency for 2020 Q3**

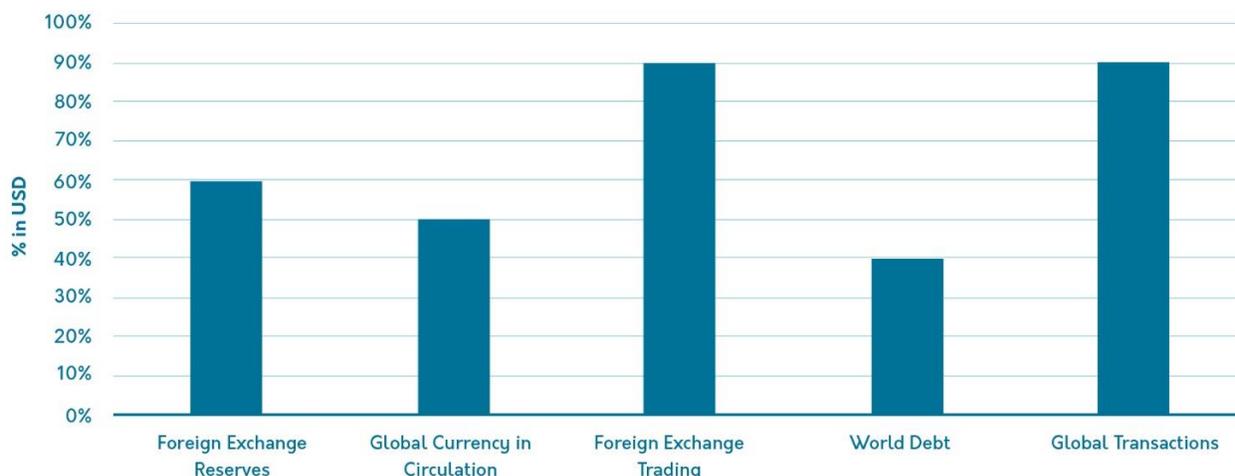


Source: Currency Composition of Official Foreign Exchange Reserves (COFER); <https://data.imf.org/?sk=E6A5F467-C14B-4AA8-9F6D-5A09EC4E62A4>

Developed economies are much more resilient to economic concerns in the US because of existing protection policies and may be able to return to pre-pandemic growth rates. Developing economies on the other hand may not fare well with quantitative easing measures as a fear of deflation and lower consumer spending will influence profits and have a serious impact on emerging markets. As shown below, the USD is dominant in the global financial and commodity markets.



## US Dollar Dominance in Global Financial and Commodity Markets



Source: AgFlow; "How Do USD and Emerging Markets Drive Commodity Prices?", 2020

### The Role of Government and Education

It is important to acknowledge the role government plays regarding the adoption and education of the public regarding alternative asset classes.

Cynthia Lummis, a US Senator from Wyoming, is an advocate of digital currencies and is the first Senator known to invest in Bitcoin. Below is an extract from a February 2021 interview with her on the Anthony Pompliano podcast, named 'The Pomp' podcast.

When asked about government adoption of Bitcoin, Lummis said:

*"I hope it will be for all the above as for a full diversified asset allocation. So, for example, if you are a postal worker, I believe a postal worker's retirement fund should have the opportunity to invest in Bitcoin. Not Bitcoin exclusively, but Bitcoin as a wide variety and array of assets, if you want to store value for the long term – sort of to protect yourself from inflation. That is where I think Bitcoin plays an important role."*

When asked about education of US politicians on Bitcoin, Lummis said:

*"We are forming a financial innovations caucus in the Senate. We hope to use it as a springboard to educate members of the US Senate and their staff about Bitcoin specifically, but about other opportunities for cryptocurrencies and financial innovation and uses of blockchain."*

They want to specifically see how and why early adopters choose to confidently invest in Bitcoin and cryptocurrencies and educate US senators on what worked and did not work to become confident in investing in innovation such as cryptocurrencies as an alternative asset class.

The other aspect that is important to note is how innovative the state of Wyoming has become when considering innovation, blockchain, and cryptocurrency. The is an extract from an article published on 17 September 2020 regarding the announcement of Kraken as the first cryptocurrency firm to become a registered bank in the United States.

*“Kraken is the first cryptocurrency firm in the U.S. to become a bank.*

*“On Wednesday, the Wyoming Banking Board voted to approve the San Francisco-based crypto exchange’s application for a special purpose depository institution (SPDI) charter. Kraken is now the first SPDI bank in Wyoming. According to the Wyoming Division of Banking’s general counsel, Chris Land, Kraken will also be the first newly chartered (de novo) bank in the state since 2006.*

*“By becoming a bank, we get direct access to federal payments infrastructure, and we can more seamlessly integrate banking and funding options for customers,” said David Kinitsky, a managing director at Kraken and the CEO of the newly formed Kraken Financial. (Kinitsky has run Grayscale Investments, was the first digital assets hire at Fidelity and was most recently head of business development at payments start-up Circle.)”*

Source: <https://www.coindesk.com/kraken-crypto-exchange-secures-bank-charter-under-wyoming-law>

### Why this Study?

In this study, the Government Blockchain Association (GBA) will look at the many factors related to cryptocurrencies and how cryptocurrency will impact governments all around the world. This summary introduces GBA’s approach to analyzing this phenomenon and proposes recommendations to governments dealing with this emerging reality.

As a new and emerging area, retail consumers and institutional investors are rightly worried or scared about going beyond what they are familiar with and taking risks by investing in cryptocurrency. In this space, traditional finance has a role in developing solutions and providing the confidence for consumers to have exposure. Additionally, industry, self-regulatory organizations, and the government have a role to play in helping raise awareness of the opportunities and risks associated with engaging with cryptocurrencies as well as educating consumers on the various cryptocurrency products. In the meantime, this report seeks to provide clarity as to these issues to inform both governments as well as citizens regarding cryptocurrencies.

There are many factors that influence the adoption of cryptocurrencies for widespread use. This study is limited to the adoption of the top 10 cryptocurrencies as determined by market capitalization.

Following is a short summary of the top three cryptocurrency projects ranked by market capitalization. It is important to note the different uses associated with each project or coin:

- **Store of value:** This is the access and purchase of financial transaction coins such as Bitcoin, and the use of exchanges to purchase cryptocurrencies or store value on the blockchain, e.g. Bitcoin.
- **Application platforms:** The area focuses on supporting software applications that leverage blockchain technology and the use of smart contracts, e.g. Ethereum.
- **B2B merchant:** These types of blockchains focus specifically on business-to-business transactions. They can be in the form of fiat-to-fiat or fiat-to-crypto transactions, e.g. XRP/Ripple.

In addition, this study includes other factors such as ease of use, inflationary factors, and regulation. In relation to regulation, this study examines some specific types of regulation, including those related to anti-money laundering and financial crimes. The study also compares different countries' attempts to adopt tax policies for these new types of currencies.

To know where we are going with cryptocurrencies, we need to examine the past. The GBA provides background information on cryptocurrencies for those who may not be familiar with this topic, including potential future adoptions of this breakthrough technology. In Section 3, we investigate the demographics, trends, and patterns relating to cryptocurrency usage and current legislative responses to this technology, and we offer future scenarios for how governments will respond to this new world.

Based on the insights and data from Sections 1 to 3, in Section 4 we discuss the essential impacts on governments. In Section 5 we attempt to connect the dots and offer recommendations for how governments can adapt to the changing landscape of cryptocurrencies. Our discussion covers the following key areas:

- **Regulation** – understanding the new frameworks and paradigms that must be created to give governments the capability to govern in a world where transactions are peer-to-peer.
- **Ethics** – new paradigms for financial systems that consider the ethical impacts of decentralized currency systems.
- **Privacy** – how blockchain and cryptocurrency technology are impacted by existing privacy legislation and how the technology is influencing future policy.
- **Jurisdictions** – governments will need to work together to develop a governance framework that encourages technology innovation, ensures consumer protection, embraces financial inclusion, and incentivizes participants to follow the rules in this new financial monetary and economic system.
- **Economy** – how the global pandemic has impacted economies around the world and how blockchain and cryptocurrency are investments of the future.
- **Enforcement** – how blockchain and cryptocurrency technology is assisting and influencing local, state, national, and international law enforcement entities to develop new ways to ensure consumer and investor protection, including the drafting of new laws.
- **Tax policy** – governments have varying policies when addressing cryptocurrency tax due in part to the lack of common cryptocurrency definitions.



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## 1 Introduction

The way the world exchanges value is changing.

We are witnessing a rapidly growing phenomenon in the world of cryptocurrencies. Consider the fact that cryptocurrencies in just one decade have grown from a novel concept to hundreds of billions of dollars in market capitalization. Another way to measure this amazing trend is to consider the total market capitalization of cryptocurrency has reached US\$1 trillion.<sup>1</sup> Cryptocurrency is trending toward total market capitalization of the world's largest technology companies (Alphabet US\$1.2 trillion, Microsoft US\$1.7 trillion<sup>2</sup>). If this trend continues, there is no doubt that the future of money, law, and governance will change forever.

But what will this mean for government?

To understand this phenomenon, we need to start asking questions about cryptocurrency. As this global phenomenon continues to grow, what will be the impact on the global financial system? If significant transactions bypass traditional financial institutions, how will governments manage their economies and enforce their laws? Will the electronic forms of payment suffice? Will cryptocurrency complement the payment systems, compete with them, or even replace them? Will the adoption of cryptocurrency have wide-sweeping impacts on governments?

### 1.1 Purpose

The purpose of this study is to examine the adoption of cryptocurrency and determine the impact cryptocurrency may have on governments around the world. The study is also intended to provide public and private sector leaders with the information needed to understand cryptocurrency trends and recommend potential courses of actions.

### 1.2 Paper Money and Cryptocurrency

Throughout history, money has taken on many forms but the definition of 'money' has remained constant as an intangible concept for the exchange of goods and services. Money is essentially numbers. Currency on the other hand is a physical manifestation of money and comes in the form of paper, coins, or electronic medium issued by governments and is generally accepted as a method of payment.

Fiat currency<sup>3</sup> is paper and coin decreed as legal tender by the government that issued it. For example, the US dollar is fiat currency, as is the euro, the yen, and all other major currencies issued by governments around the world. Governments have the power to control and manipulate the supply of fiat if economic or political conditions show signs of stress.

It is important to note that the US and countries around the world no longer physically back fiat currency with anything. That is, fiat does not have any intrinsic value and is not underpinned by a physical good such as gold. The only reason we see value in the fiat currency in our pockets is because we, as a society, have reached 'consensus' that the currency has value. Fiat has relative value that is measured by the stability of the government that issued it and the strength of the government's economy. When a society loses public confidence in a government's stability or economy, it can render

fiat worthless. Money is essentially a social construct with its intrinsic value tied directly to the public confidence in the issuer. Transitioning to a digital currency is not a far reach for society because countries started the transition decades ago when they stopped physically backing fiat currency.

Electronic currency or e-money is a digital store of value that can be used as a method of payment for goods and services. E-money uses can be seen in point-of-sale terminals, mobile-to-mobile payments, direct payments on websites, transactions associated with bank accounts, and electronic fund transfers. E-money networks can be centralized through banks and clearing houses or decentralized using peer-to-peer transactions.

Like e-money, cryptocurrency is a digital method of payment, but cryptocurrency makes use of cryptographic and encryption methods to secure transfers and is issued through decentralized, independent networks. The method of payment on the cryptocurrency networks is called 'coins'. There are over 7,800 coins in existence with Bitcoin being the most well-known cryptocurrency in the world.

Bitcoin and fiat share similar attributes, such as a store of value, but there are some major differences. Bitcoin is not issued by a government and cannot be manipulated when economic or political conditions change. Bitcoin is issued and exchanged through an independent decentralized system managed by individuals from around the world which means no one person or government controls the issuing of Bitcoin. With fiat, governments and central banks can, at any time, decide to print more when stresses in the economy call for it, which weakens the value of fiat. Unlike fiat, Bitcoin does not weaken in value the more it is created, and additional Bitcoins cannot be created when supply is low.

Bitcoin is in limited availability and is considered a fixed asset because of a provision built into its system that only 21 million Bitcoins will be issued. The scarcity of Bitcoin has many in the cryptocurrency space labeling Bitcoin as 'digital gold'.

Coin networks each have their own native tokens. Bitcoin has BTC, Ethereum has ETH, Monero has XMR, Litecoin has LTC. These tokens operate within their independent networks and are used as a store of value, medium of exchange or to pay for services. The Bitcoin network's native token BTC can only be used as a medium of exchange or a store of value. The Bitcoin network and token cannot be extended to do additional tasks such as automation or increase the speed of transaction payments. Coin networks offer various functionality such as reducing price volatility by pegging coin to fiat (stablecoins), the ability to automate decentralized applications (Ethereum), increased fungibility and privacy (Monero) and faster payment transactions (Litecoin).

It is important to note that coins are a means of payment in cryptocurrency networks, while tokens offer a specific function such as paying transaction fees. Tokens can also digitally represent an asset such as company shares or a piece of art. A good example of this innovation is the non-fungible token (NFT), which means it is unique, a one-of-a-kind because it cannot be exchanged for another token like BTC or ETH or something else. NFTs can represent anything digital such as art, music, even a tweet. NFTs cannot be copied and can be sold for higher value because of their uniqueness.

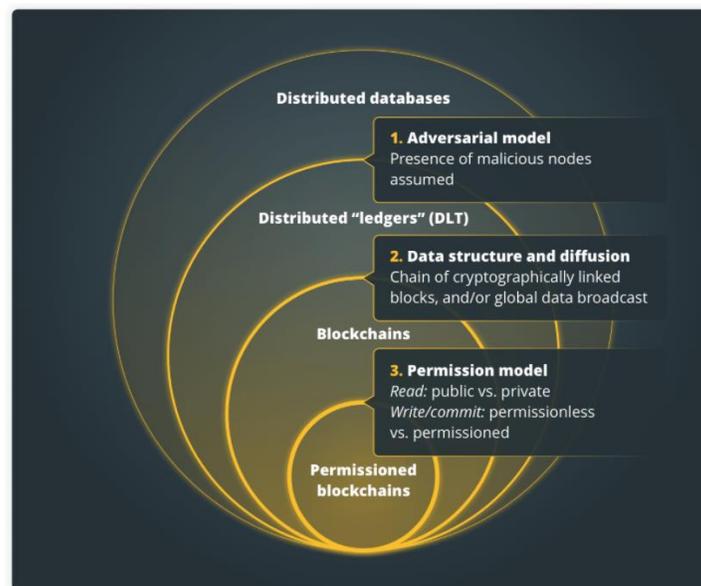
Tokenization is the process of representing physical and non-physical assets in the form of digital tokens. Tokens can be converted into cash, other cryptocurrencies or traded for other tokens of value. Examples include tokenized securities, initial coin offerings (ICOs), cryptocurrency/payment tokens, platform tokens (Ethereum), access tokens (utility, security, protocol), transaction tokens (Ripple) and stablecoins.

## 1.3 Blockchain Technology

Bitcoin introduced a mechanism for computers (nodes) on a network to send and receive digital tokens and for all the nodes to collectively remember current and past transactions between users of the system. Blockchain networks, like the one used by Bitcoin and other coin networks, are secured by cryptography and encryption, and are not managed by a sole source but by several different participants of the network.

Blockchain is a type of distributed ledger technology (DLT). A distributed ledger is a consensus of replicated, shared, and synchronized digital data geographically spread throughout the world.<sup>4</sup> Referenced in the diagram below, there are some similarities between the blockchain and distributed ledger technology. Both offer consensus mechanisms, decentralization, and cryptographic tokens, but the biggest difference is the public aspect of blockchains. Public blockchains have the following characteristics that set them apart from distributed ledger technology: a) anyone can review and agree on the state of the data in the network; b) anyone can use the network; and c) anyone can validate the transactions of the network.

### The relationship between blockchain and distributed ledger technology



 cointelegraph.com

source: *jjablog*

Source: <https://cointelegraph.com/news/what-is-the-difference-between-blockchain-and-dlt>

Both blockchain and distributed ledger technology offer transparency, security, and privacy. The technologies provide the underlying network (decentralized, scalable) and transport layer (consensus, validation) that make it possible for the exchange of value from digital wallets (digital identity, currency, decentralized applications) to the physical and non-physical assets (programmable tokens, digital assets).

### 1.4 Monetary Networks

The purpose of a financial system is to facilitate the exchange of value between economic areas with risk being shared among the participating individuals and groups.

Tokens created on blockchain networks are just programmed algorithms (math), with no relative value outside of the network it was created on. Like e-money, tokens do not exist in physical form but only as digital entries in bank balances or records of credit. E-money can be exchanged for fiat money as can tokens called 'stablecoins' that are pegged one-for-one with fiat money. Tokens offer a store of value, provide functionality when transacted and are a medium of exchange for physical and non-physical assets, such as fiat money, other cryptocurrency, real estate, music, or art.

There are over 7100 tokens transacted every day on coin networks. Cryptocurrency tokens are transacted to accomplish certain network tasks such as payments, store value, alternative finance, investments, privacy, and digital ownership. The cryptocurrency networks offer a new kind of monetary system where tokens are created and provide money for online global economies without an intermediary like a central bank, clearing house or government.

Existing technologies, such as blockchain, cryptography, and encryption, are being combined with economic, monetary, and regulatory methods to create frameworks for a new global financial monetary system.

### 1.5 Cryptocurrency Exchanges (Appendix B: Types of cryptocurrency)

There are an estimated 401 cryptocurrency exchanges with 291 of those exchanges being active.<sup>5</sup> Bitcoin makes up 79%<sup>6</sup> of the cryptocurrency market with altcoins at 15%<sup>7</sup> and tokens at 5%.<sup>8</sup> Cryptocurrency exchanges act as brokers and market makers for various cryptocurrencies. Investors can buy and sell coins like a typical stock brokerage and self-custody at extremely low costs. Exchanges also allow investors to withdraw coins to a personal digital wallet. (Appendix C: Cryptocurrency wallets)

Cryptocurrency exchanges are not supervised by a central regulatory authority. There is increased legislation at the regional level for which the cryptocurrency exchanges operate which prohibits non-citizens from transacting on the exchange. Many exchanges require registration and identification because of regional anti-money laundering (AML) and know your customer (KYC) laws. It is important to note that not all exchanges have KYC requirements to use their services.

Cryptocurrency exchanges can be categorized as regulated, unregulated, or decentralized. Each exchange offers a variety of services ranging from custodian services, buy/sell, trading, derivatives, perpetual swaps, and futures trading.

### ***Regulated exchanges***

In the US, exchanges are regulated as Money Services Businesses (MSBs). In the state of New York, the New York Department of Financial Services (NYDFS) offers licenses (BitLicense) for MSBs to operate a virtual currency business. Businesses that are assigned a BitLicense are regulated for KYC, AML and consumer protections laws.

New York's BitLicense is one of the world's strictest regulations of cryptocurrency exchanges and has been the subject of much controversy. Some of the most notable cryptocurrency exchanges with a BitLicense include Gemini, Coinbase, River Financial, Kraken, and Binance. Square's CashApp also acts as a Bitcoin exchange, and PayPal announced in June 2020 that its competitor, Venmo, would add a similar feature in the future.

### ***Unregulated exchanges***

Many unregulated exchanges are 'straight-to-market' exchanges<sup>9</sup> that offer futures trading of the cryptocurrency markets. Straight-to-market exchanges are consumer led and are influenced by speculative investing.

Unregulated exchanges are not supervised and have little to no oversight from any governing institution. Unregulated exchanges have a shaky past with a history of illegal activity that includes pump-and-dump and front-running schemes.<sup>10</sup> Individuals can buy Bitcoin on over-the-counter markets, dump the price on a regulated exchange, and sell them. Increased fraud has led state and government regulators to issue cease and desist letters to many unregulated exchanges.

### ***Decentralized exchanges (DEXs)<sup>11</sup>***

Decentralized exchanges are distinctly different to regulated cryptocurrency exchanges and have unique properties that present challenges for government regulators. Decentralized exchanges are non-custodial and are managed by automated software.

Unlike regulated cryptocurrency exchanges, DEXs do not hold customer funds or manage order books. All transactions are directly settled on the exchange by the buyer and seller. DEXs are usually not targeted by hackers because there are no funds stored on the exchange. From a regulatory standpoint, DEXs present challenges because there is no central group to be held accountable (DEXs are maintained by software), no personal accounts on which to enforce KYC/AML, and the exchanges cannot be easily blocked or taken down. DEXs provide the ability to convert cryptocurrencies into other types of currencies without regulatory oversight and could help entities avoid international sanctions.

1.6 Cryptocurrency Markets

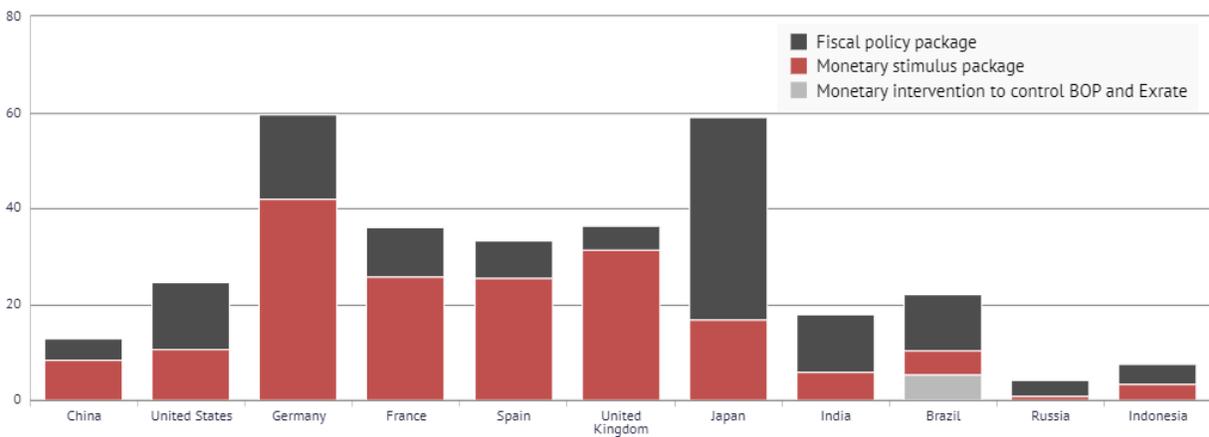
The cryptocurrency market has grown from US\$16 billion in January 2017 to U\$1 trillion in January 2021 as referenced in the following diagram.



Source: <https://coinmarketcap.com/charts/>

The rise in the cryptocurrency markets can be attributed to many factors ranging from the increased interest of institutional investors to the extreme growth in decentralized finance (DeFi), to governments getting comfortable with cryptocurrency.<sup>12</sup> An important factor is the international response to the global pandemic and how stimulus efforts have impacted global economies. Governments around the world have allocated large amounts of funds for emergency pandemic relief in both fiscal and monetary packages, with many packages exceeding over half of a country’s gross domestic product.

**Economic stimulus packages in the world’s largest economies (% of GDP), as of August 2020**



Source: Bogazici University, Economic Policy Response to a Pandemic; <https://knoema.com/ankvopb/worldwide-economic-stimulus-responses-to-covid-19>

Global stimulus has placed enormous amounts of money into circulation in order to help stimulate economic recovery and to offset local and regional financial burdens. The combined general government gross debt for 39 advanced economies exceeded over 141%<sup>13</sup> in 2020.

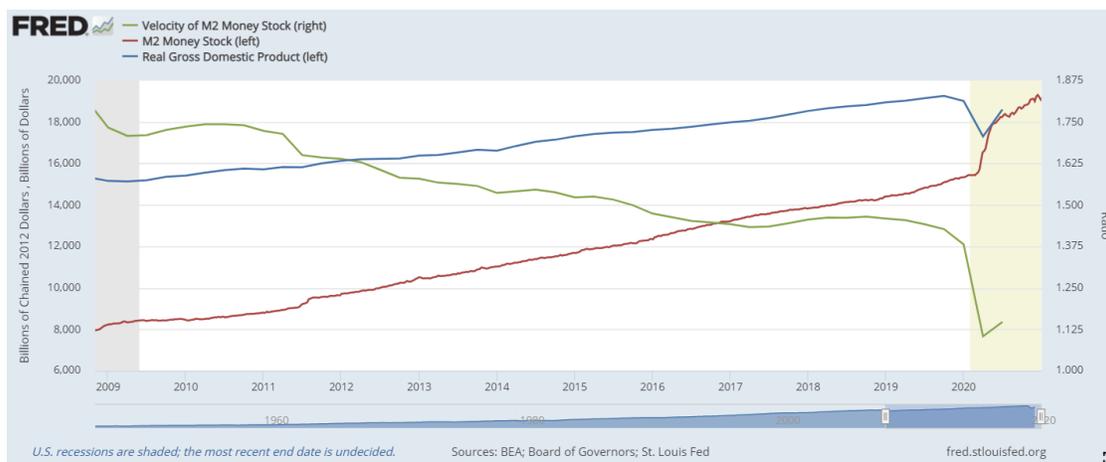
### General government gross debt (2019–2021)

Country Group Name	Units	2019	2020	2021
Advanced economies	Percent of GDP	104.206	124.129	124.246
Euro area	Percent of GDP	83.984	101.142	99.975
Major advanced economies (G7)	Percent of GDP	118.504	141.179	141.248
Other advanced economies (Advanced economies excluding G7 and euro area)	Percent of GDP	43.342	50.759	54.229
European Union	Percent of GDP	79.205	95.347	94.607
Emerging market and developing economies	Percent of GDP	52.131	61.361	63.995
Emerging and developing Asia	Percent of GDP	53.252	62.897	66.923
Emerging and developing Europe	Percent of GDP	29.914	38.989	39.963
ASEAN-5	Percent of GDP	38.607	46.993	49.95
Latin America and the Caribbean	Percent of GDP	68.867	79.279	78.963
Middle East and Central Asia	Percent of GDP	47.313	55.684	55.805
Sub-Saharan Africa	Percent of GDP	50.436	56.647	57.767

Source: International Monetary Fund, World Economic Outlook Database, October 2020; [https://www.imf.org/external/datamapper/GGXWDG\\_NGDP@WEO/DZA](https://www.imf.org/external/datamapper/GGXWDG_NGDP@WEO/DZA)

In Q2 2020, the US released US\$3.8 trillion into circulation while gross domestic product dropped US\$2 trillion and money trading hands in the economy dropped to from 1.3 to 1.1 percent.

### US M2 money stock, velocity, real GDP (Q2 2020)



Source: BEA; Board of Governors; St. Louis Federal Reserve; <https://fred.stlouisfed.org/series/M2V>

Introducing more money into circulation reduces the value of the money and sparks inflation, which causes nervousness among the public and financial markets. Cryptocurrency is resilient to cyclical financial crises that plague the traditional banking and financial sectors. Investors understand cryptocurrency's universally balanced value is a better alternative to dropping currency values, regional instability, and weakening economic conditions.

There are over 18,000 trading pairs<sup>14</sup> for investors to trade cryptocurrency. Cryptocurrency exchanges offer various investment approaches for the common and institutional investor. Offerings include trading pairs, futures contracts, crypto funds, crypto bonds, order books and settlements, and managed funds.

### ***Future contracts<sup>15</sup>***

Cryptocurrency futures are derivative products in the form of a contract between two parties to buy or sell an asset at a predetermined date or price. Cryptocurrency futures operate in the same manner as contracts for a commodity or stock allowing traders to speculate on the future price of cryptocurrency. Most average users obtain their coins from exchanges, but some large volume traders prefer to buy from over-the-counter (OTC) services, which are more private and keep large orders off publicly visible order books. Future contracts allow traders to gain exposure to cryptocurrency and manage cryptocurrency volatility without owning cryptocurrency. Many cryptocurrency exchanges offer futures contracts for investors such as Bitfinex and Kraken.

### ***Funds<sup>16</sup>***

Cryptocurrency funds are a portfolio of digital assets where investors can buy and collectively share in the profits. There are three categories of cryptocurrency funds. The first group are venture capital funds where investors pool money together to fund new blockchain or coin projects. The second group are hedge funds to help investors offset the volatility in the cryptocurrency markets while making a profit with both short and long strategies. The last group are exchange-traded funds, also known as ETFs, which allows investors to track the value of Bitcoin on traditional market exchanges without having to buy or sell on cryptocurrency exchanges. ETFs are regulated as a traditional financial product and are offered by many trading firms such as TD Ameritrade, Robinhood, and Fidelity. Some well-known Bitcoin ETFs include Purpose Bitcoin ETF (BTCC) and Evolve Fund Group's Bitcoin ETF (EBIT).

### ***Bonds<sup>17</sup>***

Cryptocurrency bonds are debt instruments and represent a loan by a corporation or government to finance projects and operations. Like traditional bonds, maturity, yield, and value are included with cryptocurrency bonds. There are some variations in bond characteristics depending on the issuer. A Chinese bank issued bonds<sup>18</sup> that can be tokenized and then traded on the Fusan exchange. Minereum<sup>19</sup> issued a bond that has no debt with investor tokens being locked on a blockchain for the duration of the bond. Banco Santander issued its first blockchain-based bond in preparation for a potential secondary market of security tokens. It has a quarterly coupon of 1.98%. Santander Securities Services acts as the tokenization agent and the key custodian.

### ***On-chain order books and settlements<sup>20</sup>***

DEX's first generation architecture was entirely blockchain-based. Every new order or adjustment to an existing order updates the state of the blockchain. Despite protecting user privacy and security, this method renders exchanges illiquid, slow, expensive, and inoperable with one another. There are many cryptocurrency exchanges that offer on-chain order books and settlements, including Maker and StellarTerm.

### ***Off-chain order books with on-chain settlements***

The 0x protocol, built on Ethereum, introduced a solution in the form of off-chain order books. Trade execution occurs on the Ethereum blockchain, giving users control of their funds until the exchange takes place. The order books are hosted by third parties called 'relayers'.

These relayers host and maintain order books using the 0x architecture to pool their liquidity together creating a more robust trading infrastructure. After submitting an order to the relayer, a market maker waits for a taker to fill that order, at which point the trade is trustlessly executed on the blockchain. In addition to 0x, Binance DEX and ForkDelta offer off-chain order books.

### ***Smart contract-managed reserves***

A smart contract<sup>21</sup> is a defined agreement between two parties written into lines of code that can be self-executed when conditions of the agreement are met. There are two main hurdles faced by centralized exchanges – they are prone to government intervention, susceptible to hacking, and function sub-optimally when there is low liquidity. This problem, introduced by William Jevons (1875), is known as the 'double coincidence of wants'. Jevons reasons that "the first difficulty in barter is to find two persons whose disposable possessions mutually suit each other's wants."

With smart contract-managed reserves, instead of having to find a buyer for Bitcoin, a user can trade with an external reserve, depositing Bitcoin into the reserve and receiving Ethereum in return. In the case of Bancor, an Israel-based project which raised U\$153 million through an ICO in June 2017, the smart contract facilitating the trade utilizes a precise mathematical formula to control the exchange rate between the two tokens which is based on an agreed-upon Constant Reserve Ratio (CRR.)

The ICO saw the release of the Bancor Network Token (BNT) which was backed up 20 percent by Ethereum raised in the crowd sale and held in reserves. Should a seller wish to liquidate BNT in exchange for Ethereum, the seller would do so into the smart contract and receive Ethereum in return.

The larger the proportion of a particular asset held in reserves, the higher the price.

By substituting smart contract-managed reserves for the process of finding a seller, Bancor creates a decentralized exchange solution that can circumvent the double coincidence of wants, opening illiquid tokens for trade.

### 1.7 Governance Framework

Governments have reacted differently to cryptocurrency and blockchain-related technology. Reactions to cryptocurrency have ranged from apprehension to curiosity to acceptance. Governments have issued public awareness statements to educate citizens about the differences between fiat currency and cryptocurrency including the high volatility associated with cryptocurrency investments. Countries have updated money laundering, counter-terrorism, and organized crimes laws to include the cryptocurrency markets, and require business that operate cryptocurrency service businesses to conduct due diligence or risk fines, closures, or imprisonment.

On the other hand, governments have embraced blockchain technology as beneficial for addressing financial transactions, encouraging regional economic growth, and supply chain solutions. Government has proposed coins for use with interbank settlements and has even proposed coins for public retail purposes. Governments are researching the benefits of blockchain solutions in tracing agricultural, pharmaceuticals, and military supply chains.

Cryptocurrency and blockchain-related technology are more than just a disruption for investing, the financial markets, and supply chains. The technology impacts the social, political, and economic structures around the world.

Authors of the 2018 *Innovations* article, 'The Blockchain Ethical Design Framework',<sup>22</sup> argue that the blockchain "technology has the ability to disrupt different types of institutions and social systems across the globe" by offering "microeconomies" that are "bypassing traditional institutions to meet the specialized needs of diverse populations." The discussion includes a set of impacts which include information control, censorship, privacy, and control over personal information.

To better understand the impact, governments should consider a governance framework that encourages technology innovation, ensures consumer protection, embraces financial inclusion, and incentivizes participants to follow the rules in a financial monetary and economic system.

The global pandemic exposed how fragile and dependent government economies are. The pandemic has increased economic nationalism through multi-million-dollar stimulus packages which has further hurt the global economy. If the current financial system was a patchwork built on bank runs and crises, then the new financial system must be well thought out with planned approaches that not only include the cryptocurrency networks and related technology but local leadership, multilateral agreements, and sustainable development goals.

What Bitcoin brought to the world is just a piece in the larger foundation for a new financial environment. The ability to represent an asset with a digital token, store that asset in a digital wallet and then transact on a decentralized cryptocurrency network is just the start. When coupled with self-executing code, machine learning, and software that interfaces with existing financial networks the functionality and impact become greater. Success of this new financial environment depends on a well thought out planned governance framework developed by governments from around the world.

## 2 Background and Research Approach

### 2.1 Scope

There are over 11,775 cryptocurrencies in the world as of January 2021, with 3,754<sup>23</sup> actively traded on global exchanges. For this reason, the scope of this study is limited to the adoption of Bitcoin in addition to top nine altcoins. The top cryptocurrencies comprise approximately 90 percent of the total cryptocurrency value worldwide.

The study will discuss the impact of cryptocurrency adoption on the following areas of government and provide recommendations for further consideration:

- Regulation
- Ethics
- Privacy (Appendix D: Privacy and anonymity)
- Jurisdictions
- Economy
- Enforcement
- Taxation.

### 2.2 Method

The Goal-Question-Metric approach and traditional quantitative data collection and analysis methods are used for the research content of this study. Each method will address scope goals, measurements, and quantified data collection, analysis, and reporting, respectively.

### 2.3 Goal-Question-Metric (GQM) Methodology (Appendix A: GQM results)

The Goal, Question, Metric (GQM) Methodology<sup>24</sup> includes three steps:

- Establish the goals the study is going achieve.
- What questions are asked to address goal satisfaction?
- Identify the metrics that need to be collected to answer the questions.

### 2.4 Data Collection

The data obtained for this study<sup>25</sup> follows traditional quantitative data collection and analysis methods. It is the intention of this study to provide established known facts for the concepts and predictions expressed in this study.

### 2.5 External Sources

The data sources are captured in references section.

### 2.6 Analysis, and Reporting Methodology

Cryptocurrency adoption is determined by measures that are proxy in nature providing research limitations influenced by the following:

- Government cryptocurrency and blockchain-related legislation are behind actual adoption.
- Government addresses policy and legislation after adoption reaches a certain level.
- Public awareness of cryptocurrency.
- Investment in cryptocurrency and blockchain-related technology.

- Global economic conditions.

## 3 Adoption of Cryptocurrency

### 3.1 Global

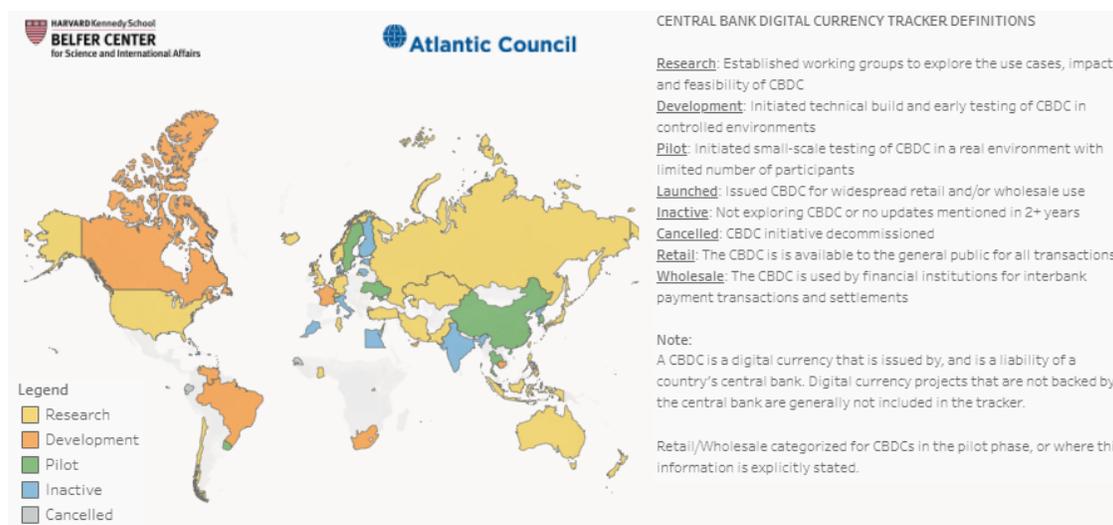
Blockchain technologies, digital currency, the internet, and mobile applications (5G) provide individuals with the necessary tools to take control of their finances without the need for intermediaries such as banks, brokerage firms or stock exchanges. Decentralized finance (DeFi), a framework of automated financial services without intermediaries, offers the possibilities to lower boundaries of entry to the global financial markets for the ‘unbanked’ and allows remote regions to transact value, save, and even invest for the future. The opportunities and innovations are numerous allowing any person, company, or government to foray into this new decentralized financial environment.

Decentralized finance has redefined ‘global competitiveness’, which cannot be measured by just the productivity and efficiency of a country but by how the country regulates and innovates the use of digital currencies for asset exchange. Global competitiveness has extended to include private digital currency being developed by technology companies such as Facebook’s Diem and national digital currencies such as the Chinese digital yuan.

Central banks are starting to realize the impact decentralized finance will have on their business models. Central banks have started research initiatives to understand the benefits of digital currency and how it can be implemented in local economies and eventually in the global financial system.

The following map from the Belfer Center for Science and International Affairs and the Atlantic Council shows various central bank digital currency initiatives around the world.

### National Digital Currency Tracker



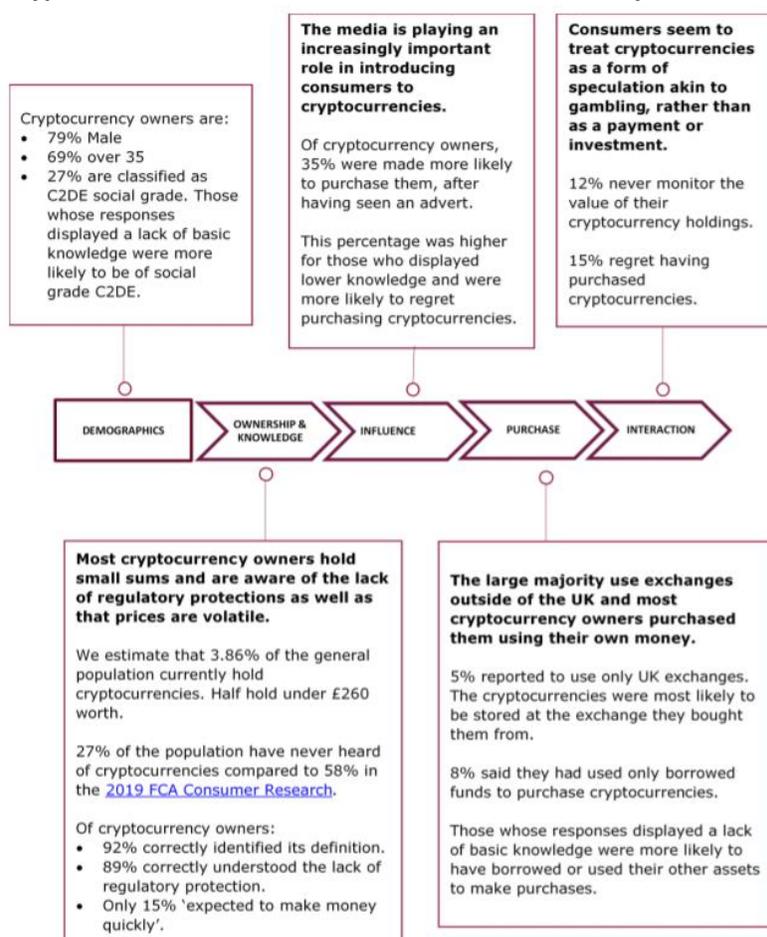
Source: Harvard Kennedy School's Belfer Center for Science and International Affairs; Atlantic Council's Global Business and Economics Program



The global pandemic has increased the focus on cryptocurrency due in part to government stimulus spending, talks of central bank digital currency and the public’s willingness to move to a ‘touchless, cashless’ society. <sup>26</sup>

The Financial Conduct Authority (FCA) published a 2020 research note, *Cryptoasset consumer research*, which estimates “3.86 % of the UK general population currently own cryptocurrency” as referenced in the diagram below. Additional findings show a rise in cryptocurrency ownership from “3% in 2019” to “5.35% in 2020”, and an awareness increase from “42% in 2019” to “73% in 2020.”<sup>27</sup>

### Cryptoasset Consumer Research Note 2020 summary of results<sup>28</sup>

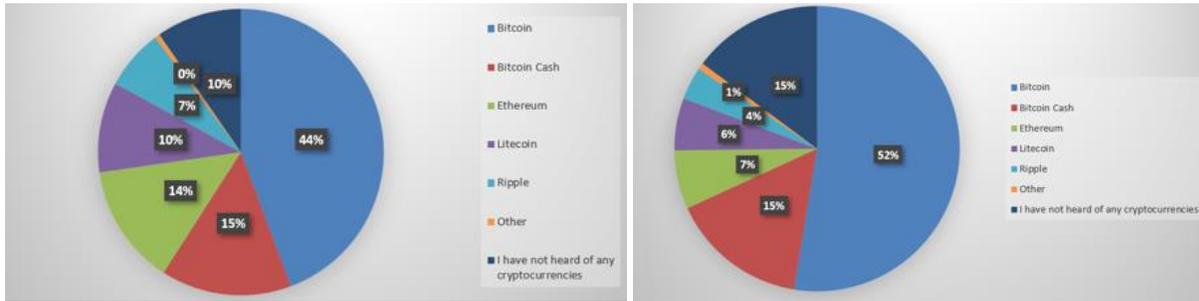


Source: Financial Conduct Authority 2020

In the US, males tend to maintain an 87% majority in participation and involvement with the Bitcoin community, whereas females maintain 12% less involvement. But female participation in the Bitcoin community has increased 3% from 9% in 2018, to 12% in 2019.

On the other end of the spectrum, 52% of females and 44% of males have heard of cryptocurrencies such as Bitcoin as referenced in the following diagram.

Percentage of Males and Females that have Awareness of Cryptocurrency (2019)<sup>29</sup>



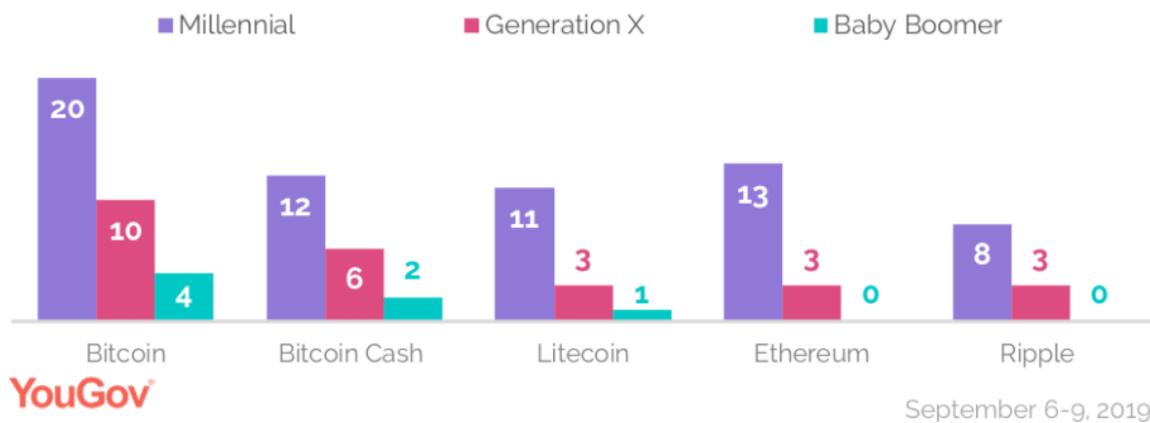
Source: YouGov; <https://today.yougov.com/topics/finance/articles-reports/2019/09/24/cryptocurrency-bitcoin-americans-millennials-poll>

**Age group**

Groups between the ages of 25 and 34 have 46% active participation and involvement with Bitcoin while only 26% of the groups aged 35–44 are actively involved. In the US, the number of individuals with awareness of cryptocurrency in 2019 is far slimmer when compared to those that are actual investors. A survey<sup>30</sup> from Finder.com showed an increase of 7% in 2018 to 14% in 2019, but overall, it is estimated that only 5%<sup>31</sup> of Americans held Bitcoin in 2020.

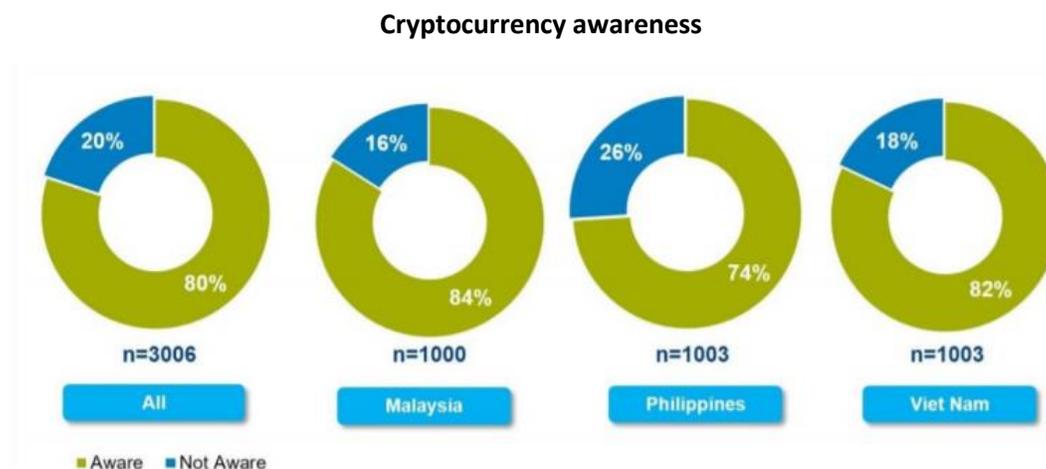
Millennials have purchased more cryptocurrencies than Gen Xers and Baby Boomers combined as referenced by the 2019 YouGov survey results in the diagram below.

Cryptocurrency Purchases by Age Group (select cryptocurrency)



Source: YouGov; <https://today.yougov.com/topics/finance/articles-reports/2019/09/24/cryptocurrency-bitcoin-americans-millennials-poll>

The Organisation for Economic Co-operation and Development (OECD) 2019 Cryptoassets report<sup>32</sup> found that three Asian nations (Vietnam, Malaysia, and Philippines) show a high rate of cryptocurrency awareness at 80% as shown in the following diagram.



Sample: Main sample, no booster.

Question: Which of the following statements applies to you? "I have heard of digital or cryptocurrencies such as Bitcoin or Ethereum".

Source: OECD; <https://www.oecd.org/countries/philippines/2019-cryptoassets-in-asia.pdf>

The 2019 OECD report also states that even though awareness is high, only 30% of the nations surveyed owned cryptocurrencies, as shown in the table below.

### Cryptocurrency ownership

Cryptocurrency Ownership	Total	Malaysia	Philippines	Viet Nam
Currently holds	30%	23%	32%	35%
Does not hold	70%	77%	68%	65%
Base	3006	1000	1003	1003

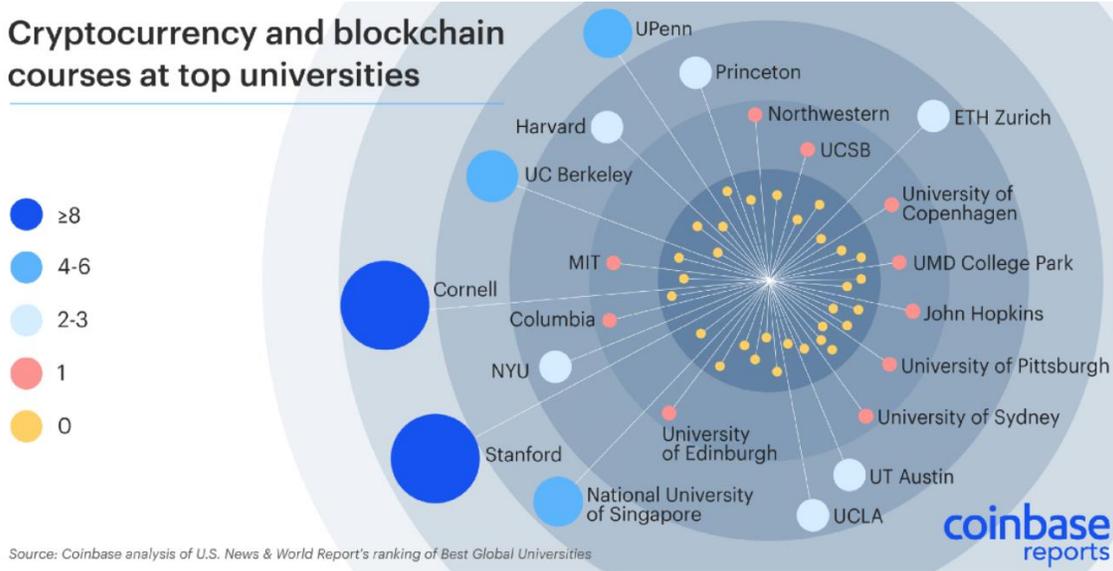
Sample: Main sample, no booster.

Question: Which of the following statements applies to you? "I currently hold digital or cryptocurrencies (such as Bitcoin or Ethereum)".

Source: OECD; <https://www.oecd.org/countries/philippines/2019-cryptoassets-in-asia.pdf>

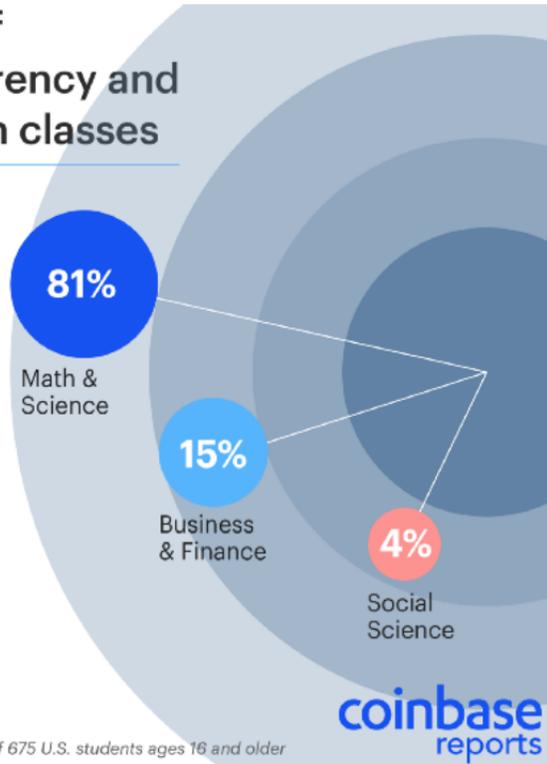
The increase in global awareness of blockchain technology and cryptocurrency can also be attributed to self-education efforts by the general public by means of blockchain<sup>33</sup> and cryptocurrency<sup>34</sup> blogs, YouTube videos,<sup>35</sup> and certification programs.<sup>36</sup> Professional associations, as well as industry associations, are offering continuing professional development courses as well as micro-certificates in blockchain and cryptocurrency technology in an effort to increase knowledge and understanding and ensure relevance of their members' skill sets to the needs of the financial sector and global markets. A

study from Coinbase Reports shows that 42% of the top 50 universities offer at least one blockchain or cryptocurrency class and 22% offer more than one.<sup>37</sup>



The Coinbase Reports study shows that course disciplines that offer cryptocurrency and blockchain education included business, economics, finance, and law departments. Interestingly, cryptocurrency and blockchain are also offered in anthropology, history and political science. The study also finds that math and science offer the most classes at 81%, followed by business and finance at 15%, and social science at 4%, as shown the following diagram.

### Number of cryptocurrency and blockchain classes

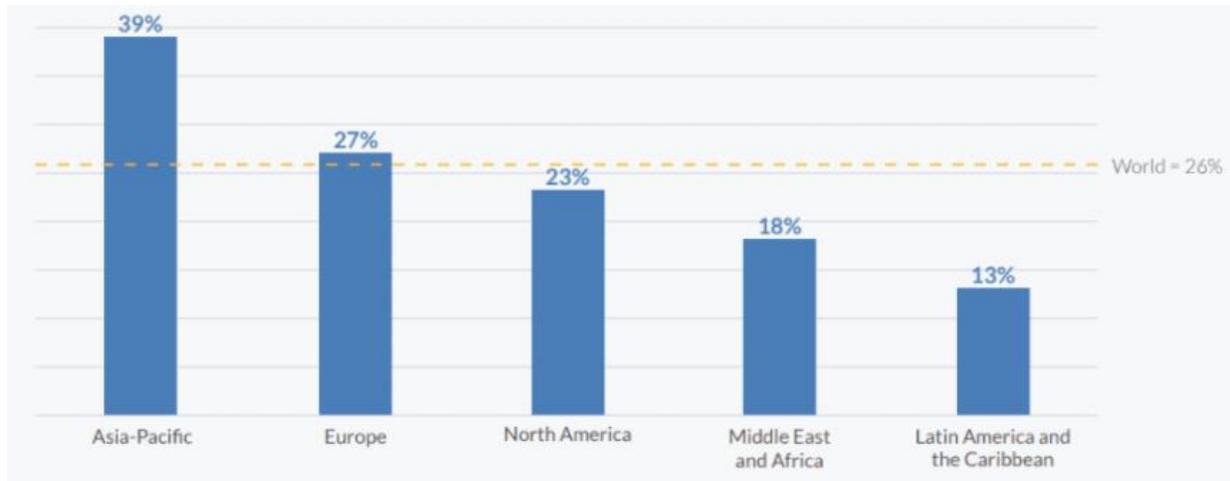


Source: Qriously survey of 675 U.S. students ages 16 and older

Source: <https://blog.coinbase.com/the-rise-of-crypto-in-higher-education-81b648c2466f>

There has been an awareness and acceptance of cryptocurrency worldwide that has further accelerated adoption on a global scale.

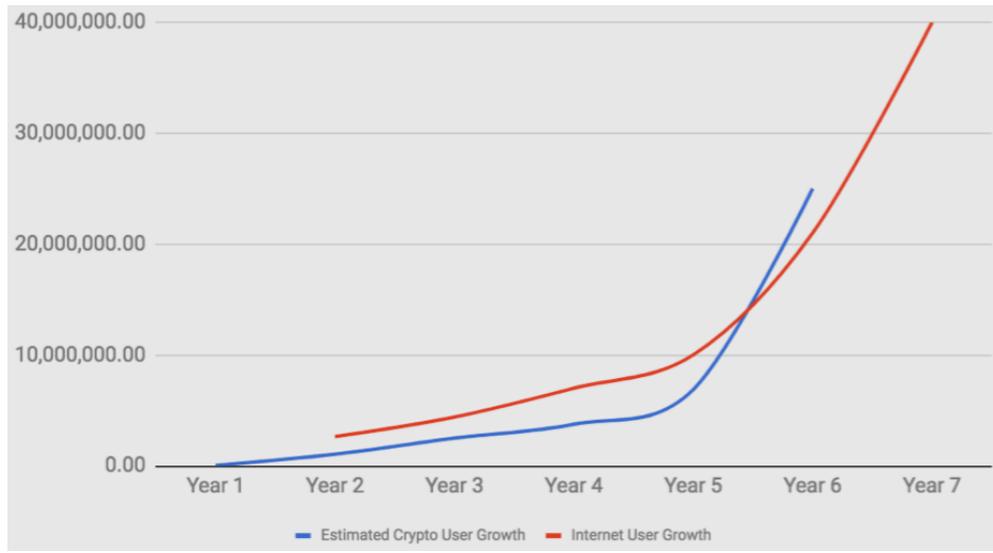
### Highest growth enterprises by region (2019)



Source: University of Cambridge, *Global Cryptocurrency Benchmark Study*

To better understand the trajectory of cryptocurrency adoption worldwide, a comparison can be made with the adoption of the internet in the 1990s. A five-year comparison between the internet growth in the 1990s to cryptocurrency growth in 2013 is shown below.

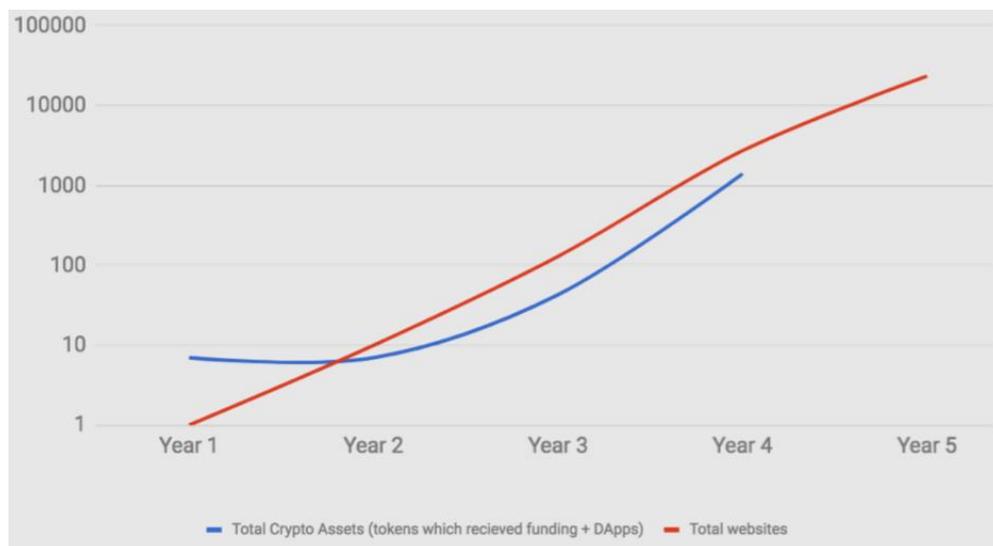
**Estimated internet user growth (1990–1995) vs cryptocurrency user growth (2013–2018)**



Source: Chris McCann; <https://medium.com/@mccannatron/12-graphs-that-show-just-how-early-the-cryptocurrency-market-is-653a4b8b2720>

Additional growth can be estimated between website development and the growth of cryptoassets.

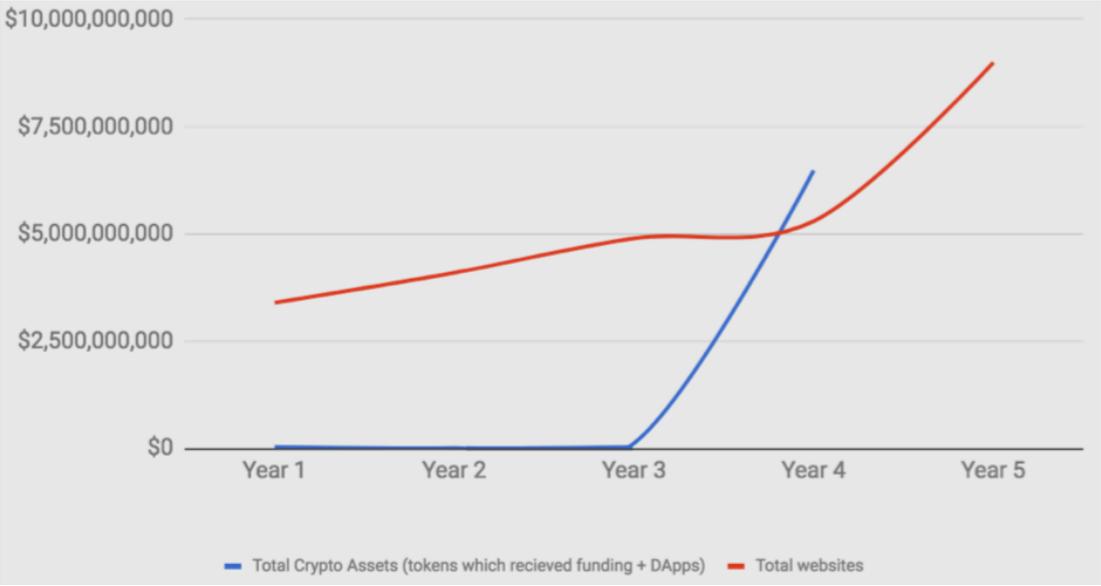
**Growth of websites (1991–95) vs growth of cryptoassets (2014–17)**



Source: Chris McCann; Data:TokenData, DappRadar

The following diagram shows the comparison between venture capital financing received by internet start-ups in the 1990s and ICO funded by tokens and distributed applications (Dapps).

Venture capital financing (1991–96) vs ICO funding (2014–18)



Source: Chris McCann; Data:TokenData, DappRadar

3.2 National

*European Union, Middle East, Africa, Russian Federation*

To promote digital finance in Europe, the European Commission services are working towards a new Digital Finance Strategy for the EU. Key areas of reflection include deepening the European Single Market for digital financial services, promoting a data-driven financial sector in the EU while addressing its risks and ensuring a true level playing field, making the EU financial services regulatory framework more innovation friendly, and enhancing the digital operational resilience of the financial system.<sup>38</sup> The European Commission released a public consultation requesting the public’s input in establishing a new framework for cryptoassets.<sup>39</sup> To this consultation, cryptoassets will be defined as “a digital asset that may depend on cryptography and exists on a distributed ledger.” A basic taxonomy of cryptoassets includes three main categories: ‘payment tokens’ that may serve as a means of exchange or payment, ‘investment tokens’ that may have profit rights attached to it and ‘utility tokens’ that may enable access to a specific product or service. The cryptoasset market is also a new field where different actors – such as the wallet providers that offer the secure storage of cryptoassets, exchanges, and trading platforms that facilitate the transactions between participants – play a particular role.

*“Crypto-assets and distributed ledger technology will be our first test case. They have the potential to bring benefits to consumers, businesses as well as market participants. – Executive Vice-President Valdis Dombrovskis, 23 June 2020.”<sup>40</sup>*

The European Central Bank (ECB) has been analyzing the cryptoasset phenomenon with a view to identifying and monitoring potential implications for monetary policy and the risks cryptoassets may pose to the smooth functioning of market infrastructures and payments, as well as for the stability of the financial system. The ECB has chosen to define cryptoassets as “a new type of asset recorded in digital form and enabled by the use of cryptography that is not and does not represent a financial claim on, or a liability of, any identifiable entity.” The main characterizing element of a cryptoasset is that it is not a claim on either an issuer or a custodian. Cryptoasset risks primarily originate from i) the lack of an underlying claim, ii) their (partially) unregulated nature, and iii) the absence of a formal governance structure. The challenges in measuring the phenomenon of cryptoassets are diverse and relate both to on-chain and off-chain data.<sup>41</sup>

European Securities and Markets Authority (ESMA) published the results of a survey conducted in conjunction with the National Competent Authorities of all EU member states in January 2019. The report entitled *Advice on Initial Coin Offerings and Crypto Assets* aimed to better define which cryptoassets should be regarded as financial instruments and which criteria must be met if a cryptoasset is to be regarded as a financial instrument respectively, be it a transferable security, a share in a collective investment undertaking, or a derivative contract.<sup>42</sup>

Based on broad public consultations and the Digital Finance Outreach, the European Commission adopted on 24 September 2020 a digital finance package, including a digital finance strategy and legislative proposals on cryptoassets and digital resilience, for a competitive EU financial sector that gives consumers access to innovative financial products, while ensuring consumer protection and financial stability. The Commission proposes a framework on cryptoassets to allow for innovation in a way that preserves financial stability and protects investors. Cryptoassets are digital representations of values or rights, which are transferred and stored electronically. They can serve as an access key to a service, could facilitate payments, or could be designed as financial instruments. The Commission differentiates between those cryptoassets already governed by EU legislation, and other cryptoassets. The former will remain subject to existing legislation, but the Commission proposes a pilot regime for market infrastructures that wish to try to trade and settle transactions in financial instruments in cryptoasset form. This should enable market participants and regulators to gain experience with the use of DLTs exchanges that would trade or record shares or bonds on the digital ledger. For previously unregulated cryptoassets, including ‘stablecoins’, the Commission proposes a bespoke regime. The proposed regulation sets strict requirements for issuers of cryptoassets in Europe and cryptoasset service providers wishing to apply for an authorization to provide their services in the single market. Safeguards include capital requirements, custody of assets, a mandatory complaint holder procedure available to investors, and rights of the investor against the issuer. Issuers of significant asset-backed cryptoassets would be subject to more stringent capital requirements, liquidity management and interoperability requirements.<sup>393</sup>

The European Commission released the Markets in Crypto-Assets (MiCA) regulation in September 2020 to ensure consumer protection in the cryptoasset market without impacting market stability. MiCA is a regulatory framework to address the ever-growing cryptoasset and service provider market and to establish a comprehensive licensing authority for all member states by 2024. MiCA aims to provide legal certainty for cryptoassets, provide uniform rules for servicers, replace national frameworks applicable to cryptoassets, and define rules for stablecoins. The potential impacts of MiCA include greater compliance challenges for newly regulated businesses including impacts from additional legislation from EU supervisors. MiCA may also influence institutional changes at supervisors and central banks concerning oversight and additional regulatory approaches.

The Middle East has embraced the blockchain industry by hosting several blockchain projects:

- The Saudi Arabian Monetary Authority (SAMA) is assessing the use of blockchain technology to inject liquidity into the banking sector. SAMA has also developed a regulatory sandbox to assist the Saudi Fintech community with digital banking services and blockchain education programs.
- Bahrain regulators have been working with blockchain technology development since 2017 and introduced cryptoasset regulation for the financial services industry. Bahrain established initiatives to attract blockchain businesses to the region by launching a regulatory sandbox and offering digital diplomas on the blockchain through the University of Bahrain.
- To further encourage additional companies to develop blockchain and cryptocurrency-related projects, the United Arab Emirates (UAE) Securities and Commodities Authority (SCA) drafted regulations for issuing and offering cryptoassets.<sup>77</sup> The draft legislation provides cryptoassets definitions and clarifications on the promotion of security tokens, listing cryptoassets on exchanges, custody of cryptoassets, fundraising standards, financial crime controls, recognized cryptocurrencies, and technology governance and standards.

Africa's legal stance on cryptocurrency and blockchain project initiatives vary from country to country.<sup>51</sup> South Africa, Sierra Leone, Senegal, and Tunisia have a progressive stance towards cryptocurrency and blockchain technology by providing statements on cryptocurrency and developing blockchain research projects. Morocco, Algeria, Libya, Zambia, Zimbabwe, and Namibia have all-out bans on cryptocurrencies and 12 countries have no official stance.

- The South African Intergovernmental Fintech Working Group (IFWG) released a joint statement on the regulatory and policy response to cryptoasset activities in South Africa.<sup>52</sup> The statement defines and classifies cryptoassets, defines use cases such as ICOs, defines risks of cryptoassets, and outlines South Africa's regulatory response. The statement closes with 30 recommendations modelled around the existing South African legal and regulatory framework.
- A 2020 report by Chainalysis<sup>53</sup> ranked Nigeria eight in cryptocurrency adoption out of 154 countries. Nigeria has shown an increase in peer-to-peer transactions<sup>54</sup> due to the Central Bank of Nigeria's devaluation of the naira.<sup>55</sup> The Nigerian Securities Exchange and Commission

released a statement<sup>56</sup> on cryptocurrency regulation ensuring not to stifle innovation but to ensure public safety and to provide regulatory solutions to problems.

- The Financial Intelligence Authority of Uganda (FIA) has amended the 2013 Anti-Money Laundering Act to address the growing number of virtual currency service providers in Uganda and to ensure consumer protections for its citizens. The Act recognizes cryptocurrency exchanges as ‘accountable persons’ and that they are subject to supervision by FIA. Cryptocurrency exchanges operating in Uganda must register with the FIA and are required to follow KYC/AML/CFT policies, keep records, and report suspicious activity and large cash transactions.
- Even though cryptocurrency was banned in Egypt, the Central Bank of Egypt released draft legislation<sup>57</sup> in 2020 outlining a cryptocurrency payment and licensing framework that is geared to the payments market. The draft law makes it illegal for any entity to trade, sell, or create cryptocurrency without a license. Other advancements that have possibly moved the Egyptian government to consider cryptocurrency as an option for payments could be the appointment of Mona Hamdy<sup>58</sup> as ambassador to the Middle East for the Government Business Blockchain Council (GBBC). The GBBC has led efforts in the Middle East to help countries incorporate blockchain technology and cryptocurrencies into existing financial frameworks.

Russia has proposed draft legislation for cryptocurrency and blockchain-related technologies. The legislation is part of the larger Russia Digital Economy Program,<sup>66</sup> which includes three cryptocurrency and blockchain-related laws: ‘On Digital Rights’,<sup>67</sup> ‘On Digital Financial Rights’,<sup>68</sup> and ‘On Attracting Investment Using Investment Platforms’.<sup>69</sup>

### *North America, United States, Latin America, Caribbean*

Canada has heavily invested in blockchain-related technologies since 2012 and the Government of Canada drafted a Digital Operation Strategic Plan,<sup>43</sup> which establishes guidelines on how the Canadian government manages technology and technological changes. The Bank of Canada has been researching central bank digital currencies (CBDCs) and has developed a distributed ledger technology solution for wholesale payment systems.<sup>44</sup>

The Ontario Securities Commission (OSC) approved the first Bitcoin ETF, Purpose Bitcoin ETF, providing an easy access for investors to hold settled Bitcoin and not Bitcoin derivatives. The OSC announcement opens the door for additional cryptocurrency financial tools for investors, including futures contracts and investment funds.

US lawmakers have introduced the Automatic BOOST to Communities Act (ABC Act),<sup>45</sup> which describes a digital public currency wallet system based on the US dollar and which would allow US residents, citizens and businesses located in the country to access financial services. In addition to the ABC Act, US lawmakers introduced the Crypto-Currency Act of 2020, a bill that looks to designate a wide range of digital assets to the appropriate regulator. It is hoped the bill will provide clarity and legitimacy to

cryptoassets in the US. It divides digital assets into three categories: crypto-commodity, cryptocurrency, and crypto security.

The US Office of the Comptroller of the Currency (OCC) published a letter explaining national banks and federal savings associations' authority to provide cryptocurrency custody services for customers. The letter solidifies authority for banks to hold digital assets for safekeeping, including cryptocurrency custody services, holding cryptographic keys associated with cryptocurrency, and extending custody services beyond just passively holding keys.

Even though Latin America has seen an increase in cryptocurrency usage,<sup>46</sup> Latin American governments have not established cryptocurrency legislation or frameworks:

- Brazil: Central Bank of Brazil 2014 notice<sup>47</sup> does not recognize virtual currencies as electronic currency as they are not issued or guaranteed by a monetary authority.
- Colombia: A cryptocurrency regulatory framework has not been developed at this time. The Financial Superintendence of Colombia<sup>48</sup> defines cryptocurrency as “not legally recognized obligations by a legal person or institution that supports them.”
- Chile: Does not have a cryptocurrency regulatory framework. The Banco Central de Chile<sup>49</sup> does not recognize cryptocurrency as legal tender and states “cryptocurrencies have no real potential to replace traditional money.”

Cryptocurrency developments have increased in the Caribbean because of central bank-backed digital currency projects<sup>50</sup> and the introduction of the Bahamian Digital Assets and Registered Exchanges Bill 2020 (DARE), which introduces a framework to trade, sell and exchange digital currency in the Bahamas. Bermuda introduced the Digital Asset Business Act (DABA) to establish a regulatory and licensing framework for digital asset businesses and coin and token offerings. The DABA scope includes sales regulation and AML requirements for digital assets businesses that issue, sell or redeem virtual coins and tokens, including requirements to obtain a license to operate digital assets services in Bermuda. Digital assets are not taxed in Bermuda.

### 3.2.1 Asia Pacific

Japan's Financial Services Agency cryptocurrency regulation framework includes legislation for cryptoasset custody service providers and cryptoasset derivatives businesses. Recent amendments to the Payment Services Act (PSA Japan)<sup>59</sup> and the Financial Instruments and Exchange Act<sup>60</sup> (FIEA) include protections for Japanese residents who invest in cryptoassets, and they require cryptoasset exchange service providers to educate Japanese residents on the difference between cryptoassets and fiat currency.

The Monetary Authority of Singapore (MAS) has established a progressive cryptocurrency framework in Singapore. In 2017, MAS released *A Guide to Digital Token Offerings*,<sup>61</sup> which outlined guidance for offering and issuing digital tokens in Singapore. The guide states that a “digital token is considered a capital markets product when defined under the Securities and Futures Act<sup>62</sup> as a share, a debenture, a

unit in a business trust, a securities-based derivatives contract or a unit in a collective investment scheme.” The guide also includes statements on the application of anti-money laundering and combating the financing of terrorism (AML/CFT) laws to digital tokens and servicers of digital tokens.

There is no cryptocurrency regulatory framework in Australia. Australia has taken a ‘hands-off’ approach to cryptocurrency regulations,<sup>63</sup> which has allowed Fintech companies and cryptocurrency entrepreneurs to facilitate growth and innovation in payments, lending, investment, and custodial services.<sup>64</sup> Australia’s Department of Industry, Science, Energy and Resources promotes this approach by stating “Regulation is fit for purpose and technology neutral, allowing businesses and industry to quickly adopt beneficial technologies.”

China has taken a hardline approach in addressing the use of cryptocurrencies. The government does not recognize cryptocurrency or Bitcoin as legal currency nor accepts that cryptocurrencies provide any legitimate services. China has banned many cryptocurrency-related initiatives such as initial coin offerings (ICOs), initial miner offerings (IMOs),<sup>65</sup> and cryptocurrency trading exchanges.

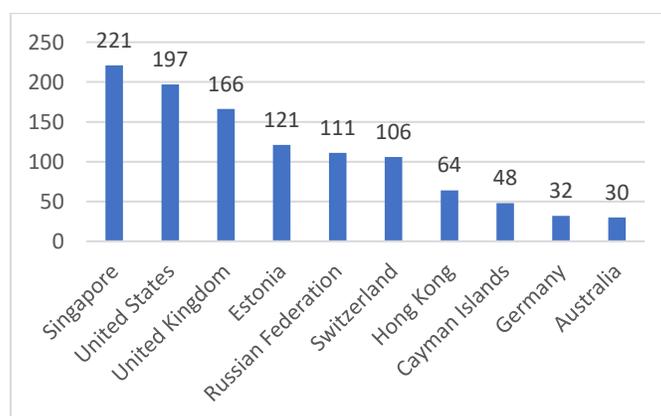
India has not established a cryptocurrency regulatory framework and does not consider Bitcoin a form of legal currency. India has resisted banning cryptocurrencies, except a state-issued one, or regulating cryptocurrencies.<sup>70</sup>

### 3.3 Projects

Many countries are researching the probability of using cryptocurrency in their local economies. Some countries have published strategic whitepapers with cryptocurrency recommendations. Use cases vary but each country is starting to see the benefits of how digital government-backed cryptocurrencies can help provide ease of accounting and reduce the overall cost for the nations.<sup>71</sup>

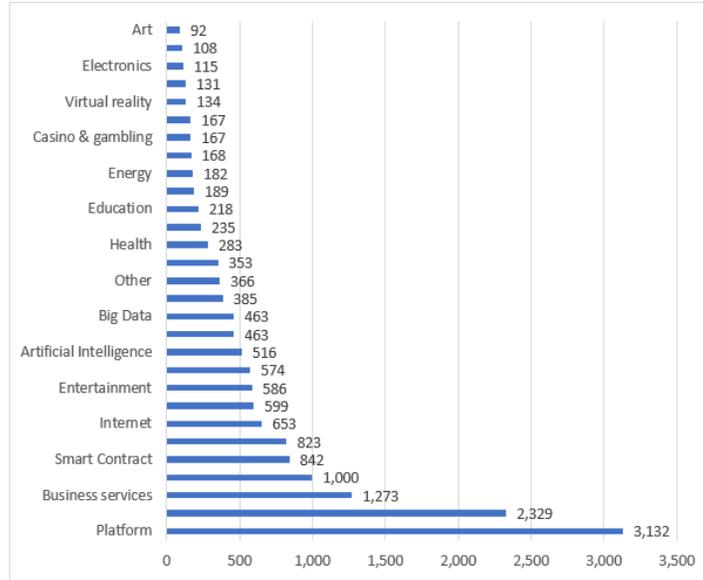
Two examples provide the number of ICO projects globally including the number of projects broken down by industry.

**Number of regional cryptocurrency ICO projects (2019)**



Source: ICOBench; <https://icobench.com/icos>

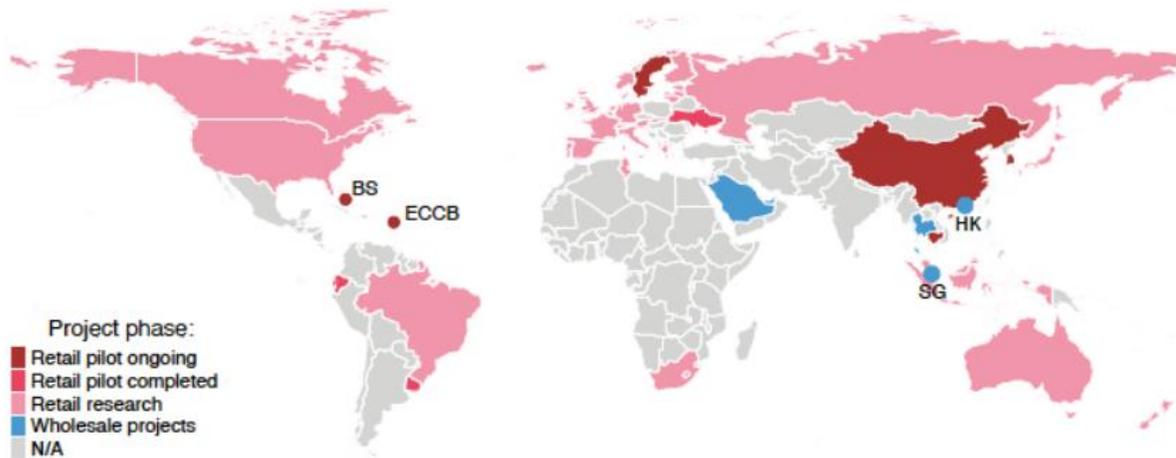
**Number of cryptocurrency ICO projects by industry (2019)**



Source: ICOBench; <https://icobench.com/icos>

Governments are researching the use of their own central bank digital currencies for wholesale bank-to-bank settlements and retail payments.

**Central bank digital currency (CBDC) projects 2020**



Source: R Auer, G Cornelli and J Frost; CEPR Discussion Paper 15363; <https://voxeu.org/article/central-bank-digital-currencies-drivers-approaches-and-technologies>

## 3.4 Investments

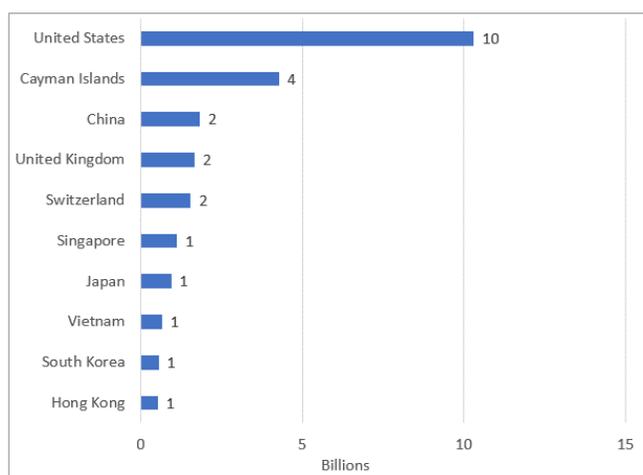
When considering blockchain and cryptocurrency innovation, it is important to consider the influence of venture capital investment.

Below are important but key metrics to measure the current state of venture capital investment in the emerging space that is blockchain and cryptocurrency.

### As of February 2021:

- 5,794 registered global businesses were classified under the categories of blockchain, cryptocurrency, Bitcoin, and Ethereum.
- 18,484 registered funding rounds:
  - Total investment equates to US\$39 billion (this excludes undisclosed private funding rounds).
  - Industries that are considered to have reached a level of maturity are considered Fintech and health care.
  - The latest total investment in those respective industries are as follows:
    - Fintech: US\$236 billion
    - health care: US\$473 billion.
  - These comparison industries demonstrate that blockchain and cryptocurrencies are still at an early stage of development. Mainstream integration and adoption are considered to be three to five years away.
  - Bitcoin as a standalone segment or sub-industry is the single use case driving market growth currently.
- The top three placed countries of the US, Cayman Islands and China represent 50% of total investment to date.

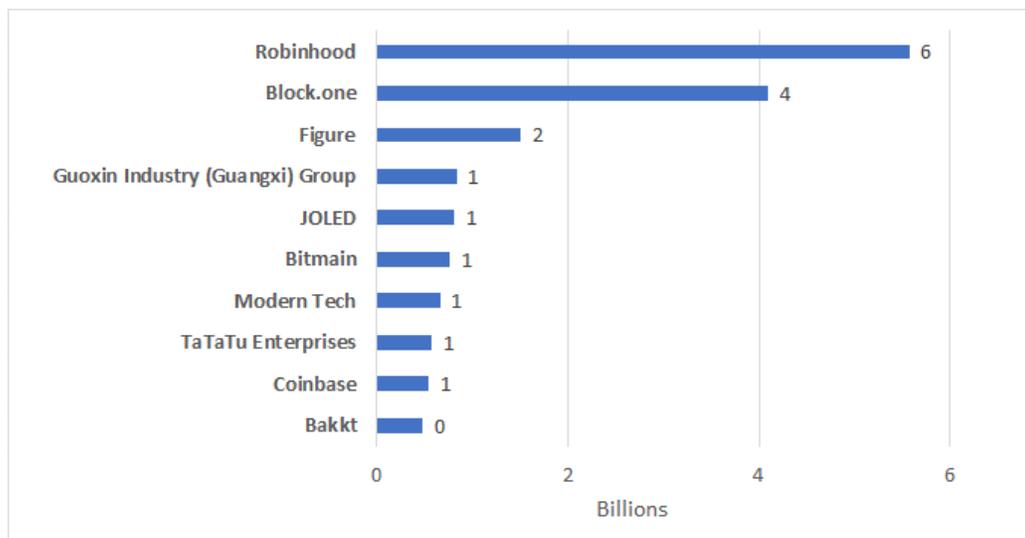
**G1: Top 10 countries by venture capital investment deal size**



Note: Chinese investment is considered to be state driven and private investment is considered to be valued with publicly available statistics.

Source: Crunchbase; <https://www.crunchbase.com/>

G2: Top 10 businesses by investment (2020–2021)



Note: Modern Tech, Vietnam: While in the top 10, the business was declared a scam operation as investors departed with the ICO fundraising.

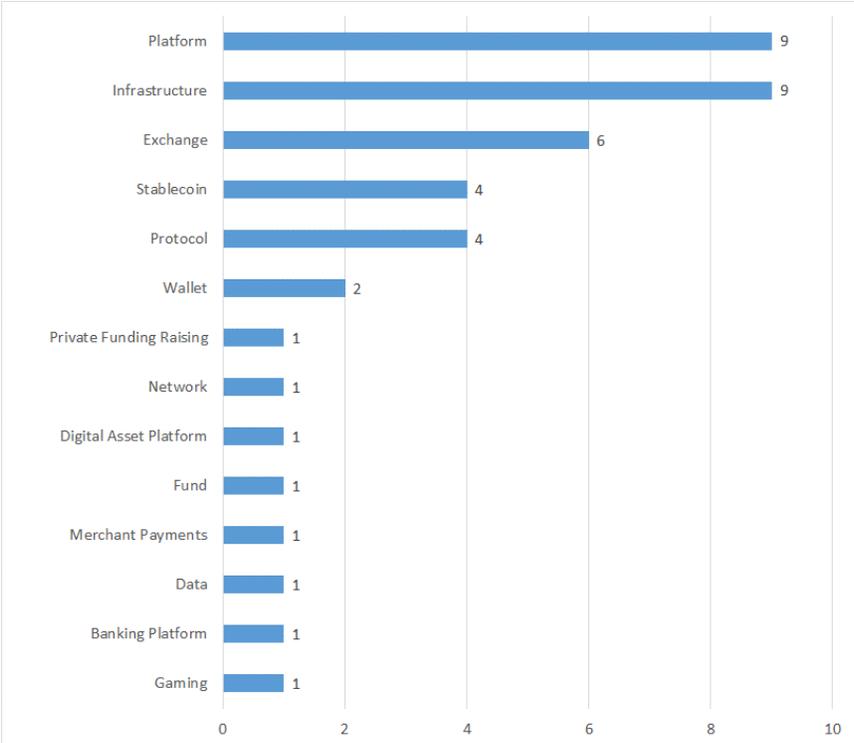
Source: Crunchbase; <https://www.crunchbase.com/>

In reference to the G2 graph above, it is important to note the growth of number one-placed business Robinhood. Robinhood is a stock brokerage that allows customers to buy and sell stocks, options, exchange traded funds (ETFs), and cryptocurrencies with zero commission. Their platform offers equity, cryptocurrency, and options trading, as well as cash management accounts. It also provides a stock brokerage platform that democratizes access to the financial markets and aims to make people comfortable storing money and trading stocks using its platform.

The management team at Robinhood raised US\$4.6B of their total US\$5.5B in 2020, which aligned with the associated downturn of the global economy and pandemic. The funding was tied to the platform’s ability to scale and target investors wishing to purchase cryptocurrency and in particular Bitcoin. Due to the global monetary stimulus backed by Reserve Bank printing, the use case for Bitcoin was as strong as ever. Due to Bitcoin being a store of value which protects against currency devaluation and future forms of inflation, retail and sophisticated investors became educated on these very items and Robinhood positioned itself perfectly with venture capital funds and the mainstream markets to take advantage of this growth during global lockdowns.

With the large amount of investment on the table, it will be interesting to observe if Robinhood can sustain growth and return on investment for their investors in future cryptocurrency bear markets, particularly following the contraction of global government stimulus programs.

G3: Andreessen Horowitz & Galaxy Digital – business classification



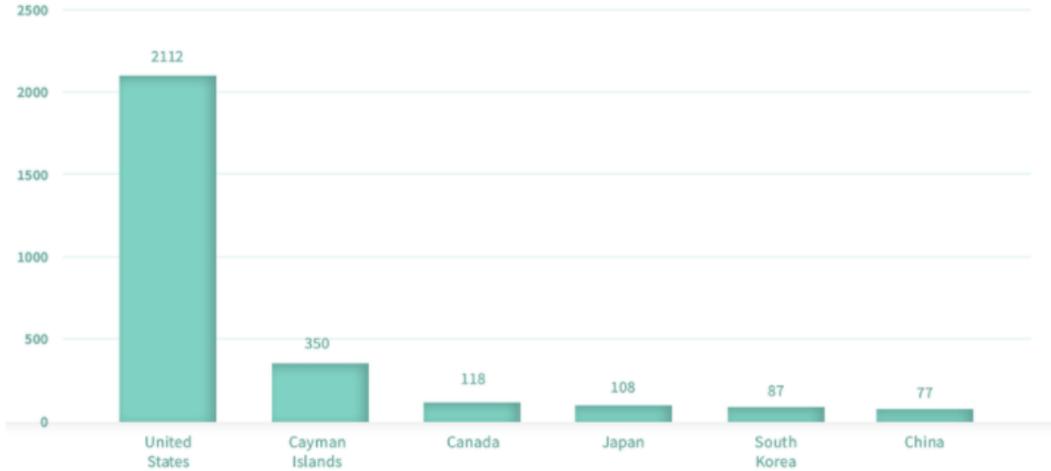
Source: a16z.com & galaxydigital.io

The above graph represents the classification of businesses within the Andreessen Horowitz & Galaxy Digital crypto funds. The categories of platform, infrastructure, exchanges, stablecoins and protocols represent that the current focus within these high-profile funds is around building the foundations for blockchain and cryptocurrency to engage mainstream markets in the next decade. This sample outlines that the industry is in the middle of a growth/build phase.

Another measurement when considering blockchain and cryptocurrency innovation is the increased number of blockchain-related patents around the world.

A blockchain patent study by KISSPatent shows that the US issued the most blockchain-related patents in Q1 of 2020 followed by the Cayman Islands. The study notes that the Cayman Islands is second because Alibaba’s subsidiaries are located there.

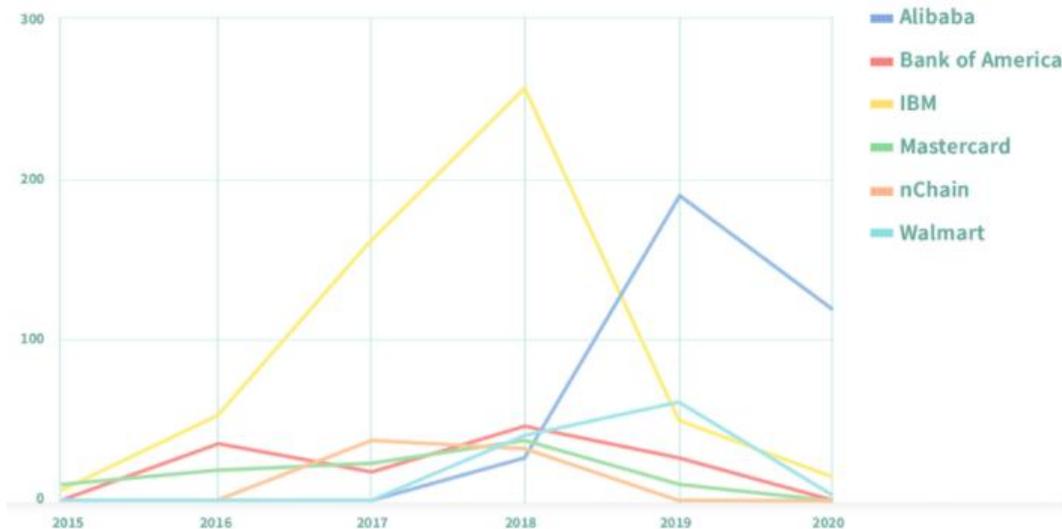
Number of blockchain patent applications by country (Q1 2020)



Source: KISSPatent; <https://kisspatent.com/blockchain-patents-study>

The report continues with the largest number of blockchain patent applications being applied from Fortune 500 companies and not blockchain-only companies. IBM applied for more blockchain-related patents than Alibaba in 2020.

Top companies with the number of blockchain applications per year (2020)



Source: KISSPatent; <https://www.coindesk.com/alibaba-blockchain-patents>

### **Case study: Payment settlement and the influence of blockchain**

The US Federal Reserve does not have complete and unbridled authority over the regulation and supervision of the payments system; by working on an operational core of the national payments structure, the Fed aims to boost fundamental improvements in the nation's payment system through an efficient, innovative, and instant payment system that provides the public with a safe, effective, and modern financial system.

What is also important to note is the Federal Reserve is now conducting experiments with a hypothetical digital dollar for research purposes.

US central bankers were slow to warm to the idea of a digital currency, but their interest picked up after Facebook proposed its own unit of exchange for its users. Digital money could change the way monetary policy works in the economy, as well as speed up a payment system that remains slow and taxing for consumers and behind many other nations. The Fed is separately developing its own same-day settlement payment system called FedNow.

This position paper will analyze the potential companies or digital ledger technology that could support the FedNow initiative. The paper will also assume the initiative will undertake a private partnership approach with US-based entities.

We have also included a foreign payment system example from China and how such investment may influence the enabling of their sovereign digital currency.

### **Key reference articles:**

- <https://www.bloomberg.com/news/articles/2020-08-13/brainard-says-fed-is-conducting-e-money-tests-for-research?srnd=cryptocurrencies>
- <https://www.forbes.com/sites/vipinbharathan/2020/08/07/fednow-aimed-at-transforming-the-us-payment-system-approved-by-the-board-of-governors-of-the-federal-reserve/#633a25ec6ecd>

### 3.5 Past, Present and Future

The introduction of the consumer internet – and the smartphone in particular – has resulted in a raft of new payment solutions and financial products, each designed to erase one of life’s little annoyances or provide access to a financial product. New technologies, and the new payments solutions that use them, are shaping how we think about and pay for the products and services we consume. We are choosing to pay with the tap or wave of a card, click of a mouse or the tap of a finger, rather than handing over the paper currency that has been used for generations.<sup>72</sup>

#### **Past**

“**Build it and they will come,**” as the age old saying goes, but in the blockchain and cryptocurrency space the saying should be, “Offer ease of use and they will come.” One of the most profound differences and great examples of where the consumer internet and the blockchain differ is in how the technology was offered to the public. Early internet developers and early backers wanted to make the technology easy for the non-technical user. Developers created user-friendly interfaces for public access to the internet. Having a user-centric approach that abstracted the complexity of the technology aided in its rapid adoption. Blockchain has taken a different route; the technology was first offered to the cryptography hobbyist community which used Unix-command line interfaces to work with the blockchain. Early blockchain and cryptocurrency technology required a working knowledge of cryptographic primitives and code compiling skills. Current blockchain and cryptocurrency technology still require skills a normal user does not have. Examples of the current complexity include use of the Lightning Network or setting up a hardware wallet to purchase cryptocurrencies.

Technologies, applications, and business models will continue to improve along with interests from venture capitalists and governments that will help drive adoption of blockchain and cryptocurrency technologies. As with the internet, some solutions will disappear in favor of ease of use, better user interfaces and convenience, but the foundational attributes of the technology being decentralization, security, and incentives mechanisms will not disappear.

#### **Present**

The 2020 pandemic ushered in many new challenges and exposed growing cracks in the current global financial and economic system. Governing bodies, academia and the public have taken notice and proceeded to develop ways to offer positive change.

Before Bitcoin there was no mechanism to relate something in the physical world to something in the digital world. Cryptocurrency allows for real money to be represented by something digital called a ‘token’. It is often referred to as ‘programmable money’ because in the blockchain world you can program the way your money works, and based on circumstances it can be sold, traded, transferred, changed into another format, and even enable an action in the physical world. For example, you can program a token to be transferred to a digital wallet implanted in solar cell to provide electricity for a family in Africa.<sup>73</sup> Providing timely services to remote locations is not possible with the current banking infrastructure, existing international laws, and slow transaction methods.

Proving your identity and properly securing transactions have been the staple for online banking, e-commerce, government interaction and health care for years now. Digital identity is not a digitized version of your name and password or social security number for use with a banking application. Digital identity is an anonymous verification tool that protects privacy by replacing sensitive information with non-sensitive elements through a process called ‘tokenization’. Essentially, once your identity is tokenized, it can be used across multiple devices.

Just like digital identity tokens, digital wallets are cross-platform solutions that can be used across many different devices. The ability to use digital identity with digital wallets opens many opportunities to advance convenience and adoption including the application of KYC/AML/CFT rules. Most importantly, digital identity and digital wallets return control of identity information back to the individual and provides a way for them to control their information without relying on a centralized entity.

Bitcoin has given new life to the term *digital assets*. Traditionally, digital assets included any physical medium that was converted to digital, for example video, music, documents, etc. The programmability part of cryptocurrency has enhanced digital assets to not only include the physical part but also include its attributes such as trade history, who owns the asset, or if the asset is authentic. The ability to tokenize real-world physical items provides greater liquidity and makes the asset accessible to a broader audience while lowering investment cost. These tokens are the securitization of real tradeable assets.

### **Future**

The future has laid out many avenues as the world progresses from the 1990 fiber-laced server frameworks, brick and mortar regulations, and patchwork policies. To a decentralized, cryptographically secured value of exchange where regulations and policies sprint to embrace or control a new global financial ecosystem.

Satoshi Nakamoto’s seminal whitepaper combined existing cryptography, consensus, and mechanism design methods to create a new kind of science that gave the world the Bitcoin network. Since 2008, Satoshi’s new science has progressed to provide digital identity tools, new types of digital wallets, established programmable money methods, and pushed blockchain technologies to new heights which are becoming the foundation for a new global financial, economic, and monetary system.

We are in uncharted waters as the global pandemic introduces many challenges to economies around the world. Governments are especially vulnerable to the changing tides that threaten established norms as the very definition of money itself is changing. In many times of crises, there are opportunities to explore new ways of doing things that end up improving lives around the world.

### ***Can governments continue issuing unlimited unsecured debt?***

Issuing endless amounts of unsecured debts can work under the right circumstances. It seems to be dependent upon a tightly coupled house of cards that has no room for error. For a select few, they can prosper without limitations. For most of any given society, it only leads to constant inflation and taxation hindering many from experiencing prosperity and peace of mind.

We may have entered an era where the alternative for governments is to explore the issuance of collateralized debt. Fundbox defines collateral as “something pledged as security for repayment of a loan, to be forfeited in the event of a default.” Previously, many currencies have been backed by metals such as silver and gold. With the advent of blockchain, there are now ways to tie together cryptocurrencies with these types of precious metals. In addition, some cryptocurrencies can now be tied to other types of commodities such as lumber, data storage credits, and even stem cells. We could even see cryptocurrencies tied to 3D printing credits and access to quantum computing resources.

Precious metals are in finite supply here on earth. However, recent discoveries have indicated there are vast amounts of precious metals on asteroids in outer space. Many private companies and some countries have taken notice and hope to capitalize on these discoveries. One country for example, Luxembourg, is looking to be the first country to support asteroid mining as covered in this article.<sup>74</sup> In another related article, Luxembourg is touted to be the 21st century’s gold rush capital of the world. Consider that ConsenSys, a major blockchain player, recently purchased a firm related to asteroid mining called Planetary Resources. Asteroid mining meets blockchain technologies – imagine the possibilities!

Let’s circle back to countries issuing debt notes. Are we about to witness countries being able to collateralize their debts not only on precious metals here on earth but on asteroids in outer space? Much like current fiat currencies, cryptocurrencies based on underlying assets such as these will also need to be based on inherent trust. Only time will tell if this new paradigm shift takes hold.

Let’s say asset-based cryptocurrencies take hold – here is the bigger question to ask. Can countries issuing these types of cryptocurrencies be able to better provide services for its citizens and afford to provide such big-ticket items as:

- Free job training/education
- Employment guarantees/security
- Affordable access to health care.

Many say we need to tout the Danish model of having capitalism and yet provide for generous social welfare benefits and a more stable safety net for its citizens. Could a country with a stable crypto currency system be in a better position to replicate the Danish model? Perhaps exploring the answer to this question could lead to more ideas that are not yet in existence now. In addressing this question, this type of system might be able to emerge across more nations.

As the Internet of Things (IoT) becomes more fact than fiction, many new opportunities are emerging that could usher in a new age of progress. Millions and perhaps billions of devices will be interconnected in ways that will usher in what is being called a ‘machine-to-machine economy’.<sup>391</sup>

It is easy to see that in the not-too-distant future, that many of these machines will be able to lend money, earn wages, conduct business transactions, make profits, and even invest money. In theory, many of these machines could end up paying taxes to government coffers. These tax-paying machines perhaps could even end up helping to pay down our public debts and reduce future deficits. We could

even see a scenario where many of these machines could be programmed to invest a portion of their funds into the stock, bond, and cryptocurrency markets. Imagine if a lot of devices could even play the lottery and where a few lucky machines win huge windfalls, and the proceeds ripple through the (M2M) ecosphere. A recent article,<sup>392</sup> points out that blockchain will be an enabler for the M2M economy. There will also be many innovations stemming from the IoT that we cannot even yet imagine, and before you know it, we will be asking ourselves, “how did we live without these items?”

Many reading these predictions will be quick to point out the flaws some of these possible systems and the havoc they will cause. Many will think of Skynet and the Terminator movies. Those who are more optimistic will perhaps think of the TV show, ‘Star Trek’, next generation with the technologies being able to address poverty.

As these technologies and new economic models emerge, there will be a need to discuss the best ways to regulate these developments. With sound regulations in place, we could be experiencing the dawn of a new age that could rise the tide for many and provide a much-needed peace of mind that is long overdue.

## 4 Government Impacts

Cryptocurrency and blockchain-related technologies will change the way society exchanges value in the future. Governments around the world need to consider how cryptocurrency adoption will impact various areas of their purview and in what manner they should act to advance economic growth, shared prosperity, and social progress. In the coming years, government regulators and legislators will need to consider in what ways technological innovation will need to be balanced to protect consumers and the public interest. As the digital economy evolves, governments will need to consider the ethical and privacy-related aspects of exchanging virtual currencies. With the ease of transcending jurisdictional barriers, how can local economic growth be expanded while engaging globally and avoiding a ‘race to the bottom’ in regard to regulation and enforcement of legal and regulatory frameworks?

Today, governments have embarked on many different initiatives ranging from central bank digital currency (CBDC) development projects, to authorizing cryptocurrency custodial services for banks, to drafting new cryptocurrency regulation. How and in what ways will the evolution impact government and the broader public sector? The following paragraphs explore this subject in further detail providing insight region by region on some of the key advancements, challenges and impacts felt by governments during this period of digital evolution.

### 4.1 Regulation

#### **European Union**

The European Supervisory Authorities (ESAs) identified a loss of opportunity from the absence of a European Union (EU) regime, noting challenges to the scaling up of cross-border activities in the absence of a common approach regarding factors such as accounting treatment, conduct of business, including client asset rules, prudential treatment, custody and transaction finality, insolvency treatment, and tax. So far, regulators and legislators have struggled to classify cryptoassets within existing laws and regulatory schemes. The most important factor of the EU's approach to cryptoassets is a uniform one, based on the principle that activities that create the same risks should be governed by the same rules, thus avoiding fragmentation in this regard.<sup>75</sup>

The EU has draft legislation<sup>76</sup> to support a digital financial services regulatory framework that aims to provide an “innovation-friendly” environment that “does not pose obstacles to the application of new technologies” such as distributed ledger technology, blockchain or cryptoassets.

#### **Middle East**

The Middle East has embraced the blockchain industry by hosting several blockchain projects:

- The Saudi Arabian Monetary Authority (SAMA) is assessing the use of blockchain technology to inject liquidity into the banking sector. SAMA has also developed a regulatory sandbox to assist the Saudi Fintech community with digital banking services and blockchain education programs.
- Bahrain regulators have been working with blockchain technology development since 2017 and introduced cryptoasset regulation for the financial services industry. Bahrain established initiatives to attract blockchain businesses to the region by launching a regulatory sandbox and offering digital diplomas on the blockchain through the University of Bahrain.
- To further encourage additional companies to develop blockchain and cryptocurrency-related projects, the United Arab Emirates (UAE) Securities and Commodities Authority (SCA) drafted regulations for issuing and offering cryptoassets.<sup>77</sup> The draft legislation provides cryptoassets definitions and clarifications on the promotion of security tokens, listing cryptoassets on exchanges, custody of cryptoassets, fundraising standards, financial crime controls, recognized cryptocurrencies, and technology governance and standards.

#### **Africa**

Africa's legal stance on cryptocurrency and blockchain project initiatives vary from country to country.<sup>51</sup> South Africa, Sierra Leone, Senegal, and Tunisia have a progressive stance towards cryptocurrency and blockchain technology by providing statements on cryptocurrency and developing blockchain research projects. Morocco, Algeria, Libya, Zambia, Zimbabwe, and Namibia have all-out bans on cryptocurrencies and 12 countries have no official stance.

- Uganda has embraced blockchain technology for use with micropayments and for the registration of land titles, but there does not appear to be legislation concerning cryptocurrency.

Ugandan members of Parliament and regulators stated that the Bank of Uganda Act does not govern the use of cryptocurrency or define ‘cryptocurrency’ as fiat currency. In addition, the Bank of Uganda Act does not give the Bank of Uganda power to regulate cryptocurrency. The Government of Uganda is determining if existing policies need to be amended to cover cryptocurrency.

- The Central Bank of Nigeria and the Nigerian Deposit Insurance Corporation (NDIC) hold the world’s third largest Bitcoin holdings (as a percentage to GDP) but has warned financial institutions not to deal with cryptocurrency until adequate regulation is established in Nigeria. The Central Bank of Nigeria has established departments to research and draft cryptocurrency legislation.
- In South Africa, the intergovernmental Fintech Working Group (IFWG), which includes members from the National Treasury (NT), the South African Reserve Bank (SARB), the Financial Sector Conduct Authority (FSCA), the South African Revenue Service (SARS), and the Financial Intelligence Centre (FIC), released a joint statement on the regulatory and policy response to cryptoassets activities in South Africa.<sup>78</sup> The statement provides an overall policy position from the IFWG on cryptoassets in South Africa. The statement defines and classifies cryptoassets, defines use cases such as ICOs, defines risks of cryptoassets, and outlines South Africa’s regulatory response. The statement closes with 30 recommendations modelled around the existing South African legal and regulatory framework.

### ***Russian Federation***

Russia has proposed draft legislation for cryptocurrency and blockchain-related technologies. The legislation is part of the larger Russia Digital Economy Program,<sup>256</sup> which includes three cryptocurrency and blockchain-related laws: ‘On Digital Rights’,<sup>257</sup> ‘On Digital Financial Rights’,<sup>258</sup> and ‘On Attracting Investment Using Investment Platforms’.<sup>259</sup>

The ‘On Digital Rights’ law establishes such terms as ‘digital right’ and ‘e-transactions’ as legal terms officially recognized by the state. Most importantly, smart contracts are legally binding, “therefore, smart contracts are a condition for the automatic execution of any civil law contract” (e.g. a contract of sale and purchase).

The ‘On Digital Financial Rights’ law divides cryptocurrency into three categories: virtual assets (crypto), technical (utility), and digital financial assets (security tokens).

The ‘On Attracting Investment Using Investment Platforms’ law places investor protections on initial coin offerings (ICOs) and security token offerings (STOs), and requires businesses offering such services to register with the Central Bank of Russia.

### ***United States***

The United States (US) has drafted many different sets of legislation on cryptocurrencies at both the federal and state level. Federal legislation for cryptocurrency is not unified across the US and has often been applied at the federal agency level with a focus on consumer and financial market protection.<sup>152</sup> State guidance on cryptocurrencies varies from state to state and can range from no formal statement

on cryptocurrencies to advise on the use of cryptocurrency-related technology for economic growth. The states have developed a unified regulatory framework<sup>153</sup> for payment and to help cryptocurrency firms reduce compliance costs.

It is important to recognize that the leading cryptocurrencies, most prominently Bitcoin, were declared not to be securities by the Securities and Exchange Commission (SEC) in June of 2019.<sup>154</sup> Thus, many of the regulations that the SEC has imposed on other tokens such as Ripple (XRP) and initial coin offerings (ICOs) do not apply to Bitcoin. Instead, the Commodity Futures Trading Commission (CFTC) and the Internal Revenue Service (IRS) have taken the frontstage on adapting existing legislation and regulations to Bitcoin.

The US Commodity Futures Trading Commission (CFTC) defines cryptocurrency as a ‘commodity’ and offers regulation<sup>155</sup> requiring US cryptocurrency exchanges to register as a Futures Commission Merchant (FCM) that offers retail commodity transactions for the sale or purchase of cryptocurrencies. The CFTC has also released guidance on the use of cryptocurrencies in option contracts,<sup>156</sup> to ensure consumer protection and safe markets.

Until late 2017, the CFTC did not permit the trading of Bitcoin futures, and the CFTC has still refused all applications to form a Bitcoin exchange traded funds (ETFs). Currently, the only financial instrument resembling a Bitcoin ETF is the Grayscale Bitcoin Trust (GBTC). This trust operates on a physically settled ETF model – like the SPDR Gold Trust.

The US Securities and Exchange Commission (SEC) issued regulation A+<sup>157</sup> and D<sup>158</sup> for ICOs, which are considered a ‘tradeable financial asset’ or ‘security’ if the ‘utility’ token markets itself for potential profits. Regulation D allows a company to offer the sale of tokens to any number of investors and is subject to transfer restrictions and anti-money laundering (AML) laws. Regulation A+ allows a company to raise capital through crowdfunding ICO sales (crowdsales).

The Financial Industry Regulatory Authority (FINRA) and the US SEC released joint guidance<sup>161</sup> for SEC-registered broker–dealers’ custody handling of cryptocurrency securities. The guidance provides additional compliance details on the SEC’s Compliance Protection Rule as it relates to broker–dealer non-custodial and custodial activities involving digital asset securities. Non-custodial activities include trade matching transactions with digital wallets, over-the-counter transactions, and secondary market transactions. Custodial services include due diligence on customer private keys, DLT and broker–dealer record-keeping, and inability to return ‘customer property’ not defined as a security.

The US Financial Crime Enforcement Network (FinCEN) issued guidance stating companies offering money transmission services involving cryptocurrency are to be considered Money Service Businesses (MSBs)<sup>162</sup> and are subject to the US Bank Secrecy Act (BSA) regulations, including AML programs. The guidance covers peer-to-peer (P2P) cryptocurrency exchanges, hosted and multi-signature wallets,

cryptocurrency kiosks and distributed applications (Dapps) money transmissions, cryptocurrency internet casino and payment processing services, and providers of anonymous transaction services.

FinCEN is in the process of implementing revised compliance<sup>163</sup> from the Financial Action Task Force (FATF) 2020 recommendations report.<sup>164</sup> The report states that the US is largely compliant with FATF standards relating to money laundering risk involving cryptocurrency activities and virtual assets service providers (VASPs).

### **Canada**

The Canada Revenue Agency (CRA) defines ‘cryptocurrency’<sup>165</sup> as “a digital representation of value that is not legal tender,” also known as “crypto-asset or altcoins”, for “medium of exchange for goods and services.” The CRA considers cryptocurrency as a commodity for tax purposes. The Canadian Securities Administrators (CSA) considers cryptocurrency a security<sup>166</sup> (a publicly traded share of the capital stock of a corporation), “such as initial coin offerings (ICO), initial token offerings (ITO) and sales of securities of cryptocurrency investment funds.” The CSA issued guidance<sup>167</sup> for companies that offer cryptocurrency services such as buy/sell transactions, trade contracts or cryptocurrency-based derivatives. Security legislation would apply if ownership of cryptoassets is transferred to a customer who is then free to use the asset without involvement from the issuer, or the issuer no longer has a security interest.

### **Latin America**

Statista, one of the world’s leading statistics portals, revealed that Latin America has the most cryptocurrency users in the world. According to the study, the top countries most involved are Brazil, Colombia, and Chile.<sup>168</sup>

There is no cryptocurrency regulatory framework in Latin America, as explained below:

- Brazil: Central Bank of Brazil 2014 notice<sup>169</sup> does not recognize virtual currencies as electronic currency as they are not issued or guaranteed by a monetary authority. Brazil’s Social Liberal Party has outlined proposed rules<sup>170</sup> for cryptocurrency businesses, including unified supervisory roles for Brazil’s central bank, tax administration, and securities authority.
- Colombia: A cryptocurrency regulatory framework has not been developed at this time. The Financial Superintendence of Colombia<sup>171</sup> defines cryptocurrency as “not legally recognized obligations by a legal person or institution that supports them.”
- Chile: Does not have a cryptocurrency regulatory framework. The Central Bank of Chile<sup>172</sup> does not recognize cryptocurrency as legal tender and states “cryptocurrencies have no real potential to replace traditional money.”

### **Caribbean**

The Caribbean does not have a unified cryptocurrency regulatory framework. Antigua, Barbuda, and the Bahamas have developed cryptocurrency regulations, with the British Virgin Islands showing interest but not having yet drafted any cryptocurrency-related policies:

- Bahamas: The Central Bank of the Bahamas launched a CBDC in Q3 2020 called the ‘sand dollar’ pegged to the Bahamian dollar. The Securities Commission of the Bahamas drafted legislation to regulate digital assets and ICOs.
- Antigua and Barbuda release regulation in Q2 2020 to regulate and issue licenses to digital asset businesses that offer payment services, exchanges, and custody wallets.

Haiti, Cuba, Barbados, and Jamaica have no cryptocurrency regulation and Dominican Republic has banned cryptocurrency altogether.

### **Japan**

Japan’s Financial Services Agency (FSA)<sup>229</sup> defines a ‘cryptoasset’ as “proprietary value”, which is recorded or transferred by electronic means for services and goods, excluding currency-denominated assets (Japanese or foreign currency). The FSA does not define cryptoassets as a ‘security’,<sup>230</sup> but certain cryptoasset transactions on blockchain technology are considered a security,<sup>231</sup> such as initial coin offerings (ICOs), security token offerings (STOs), and collective investment schemes (CISs).<sup>232</sup>

Japan’s FSA cryptocurrency regulation framework includes legislation for cryptoasset custody service providers and cryptoasset derivatives businesses. Recent amendments to the Payment Services Act (PSA Japan)<sup>233</sup> and the Financial Instruments and Exchange Act<sup>234</sup> (FIEA) include protections for Japanese residents who invest in cryptoassets, and they require cryptoasset exchange service providers to educate Japanese residents on the difference between cryptoassets and fiat currency. Amendments in 2020 to the PSA Japan further extend regulations on businesses engaging in cryptoasset custodial services,<sup>235</sup> including requirements for registration as a cryptoasset exchange, the handling of private keys and wallets, rules for margin trading transactions, and restrictions on advertising and marketing.

### **Singapore**

The Monetary Authority of Singapore (MAS) has established a progressive cryptocurrency framework in Singapore. In 2017, MAS released *A Guide to Digital Token Offerings*,<sup>236</sup> which outlined guidance for offering and issuing digital tokens in Singapore. The guide states that a “digital token is considered a capital markets product when defined under the Securities and Futures Act<sup>237</sup> as a share, a debenture, a unit in a business trust, a securities-based derivatives contract or a unit in a collective investment scheme.” The guide also includes statements on the application of anti-money laundering and combating the financing of terrorism (AML/CFT) laws to digital tokens and servicers of digital tokens.

In 2019, MAS implemented the Payment Services Act (PSA Singapore),<sup>238</sup> which defines a regulatory framework to provide consumer safeguards, strengthen technology and cybersecurity standards, increase interoperability, and build better AML/CFT controls, while encouraging innovation for Fintech payment systems and digital payment token services.

### **Australia**

There is no cryptocurrency regulatory framework in Australia. Australia has taken a ‘hands-off’ approach to cryptocurrency regulations,<sup>239</sup> which has allowed Fintech companies and cryptocurrency entrepreneurs to facilitate growth and innovation in payments, lending, investment, and custodial

services.<sup>240</sup> Australia's Department of Industry, Science, Energy and Resources promotes this approach by stating "Regulation is fit for purpose and technology neutral, allowing businesses and industry to quickly adopt beneficial technologies."

The Australian Securities and Investments Commission (ASIC) states that true digital currency such as Bitcoin is not currency or money and is considered a commodity.<sup>241</sup> This statement is in line with the Australian Taxation Office (ATO), which states digital currencies are not 'currency'<sup>242</sup> and do not fit into the current definition of a 'financial product'. Financial products are "facilities through which a person makes a financial investment, manages financial risk or makes non-cash payments."<sup>243</sup>

Australia has structured their cryptocurrency laws by amending or updating existing legislation.<sup>244</sup> This includes updates<sup>245</sup> to the Corporations Act 2001<sup>246</sup> to assist businesses considering raising funds through an ICO or considering cryptoassets services. The Competition and Consumer Act 2010<sup>247</sup> gives power to ASIC to enforce consumer protection against harmful marketing practices in the selling of ICOs.<sup>248</sup> The Anti-Money Laundering and Counter-Terrorism Financing Act 2006 was amended<sup>249</sup> to include Australian digital currency exchanges.

### **China**

China has taken a hardline approach in addressing the use of cryptocurrencies. The government does not recognize cryptocurrency or Bitcoin as legal currency nor accepts that cryptocurrencies provide any legitimate services. China has banned many cryptocurrency-related initiatives such as initial coin offerings (ICOs), initial miner offerings (IMO),<sup>250</sup> and cryptocurrency trading exchanges.

China has a range of laws that influence cryptocurrency and blockchain regulation. Chinese regulators released a joint statement, 'Notice on Precautions Against the Risks of Bitcoins', which prohibits banks and payment services from using Bitcoins for payments, clearings, trades, or sales. In relation to ICOs, Chinese regulators released 'Token Issuance Financing Risk Prevention Announcement',<sup>251</sup> which states that tokens offered through ICO financing are unauthorized public financing tools and are suspected by authorities as illegal and criminal activities. The announcement further states that tokens offered through ICO financing are not legal tender, are not issued by a monetary authority, and are not mandatorily accepted to have equal legal status with fiat currency.

Even though China has banned certain cryptocurrency activities, it does not prohibit citizens to hold or trade cryptocurrency. This is because China defines Bitcoin as a commodity and not a currency.<sup>252</sup> China is also heavily invested and encourages the research of blockchain technology when it seems appropriate and beneficial for the Chinese economy.

China's 13th Five Year Plan<sup>253</sup> mentions blockchain-related technologies as the foundation for a future strategic framework that will offer a technological advantage for China. The People's Bank of China (PBOC) created the Digital Currency Research Institute (DCRI)<sup>254</sup> as part of the 13th Five Year Plan's Innovation-Driven Development Plan that is tasked with developing a digital currency.

The Cybersecurity Administration of China (CAC) issued a set of rules governing blockchain information services. The Administrative Provisions on Blockchain Information Services<sup>255</sup> regulate services that provide information to the public through websites or applications using blockchain technology. Services include network nodes and businesses providing technical support for blockchain systems.

### **India**

India has not established a cryptocurrency regulatory framework and does not consider Bitcoin a form of legal currency. India has resisted banning cryptocurrencies, except a state-issued one, or regulating cryptocurrencies.<sup>260</sup>

The Reserve Bank of India (RBI) considers blockchain-related technology beneficial for financial inclusion and for the efficiency of India's financial system. The RBI has established an internal department to research and report on the possibility of issuing a state-issued digital currency.

The RBI released a 2018 notification<sup>261</sup> addressing cryptocurrency activity in India. The notice issues caution for cryptocurrency users, prohibiting banks and lenders from using cryptocurrencies or offering such services. The RBI is worried that the anonymous nature of cryptocurrencies could pose a threat to India's banking system.

The Ministry of Finance does not recognize cryptocurrency as legal tender and has stated the need to eliminate the use of cryptocurrency in financing illegal activities or as part of India's payment system; however, it fully supports the exploration of blockchain-related technology as a solution for a new digital economy in India.

The RBI's petition to ban financial institutions from providing cryptocurrency services to businesses was struck down in a 2020 ruling by India's Supreme Court. News of the ruling resulted in a rise in global investments for India and has boosted India's current cryptocurrency industry.<sup>262</sup>

An Inter-Ministerial Committee (IMC) drafted the 'Banning of Cryptocurrency and Regulation of Official Digital Currency Bill 2019'.<sup>263</sup> The bill prescribes that cryptocurrency services, institutional and individual holdings, mining and generating of cryptocurrency are illegal in India with punishment consisting of 10 years imprisonment.

### 4.2 Ethics

Ethical coverage, like technology, is largely decentralized given that several professions engage in the ethics space as well as many industry groups who maintain a code of conduct, ethical standards or principles that guide the behavior of their members.

These principles are at a higher order and are not technology agnostic, but rather technology aware, so that their members can have guidance in a variety of different situations and allow for the evolution of technology but also ethical bounds for behavior and practice.

There are core foundational ethical principles that need to be upheld when designing and deploying cryptocurrency exchanges or cryptocurrencies such as beneficence, nonmaleficence, justice and autonomy. It is important that governments try to harmonize legislation and frameworks with key issues in digital ethics such as trust, transparency, self-sovereignty, and privacy.

#### **European Union**

The European Commission's Markets in Crypto-Assets (MiCA) released legislation<sup>79</sup> to provide a unified legal framework around the cryptoassets and e-money token markets. The legislation established four objectives. Two objectives deal with filling in regulatory holes that missed the cryptocurrency space and its impact on financial stability. The other two objectives deal with a safe and proportionate framework for innovation and consumer protection. To help further the statement of creating a safe framework for innovation, the European Commission created a small and medium business enterprise (SME) strategy<sup>80</sup> that provides a roadmap to educate, train and collaborate to help spur a digital transformation in Europe. The legislation explores rules to enable consumer protection when dealing with stablecoins and cryptoassets.

The legislation provides business ethics outliers but does not reference ethics directly. The SME strategy does not provide ethics training.

The European Parliament released a study<sup>81</sup> discussing blockchain's transparency attributes considering the General Data Protection Regulation (GDPR) and the ability to limit access to personal information during storage, transmission, and processing. The study establishes ethical concerns on business strategies to monetize personal information for behavioral analysis, marketing, and advertising.

#### **Middle East**

Even though there are proponents of cryptocurrency in the Middle East, like the United Arab Emirates (UAE), there are some areas where cryptocurrencies are banned. The ban goes beyond consumer financial protection and into Sharia law. Sharia law, a religious law forming part of Islamic tradition, states that cryptocurrency is either 'haram' (forbidden) or 'halal' (lawful). For example:

- The Grand Mufti of Egypt, Shaykh Shawki Allam, considers Bitcoin haram and stated in a BBC article<sup>82</sup> that "[b]itcoin is often used by criminal and nefarious elements to fund their work."
- Ziyaad Mahomed, Shariah Committee Chairman of HSBC Amanah Malaysia Bhd, considers cryptocurrencies 'halal', stating, "gold and silver are unambiguously permissible as currencies in Islam, the Sharia doesn't require that a currency have intrinsic value. All that is important is that

there is social acceptance among people that such currency has value, and it is capable of being used in transactions.”

### ***Africa***

Regional regulators have made statements concerning cryptocurrency when addressing consumer protection and ethical practices of cryptocurrency businesses. The Securities and Exchange Commission of Nigeria released a statement on “digital assets and their classification and treatment” which outlines general regulation that encourages ethical practices when dealing with cryptocurrency – the regulation states, “to ensure that these offerings operate in a manner that is consistent with investor protection, the interest of the public, market integrity and transparency.”

### ***Russian Federation***

Russia has made statements on legal and ethical rules concerning artificial intelligence (AI) in the latest draft of their National AI Strategy.<sup>270</sup> There are no ethics-related statements on cryptocurrency or blockchain-related technologies, but AI and blockchain technology are part of Russia’s initiative in “creating framework conditions for digitalization and penetration of digital-based technologies in most sectors of the Russian economy.”<sup>271</sup>

### ***United States***

The ethics question is hard to establish in the cryptocurrency space because it relies on one very fluid variable – human behavior. However, business and government leaders have a moral imperative to establish proactive and comprehensive ethics programs that provide a clear code of ethics, highlight the ethical values to be upheld, as well as the optimal governance structure that facilitates ethical human behavior by creating a sustainable culture of ethics.

When applying these important ethical considerations to cryptocurrency, it is important to highlight the additional complexities. Not only do we have to consider all ethical challenges related to ledger technology, but we also have ethical dilemmas related to investing in cryptocurrencies, dual agency in establishment of digital currencies by governments, cultural ethics related to cross-border payments, and justice as it relates to financial inclusion.

The topic of ethics has been taught and discussed in other technology fields such as artificial intelligence (AI), big data analytics, and privacy. The US has drafted legislation concerning the ethical use of technology as technology use and solutions grow in the US. Many US laws include consumer privacy and protection, such as digital privacy<sup>173</sup> and AI ethics,<sup>174</sup> but there is no US blockchain or cryptocurrency ethical design-related legislation. The reason may be that US regulators are still understanding how the technology impacts their statutory requirements and purview of the law.

The authors of the 2018 *Innovations* article, ‘The Blockchain Ethical Design Framework’,<sup>175</sup> argue that the blockchain “technology has the ability to disrupt different types of institutions and social systems across the globe” by offering “microeconomies” that are “bypassing traditional institutions to meet the specialized needs of diverse populations.” The discussion includes a set of impacts which include information control, censorship, privacy, and control over personal information.

If cryptocurrency and blockchain-related technology offer the possibility to change how the world exchanges value, then ethical blockchain and cryptocurrencies questions should be asked and understood:

- What can these technologies do?
- What are the consequences and risks of these technologies?
- What is the social impact of these technologies?

Cara Lapointe and Lara Fishbane from the Beeck Center for Social Impact + Innovation at Georgetown University released a framework outlining ethical design of blockchain technology.<sup>176</sup> The framework provides ethical considerations when developing blockchain solutions:

- How is governance created and maintained?
- How is identity defined and established?
- How are inputs verified and transactions authenticated?
- How is access defined, granted, and executed?
- How is ownership of data defined, granted, and executed?
- How is security set up and ensured?

### **Canada**

The Government of Canada drafted a Digital Operation Strategic Plan,<sup>177</sup> which establishes guidelines on how the Canadian government manages technology and technological changes. The plan sets out 10 standards for the development of policy, programs, and services in the Government of Canada for the digital era. One of the 10 standards includes a statement for ‘ethical design services’ – “Make sure that everyone receives fair treatment. Comply with ethical guidelines in the design and use of systems that automate decision-making (such as the use of artificial intelligence).” In the section ‘Going forward – Responsible use of AI and automation’, a statement on blockchain pilots includes, “may have potential for addressing data integrity issues, automated reconciliation and trusted transactions”; however, the “practicality of blockchain-based applications is still being explored.”

### **Japan**

The Financial Services Agency of Japan (FSA) recognizes the cryptocurrency industry’s ‘self-regulatory’ status and recognizes the Japan Crypto Asset Trading Business Association (JCATBA) and Japan Security Token Offering Association (JSTOA) as self-regulatory organizations (SROs).

The JCATBA released *Guidelines on Regulations Pertaining to the Sale of New Cryptocurrencies*<sup>264</sup> for cryptoasset ICO tokens. The guidelines establish rules for the handling of new cryptocurrencies, solicitation of sales, customer management, anti-money laundering (AML) and combating the financing of terrorism (CFT) enforcement and addressing anti-social forces.

The JSTOA released a set of guidelines<sup>265</sup> for businesses that engage in cryptocurrency activities in Japan to help them stay in sync with Japan’s cryptocurrency legislation. The guidelines provide rules for the right to transfer electronic records, blocking relationships with anti-social forces, qualifications for sales representatives, internal management, and management of customer assets.

### **Singapore**

A Singapore consortium of crypto and blockchain companies established a Code of Practice<sup>266</sup> to assist businesses to understand crypto-related regulatory legislation and improve conduct. The Association of Crypto Currency Enterprises and Start-ups Singapore (ACCESS) Code of Practice was developed in collaboration with the Monetary Authority of Singapore (MAS) and the Association of Banks in Singapore (ABS). The Code of Practice includes guidance on license applications (per the PS Act), AML/CFT rules, and know your customer (KYC) practices.

### **Australia**

The Australian Digital Currency Commerce Association (ADCCA) released the Australian Digital Currency Industry Code of Conduct,<sup>267</sup> which provides information to consumers on digital currency businesses that have standards for consumer protection. It also includes information on digital currency businesses that have established best practices in legal compliance, reputation, and background information on exchange owners, AML/CFT protections, and consumer protections.

### **China**

China has developed a digital payment system known as ‘Digital Currency Electronic Payment (DCEP)’, which is essentially a digital version of China’s yuan currency.<sup>268</sup> The digital yuan will help lift the covers off the opaque shadow banking industry, which grew in China during the 2008 financial crisis, and assist authorities in regulating the debt market effectively.<sup>269</sup>

The DCEP will be supplied with digital yuan from the four state-run banks in China. This will allow the banks to provide tokenized subsidies to the public during a financial crisis or during a pandemic with the ability to track, in real time, all transactions between customers and merchants. China proposes that tracking can be ‘switched off’ to ensure corporate and household spending stays anonymous, but the ability remains present for authorities to review pseudonymous transactions for illegal activity.

The inclusion of a state-issued digital currency will only strengthen China’s surveillance powers over the economy and raise ethical concerns, with a fully integrated financial system controlled by a government. The ethical concerns are not unique to China but pertain to any country or central bank that issues a state-issued digital currency.

### **India**

The Indian state government of Tamil Nadu released the ‘Safe & Ethical Artificial Intelligence Policy 2020’<sup>272</sup> roadmap for AI-based solutions. The policy framework includes six major challenges – Transparency and Audit; Accountability and Legal Issues; Misuse Protection; Digital Divide and Data Deficit; Ethics; and Fairness and Equity. The proposed framework will include a blockchain interface (AI Certification, Transparency and Scorecard (ACTS) Blockchain) to integrate information about AI training datasets, AI scorecards, and procured AI solutions.

## 4.3 Privacy

The need for increased privacy is essential as the world’s online interactions continue to grow into the future. Clarifying digital identity is crucial for successful privacy. The ability to use digital identity with

digital wallets opens many opportunities to advance convenience and adoption, including the application of KYC/AML/CFT rules. Most importantly, digital identity and digital wallets return control of identity information back to the individual and provide a way for them to control their information without relying on a centralized entity.

### ***European Union***

Each region has disparate privacy and data protection legislation requirements across member states which cause compliance challenges. Europe is in a much better shape for compliance across member states because of the single legislation found with the General Data Protection Regulation (GDPR). The EU's GDPR has greatly assisted cryptocurrency privacy advocates fighting against state surveillance programs and private company data monopolies. GDPR's "right to be forgotten"<sup>83</sup> and the Cypherpunk's Manifesto,<sup>84</sup> "Privacy is necessary for an open society in the electronic age", have become synonymous and have caused regulators to review current policy to help re-enforce GDPR privacy laws. The Bitcoin network is pseudonymous in nature and does not offer anonymity for transactions. Bitcoin transactions are transparent and, with the right analysis tools, can identify the originator of the transaction. The open transparency of blockchain technology coupled with the ability to have an immutable record of an individual's transaction and personal identifiable information have become troublesome to regulators and lawyers considering GDPR compliance.

### ***Middle East***

The Dubai International Financial Centre (DIFC) released the Data Protection Law No. 5 of 2020,<sup>85</sup> which impacts regional data protection laws in countries such as the UAE, Saudi Arabia, and Bahrain. Part 6 – Rights of Data Subjects of the Data Protection Law echoes legislation defined in the EU's GDPR with the "right to withdraw consent" and "erasure of Personal Data." Part 2D – General Requirements (21.6.) states that any business considering a "new technology or platform, or where there is an innovation in a particular industry that changes the way Personal Data is Processed" must have "prior consultation" with the Commissioner of the DIFC to ensure adequate levels of protection.<sup>86</sup> This includes emerging technologies such as blockchain technologies, cryptocurrencies, or CBDC.

### ***Africa***

Out of 54 countries in Africa, 28 countries have data protection and privacy legislation, nine countries have draft legislation, and 13 countries have no legislation:

- Nigeria has draft legislation that is part of the African Community of Sahel-Saharan States Economic Community of West African States.
- Uganda released legislation that is part of the Common Market for Eastern & Southern Africa East African Community Intergovernmental Authority on Development.
- The South African government released the Protection of Personal Information Act 4 of 2013,<sup>87</sup> which defines eight privacy and data protection objectives. The most relevant to cryptocurrency and blockchain technologies include protections on personal identifiable information by private and public bodies, electronic communications and automated decision making, and cross-border information flow. Electronic communication is defined as "any text, voice, sound, or image message sent over an electronic communications network which is stored in the network or in the recipient's terminal equipment until it is collected by the recipient."

### ***Russian Federation***

Russia's Data Localization Law addresses non-Russian businesses that target Russian citizens for marketing and business services. The law protects the collection and storage of Russian citizens' personal data used in cross-border transfers such as online IT services, cloud-based services or remote access services.<sup>288</sup>

Russia's cryptocurrency law, 'On Attracting Investment Using Investment Platforms', addresses data operators of cryptocurrency exchanges within the Russian Federation that issue digital assets. All digital assets transactions must be made through digital financial asset exchange operators such as banks or exchanges. The Bank of Russia must review and approve any offered digital assets. The issuer must provide information that includes full name, place of residence, state registration, full legal entity name and address, beneficial owner, and website information.<sup>289</sup>

### ***United States***

The US has not drafted federal data protection legislation like the European General Data Protection Regulation (GDPR), but there is state-level legislation which may be a blueprint for future data protection laws. California has drafted state-level data protection legislation with the California Consumer Protection Act (CCPA). The Act defines personal information as a "broad list of characteristics and behaviors, both personal and commercial, as well as inferences drawn from this information."<sup>178</sup> As with GDPR, there are aspects of CCPA that benefit from blockchain technology, such as encryption, but issues arise when applying privacy laws to the decentralized and distributed nature of blockchain technology.

### ***Canada***

The Government of Canada released federal data privacy legislation in the Personal Information Protection and Electronic Documents Act (PIPEDA),<sup>179</sup> which governs how private sector organizations collect, use, and disclose personal information during commercial business. In 2020, the Government of Canada amended the Act to include enhanced transparency over personal information, data mobility and stronger enforcement for non-compliance. The amendments are closely aligned to Europe's GDPR. Commercial entities working with blockchain technology are subject to PIPEDA if personal information is stored or transacted on the blockchain.

### ***Latin America***

Europe's GDPR influence can be seen in Latin America's data privacy laws. In Latin America, protection of personal information is a national and constitutional right:

- Brazil:<sup>180</sup> A proposed amendment to the Constitution (PEC 17/2019) will make personal information protection an "autonomous right."
- Colombia: Articles 15 and 20<sup>181</sup> of Colombia's Constitution protects personal information in the collection, processing, and circulation of those data. Colombia also established additional laws<sup>182</sup> to address processing and management of personal financial information by businesses.
- Chile: Chile extended Article 19 of the Constitution,<sup>183</sup> which protects citizens' right to a "private life" to include collection, transmission, and processing of personal information.<sup>184</sup>

Though not a unified approach like GDPR, each country has drafted new laws or has updated existing laws. Brazil consolidated existing legislation<sup>185</sup> to create Lei Geral de Proteção de Dados (LGPD),<sup>186</sup> which provides a very broad definition of personal information. Colombia established data protection laws<sup>187</sup> back in 2012, which have since been updated to include regulations requiring employers to provide a privacy notice on personal data processing and databases. Chile introduced the Chilean Personal Data Protection Law (PDPL),<sup>188</sup> which places restrictions on how personal information can be processed, stored, and communicated.

### **Caribbean**

Data protection and privacy differs from country to country, but the European General Data Protection Regulation (GDPR) has influenced Caribbean countries to address or enhance data protection and privacy laws in their countries:

- Barbados is publishing a Data Protection Bill 2019.
- Jamaica is updating the Data Protection Act 2017 with new rights for Jamaican citizens.
- Bermuda is updating the Personal Information Protection Act 2016.

### **Japan**

Japan does not have a specific privacy law concerning blockchain or cryptocurrency technology. Privacy is governed by a general law, the Act on Protection of Personal Information (APPI), which provide rules, and “requires all business operators handling personal information to specify the purpose for which personal information is utilized.”<sup>273</sup>

In 2020, the APPI was amended<sup>274</sup> to include an individual’s right to have their information deleted or to allow disclosure of their personal information. Further, personal information can only be transferred on an ‘opt-out’ basis to a third party and the third party cannot pass on personal information to another party.

Japan’s Financial Services Agency (FSA) has banned anonymous (privacy) coins and does not allow Japanese-based crypto exchanges to offer the buying, selling, or trading of anonymous coins. The FSA states the reason for the ban is “for consumer protection, the public interest, and risks concerning anti-money laundering (AML) and combating the financing of terrorism (CFT) policies.”<sup>275</sup>

### **Singapore**

Singapore’s Personal Data Protection Act (PDP Act)<sup>276</sup> provides guidelines for the handling of personal information, in both electronic and non-electronic format, for organizations across various industries and the economy. The PDP Act outlines rules for personal data consent, use or disclosure, and reasonableness of personal data collection.

The PDP Act does not include guidance for the deletion or removal of personal information. Amendments in 2020 to the PDP Act include the notion of ‘data portability’,<sup>277</sup> which provides “individuals with the ability to request the transmission of their personal information to another service provider.” The amendments do not include statements on deletion or removal once the information is

transferred. Further, the PDP Act guidelines will be hard to enforce in a decentralized, public blockchain where there is no ‘identifiable organization’.<sup>278</sup>

### **Australia**

In 2020, the Australian government proposed amendments to the Privacy Act 1988,<sup>279</sup> to increase privacy requirements for online companies and digital platforms that operate in Australia’s economy. The proposals include individual rights to control how personal information is managed and organizations’ accountability for breaches.

Cryptocurrency exchanges operating in Australia must register with the Australian Transaction Reports and Analysis Centre (AUSTRAC)<sup>280</sup> and are subject to rules established under the Privacy Act 1988. The Australian Department of Industry, Science, Energy and Resources has made the following statement<sup>281</sup> regarding privacy and blockchain systems: “Due to the decentralised nature of blockchain, there is often no responsible party to seek remedy from if privacy is breached, nor ways to remove personal information from the ledger once entered.”

### **China**

The People’s Republic of China’s (PRC) first legislation covering data protection and consumer privacy was established in the PRC’s Cybersecurity Law. Rules for personal data protections include third party processing of data, statements on data minimization and portability, ‘right to be forgotten’, automated decision making, and profiling.

The PRC’s Cybersecurity Law has some unique aspects concerning data localization and restrictions for cross-border data transfers, which is considered a cyber-sovereignty principle. Data localization requires that a copy of personal data should remain within the PRC’s border and any cross-border data transfers are defined as subordinate to the interests and values of the country within its borders. The PRC will ensure sovereignty over internet data imports and exports by exerting control over the internet architecture and content. The PRC’s Cybersecurity Law<sup>282</sup> addresses concerns involving privacy, surveillance, sovereignty, and economic development.<sup>283</sup> The law also states it is illegal for cross-border enterprise blockchain networks to “produce, duplicate, publish and disseminate” information.<sup>284</sup>

The PRC’s Cybersecurity Law establishes privacy rights and data protection for individuals and consumers in relation to the private sector, but no significant privacy protection has been established between the PRC’s citizens and the government.

China established the ‘Cryptography Law of the People’s Republic of China’, a regulatory framework that provides guidelines for the application of cryptography and password management including the development of new cryptographic hashing algorithms and related technology.<sup>285</sup> The new legislation will have an indirect impact on the cryptocurrency industry and related functions, including mining and block propagation.<sup>286</sup> The law addresses government and commercial cryptography systems with each system requiring certification by the Office of State Commercial Cryptography Administration (OSCCA).<sup>287</sup>

### **India**

India's Personal Data Protection Bill (PDPB)<sup>290</sup> will establish a data governance framework to address the collection, processing, and storage of personal data within Indian territories.<sup>291</sup>

The pseudonymous and decentralized nature of blockchain technology provides enforcement and compliance difficulties for the Indian government. Personal data is encrypted and pseudonymized on the blockchain, which means the data cannot be easily identified by businesses or the government. Enforcement is also a challenge in a decentralized environment making it difficult to distinguish between the Data Principle,<sup>292</sup> Data Fiduciary, and Data Processor.

## 4.4 Jurisdictions

### **European Union**

Many European countries have adjusted their cryptocurrency regulations to follow the Fifth Anti-Money Laundering Directive (AMLD5)<sup>88</sup> for Anti-Money Laundering (AML), Know Your Customer (KYC) and Combating the Financing of Terrorism (CFT) laws, but regulations still vary among countries such as France, Germany, and Luxembourg. Cryptocurrencies vary in characteristics and use in the financial marketplace thus causing different interpretations on what asset class a cryptocurrency should belong to:

- France<sup>89</sup> – the Commercial Court of Nanterre ruled that Bitcoin is a “fungible intangible asset” and an “interchangeable good” but not “individualizable.” This ruling has a profound impact on Bitcoin’s future in France. France has a more progressive approach to cryptocurrency and has made it easier for major retail shops to accept cryptocurrency payments.
- Germany<sup>90</sup> – Germany’s implementation of AMLD5 has enabled the categorization of cryptoassets as a financial instrument thus allowing banks to offer cryptocurrency custodial services and to offer cryptocurrency as an investment alongside traditional investments. Cryptoassets are defined as a digital representation of value that is not recognized as legal money but accepted as a means of exchange, payment or investment and can be stored and traded electronically.
- Luxembourg – has an advanced approach to cryptocurrency being the first country in Europe to offer cryptocurrency exchange licenses.<sup>91</sup> Like Germany, Luxembourg does not recognize cryptocurrencies as a form of legal currency<sup>92</sup> or money but offers guidance that cryptocurrencies should be “accepted as a means of payment for goods and services.”

### **Middle East**

Throughout the Middle East, cryptocurrency and related technologies are being researched with initiatives in blockchain proofs of concept and digital currency projects, but legal frameworks and initiatives vary from country to country:

- United Arab Emirates – The Abu Dhabi Global Market (ADGM), which is the international financial center in Abu Dhabi, established a regulatory framework<sup>93</sup> to monitor cryptocurrency

activities, including exchanges, custodians, and intermediaries. The UAE are heavily invested in blockchain-related projects ranging from health care,<sup>94</sup> roads and transportation,<sup>95</sup> and banking.<sup>96</sup>

- Saudi Arabia – Does not have any legal or regulatory framework concerning Bitcoin and cryptocurrencies. Cryptocurrencies are not banned but are considered speculative investments.<sup>97</sup> Saudi Arabia has embraced blockchain technology and see great potential for its use in the banking system. The Saudi Arabian Monetary Authority<sup>98</sup> (SAMA) is researching how blockchain technology can help move liquidity into the banking system.
- Bahrain – The Central Bank of Bahrain (CBB) updated its rulebook<sup>99</sup> to include regulations concerning cryptoassets services and cryptoassets exchanges. Volume 6 – Capital Markets Part A Institutions establishes rules for cryptoassets service licensing, capital requirements, business standards, technology governance (cryptographic keys, wallet management), anti-money laundering (AML), know your customer (KYC), and custodial services. Bahrain developed a “regulatory sandbox”<sup>100</sup> in 2017 to encourage innovative solutions in the Kingdom from start-up Fintech companies. Like the UAE, Bahrain is developing multiple blockchain projects ranging from customs to pharmaceutical and food supply chains.

### ***Africa***

Africa’s legal stance on cryptocurrency and blockchain project initiatives vary from country to country.<sup>101</sup> South Africa, Sierra Leone, Senegal, and Tunisia have a progressive stance towards cryptocurrency and blockchain technology by providing statements on cryptocurrency and developing blockchain research projects. Morocco, Algeria, Libya, Zambia, Zimbabwe, and Namibia have all-out bans on cryptocurrencies and 12 countries have no official stance:

- South Africa – Even though the intergovernmental Fintech Working Group (IFWG) has established a legal and regulatory framework for cryptocurrencies, the South African Revenue Service (SARS) states that cryptocurrencies are “neither official South African tender nor widely used and accepted in South Africa as a medium of exchange.” SARS goes further to define cryptocurrency “as an asset of intangible nature” and must be reported as “gains or profits.” The South African Reserve Bank (SARB) developed a proof of concept<sup>102</sup> to use blockchain technology for bank-to-bank wholesale open settlement transactions.
- Sierra Leone – Does not have any formal legal or regulatory framework for cryptocurrency. Sierra Leone, in conjunction with the United Nations Capital Development Fund (UNCDF), and the United Nations Development Programme (UNDP), developed a blockchain national digital identity solution to “provide citizens with formal identity and control over their own credit information.”<sup>103</sup>

### ***Russian Federation***

There is no regulatory framework concerning cryptocurrency or blockchain-related technology in Russia.<sup>304</sup> The Russian government has drafted proposed legislation as part of the larger Russia Digital Economy Program, but the legislation has not been ratified. The Central Bank of Russia (CBR) is considering a state-issued digital currency or digital ruble, including a support payment infrastructure.<sup>305</sup>

### **United States**

The US does not have a unified federal approach to regulating cryptocurrencies. US regulation on cryptocurrencies has been at the federal agency level. The most relevant unified regulation of cryptocurrencies in the US has been drafted by the Conference of State Bank Supervisors (CSBS)<sup>189</sup> for the supervision of “payment and cryptocurrency companies that combined move more than \$1 trillion a year in customer funds.” Guidance on cryptocurrencies varies from state to state and ranges from no comment on cryptocurrencies to legislation on the use of blockchain technology to spur local economic growth. Indiana, Iowa, Kansas, Alaska, and Florida do not have any guidance on cryptocurrency or blockchain technology. Alabama, Arizona, Arkansas, Connecticut, and Georgia have drafted legislation concerning the transmission of virtual currencies.<sup>190</sup> Wyoming, Colorado, Ohio, Texas, and California<sup>191</sup> have drafted innovation-friendly regulation for cryptocurrency and blockchain companies:

- Wyoming – custody services, cryptocurrency businesses
- Colorado – cryptocurrency businesses, crypto-agriculture
- Ohio – cryptocurrency businesses, taxes, real estate agents
- Texas – cryptocurrency mining, consumer protection
- California – cryptocurrency businesses, consumer protection.

### **Canada**

The Canadian Securities Administrators (CSA) defines cryptocurrency as a security and established unified cryptocurrency legislation to cover initial coin and security token offerings.<sup>192</sup> The CSA members include securities regulators from 10 provinces and three territories, with each province and territory responsible for implementation of securities laws across Canada.

### **Latin America**

Application of cryptocurrency legislation across Latin America is very diverse. The Brazilian government fully backs blockchain research as an emerging technology,<sup>193</sup> as defined in Brazil’s 2020–2022 Digital Government Strategy but is still cautious on cryptocurrencies<sup>194</sup> such as Bitcoin. Colombia is researching blockchain and cryptocurrency technology to better understand what regulation is required to ensure consumer protection while supporting innovation to spur economic development. The Colombian Ministry of Technology and Communication released a document<sup>195</sup> providing information on blockchain technology to provide a “basic understanding of this technology and context of its use, thus promoting the growth of initiatives that specify projects based on distributed ledger technology (DLT), aimed at facilitating the interaction of government and citizens, generating social and economic value.” The Financial Superintendence of Colombia (SFC) initiated a “pilot project<sup>196</sup> to help entities of the financial system, in alliance with crypto-asset platforms, to carry out temporary tests in the SFC’s sandbox.”

### **Caribbean**

The Caribbean does not have a unified cryptocurrency regulatory framework. Antigua, Barbuda, and the Bahamas have developed cryptocurrency regulations, with the British Virgin Islands showing interest but as yet has not drafted any cryptocurrency-related policies. Haiti, Cuba, Barbados, and Jamaica have no cryptocurrency regulation and Dominican Republic has banned cryptocurrency altogether.

### ***Japan***

Japan's Financial Services Agency (FSA)<sup>293</sup> is the financial regulator responsible for monitoring the securities and exchange, banking, and insurance sectors in Japan. The FSA has issued legislation that cryptocurrency exchanges and businesses are required to comply with in order to operate in Japan. The FSA is responsible for enforcing the Payment Services Act (PSA Japan), the Financial Instruments and Exchange Act (FIEA), and the Act on Prevention of Transfer of Criminal Proceeds (APTCP).

Even though the FSA is considered the primary source for cryptocurrency laws, there are self-regulating organizations (SROs) recognized by the FSA to ensure cryptocurrency exchanges and businesses comply with the FSA legislation. To operate a cryptocurrency exchange in Japan, the exchange must have an office with a Local Finance Bureau (FIBO) and must be a Japanese resident. Members belonging to an SRO, such as the Japan Crypto Asset Trading Business Association (JCATBA), must include Japanese cryptocurrency exchange businesses, and have drafted initial coin offering (ICO) guidelines.

### ***Singapore***

The Monetary Authority of Singapore (MAS)<sup>294</sup> is both a central bank and a financial regulator responsible for issuing bank notes and overseeing the banking, insurance, financial, and securities sectors in Singapore. The MAS enforces the Payment Services Act (PSA Singapore) for payment systems and the MAS Notice PSN02 (paragraph 13) for anti-money laundering (AML) and combating the financing of terrorism (CFT) compliance for digital payment token (DPT) service providers.<sup>295</sup> The Financial Intelligence Unit (FIU)<sup>296</sup> and the Asia/Pacific Group on Money Laundering (APG)<sup>297</sup> assist with AML/CFT compliance of DPT service providers.

### ***Australia***

The Australian Securities and Investments Commission (ASIC)<sup>298</sup> is Australia's corporate regulator that oversees company and financial services, including the enforcement of legislation concerning investor, consumer, and creditor protections. The Australian Transaction Reports and Analysis Centre (AUSTRAC)<sup>299</sup> is Australia's financial intelligence agency responsible for monitoring money laundering, tax evasion and terrorism financing activities. ASIC applies the Corporations Act 2001 and the Australian Securities and Investments Commission Act 2001 to buying and selling of cryptocurrencies and investing in ICOs along with consumers protection risks. AUSTRAC monitors digital currency exchange and compliance with the Anti-Money Laundering and Counter-Terrorism Financing Act 2006.

### ***China***

The Cyberspace Administration of China (CAC) released guidelines<sup>300</sup> for individuals and organizations that offer blockchain-related services in China. The CAC manages blockchain regulation compliance in China, with established cyberspace administration bodies in each province.<sup>301</sup>

The People's Bank of China (PBOC) plans to release its version of a state-issued digital currency or central bank digital currency (CBDC) called the 'digital yuan',<sup>302</sup> and is drafting legislation to prohibit any other form of digital currency in China such as Facebook's Libra.<sup>303</sup>

## India

India does not have a cryptocurrency regulatory framework in place, but its regulatory agencies have released varying statements on the nature of cryptocurrency in India.

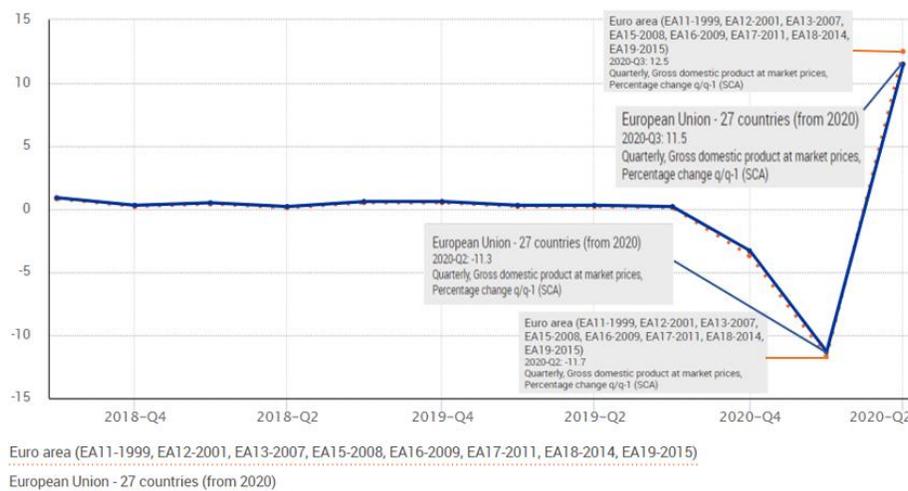
## 4.5 Economy

### European Union

Today's economy is a cumulation of multiple financial events and solutions ranging from the impact of the coronavirus pandemic to the rise of the Fintechs and Techfins<sup>104</sup> to the permeation of cryptocurrencies in financial transactions.

The European Union/Euro Area (EU/EA) GDP contracted 11.3% and 11.7% in Q2 2020 due to coronavirus restrictions but rebounded to a strong 11.5% and 12.5% in Q3 2020 as restrictions were slowly lifted.

**Gross domestic product European Union/Euro Area (Q4 2018–Q2 2020)**



Source: Eurostat; <https://ec.europa.eu/eurostat/databrowser/view/teina011/default/line?lang=en>

The European Commission (EC) provided 87.3 billion in financial support to 16 member states in August 2020 and announced the issuance of the EU Support to mitigate Unemployment Risks in an Emergency (SURE) bonds<sup>105</sup> up to €100 billion in October 2020.

The EU/EA money supply has increased €5.5 trillion from €4.92 trillion Q4 2019 to €10.5 trillion in Q3 2020 from coronavirus recovery packages.



Money supply euro area (January 2000–October 2020)



Source: European Central Bank Euro Statistical Data Warehouse

Influences from Fintech and Techfin technology innovations in digital finance can be seen throughout the European economy with the biggest impacts in banking, consumer financial, and investments. The European Commission defines ‘digital finance’<sup>116</sup> as the “impact of new technologies on the financial services industry” that offer solutions to “bring down barriers and spur competition” in “online banking, transfer services, peer-to-peer lending and personal investment services.”

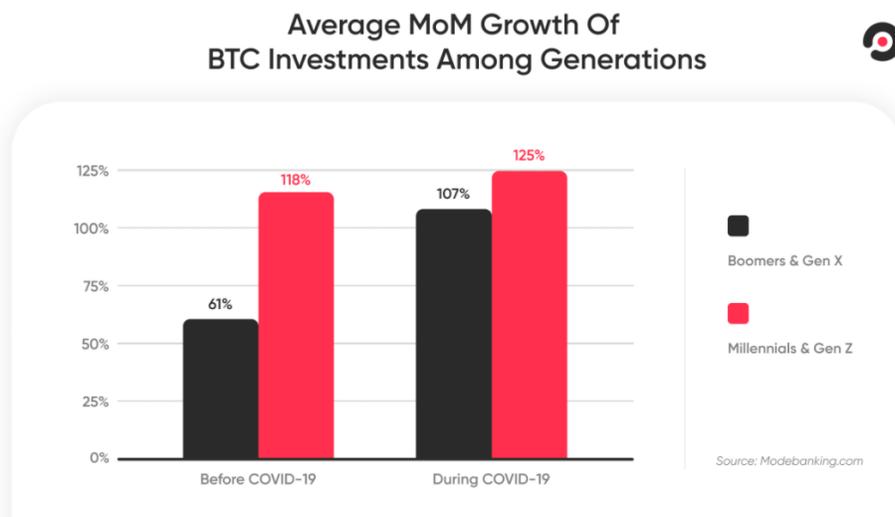
The rise of the intangible asset was evident in the financial markets due to the economic slowdown caused by the 2020 coronavirus pandemic and government measures to offset the economic impact. Intangible assets can be characterized as having no intrinsic physical properties, such as a building, and can be considered software or computer-based assets, brand name, design, research, and development. Investments in intangible assets have grown during the pandemic. Platform, processes, and system technology companies provide good examples.

Facebook Inc share price/volume, November 2017–October 2020



Source: <https://www.barchart.com/stocks/quotes/FB/interactive-chart>

In a June 2019 Interpretations Committee public meeting,<sup>117</sup> the International Financial Reporting Standards (IFRS) stated “a holding of cryptocurrency meets the definition of an intangible asset in IAS 38 on the grounds that (a) it is capable of being separated from the holder and sold or transferred individually; and (b) it does not give the holder a right to receive a fixed or determinable number of units of currency.” Investments of cryptocurrencies have also risen due to the 2020 pandemic, as shown below.



Source: <https://modebanking.com/2020/07/01/boomers-gen-x-doubled-their-investments-in-btc-every-month-since-lockdown/>

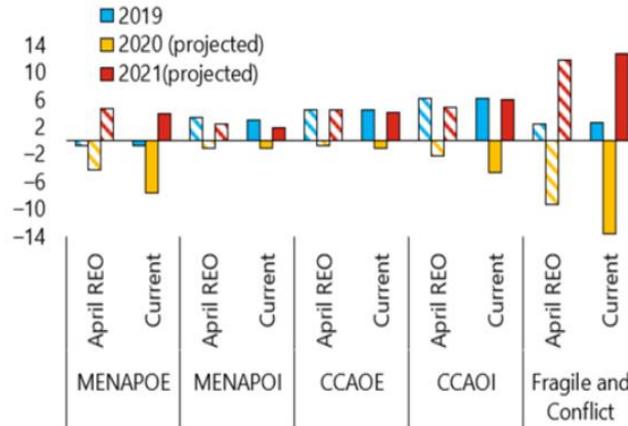
The trends in digital finance and innovations from the Fintechs/Techfins have provided new financial tools for governments which will have both direct and indirect impacts on the European economy:

- Central bank digital currency: Continuously available and interest-bearing, wholesale settlements.
- Monetary policy: Ability to push liquidity into the markets. The algorithm allows users to support stablecoins through a recapitalization mechanism for accounts with lack of collateral, at the same time receiving a set commission.
- Financial inclusion and intermediaries: Easy access and disintermediation.

### **Middle East**

The impact of the 2020 coronavirus pandemic in the Middle East has stifled the economy<sup>118</sup> due to a sharp decline in the oil price and decreased tourism. The IMF stated in their July 2020 *Regional Economic Outlook* that GDP growth in the Middle East “is now projected at -4.7 percent in 2020, 2 percentage points lower than in April 2020.”

## Middle East regional economic outlook (2019–2020)



Sources: National authorities; and IMF staff calculations.  
 Notes: MENAPOE = Middle East, North Africa, Afghanistan and Pakistan Region Oil Exporters. MENAPOI = Middle East, North Africa, Afghanistan and Pakistan Region Oil Importers. CCAOE = Caucasus and Central Asia Region Oil Exporters. CCAOI = Caucasus and Central Asia Region Oil Importers.

Source: <https://www.imf.org/en/Publications/REO/MECA/Issues/2020/10/14/regional-economic-outlook-menap-cca>

Even though the 2020 coronavirus pandemic has resulted in a slowdown in overall GDP, investment in the Fintech sector has continued to grow in the Middle East. This is evident in the increased investment of e-commerce technology due to the rise of online shopping because of pandemic-related business closures.<sup>119</sup> There were 105 Fintech start-ups in 2016 and the number was estimated to grow to 205 in 2020.<sup>120</sup> Venture capital investments in Middle East Fintech companies are expected to increase to \$2 billion<sup>121</sup> by 2022. In a 2020 Middle East Fintech study,<sup>122</sup> Deloitte states that 22% of Middle East banking customers have adopted point-to-point Fintech solutions and 82% are willing to start using Fintech solutions for their banking needs.

### FinTech deployment

How many customers have adopted FinTech solutions/features?



of which  
**78%**  
 Adopted P2P transfers and account aggregation

of which  
**75%**  
 Are heavy to moderate users of FinTech solutions

### FinTech maturity

How mature are customers with regard to FinTech use?



of which  
**75%**  
 Consider FinTech solutions make banking easier

**20-30%**  
 Year-olds are the major drivers for FinTech usage

### FinTech perception

What is the general position of customers in the Middle East?



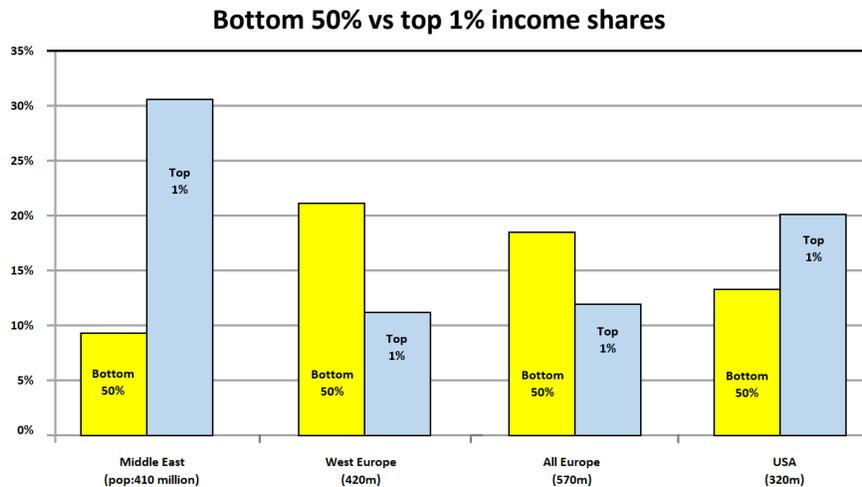
of which  
**61%**  
 Are motivated to use solutions that address their banking needs

however  
**18%**  
 Are unwilling to use the solutions - 40% of which is due to security/privacy concerns

Source: Deloitte survey March 2020

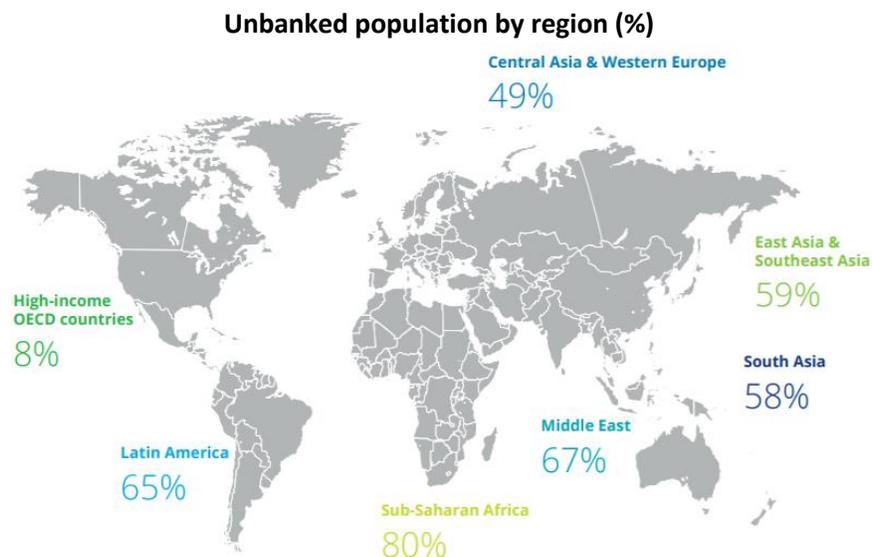
Source: [https://www2.deloitte.com/content/dam/Deloitte/xs/Documents/financial-services/me\\_fintech-study-report.pdf](https://www2.deloitte.com/content/dam/Deloitte/xs/Documents/financial-services/me_fintech-study-report.pdf)

Advancements in Fintech can positively impact the Middle East by bridging income inequality between the rich and poor. A CGAP (Consultative Group to Assist the Poor) report<sup>123</sup> demonstrated that impoverished households in Kenya who had access to mobile money (M-Pesa) enabled “an estimated 186,000 families, or as many as 2 percent of Kenyan households, to move out of poverty.”<sup>124</sup> The Middle East leads the world in income inequality, with the bottom 50% of the population receiving only 9% of the total income in the region.<sup>125</sup>



Source: <http://piketty.pse.ens.fr/files/AAP2019RIW.pdf>

The Middle East has a high population (67%) that do not use banking services or banking services are insufficient to meet their needs.<sup>126</sup> Sub-Saharan Africa has the highest level of population (80%) without access to banking services.

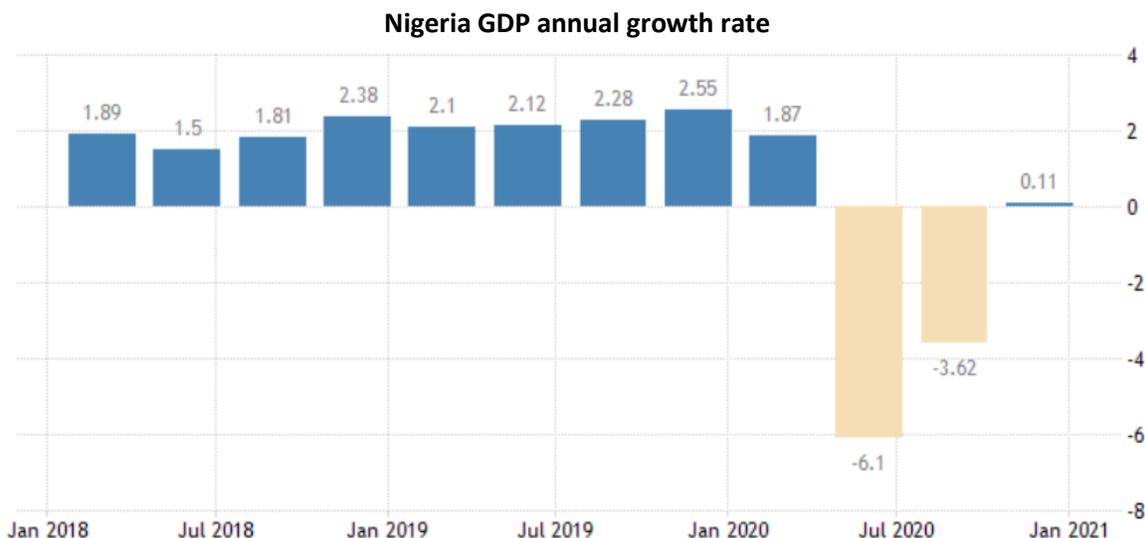


Source: <https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/technology/lu-blockchain-accelerate-financial-inclusion.pdf>

Blockchain technology can assist governments in addressing income inequality and provide financial services to 1.7 billion adults around the world. Blockchain technology can reduce global payment remittance fees, offer secure digital identity management, and provide trustworthy financial practices to combat corruption.<sup>127</sup>

### Africa

Nigeria GDP shrank 3.6% at the end of 2020 but rose 0.1% at the beginning of 2021 after a gradual return to economic activities after pandemic lockdowns.

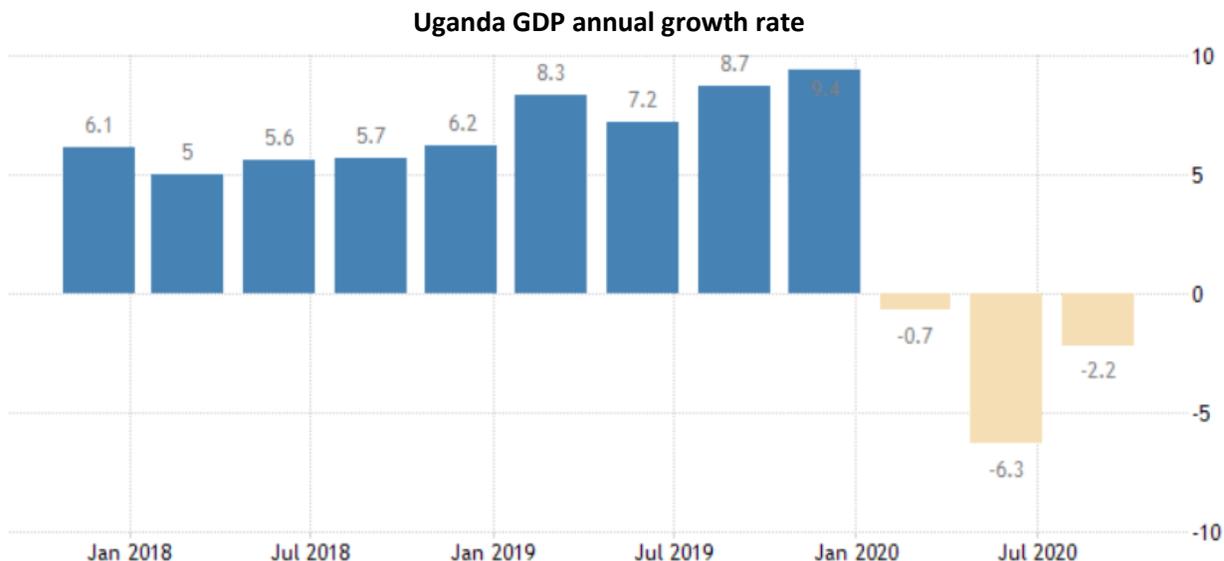


Source: <https://tradingeconomics.com/nigeria/gdp-growth-annual>

Telecommunication, information services, agriculture and real estate grew 1.7% in Q4 2020, but the oil sector drastically declined 19.8%.

The pandemic hit Nigeria’s economy severely including the drastic decline in oil prices. The Central Bank of Nigeria initially released N\$120 billion (U\$333 million) to address the pandemic and provided further assistance of N\$3.5 trillion in Q3 2020. The stimulus packages included N\$73.7 billion to assist households and small and medium enterprises.

Uganda’s economy declined 2.2% in Q3 2020 but is less that the 6.3% in the previous quarter a result the lessening of pandemic lockdowns.



Source: <https://tradingeconomics.com/uganda/gdp-growth-annual>

Uganda’s industrial industry grew 4.3%, while the services sector saw a steep decline of 6.2% in Q3 2020.

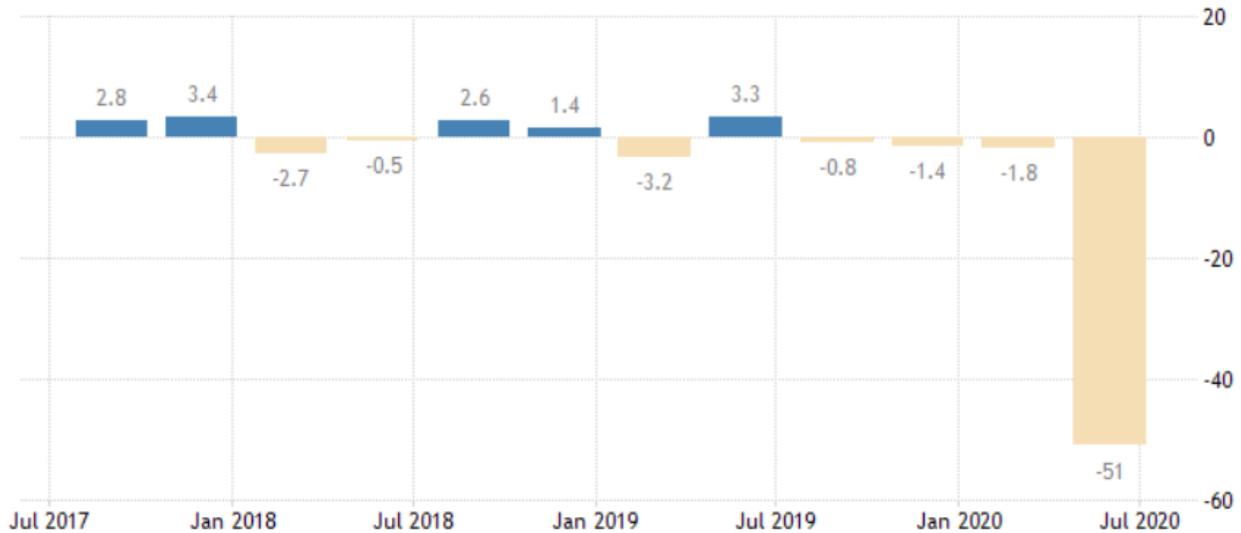
Uganda released two stimulus packages to help offset the economic impact of the pandemic, which included U\$270 million (0.7 percent of GDP) to critical parts of the economy.

The South African Annual GDP contracted 17.1% in Q2 2020 due to the coronavirus pandemic restrictions, which resulted in a record economic decline.<sup>128</sup> The South African economy fell to an astounding 51% in three months (Q2 2020). The economic impacts can be seen across all South African sectors:

- Construction: -76.6% (-4.7% Q1)
- Manufacturing: -74.9% (-8.5% Q1)
- Mining: -73.1% (-21.5% Q1)
- Transport, storage & communication: -67.9% (0.5% Q1)
- Trade, catering & accommodation: -67.6% (-0.7% Q1).

An exception to the extreme decline is noticeable in the agriculture, forestry and fishing which remained positive at 15% (26.8% Q1).

South African GDP growth rate



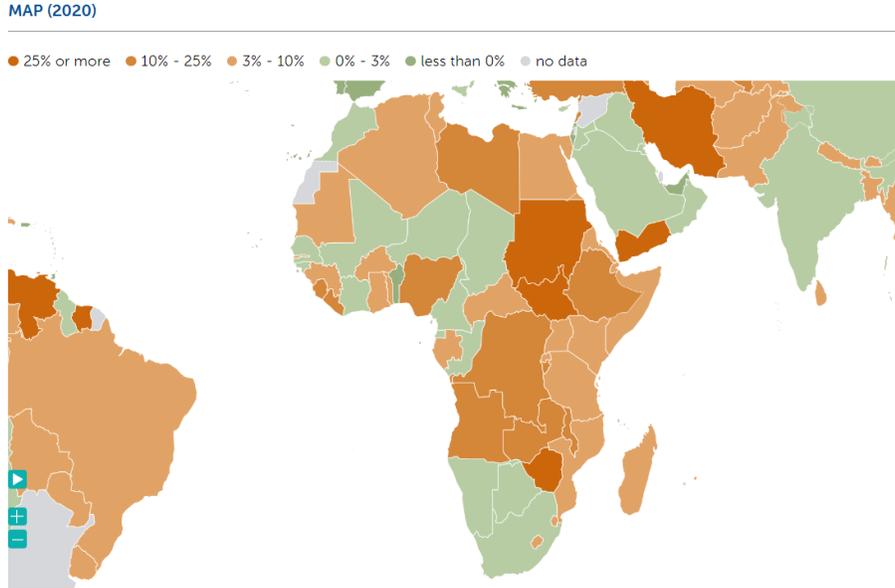
SOURCE: TRADINGECONOMICS.COM | STATISTICS SOUTH AFRICA

Source: <https://tradingeconomics.com/south-africa/gdp-growth>

Even though the coronavirus pandemic has greatly impacted the African economy, it seems the pandemic has not dampened Africa’s push for a more digitized economy.<sup>130</sup> African Fintech companies increased from 301 to 491 in 2017,<sup>131</sup> with investments totaling \$320 million since 2015. The top growing African regions include Kenya, Ghana, and Ethiopia, which are offering mobile banking solutions, infrastructure, and biometrics. The 2020 Blockchain Africa Conference<sup>132</sup> highlighted how blockchain technology can help overhaul Africa’s trade finance and supply chain networks by improving traceability, transparency, auditability, efficiency, and security of the traditional networks.

Cryptocurrency ownership in South Africa is high and may be due in part to Africa’s high inflation rates, which are much higher than the global average. South Sudan rates are at 83.5%<sup>133</sup> and countries like Nigeria, Ghana, and Zimbabwe have also experienced increased inflation rates.<sup>134</sup>

**Africa inflation rate (IMF data mapper 2020)**

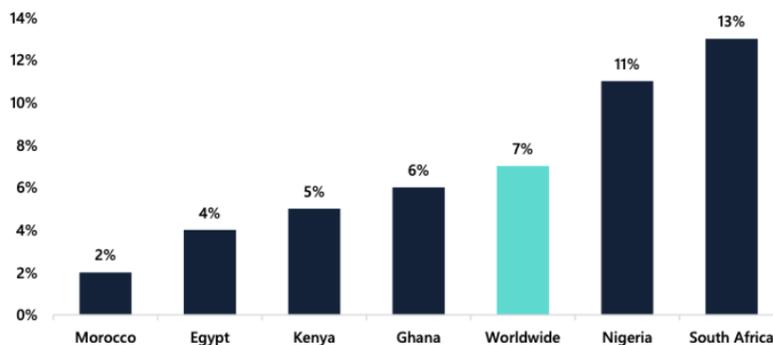


Source: <https://www.imf.org/external/datamapper/PCPIEPCH@WEO/OEMDC/ADVEC/WEOWORLD>

Cryptocurrency ownership in South Africa remains high at 13% compared to the worldwide average of 7%.

**African cryptocurrency ownership (2020)**

Figure 1: Africa Overview - Ownership of Cryptocurrency (Selected Countries)  
(Percentage of Internet Users Aged 16 to 64)



Source: *Digital 2020 Global Digital Overview*

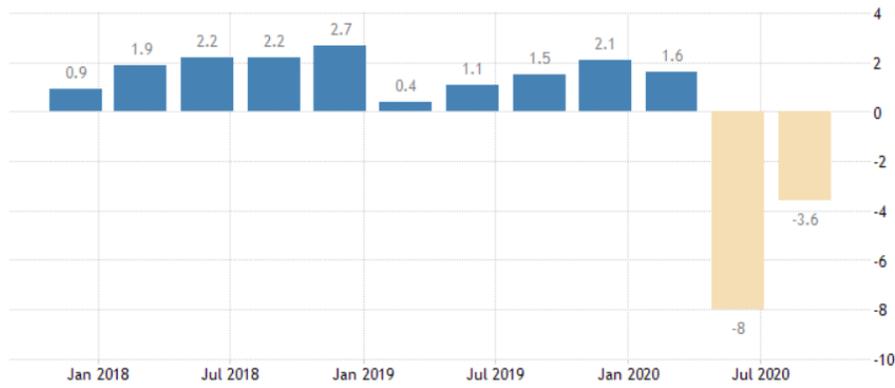
Source: <https://wearesocial-net.s3-eu-west-1.amazonaws.com/wp-content/uploads/common/reports/digital-2020/digital-2020-global.pdf>

With high inflation rates, African states have embraced cryptocurrency benefits such as ability to make cross-border payments with reduced fraud,<sup>135</sup> independence from local economy turmoil and inflation, and ability to transfer and receive money without paying high fees.

**Russian Federation**

Russia’s GDP contracted 8.0% in Q2 2020 and 3.6% in Q3 2020 due to the Federation’s response to the global pandemic and the fall in oil prices. The total cost of Russia’s pandemic economic recovery plan is ₺6.4 trillion (US\$84 billion) or 4.2% of GDP.<sup>341</sup>

**Russia’s GDP annual growth rate (January 2018–July 2020)**

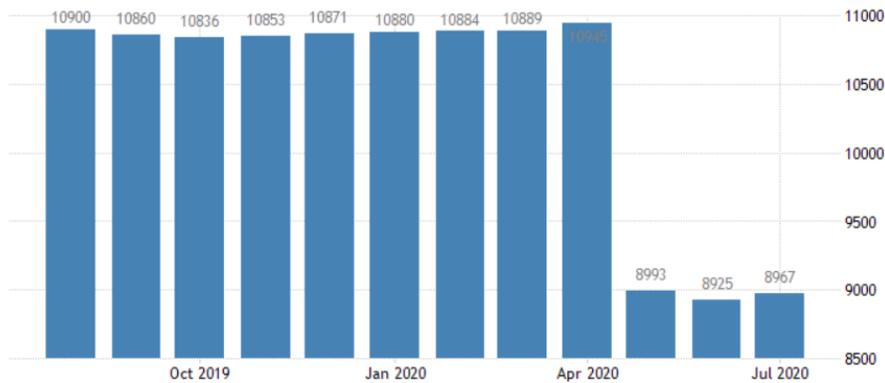


SOURCE: TRADINGECONOMICS.COM | FEDERAL STATE STATISTICS SERVICE

Source: TRADINGECONOMICS.COM; Federal State Statistics Service; <https://tradingeconomics.com/russia/gdp-growth-annual>

The fall in oil prices has greatly impacted Russia’s deficits, actual and forecast, at 7.2% of GDP in 2020 to 1.6% of GDP in 2021 and 0.5% of GDP in 2022.<sup>342</sup>

**Russia crude oil production (October 2019–July 2020)**



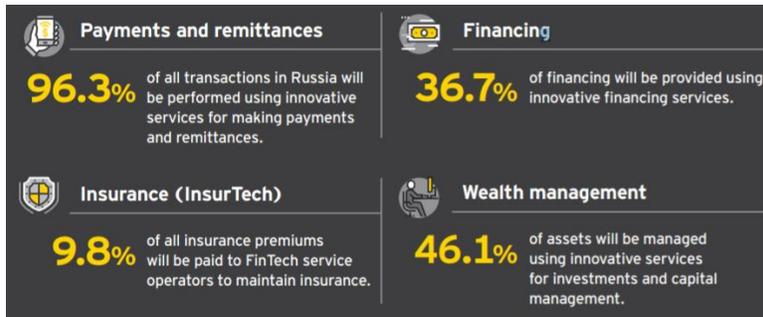
SOURCE: TRADINGECONOMICS.COM | U.S. ENERGY INFORMATION ADMINISTRATION

Source: TRADINGECONOMICS.COM; US Energy Information Administration; <https://tradingeconomics.com/russia/crude-oil-production>

The coronavirus has influenced Russian banks to develop digital innovation solution for customers.<sup>344</sup> The CBR released guidelines for Fintech development for 2018–2020 to promote competition in the financial markets and competitiveness of Russian technology, raise financial inclusion, reduce risks and costs, and ensure security and stability in applying financial technologies.<sup>345</sup>

Russia has the third most developed Fintech market in the world, next to China and India. Of Russian citizens, 82% use a Fintech-related service, with awareness of Fintech ranging between 81% and 86%, according to a 2019 study by Ernst & Young.<sup>346</sup> A forecast by EY, on behalf of the Agency for Strategic Initiatives (ASI), shows growth in Russia’s Fintech sectors, which includes blockchain-related technology, is projected to 2035.

### Projected growth in Russian Fintech

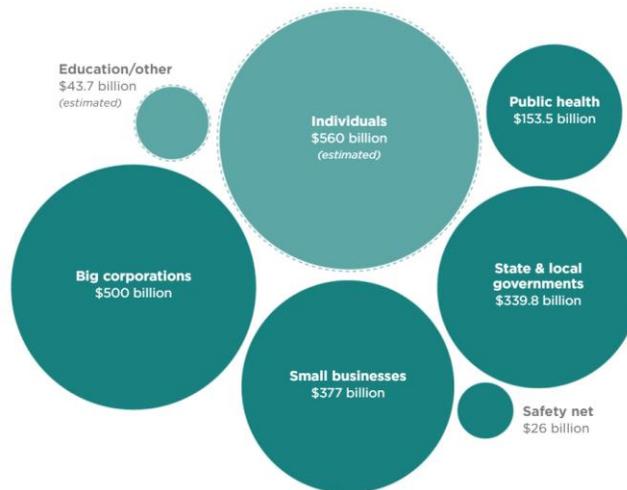


Source: Ernst & Young; [https://investinrussia.com/data/files/sectors/0\\_EY-focus-on-fintech-russian-market.pdf](https://investinrussia.com/data/files/sectors/0_EY-focus-on-fintech-russian-market.pdf)

### United States

The coronavirus pandemic has greatly affected the United States (US) economy. The US Congress have enacted four separate coronavirus relief bills<sup>197</sup> totaling more than US\$3 trillion:

### The CARES Act breakdown



Source: Estimates for third relief bill based on bill text, committee, and administration numbers  
Credit: Audrey Carlsen/NPR

From February to September 2020, the Federal Reserve contributed over US\$3.3 trillion to the US economy, giving its citizens, and small-to-medium-sized and large corporations much-needed relief during the crisis.

The US economic stimulus efforts to offset the impacts to the coronavirus pandemic have pushed the US money supply to record levels. The US money supply expanded 23% to US\$19 trillion in November 2020 from US\$15 trillion in December 2019.

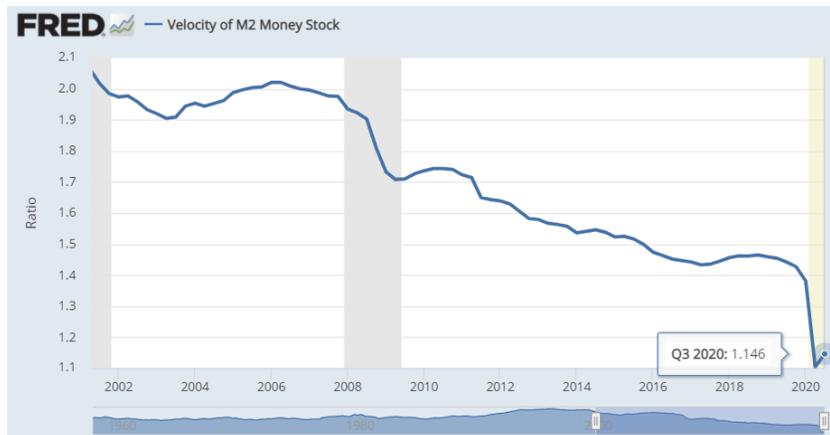
## Money in circulation 2020



Source: Board of Governors of the Federal Reserve System (US), M2 Money Stock [M2], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/M2>

The velocity of money in circulation (transactions of money being spent for goods and services) in the US economy dropped drastically from 1.42 in Q4 2019 to 1.10 in Q2 2020 as the demand for money lessened due to coronavirus restrictions. The velocity ratio has since risen to 1.14 in Q3 2020.

## Velocity of money in circulation 2020

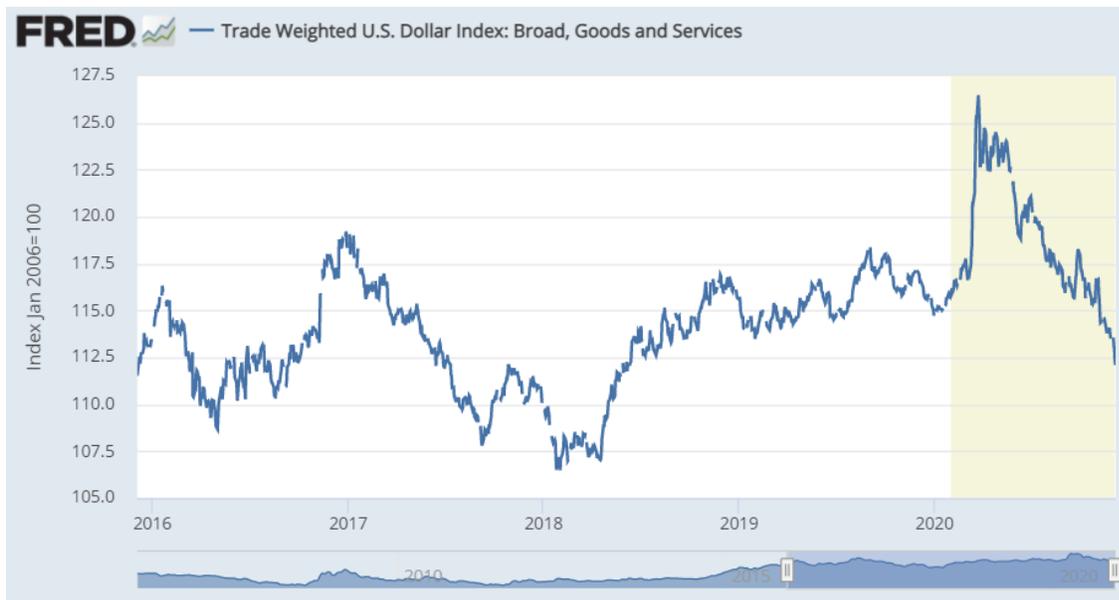


Source: Federal Reserve Bank of St. Louis, Velocity of M2 Money Stock [M2V], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/M2V>, December 2, 2020

The Federal Reserve economic assistance increased depository institutions' account balances from US\$1.6 billion to US\$3.3 billion in three months. Bank reserves jumped from US\$370 million to US\$1.8 billion in four months. US Treasury securities increased from US\$2.3 billion to US\$4.4 billion. The gap between Treasury securities and bank reserves is the result of unspent government funds by the federal government. The trend of unspent funds is also noticeable in commercial banks not lending,<sup>198</sup> in the influx of funds, and the banks not knowing what to do with excess money.<sup>199</sup> The US government is holding onto a large amount of debt.

The US Dollar Index rose from 115 in Q4 2019 to 125 in Q1 2020 then decreased to 112 in Q4 2020.

### Trade Weighted US Dollar Index (Q1 2016–Q4 2022)



Source: Board of Governors of the Federal Reserve System (US), Trade Weighted US Dollar Index: Broad, Goods and Services [DTWEXBGS], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/DTWEXBGS>, December 10, 2020

Investments in Bitcoin and Gold show that investors are hedging against inflation and understand that both are good options to keep wealth during unpredictable times in the economy.

Bitcoin to USD (September 2018–September 2020)



Source: Business Insider; <https://markets.businessinsider.com/currencies/btc-usd>

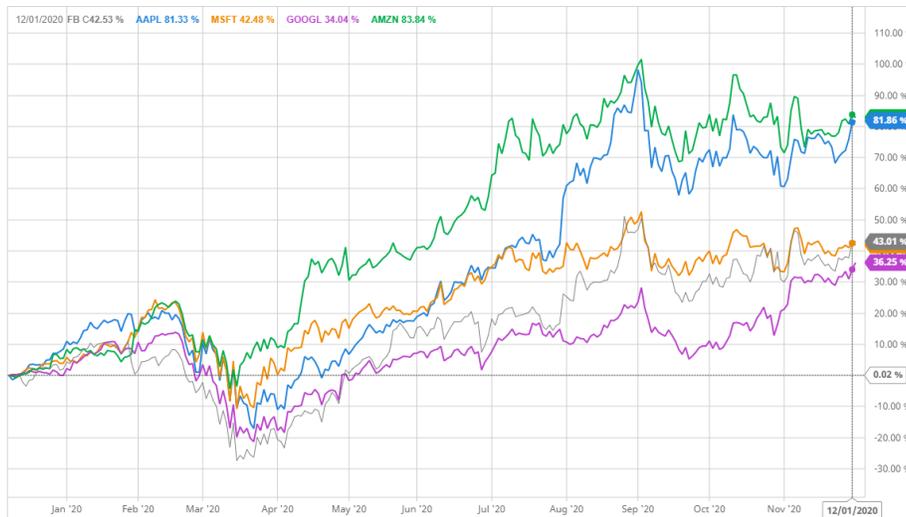
Gold price (September 2018–September 2020)



Source: Business Insider; <https://markets.businessinsider.com/commodities/gold-price>

Even though the US is in a recession,<sup>200</sup> the stock market has risen 55% from March 2020 to October 2020, driven by heavy investment in intangible assets such as Facebook, Apple, Microsoft, Google, and Amazon.

**Year-to-date comparison Facebook competitors (USD)**



Source: <https://www.barchart.com/stocks/quotes/FB/interactive-chart>

Additionally, investment in cryptocurrency and blockchain technology has fluctuated but remains high. Bitcoin dipped during Q1 2020 but continues to grow along with other cryptocurrencies.<sup>201</sup>

**Year-to-date comparison Bitcoin to Ethereum, Litecoin & Ripple (USD)**



Source: <https://www.barchart.com/crypto/quotes/%5EBTCUSD/interactive-chart>

Investors are also investing in blockchain-related technology companies through blockchain exchange traded funds (ETFs).<sup>202</sup>

Year-to-date top blockchain ETFs (USD)

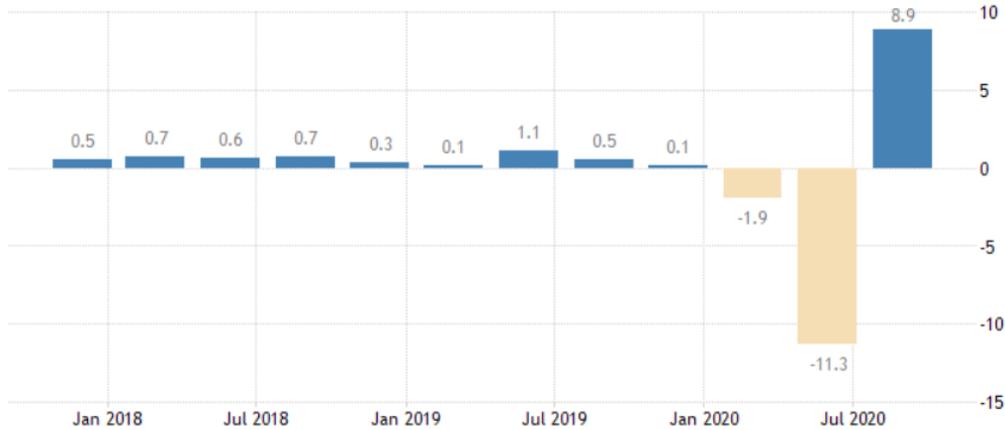


Source: <https://www.barchart.com/etfs-funds/quotes/SOXX/interactive-chart>

**Canada**

Canada’s economy was hit hard in the first two quarters of 2020 due to the coronavirus, with its GDP contracting 1.6% in Q1 2020 and 11.3% in Q2 2020. Canada’s GDP expanded 8.9% in Q3 2020 due to the government’s continued support to households and businesses impacted by the coronavirus.<sup>203</sup>

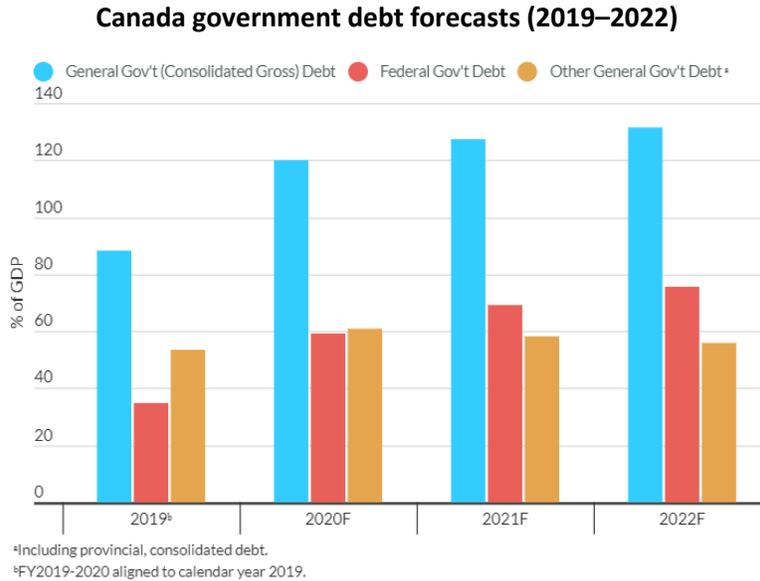
Canada gross domestic product growth rate



SOURCE: TRADINGECONOMICS.COM | STATISTICS CANADA

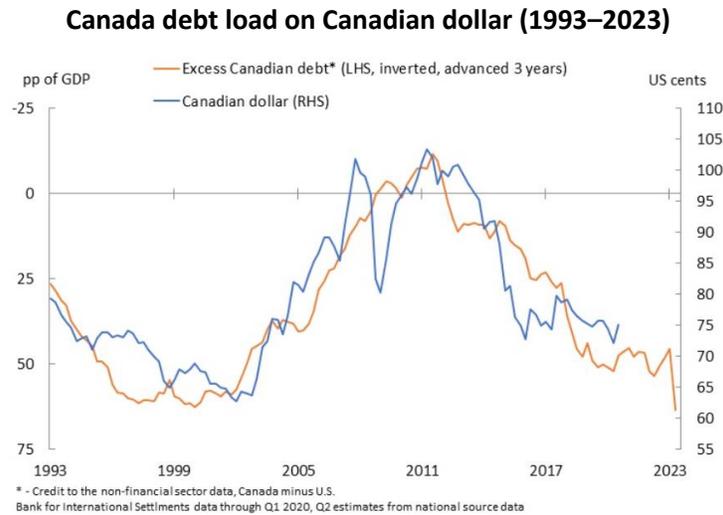
Source: <https://tradingeconomics.com/canada/gdp-growth>

Canada’s consolidated gross general government debt will increase to 120% of GDP by 2021, with estimates pushing to 131.5% of GDP by 2022.



Source: Fitch Ratings; <https://www.fitchratings.com/research/sovereigns/canadas-spending-pledges-to-push-federal-deficit-higher-still-25-09-2020>

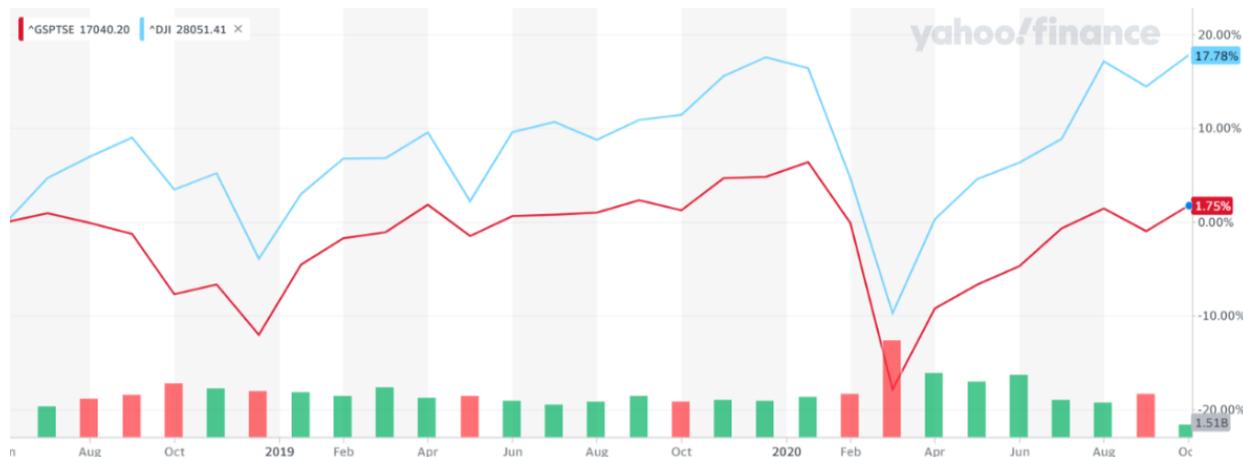
The increase in Canada’s debt burden has a direct relationship to the value of the Canadian dollar which will continue to see pressure into 2021.



Source: BIS, Statistics Canada, Federal Reserve, Haver Analytics, FMR Co

Both the Canadian (S&P/TSX) and American (DJIA) indices dropped in the early days of the pandemic but have since rebounded.

Comparison of the Canada's S&P/TSX and America's DJIA (2019–2020)



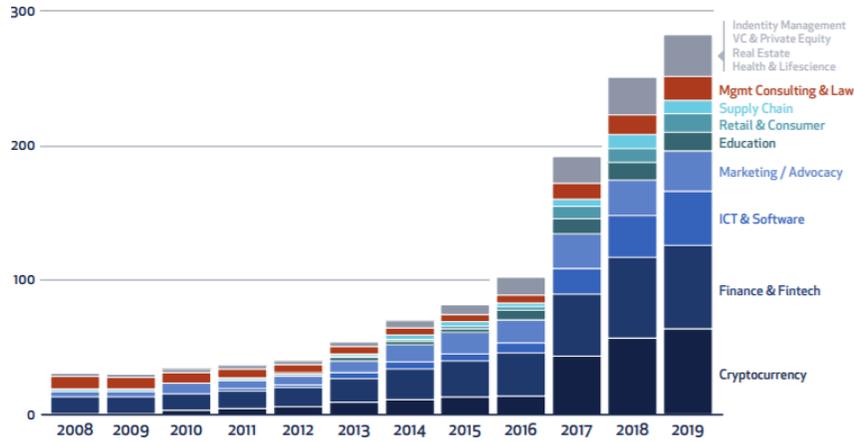
Source: <https://ca.finance.yahoo.com/>

Canada saw a notable decline (45%) in venture capital (VC) investments<sup>207</sup> for Q1 2020. This was due in part to coronavirus travel restrictions and market uncertainty, but VC investments increased by an astounding 102% in the Q2 2020. This growth may be due to the increased need for biotech solutions for the workplace and home, e-learning, remote collaboration, work, and health technologies due to the pandemic.

Canada's technology sector is expected grow from 2019 to 2027 with demands for talent in "machine learning, robotics, augmented and virtual reality, blockchain, internet of things and related emerging technologies." <sup>208</sup>

Canada has heavily invested in blockchain-related technologies since 2012 and the industry continues to grow. The Information and Communications Technology Council (ICTC) stated in a 2019 report<sup>209</sup> that "the number of new blockchain firms will have grown by 25% in 2019" and "the industry is rather robust." The following chart shows the growth of the Canadian blockchain ecosystem across time. The blockchain sector has seen growth in cryptocurrency firms, finance and Fintech, healthcare, and real estate.

Canadian blockchain sector growth (2008–2019)



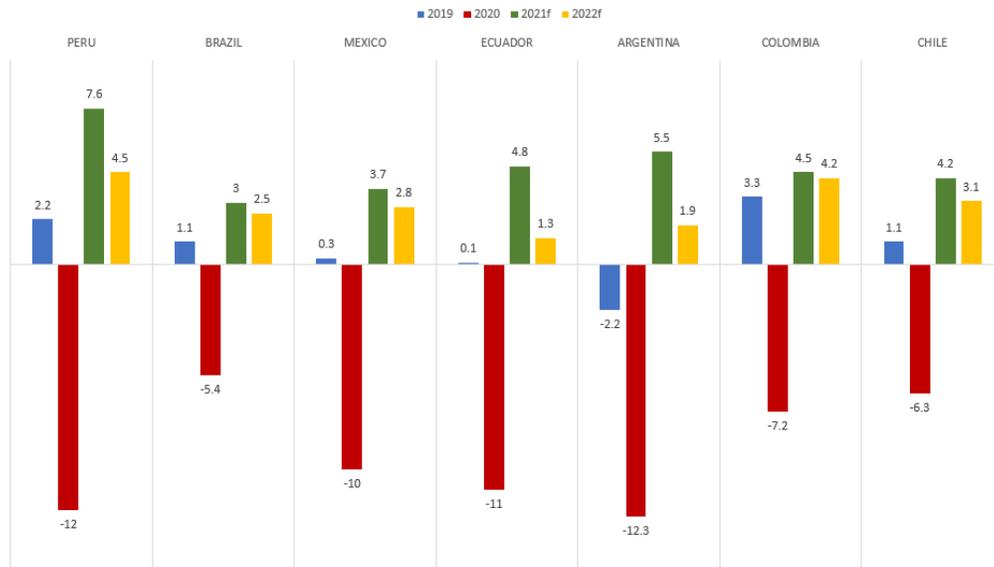
Source: ICTC Note: 2019 value based on first half of year

Source: <https://www.ictc-ctic.ca/wp-content/uploads/2020/03/canada-blockchain-ecosystem-2019-v2.pdf>

Latin America

The pandemic has had a negative impact on the Latin American economy, especially the region’s poor population. A 2020 United Nation’s Economic Commission for Latin America and the Caribbean (ECLAC) report<sup>210</sup> stated that the region’s GDP will decrease 9.1% in 2020 but is expected to rebound in 2021.

Real GDP growth in selected countries in Latin America

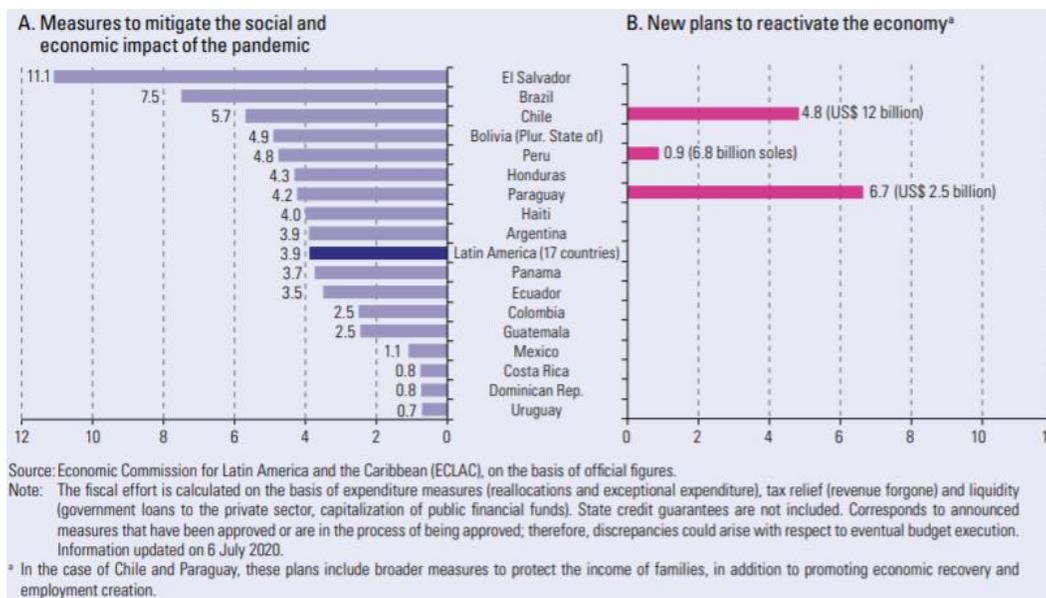


Note: Figures are in percent. ‘f’ is forecast.

Source: <https://openknowledge.worldbank.org/bitstream/handle/10986/34602/9781464816505.pdf>

Several Latin America countries enacted extreme social measures to offset the pandemic impacts on households living in poverty. The measures included direct cash transfers and social allowances for health care.

## Select Latin American countries' fiscal efforts to address the coronavirus pandemic (July 2020)

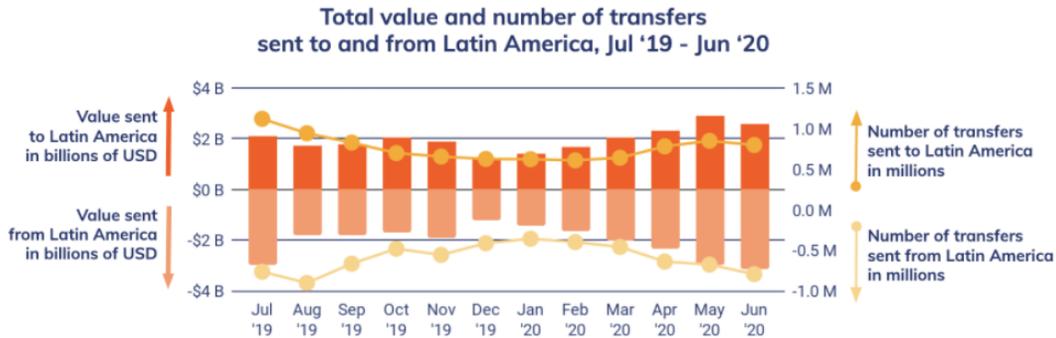


Chile announced a Small Business Guarantee Fund that allowed credit guarantees to small businesses totaling US\$24 billion.

Colombia created a National Guarantee Fund for self-employed workers and offered new lines of credit to small and medium-sized business totaling 16 billion pesos (US\$4.5 million).<sup>213</sup>

Fintech plays an important role in Latin America’s economic recovery. The UN ECLAC report provides policy recommendations that include “cooperation between national governments, universities and other actors in science and technology, and investments in R&D, can be strengthened to develop domestic capabilities and ensure all people have the right to benefit from science and its applications,” and policies should “promote meaningful participation by women and youth, and address gender bias barriers in the most technologically advanced and emerging sectors, including technology, medical supplies and pharmaceuticals.”

Latin America has also seen the lowest growth in the cryptocurrency markets compared to the rest of the world.



Source: <https://go.chainalysis.com/rs/503-FAP-074/images/2020-Geography-of-Crypto.pdf>

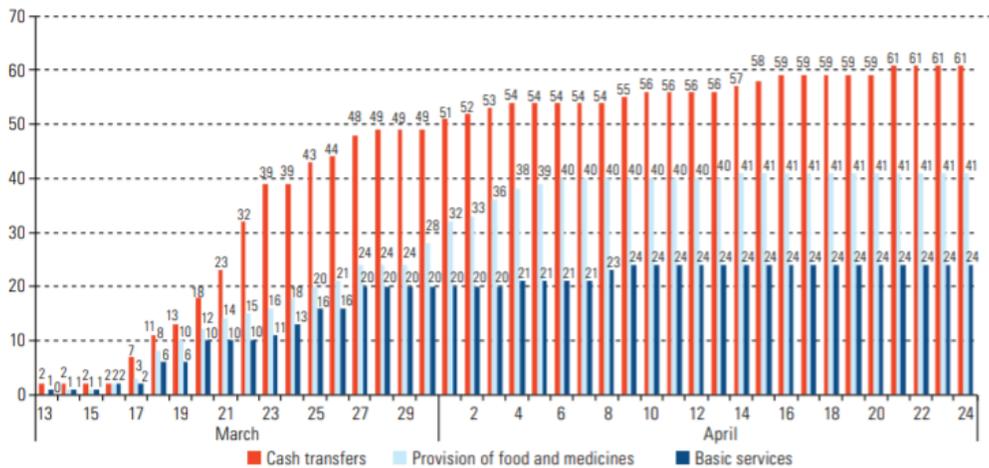
## Caribbean

Caribbean countries typically have high public debt due to infrastructure repair from natural disasters averaging 2.5% of GDP. Countries such as Barbados and Jamaica have high level of debt and high interest payments of 3.4% and 6.3% of GDP.

The Caribbean expected 2020 growth of -2.5% due to the pandemic's impact on tourism, which accounts for 50% of Caribbean employment.

Stimulus packages due to the pandemic will further increase debt levels in many Caribbean countries. Much of the stimulus response is humanitarian in nature including food provision, basic services (water, electricity, telephone, internet), and direct cash payments.

### Social protections measures for the population living in poverty (March–April 2020)

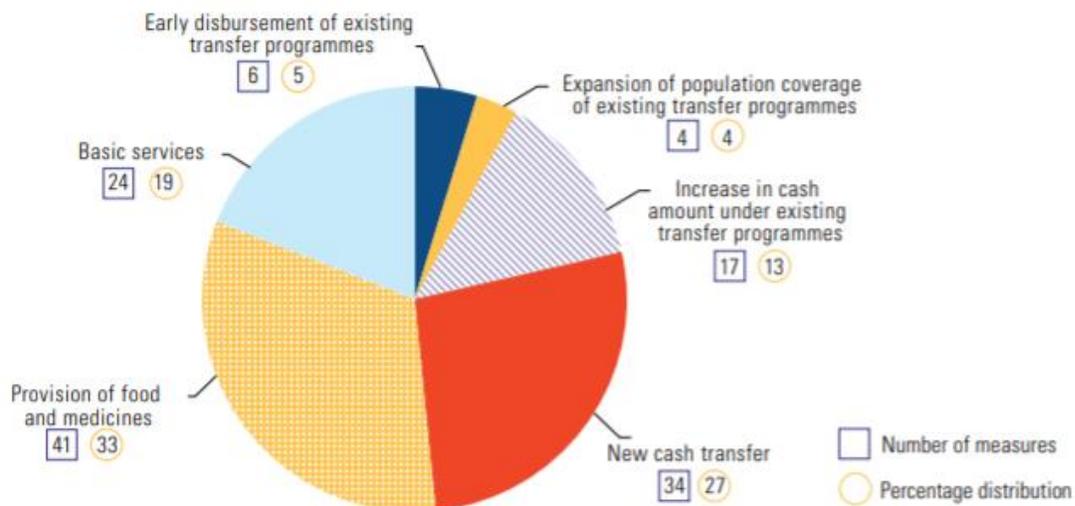


Source: Economic Commission for Latin America and the Caribbean (ECLAC).

<sup>a</sup> Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivarian Republic of Venezuela, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Panama, Paraguay, Peru, Plurinational State of Bolivia, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, and Uruguay.

Note: Number of measures, daily figures

Social protections measures for the population living in poverty (March–April 2020)



Source: Economic Commission for Latin America and the Caribbean (ECLAC).

<sup>a</sup> Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivarian Republic of Venezuela, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Panama, Paraguay, Peru, Plurinational State of Bolivia, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, and Uruguay.

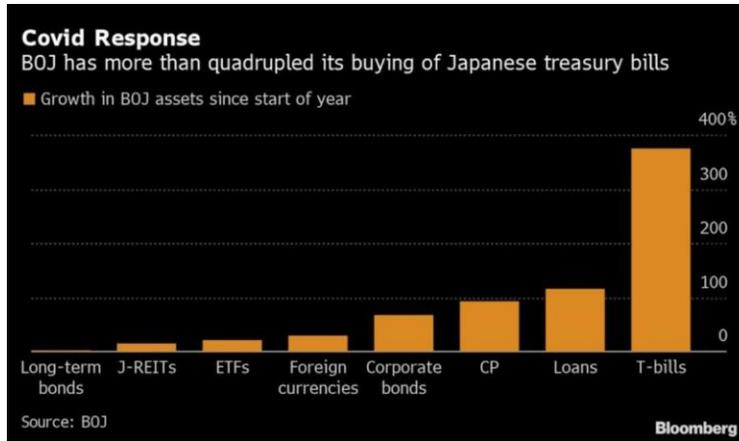
Note: Number of measures, daily figures

**Japan**

The government of Japan passed two economic stimulus packages during the coronavirus pandemic, the first on 7 April 2020 of ¥275.7 trillion and a second supplemental package on 27 May 2020 of ¥31.9 trillion.

Since the global financial crisis, Japanese banks’ reliance on the US dollar has grown most notably in floating rate deposits through transaction banking and corporate bonds. In response to the pandemic, the Bank of Japan (BoJ) released a set of measures to maintain adequately functioning financial markets (notably the US dollar funding markets<sup>308</sup>) and increased the money supply and incentive provision of credit by increasing Japanese purchases of corporate bonds, government securities, commercial paper, and exchange traded funds bonds.<sup>309</sup>

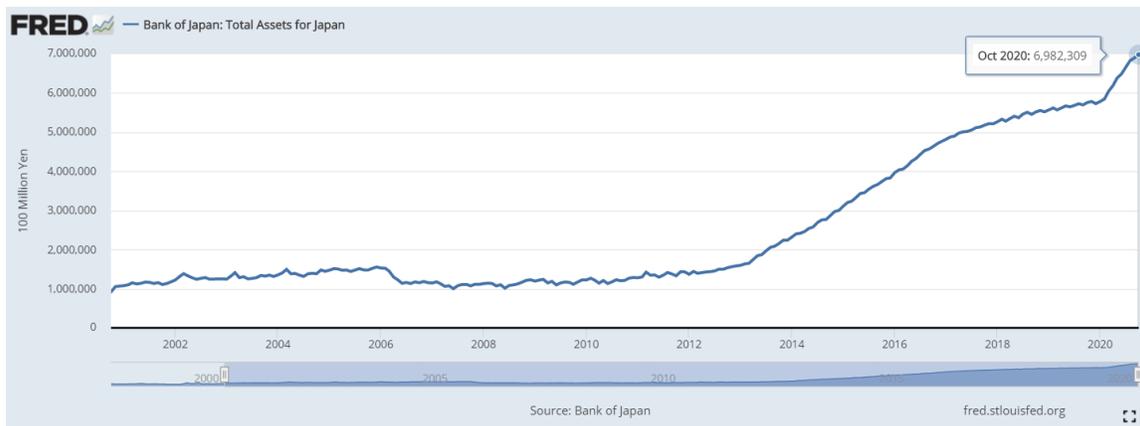
**BoJ increased purchase of Japanese treasury bills**



Source: Bloomberg; <https://www.bloomberg.com/news/articles/2020-10-11/boj-s-swelling-asset-pile-complicates-future-exit-from-stimulus>

The BoJ’s balance sheet aggressively increased between 2012 and December 2019, but significantly spiked by ¥1.2 trillion, from ¥5.7 trillion in December 2019 to ¥6.9 trillion in October 2020 (120% of GDP).

**Bank of Japan: Total assets for Japan**



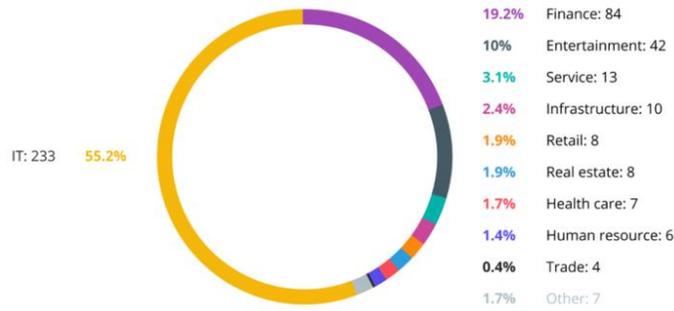
Source: Bank of Japan, Bank of Japan: Total Assets for Japan [JPNASSETS], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/JPNASSETS>, December 6, 2020

The government deficit is expected to grow to 10% of GDP at the end of 2020,<sup>311</sup> with public debt pushing to 252% of GDP at the end of 2020.<sup>312</sup>

Even though the coronavirus pandemic has impacted the Japanese economy, investments in blockchain-related technology in Japan increased in 2020. According to a 2020 report<sup>313</sup> by Monex Group’s Monex Crypto Bank, the number of blockchain-related technology companies in Japan increased 30.7% in the

second quarter of 2020 to 430, up from 329 in the second quarter of 2019. The most active areas for blockchain initiatives are in information technology followed by finance and entertainment.

**Breakdown of 422 active blockchain-related products in Japan**



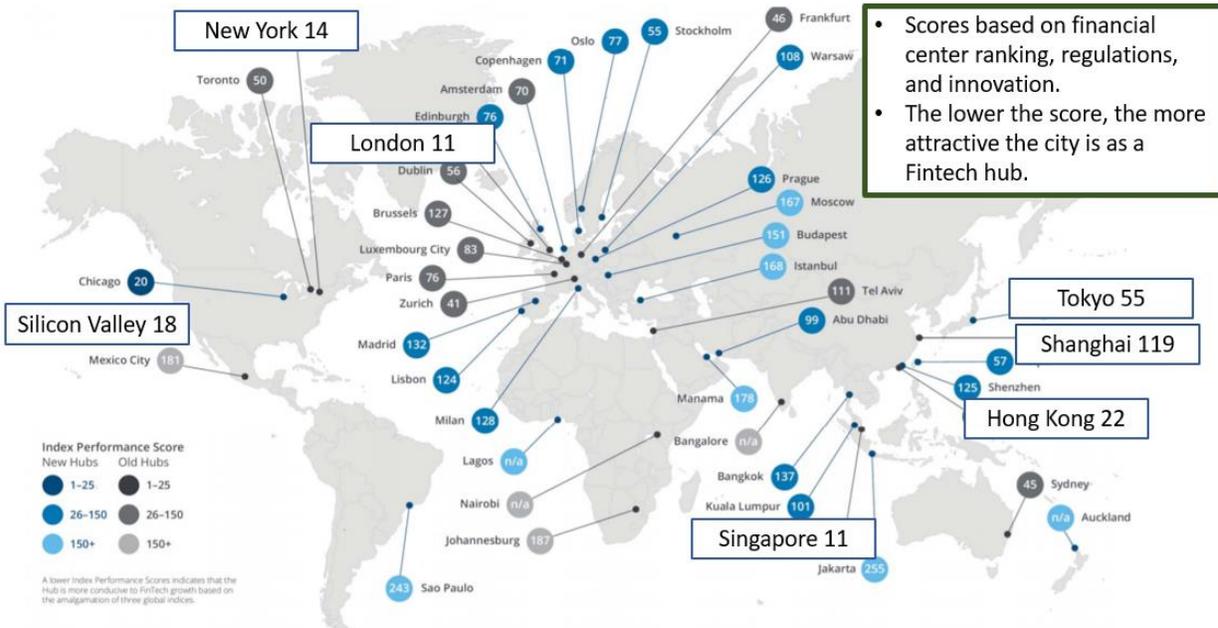
cointelegraph.com

source: Monex Crypto Bank, "Blockchain Data Book 2020"

Source: <https://cointelegraph.com/news/report-japanese-blockchain-sector-grows-over-30-since-2019>

Japan achieved a low score (55) on Deloitte’s Interim FinTech Hub Review. The low score is due to Japan’s current regulation, which are a barrier to investors, and the lack of innovation in the financial sector.<sup>314</sup> Japan is aware of these concerns for investors and is planning to lighten investment guidelines and policies to help Japan’s financial sector implement the latest financial technologies.<sup>315</sup>

**Deloitte connecting global Fintech: Interim hub review 2017**



(Source)Deloitte, "Connecting Global FinTech: Interim Hub Review 2017"

© 2017. For information, contact Deloitte Tohmatsu Consulting LLC.

Source: <https://www2.deloitte.com/tr/en/pages/finance/articles/a-tale-of-44-cities-global-fintech-hub-federation-gfhf-connecting-global-fintech-hub-report.html>

The report also states that 64% of the 430 companies primarily focus on cryptocurrency and blockchain-related business. Japan created a cryptocurrency exchange licensing framework in 2017,<sup>316</sup> and the number of exchanges has since increased to 23 FSA-registered cryptocurrency exchanges.<sup>317</sup>

## Singapore

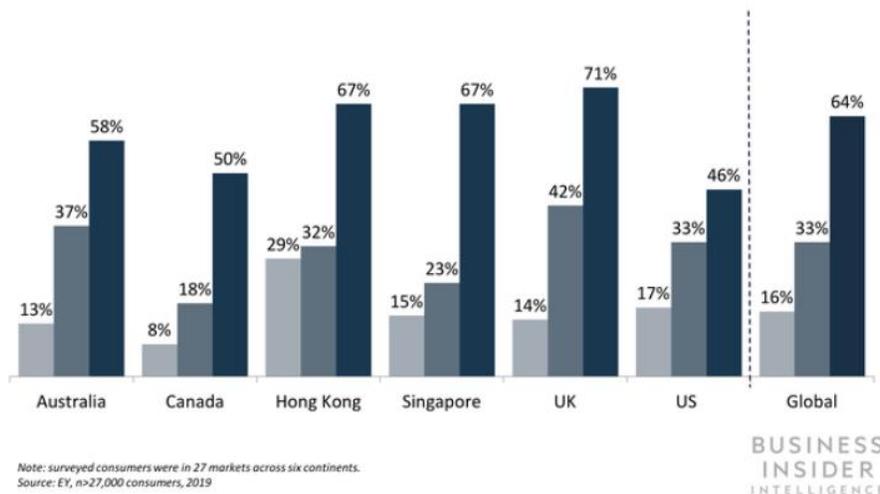
Singapore’s real GDP contracted 13.3% in Q2 2020 due to coronavirus restrictions but moderated to 5.8% in Q3 2020.<sup>318</sup> Singapore traditionally has a balance budget or surplus, but the government’s response to coronavirus pandemic increased spending to S\$93 billion (19% of GDP).<sup>319</sup> The government introduced four budget measures that offer economic, social, and public health support for households and varying levels of support for businesses, based on sector.

The **Unity** Budget (S\$6.4 billion) focused on emergency preparedness and public health management. The **Resilience and Solidarity** (S\$48 billion) Budget focused on assisting households, saving jobs, and helping businesses. The **Fortitude** Budget (S\$33 billion) provided additional help for workers and businesses.<sup>320</sup>

The Monetary Authority of Singapore (MAS) released a S\$125 million support package in Q1 2020 to help retain and enhance currency financial services and Fintech capabilities. The package consists of three developmental approaches to support workforce training, strengthen digitalization and operational resilience, and improve Fintech businesses’ access to digital platform and tools.<sup>321</sup>

Singapore is heavily invested in Fintech innovation and the S\$125 million packaged is in support of Singapore’s broader agenda to establish a Fintech ecosystem.<sup>322</sup> Fintech investments totaled S\$861 million in 2019, double that of 2018, due in part to government efforts to attract innovators and investors with low fees and sustained government initiatives.<sup>323</sup>

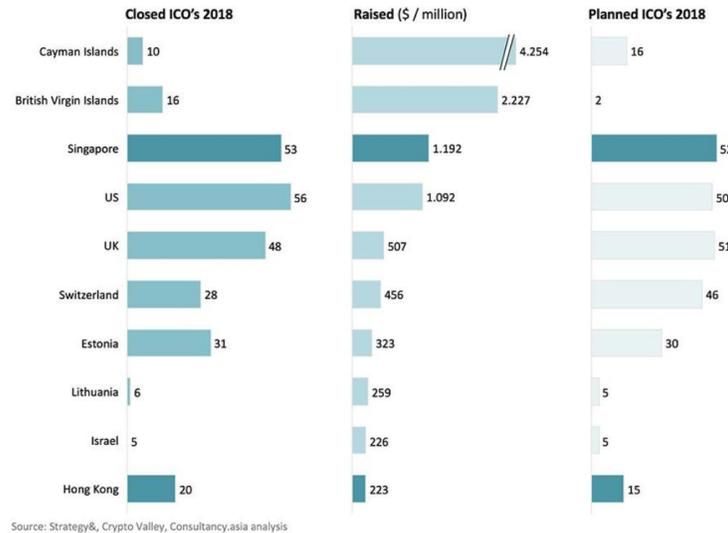
**Fintech adoption rates in select markets**



Source: <https://www.businessinsider.com/intuit-agrees-to-buy-credit-karma-for-7-billion-2020-2>

Singapore was ranked second for initial coin offerings (ICOs) in a 2018 global analysis by Consultancy.asia<sup>324</sup>

## Leading countries for ICOs



Source: <https://www.consultancy.asia/news/1402/singapore-and-hong-kong-are-leading-hubs-for-initial-coin-offerings>

A 2020 map released by OpenNodes<sup>325</sup> indicates that 234 blockchain businesses are operating in Singapore. The number of blockchain technology-related businesses has increased by 91 since 2019, further highlighting Singapore's efforts to establish a strong Fintech ecosystem.

## Singapore's blockchain landscape in 2020<sup>326</sup>

### SINGAPORE BLOCKCHAIN LANDSCAPE 2020



In Support of: SG-D, Co-Developed by: TRIBE, OpenNodes. DISCLAIMER: This is not meant to be an exhaustive list of the companies in Singapore's blockchain ecosystem. The appearance of a company does not reflect an endorsement by NBSG and/or the Singapore Government of the said company. (Last updated: Q2 2020)

Source: <https://opennodes.com/EcosystemMap2020.pdf>

## Australia

In March 2020, the Australian government released a A\$98 billion economic stimulus package for businesses and individuals impacted by the coronavirus pandemic. This includes A\$25 billion for coronavirus relief and A\$74 billion for the JobMaker Plan.<sup>327</sup> The government then responded with an additional stimulus of A\$130 billion for wage subsidies, totaling A\$327 billion between 2020 and 2023.<sup>328</sup>

The Australian deficit will reach A\$213.7 billion (11% of GDP) for fiscal year 2020–2021 but will moderate to A\$66.9 billion for fiscal year 2022–2023. Gross debt is estimated to grow to A\$872 billion (44.8% of GDP) for fiscal year 2020–2021, with net debt expected to peak at A\$966.2 billion (43.8% of GDP) for fiscal year 2023–2024.<sup>329</sup>

### Australian budget aggregates and major economic parameters

	Actual		Estimates			Total(b)
	2019–20	2020–21	2021–22	2022–23	2023–24	
<b>Underlying cash balance (\$b)(c)</b>	<b>-85.3</b>	<b>-213.7</b>	<b>-112</b>	<b>-87.9</b>	<b>-66.9</b>	<b>-480.5</b>
Per cent of GDP	-4.3	-11	-5.6	-4.2	-3	
Gross debt(d)	684.3	872	1,016.00	1,083.00	1,138.00	
Per cent of GDP	34.5	44.8	50.5	51.6	51.6	
<b>Net debt</b>	<b>491.2</b>	<b>703.2</b>	<b>812.1</b>	<b>899.8</b>	<b>966.2</b>	
Per cent of GDP	24.8	36.1	40.4	42.8	43.8	

b) Total is equal to the sum of amounts from 2020–21 to 2023–24.

c) Excludes net Future Fund earnings before 2020–21.

d) Gross debt measures the face value of Australian Government Securities (AGS) on issue.

Source: <https://budget.gov.au/2020-21/content/overview.htm>

The pandemic lockdown severely impacted Australia’s economic activity between December 2019 to June 2020, with GDP contracting around 7%. Australia’s fiscal year 2019–2020 GDP fell 0.3%, which ended a 28-year growth run for Australia.<sup>330</sup>

### Chain volume GDP and related measures

	Jun 19 to Sep 19	Sep 19 to Dec 19	Dec 19 to Mar 20	Mar 20 to Jun 20	Jun 20 to Sep	Sep 19 to Sep
Chain volume GDP and related measures (b)						
GDP	0.6	0.4	-0.3	-7	3.3	-3.8
GDP per capita (c)	0.2	-	-0.6	-7.2	3.2	-4.7
Gross value added market sector (d)	0.4	0.1	-0.6	-7.9	3.1	-5.5
Real net national disposable income	0.9	-0.5	-0.1	-7.4	4.8	-3.5

b. Reference year for chain volume measures and real income measures is 2018–19.

c. Population estimates are as published in the [National, state and territory population](#) (cat. no. 3101.0) and Australian Bureau of Statistics projections.

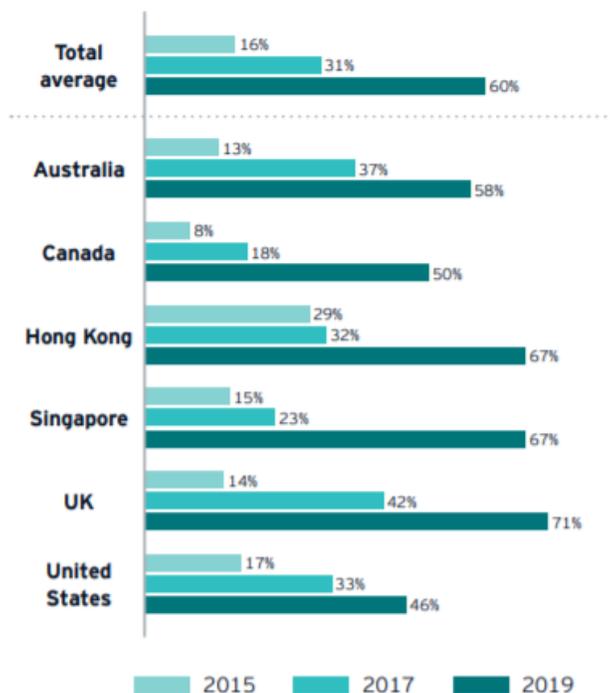
d. ANZSIC divisions A to N, R and S. See Glossary – Market sector.

Source: <https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-national-income-expenditure-and-product/latest-release>

The Australian government’s Digital Business Plan<sup>332</sup> provides a digital infrastructure package that will increase Australia’s GDP by A\$6.4 billion per year by 2024, including an additional projected A\$1.5 billion to regional Australia each year. This includes A\$28.5 million for 5G mobile network roll-out, A\$11.5 million for a new regulatory initiative to support digital technology firms, A\$9.6 million to support Fintech and attract investments in Fintech, and A\$6.9 million for blockchain pilots to reduce business compliance costs.

A 2020 report from KPMG<sup>333</sup> states that investment in the Australian Fintech sector reached A\$520 million in the first half of 2020 – a substantial increase from \$206 million in 2019. Australia has made a strong effort to be a global contender as a Fintech hub, with Fintech adoption increasing from 13% in 2017 to 58% in 2019.

**Comparison of Fintech adoption in six markets 2015–2019<sup>334</sup>**

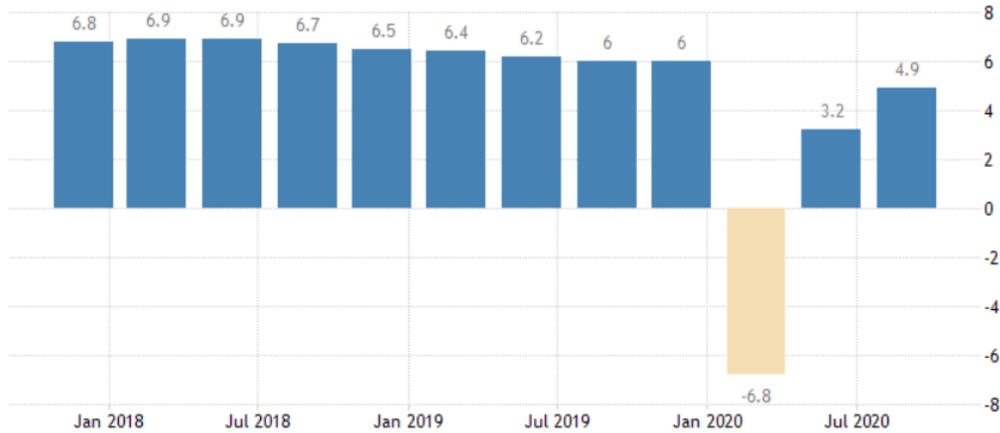


Source: [https://assets.ey.com/content/dam/ey-sites/ey-com/en\\_gl/topics/banking-and-capital-markets/ey-global-fintech-adoption-index.pdf](https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/banking-and-capital-markets/ey-global-fintech-adoption-index.pdf)

### China

China’s GDP contracted 6.8% in Q1 2020 due to pandemic measures, but rebounded to 3.2% in Q2, and 4.9% in Q3. China’s GDP is expected to grow to 8% in 2021.<sup>335</sup> China’s fiscal pandemic response totaled ¥4.8 trillion (\$729.6 billion) or 4.7% of GDP, which included coronavirus spread control, medical equipment, unemployment and tax relief, and public investment.

China’s quarterly real GDP growth rates (January 2018–July 2020)

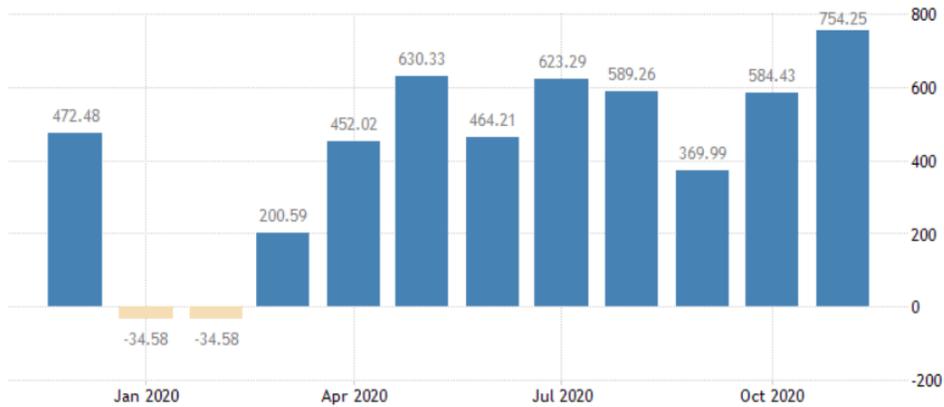


SOURCE: TRADINGECONOMICS.COM | NATIONAL BUREAU OF STATISTICS OF CHINA

Source: <https://tradingeconomics.com/china/gdp-growth-annual>

China’s trade surplus was impacted by the pandemic, with a loss of ¥223 billion (US\$34 billion) in Q1 2020. However, the trade surplus surged to ¥355 billion (US\$54 billion) by Q3 2020, with exports increasing 11.4%.

China’s balance of trade (January 2020–October 2020)

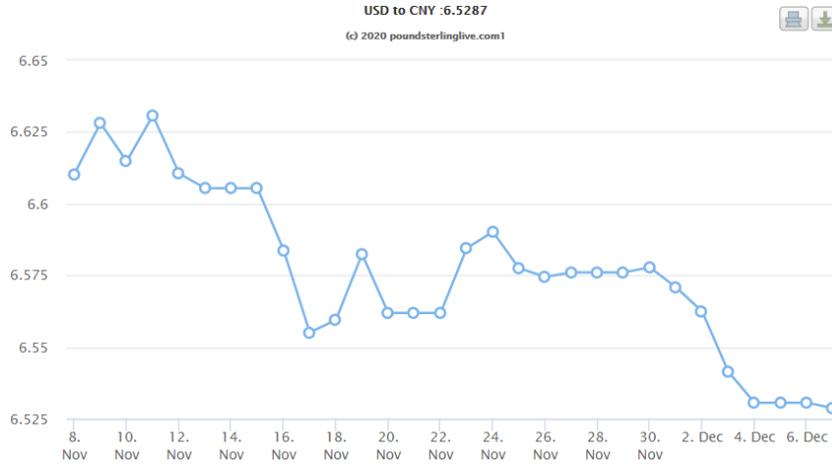


SOURCE: TRADINGECONOMICS.COM | GENERAL ADMINISTRATION OF CUSTOMS

Source: <https://tradingeconomics.com/china/balance-of-trade>

The yuan has strengthened against the weakening US dollar with levels between 6.6 in November 2020 and 6.5 in December 2020, firming up Chinese exports.

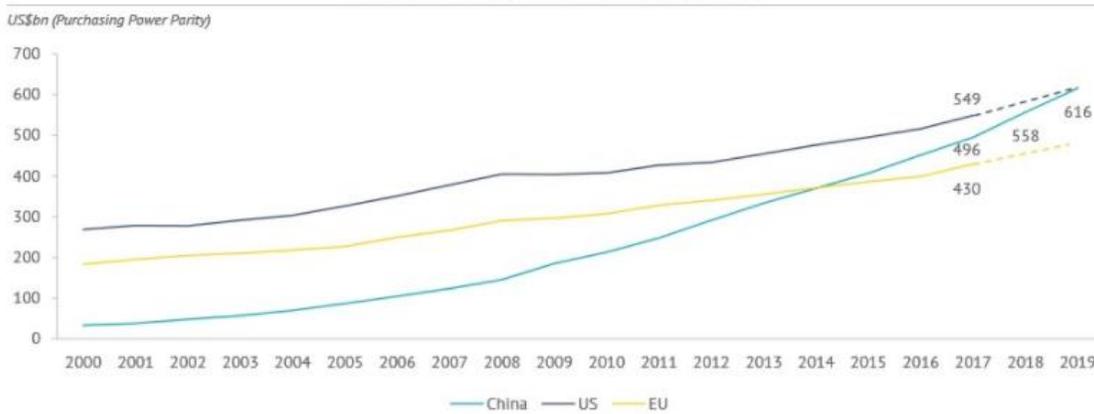
**Yuan–US dollar performance (November 2020–December 2020)**



Source: <https://www.poundsterlinglive.com/best-exchange-rates/best-us-dollar-to-chinese-yuan-history>

Fintech investment in China dropped from ¥167 billion (US\$25.5 million) in 2018 to ¥12.5 billion (US\$1.9 million) in 2019,<sup>338</sup> but a Chinese government statement<sup>339</sup> relating to the inclusion of blockchain technology research in its future strategic vision has spurred future investment.

**Gross domestic expenditure on R&D: China, US EU (January 2000–January 2019)**



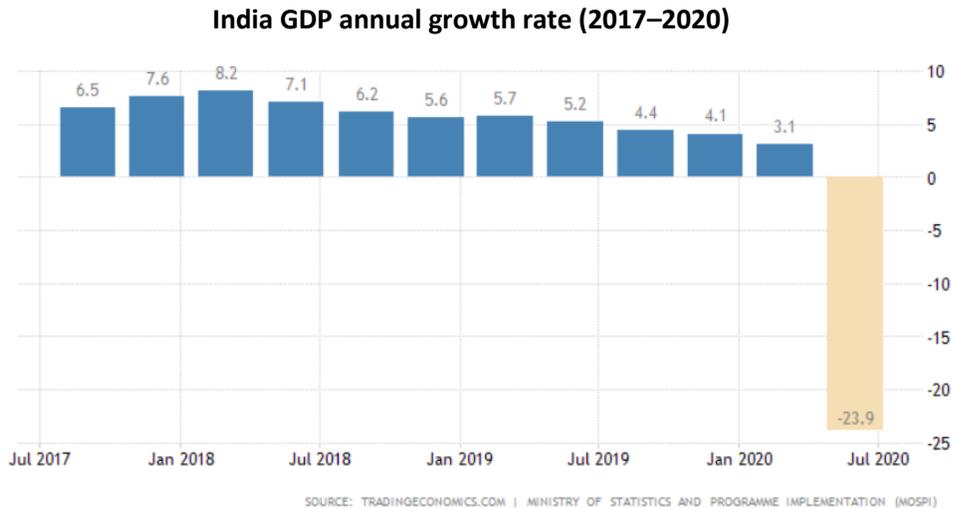
Source: SCMP Analysis, National Science Foundation

Source: SCMP Analysis, National Science Foundation; <https://as-pacific.com/assets/presentations/China-Internet-Report-2020.pdf>

China’s investment in blockchain technology is 22% of all investments worldwide and has the most blockchain-related patents of any country.<sup>340</sup>

## India

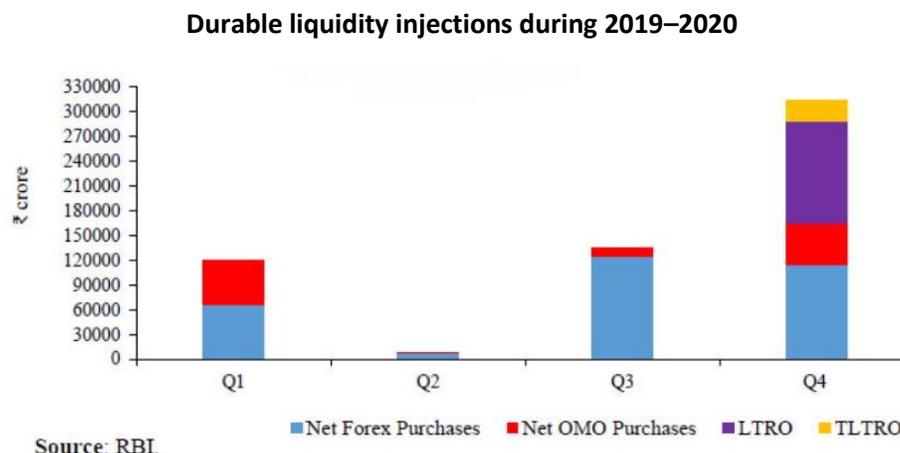
India's GDP contracted 23.9% in Q2 2020 due to the government's response to the global pandemic.<sup>347</sup>



Source: TRADINGECONOMICS.COM; Ministry of Statistics and Programme Implementation (MOSPI); <https://tradingeconomics.com/india/gdp-growth-annual>

The government's 2020 fiscal response to the coronavirus pandemic included an increase in government spending, deferred revenues, expedited spending, provided credit, and provisional measures to support business, which totaled ₹20 trillion (US\$260 billion) or 10% of GDP.<sup>348</sup>

The government's 2020 monetary response, due to the pandemic, included liquidity-enhancing measures comprising of long-term repo operations, a cash reserve ratio cut, and an increase in the statutory liquidity ratio, totaling 5.9% of GDP.<sup>349</sup>

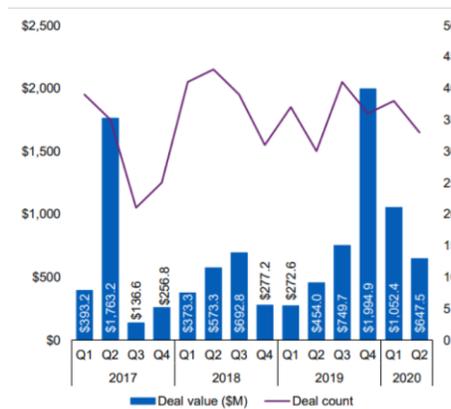


Source: Reserve Bank of India; [https://www.rbi.org.in/scripts/BS\\_ViewBulletin.aspx?Id=18878#C429](https://www.rbi.org.in/scripts/BS_ViewBulletin.aspx?Id=18878#C429)

Even though the coronavirus pandemic has greatly impacted India’s economy, investment in Fintech has continued to rise. Fintech start-ups in India received ₹\$ 117 billion (US\$1.6 billion) in 2020. This was an increase in the 2019 total investment of ₹\$53 billion (US\$726 million).

Fintech deals in Q1 2020 totaled ₹73 billion (US\$1 billion) and Q2 2020 totaled ₹47 billion (US\$647 million). This is up from ₹\$33 billion (US\$454 million) in 2019.<sup>350</sup>

### Total investment activity in India (venture capital, private equity, merger & acquisitions) (2017–2020)



Source: KPMG

Source: KPMG; <https://dazeinfo.com/2020/09/03/fintech-startup-investments-in-india-1-7-billion-h1-2020/>

Venture capital investors are still looking at India for long-term investments with the expectation that India’s regulatory agencies will develop a framework for a future cryptocurrency and with blockchain solutions.

### Key players in India’s blockchain ecosystem (2020)



Source: Medium.com; <https://medium.com/@sid.jain/the-race-to-a-billion-users-investing-in-the-indian-blockchain-ecosystem-b375a4d1893a>; Credit: Nirbhik Jangid

### 4.6 Enforcement

#### **European Union**

The European Commission released the European Union (EU) Security Union Strategy,<sup>136</sup> which supports “the development of expertise and a legislative framework in emerging risks, such as cryptoassets and new payment systems.” The Commission furthered its statement on “the emergence of cryptoassets” and the impact “new technologies will have on how financial assets are issued, exchanged, shared and accessed.”

The European Commission released the legislation relevant to ‘Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on Markets in Crypto-assets, and amending Directive (EU) 2019/1937’<sup>137</sup> to support the EU Security Union Strategy to develop a legislative framework for cryptoassets. The proposed legislation “is part of a broader framework on cryptoassets and distributed ledger technology (DLT), as it is accompanied by proposals ensuring that existing legislation does not present obstacles to the uptake of new technologies while still reaching the relevant regulatory objectives.”

Concerning blockchain technology, the EU Security Union Strategy states that the “Commission will support an enhanced and coordinated approach when building international standards, defining best practices, process, and technical interoperability in key technological areas such as AI, internet of things or blockchain technologies.”

The European Parliament released a report in 2020,<sup>138</sup> *Crypto-assets: Key development, regulatory concerns, and responses* which presents key findings and policy recommendations on cryptoassets in Europe. The report states that the “current anti-money laundering (AML) and combating the financing of terrorism (CFT) framework, AMLD5, already lags behind the current reality in the cryptocurrency industry and is not fully equipped for the fight against money laundering and terrorism financing.”

The report’s recommendations include:

- Ongoing vigilance of European central bank digital currency research and experiments
- Update the AMLD5 framework to current reality in the cryptocurrency industry
- Put adequate mechanisms in place for consumer and investor protection, cybersecurity, requirements for custodial services, and coin blacklisting
- Develop an investigative toolbox for law enforcement agencies.

The EU created a consortium of 15 partner countries called ‘Project Titanium’<sup>139</sup> to assist “law enforcement agencies in Europe to investigate and mitigate crime and terrorism that involves virtual currencies and underground market transactions.”

### ***Middle East and Africa***

The Middle East and Africa do not have established cryptocurrency or blockchain-related enforcement legislation separate from existing anti-money laundering and combating the financing of terrorism (AML/CFT) laws.

### ***Russian Federation***

Russia's 2020 cryptocurrency bills will make it illegal for Russian citizens to buy Bitcoin with cash and transfer Bitcoin to Russian bank accounts. Individuals face fines of up to ₺532,000 (US\$7,000) and up to seven years in prison. Businesses providing cryptocurrency services without approval from the Russian Central Bank face fines of up to ₺2 million (US\$28,000). Individuals receiving cryptocurrency payments for services face a fine up to ₺200,000 (US\$2,800) and businesses up to ₺1 million (US\$13,900).<sup>365</sup>

The 2020 Russian bills propose to define cryptocurrency in legal terms (digital assets), so the government has legal grounds to confiscate cryptocurrency. This will also enable the Russian Central Bank to access private keys held on cryptocurrency exchanges.<sup>366</sup>

### ***United States***

Traditionally, cryptocurrencies have been a law enforcement concern as they have been used in money laundering schemes; however, cryptocurrencies have never been a national security threat. In a July 2019 *Fortune* article, US Treasury Department stated, "cryptocurrencies posed a national security threat because they can be used to fund illicit activities" and "serious concerns about the national security implications of Facebook's coin and other virtual currencies."

In a February 2020 statement,<sup>214</sup> the US Treasury Department noted that cryptocurrencies and digital assets are a "crucial area," and the US Treasury Department is spending a lot of time on the issue of cryptocurrencies and digital payment systems. The US Treasury Department said, "The Treasury is focused on three key areas: pure cryptocurrencies, stablecoins and central bank digital currencies."

For this reason, the US Treasury Department added, "We are working with FinCEN and we will be rolling out new regulations to be very clear on greater transparency so that law enforcement can see where the money is going and that this isn't used for money laundering."

The Countering America's Adversaries Through Sanctions Act (H.R. 3364) establishes the importance of developing a "national strategy" to "analyze emerging illicit finance threats" and to discuss the "data regarding trends in illicit finance, including evolving forms of value transfer such as so-called cryptocurrencies, other methods that are computer, telecommunications, or Internet-based, cybercrime, or any other threats that the Secretary may choose to identify."

The US Department of Justice released the Cryptocurrency Enforcement Framework,<sup>215</sup> which defines a legal and regulatory framework for the US to address "illicit uses of cryptocurrencies," which include criminal financial transactions, money laundering, transaction shielding and cryptocurrency theft in the marketplace. The interagency regulatory and enforcement framework includes US agencies that will "enforce federal law in both its civil and criminal aspects" in "the Department of Justice, the Securities

and Exchange Commission, the Commodity Futures Trading Commission, and the US Department of the Treasury (including FinCEN, OFAC, and the IRS).”

### **Canada**

Canada’s financial intelligence unit, the Financial Transactions and Reports Analysis Centre of Canada (FINTRAC), released updated recommendations on cryptocurrencies and transactions as part of its response to the FATF’s revised rules on wire transfer (R.16<sup>216</sup>) to address money laundering and terrorist financing.

### **Latin America**

Latin America does not have a legal or enforcement framework in place. Unfortunately, Latin America was listed as a top region for money laundering in a 2019 report<sup>217</sup> by the cybersecurity group Intights. The report also commented, “organized crime groups and drug cartels in Latin America are taking advantage of technological advances in digital banking and money transfers” and continue to use digital transfers to “feed into dark web markets and into the cybercrime ecosystem.”

### **Caribbean**

Cryptocurrency regulation has been drafted in a few countries, but enforcement and compliance guidance has not yet been established.

### **Japan**

Cryptocurrency-related amendments to the Payment Services Act (PSA Japan) and the Financial Instruments and Exchange Act (FIEA) came into effect on 1 May 2020 for cryptocurrency assets and cryptocurrency exchanges in Japan.<sup>351</sup> The PSA Japan requires a more stringent investigation of exchanges’ anti-money laundering (AML) and know your customer (KYC) procedures, and compliance with the Financial Action Task Force (FATF) recommendation 16 on international anti-money laundering (AML) and combating the financing of terrorism (CFT) measures concerning wire transfers. The PSA Japan and FIEA redefined ‘virtual currencies’ as ‘cryptoassets’, which will have a direct enforcement impact on initial coin offerings (ICOs), security token offerings (STOs), and the digital asset derivatives markets.<sup>352</sup>

It is important to note that Japan’s Financial Services Authority (FSA) makes a distinction between ‘coin-based’ cryptocurrency, such as Bitcoin, and tokens issued for ICOs or STOs. Under FIEA, ICOs, and STOs are identified as “electronically recorded transferable rights” (ERTRs) and are not considered virtual currency or cryptoassets. ETRTs are issued cryptocurrency tokens with expectation for profit.<sup>353</sup>

Cryptocurrency-related businesses that violate the PSA Japan or FIEA are subject to fines or imprisonment, including termination orders from the FSA.<sup>354</sup>

### **Singapore**

The Monetary Authority of Singapore (MAS) announced the commencement of the revised Payment Service Act (PSA Singapore) in January 2020. The PSA Singapore enforces new regulation on digital payment token services and strengthens consumer protection.<sup>355</sup> PSA Singapore establishes two regulatory enforcement schemes – designation guidance and license guidance. Designation guidance

outlines rules for payment systems that play a critical or systemic role in Singapore's financial system. License guidance offers details on how businesses can obtain a license to offer payment services in Singapore.<sup>356</sup>

In June 2020, Singapore law enforcement arrested an individual under the PSA Singapore for selling cryptocurrency as an unlicensed digital payment token (DPT) service provider. The individual was fined \$88,000 and sentenced to three years in prison for operating unlicensed DPT services.<sup>357</sup>

### ***Australia***

The Australian Transaction Reports and Analysis Centre (AUSTRAC) released in 2018 AML/CFT guidelines<sup>358</sup> for digital currency exchange businesses licensed to operate in Australia. The guidelines require cryptocurrency exchanges to adopt and maintain an AML/CFT program to identify money laundering and any suspicious transactions.<sup>359</sup>

Three Australian cryptocurrency exchanges have selected a third-party blockchain analysis company to assist them with identifying high-risk activity, enhance consumer protection and ensure AML/CFT compliance with the AUSTRAC AML/CFT guidelines.<sup>360</sup>

In November 2019, Australian law enforcement, in collaboration with AUSTRAC, investigated unregistered cryptocurrency transactions from a cryptocurrency ATM. Two of the offenses in the AUSTRAC guidelines include operating an unregistered digital currency exchange (DCE) and continuing digital currency transactions after a cease and desist notice had been received.<sup>361</sup>

### ***China***

The National Internet Finance Association of China (NIFA) has issued notices on the risks of cryptocurrencies, initial coin offerings (ICOs), and small loans. The NIFA, along with China's exchange regulator, has raised anti-money laundering/combating the financing of terrorism (AML/CFT) concerns about illegal crypto over-the-counter (OTC) trades<sup>362</sup> and casino transactions.<sup>363</sup> Chinese law enforcement has stopped crypto trading from OTC exchanges but has not officially charged any individuals. The ability to trace and monitor cryptocurrency transactions from OTC exchanges and casinos remains difficult.<sup>364</sup>

### ***India***

India's regulatory agencies are still working through a cryptocurrency framework and discussing if cryptocurrencies should be banned outright or regulated. Enforcing a cryptocurrency ban will be difficult for India's regulators given the widely disbursed crypto holders and the decentralized nature of the cryptocurrency networks. Regulating cryptocurrency will give Indian regulators a framework to govern, tax, track, and enforce cryptocurrency laws.<sup>367</sup>

### 4.7 Taxation

#### **European Union**

In May 2001, the European Commission released a tax strategy<sup>140</sup> for the EU's future taxation policy, stating “while a large measure of harmonization is necessary in the Value Added Tax (VAT) and excise fields, in other tax fields tax co-ordination does not imply tax harmonization.” For this reason, it is necessary for each country to issue guidance on the legality of cryptocurrencies and cryptocurrency transactions. It is correct to assume taxation in Europe can be divided into two categories:

- Individuals who hold or trade cryptocurrencies
- Businesses that provide cryptocurrency services such as exchanges.

The Value Added Tax (VAT) is a broad-based tax that encompasses the production and distribution of goods and services to the consumer and not the business. Cryptocurrencies are usually taxed as capital gains or income tax and are only taxed as VAT if converted to government established money (fiat).<sup>141</sup>

HM Revenue and Customs (HMRC) would expect that the buying and selling of cryptoassets by an individual will normally amount to investment activity (rather than a trade of dealing in cryptoassets). In such cases, if an individual invests in cryptoassets, they will typically have to pay capital gains tax (CGT) on any gains they realize. Cryptoassets are digital and therefore intangible, but count as a ‘chargeable asset’ for CGT if they are both:

- Capable of being owned
- Have a value that can be realized. Individuals need to calculate their gain or loss when they dispose of their cryptoassets to determine whether they need to pay CGT.<sup>142</sup>

Croatian Tax Administration has issued a few opinions about the tax treatment of cryptocurrencies with reference to the judgment of the European Court of Justice (ECJ) (C-264/14, on 22 October 2015). The judgment concerns transactions performed by an exchange office; this is one way by which a natural or legal person can become the owner of a cryptocurrency by exchanging some of the so-called fiat currencies for Bitcoins or other cryptocurrencies on various web portals offering such a service. In addition, crypto or virtual currency can be purchased or exchanged for one of the fiat currencies on specialized ATMs.

According to the European Court of Justice (ECJ) judgment, cryptocurrencies trading in Croatia are considered a financial transaction, and the income generated by the sale of cryptocurrencies is subject to personal income tax based on capital gains, since it is the gain of the sale of that currency, which is an equivalent to money market instruments. Income is determined as the difference between the purchasing price (i.e. the value of the cryptocurrency when purchased by the taxpayer, measuring in one of the fiat currencies, for example USD, euro or kuna) and the selling price (i.e. the value at which the cryptocurrency was sold by the same taxpayer, measured by the same fiat currency), less any potential trading costs (e.g. entry and exit fees paid to the online trading platform).

This means that the purchase or acquisition of a cryptocurrency itself (or its holding in an e-wallet) does not entail any tax liability, which only arises after the cryptocurrency is sold. Income from sold

cryptocurrency is considered capital gains and have not been alienated two years from the day of procurement, that is, acquisition of those assets. It is possible to replace one cryptocurrency for another (e.g. Bitcoin is replaced with Ethereum); however, in this case no taxable income is determined.

A similar example exists in France. France will tax cryptocurrency gains when they are converted into ‘traditional’ currency, but crypto-to-crypto transactions remain tax exempt.<sup>143</sup> VAT is to be applied to cryptocurrency transactions only when they are used to acquire an asset or a service.<sup>144</sup>

Slovenia treats cryptocurrencies as virtual currencies, meaning that they are neither financial instruments nor monetary assets. The income obtained by individuals in the form of Bitcoin and other virtual currencies (e.g. employment income) is subject to personal income tax. The taxable value of such income is calculated based on the exchange rate between the virtual currency and euro on the date of receipt. The same strategy is used in taxing individual income resulting from mining cryptocurrencies. The profit received by individuals from trading Bitcoin (because of fluctuation in the cryptocurrency market) is not subject to any income taxation.<sup>145</sup>

In Denmark, with regards to the taxation of Bitcoin, the distinction is made between trading with Bitcoin as the means of payment and trading with a view to achieving a profit, that is, whether buying and selling the cryptocurrency was an investment. If Bitcoin is used as payment for a product or service, taxation on any profit achieved is irrelevant. The situation differs if it is an investment; that is, if the cryptocurrency is purchased with the intention of selling it to make a profit, which is reported as personal income. Similarly, a loss can be claimed as a deduction.<sup>146</sup>

In Poland, for individual income tax purposes, revenue derived from the cryptocurrency transactions is treated as a capital gain, even if a taxpayer obtains the revenue within a business activity. Exchanges of one form of cryptocurrency for another cryptocurrency would be “tax neutral” regardless of the exchange method (i.e., on the market, in an exchange office or within an individual exchange).<sup>147</sup>

Romania has amended its tax laws, allowing it to start taxing gains from Bitcoin investments at a rate of 10 percent. The amended fiscal code legislation categorizes earnings generated from buying and selling cryptocurrencies as “income from other sources” and therefore is subject to income tax.<sup>148</sup>

### ***Middle East***

The Middle East has not issued any tax guidance<sup>149</sup> on cryptocurrencies; however, certain regions have implemented a VAT system, but it is unknown if cryptocurrencies will be defined as ‘goods’ or ‘services’,<sup>150</sup> following the traditional VAT policies.

### ***Africa***

The Nigeria Federal Inland Revenue Service (FIRS) treats cryptocurrency as property and taxes currency based on the amount of gross income gained from cryptocurrency.

In Uganda, cryptocurrencies are considered digital assets and are designed as a medium of exchange and are taxed during the transfer of assets. The types of taxes that are applied to cryptocurrencies include, income and capital gains tax, withholding tax, value added tax, and stamp duty tax.

The South African Revenue Service (SARS) defines ‘cryptocurrency’ as an intangible asset that is not considered legal tender or money.<sup>151</sup> Cryptocurrencies are subject to income tax and CGT if a person or business is providing cryptocurrency services, converting to fiat, or using cryptocurrency as a payment for goods or services.

### Russia<sup>372</sup>

Russia has a general ban on virtual currencies and/or any transaction involving virtual currencies. The ban prohibits the purchase and sale of virtual currencies, and commonly prohibit its use as means of payment.

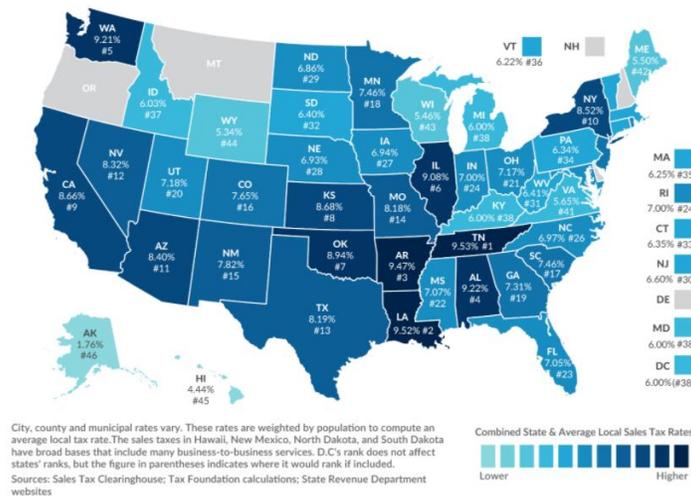
### United States

In the US, the Internal Revenue Service (IRS) has issued federal tax guidance<sup>218</sup> concerning cryptocurrency; however, most of the states have not issued any tax guidance<sup>219</sup> on cryptocurrency. Many states may choose to apply their own local digital transaction<sup>220</sup> laws concerning cryptocurrency over federal law. The IRS classified [virtual currencies as property](#) for federal tax purposes. Cryptocurrency gains are considered investment income, cryptocurrency-to-cryptocurrency trades are considered capital gains income, coins received from mining are gross income, and cryptocurrency received for services is taxable income.

Concerning short and long-term capital gains,<sup>221</sup> the IRS states, “If you held the virtual currency for one year or less before selling or exchanging the virtual currency, then you will have a short-term capital gain or loss. If you held the virtual currency for more than one year before selling or exchanging it, then you will have a long-term capital gain or loss.”

There is no standardized sales tax in the US with many states setting their tax rate based on economic conditions in their state.

**Combined state and local sales tax rates (2020)**



Source: <https://taxfoundation.org/2020-sales-taxes/>

### **Canada**

In Canada, cryptocurrency<sup>222</sup> is taxed like other capital gains made on investments, at 50%.<sup>223</sup> Individuals are required to keep records of all transactions when using cryptocurrency to buy goods, services, or other cryptocurrency, to properly report any capital gains. Moving cryptocurrency from wallet to wallet or the increase in cryptocurrency price is not a taxable event. Cryptocurrency tax is only applied when cryptocurrency is bought, sold, or exchanged for goods or services.

### **Latin America**

Even though there is no uniformity in Latin America concerning cryptocurrency tax, most of Latin America defines 'cryptocurrency' as an asset for tax purposes:

- Chile, for example, considers any cryptocurrency as “a digital or virtual asset”; Colombia as an “immaterial good”; Peru as a “movable asset,” while in Argentina, there is currently no official definition. This highlights many uncertainties on when cryptocurrency taxes should be paid. In Peru, the authorities expect that people pay taxes on cryptocurrency when they receive payments in cryptocurrencies as a product of the recipient’s profession.<sup>224</sup> In Chile, cryptocurrencies are seen as “intangible assets” and are not subject to Value Added Tax (VAT). Cryptocurrency-related earnings are considered part of total annual income for Chilean taxpayers. In Chile, income taxes are paid annually, in April.<sup>225</sup>
- In Colombia, it is illegal to use Bitcoins or any other cryptocurrency for any transaction, since it is a currency that is not issued and controlled by a government or authorized entity.<sup>226</sup> Cryptocurrencies are considered personal property and are not subject to VAT.<sup>227</sup>

Brazilian tax law has no specific policy concerning the taxation of cryptocurrency operations, so transactions involving virtual currencies are currently subject to the same taxation as transactions for different classes of assets. The taxation will follow the set guidelines: (1) the revenue obtained with the settlement in cryptocurrency should be regularly taxed; (2) an entity that settles an obligation with the use of cryptocurrencies should withhold the applicable taxes; and (3) the capital gains earned with the sale of cryptocurrency should also be taxed.<sup>228</sup>

### **Caribbean**

Cryptocurrency regulation has been drafted in a few countries, but cryptocurrency taxation is still in its infancy in the Caribbean. Even though Antigua and Barbuda’s will start accepting cryptocurrency payments, residents and citizens will not pay cryptocurrency tax.

### **Japan**

According to Japanese regulation, cryptocurrency trading, mining, lending, and other income is classified as miscellaneous income, and subject to a tax rate of up to 55%. Japan’s tax on stock profits is a flat 20%, while crypto gains are very highly taxed, dissuading individuals and companies from properly reporting crypto gains on their tax returns. However, non-residents are taxed at a flat rate of 20% on all income, that is, stock profits and crypto gains which they need to pay upon leaving Japan. Tax rates vary depending on how much is earned in the previous year. One could owe significantly less than the 55% maximum tax rate on their cryptocurrency gains.

### **Australia<sup>368</sup>**

The purchase of goods and services with virtual currencies is not considered a taxable barter event. Exchanges of virtual currencies and/or fiat currency are exempt from Goods and Services Tax (GST) as financial services. Virtual currencies received as payment by individuals or businesses are taxable as income at the time of receipt. As are virtual currencies received in payment for services are taxable as ordinary income at the time they are received. Virtual currencies received as a payment for services are caveated based on whether the payment was paid under a salary package or pay as you go agreement.

In addition, tax treatment will vary whether you are transacting as an individual or as a business:

- Individuals are taxed on their gains from the disposal of the asset. The personal use exemption will not apply if the asset was held for investment purposes. However, individuals may qualify for a capital gains tax discount if the asset was held for longer than a year prior to disposal. Losses are ring-fenced to future capital gains and cannot be applied against future income.
- If a person carries on a business that involves transacting with cryptoassets (whether trading, mining, or exchange), the trading stock rules apply rather than the capital gains tax rules. Under these rules, the total proceeds from the sale of the cryptoasset are treated as ordinary income and the cost of acquiring the assets held as trading stock is deductible.

### **Singapore<sup>369</sup>**

Starting in January 2020, supplies of digital payment tokens are no longer be subject to Goods and Services Tax (GST). GST does not apply to digital payment tokens used for payment of goods or services or in exchange for fiat money or cryptocurrency. The supply of goods and services made in exchange for virtual currencies remains taxable. The transfer of non-fungible tokens such as those that represent ownership rights to specific property, for example intellectual property and artwork will remain a taxable supply of services as such tokens are not fully interchangeable for use as consideration. As the supplies of services by intermediaries also remain taxable, so too does a mining service.

### **China**

China has several restrictions on the exchange or use of cryptoassets with a ban on commercial trading platforms. These bans could apply only to local trading platforms or apply to all trading platforms.<sup>370</sup>

Trading of virtual currency, exchange of virtual currency and mining are subject to profits tax in Hong Kong.<sup>371</sup>

### **India<sup>373</sup>**

India does not have clear regulation or guidance on virtual currency which has created uncertainty about the actual legal status of virtual currencies. India had previously banned or restricted the use of virtual currencies but has since lessened regulations and is moving towards allowing the use of virtual currencies in the economy.

## 5 Recommendations

### 5.1 Regulation

The super-inflationary trajectory of sovereign currencies is a precursor to the inevitable migration to decentralized public currencies that cannot be diluted by central authorities.

Regulation today relies heavily on financial institutions and exchanges. While that works for now, it may not be adequate when people begin utilizing blockchain technology more broadly. It is likely that regulators will require new skillsets and systems in their organizations in order to effectively perform their roles as the financial system evolves.

New frameworks and paradigms must be created that give governments the capability to govern in a world where transactions are peer to peer.

### 5.2 Ethics

Many governments try to 'right' previous 'wrongs' by some application of social engineering. It is done by using the tax code to redistribute wealth from the rich to the poor. Governments set ethical rules related to ethnic and racial equality and a whole host of other methods to achieve 'ethical' outcomes.

Is it ethical to make decisions purely on data? Would financing be provided to only people with the data to know they could pay it back? Decentralized currencies do not care about race, ethnicity, religion, gender, or sexual preference.

We must consider the ethical implications of what it would look like to have currency systems that do not discriminate. Does this impact our definition of ethical systems?

As we consider new paradigms for financial systems, we should consider the ethical impacts of decentralized currency systems. There are core foundational ethical principles that need to be upheld when designing and deploying cryptocurrency exchanges or cryptocurrencies such as beneficence, nonmaleficence, justice and autonomy. It is important that governments try to harmonize legislation and frameworks with key issues in digital ethics such as trust, transparency, self-sovereignty, and privacy.

### 5.3 Privacy

As the cryptocurrency ecosystem matures, there will be more and more options for cryptocurrencies that do not include any personal identifiable information. People will have the choice to use central bank digital currencies (CBDCs) with full AML/KYC or simply opt out with peer-to-peer anonymized currencies.

The problem of privacy will eventually go away as people who are concerned about privacy will simply choose not to use currencies that require them to surrender their private information.

### 5.4 Jurisdictions

The question of jurisdiction is much more profound than disputes between geographically dispersed government. The real question will revolve around who has sovereignty over currencies. Historically

currencies have been created and managed by governments. However, we are entering a time in history when that is not necessarily true anymore.

We have watched the assimilation of European national currencies into a regional currency. We will soon observe the adoption of globally recognized currencies like Bitcoin and other global currencies.

Governments will need to re-tool government financial systems to use cryptocurrency. This is a huge impact. It will impact every government entity in the world.

### 5.5 Economy

As there is more and more adoption of cryptocurrencies and blockchain there could be a fall in demand for national sovereign currencies. Whilst there is no certainty on future outcomes with regards to the impact of blockchain on economies this is definitely an area to pay close attention to.

Could we be in a position in the future where governments look at holding strategic cryptocurrency reserves in addition to traditional commodities like oil and gold? Should this turn of events come to pass there will need to be considerably higher sophistication within government treasury departments to manage increasingly complex and diverse asset reserve.

In addition to the potential treasury impact, we could see severe impacts to government budgets if cryptocurrency continues its current trajectory. If there is a mass shift of wealth from national sovereign currencies into bitcoin the ability for governments to print money as a funding source will be severely impacted. This eventuality could force governments to live within their means should they no longer have elastic sources of funds.

Governments should prepare now by developing systems and processes that allow them to keep operating in a world where they may not have the ability to print sovereign currency as a lever.

### 5.6 Enforcement

When law enforcement professionals investigate crimes, they often rely on the technique of following the money. However, should blockchain technology lead to governments losing their ability to effectively monitor traditional regulated financial institutions, they will need to rely on other tools to enforce laws. Artificial intelligence, and a variety of surveillance tools must replace traditional financial reporting systems.

Law enforcement professionals will need to integrate data analysis and cooperate at entirely new levels. Local, state, national, and international law enforcement entities will need seamless data sharing and analytical cooperation to replace the dependency on regulated institutions.

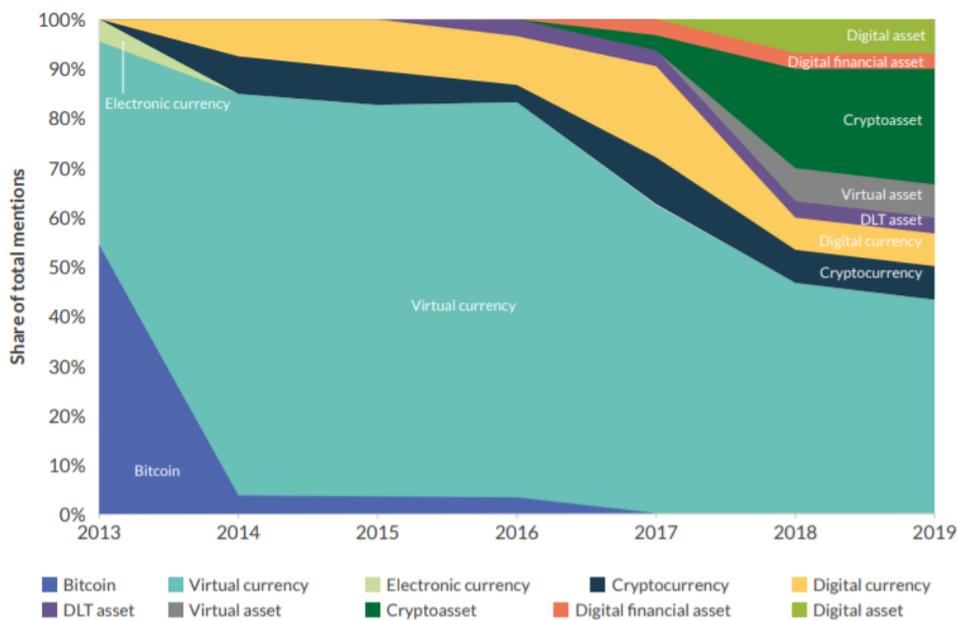
### 5.7 Taxation

Governments typically rely on centralized institutions to report financial transactions. This data is used to support taxation rules based on economic transactions. However, as more people use peer-to-peer currencies and work becomes more fractionalized such as offering bounties for testing and decentralized autonomous organization, governments should start to develop funding models based on tariffs and fees

for services. Government revenue will need to be collected on activities that can be physically confirmed without reliance on regulated institutions.

There is a lot of definitions of Bitcoin and crypto (or virtual) currency in general on the internet, but from a legal point of view when we are talking about taxation, there is still not a uniform tax approach.

**Evolution of the terminology used by regulators (2013–2019)**



Note: This chart is based on terminology used by regulators from the 23 selected jurisdictions, as well as selected international organizations (e.g. FATF, FSB).

Source: OECD; Cambridge Centre for Alternative Finance (2019), Global Cryptoasset Regulatory Landscape

There is a lack of uniform guidance from governing bodies around the world concerning cryptocurrency sales, use, and taxation. Taxpayers must work through current and disconnected local and government cryptocurrency taxation laws, adding uncertainty.

**Examples of definitions of virtual currencies for tax purposes**

Intangible assets other than good will	Financial instrument or asset	Commodity or virtual commodity	Currency	Legal payment method	Not specified
Australia, France, Chile, Czech Republic, Luxembourg, Nigeria, Spain, Sweden Switzerland** and the United Kingdom	Argentina,* Brazil, Croatia, Denmark, Israel, Japan, Slovak Republic and South Africa	Austria, Canada, China and Indonesia	Belgium, Cote d'Ivoire, Italy and Poland	Japan	United States

\* Note from Argentina: There is no clear definition. However, for income tax purposes, virtual currencies are mentioned along with some financial instruments or assets.

\*\* Note from Switzerland: Apart from companies that trade in virtual currencies. Those companies account for virtual currencies under inventories.

Source: OECD tax treatments and emerging tax policy issues questionnaire responses and country guidance documents 2020

Cryptocurrency is variously treated by the surveyed countries as investment property, a financial instrument, an intangible asset or property, a financial asset, a commodity, etc., as the table below shows.

Treatments of Cryptocurrency	Jurisdiction(s)
investment property	Denmark, Norway, Finland
capital asset	Australia
financial instrument	Germany
intangible asset	Luxembourg, Switzerland
intangible property	Singapore
investment capital	Sweden
property	New Zealand
financial asset	Venezuela
commodity	Canada

Source: Taxation of Cryptocurrency Block Rewards in Selected Jurisdictions, January 2021, Report for Congress LL File No. 2021-019649

Revenue collection from cryptocurrency is a difficult task in any country due to varying restrictions, reporting complexity, and lack of official tax data. Additionally, the balance between assuring consumer protection through increased security and maintaining the public’s privacy and anonymity compounds the revenue collection issue for tax regulators.

Uncertainty	Concern
Tax regulation	Today's crypto owners (across the globe) are subject to varying tax restrictions on their digital holdings by local regulatory bodies. Several tax agencies around the globe have been in the process of creating new guidance frameworks for overseeing their respective crypto industries. <sup>374</sup>
Anonymity of taxpayers	The major concern related to the taxation of cryptocurrency is the difficulty to trace them because they are mined, used, and traded online completely anonymously. In addition, the use of supplemental anonymization techniques, such as Virtual Private Networks (VPN) and coin-mixing services, protects owners’ identities and makes it nearly impossible to trace their transactions. Following the regulations adopted by the Chinese government, the European Parliament and the Council of the European Union published in 2017 a proposal that aims to identify owners of cryptocurrencies. The proposal clearly states that “competent authorities should be able to monitor the use of virtual currencies.” <sup>375</sup>

Procedures of collecting taxes	According to 2018 crypto investors survey, tax reporting complexity is a key concern for 62% of crypto investors. <sup>376</sup> The way of taxation, usually as capital gain, is complex for taxpayers.
Data of revenue from taxes on cryptocurrency	Lack of official, public data.
Security of transactions and privacy of taxpayers	Should be assured at the highest-level regarding regulation.
Security of transactions and privacy of taxpayers	Should be possible to stop any tax fraud.

In the area of cryptocurrency taxation, usual taxation refers to the taxation of income from trading in cryptocurrency, and special provisions may apply to the taxation of ‘mining’ and ICO. Today, new areas are developing that need to be regulated by tax laws and guides such as donations in cryptocurrencies, initial token offers, airdrops, stablecoins, DeFi, hard forks, etc. Further development of various ‘forms’ of using cryptocurrency can lead to increased economic strength of the taxpayer and that arises the question of taxation. A special issue concerns the taxation of indirect taxes as well as possible taxes on gifts.

Taxing cryptocurrencies as capital gains is a complex tax process. In order to achieve the highest possible compliance, lump-sum taxation of cryptocurrencies is proposed, as an option for taxpayers. Lump-sum taxation, which can be broken down into several tax brackets, and at a reasonable tax rate, is an easy way to determine and pay taxes. The simpler the tax solution, the lower the tax fraud and the lower the administrative burden and costs for taxpayers, and also for tax authorities. Unique international and global solutions for cryptocurrency taxation would bring significant relief in taxation, unlike different national solutions, as we see now in practice.

## 5.8 Next Steps

The Government Blockchain Association (GBA) has brought together government experts from around the world to work on this report. However, this is only the beginning of the journey. Discussions need to take place across the world between experts in various domains like regulations, ethics, privacy, politics, economics, law enforcement, and taxation. To address these challenges, the GBA has established working groups to help facilitate discussion and provide collaborative solutions to governments. To learn more about the impact of cryptocurrency adoption on government go to [www.GBAglobal.org/cmp](http://www.GBAglobal.org/cmp) to view the Cryptocurrency Maturity Profile and download the full report. To join the effort to help educate public and private sector leaders about this subject go to [www.GBAglobal.org/working-groups](http://www.GBAglobal.org/working-groups) and join one of the many groups looking to help governments address the impact of cryptocurrency.

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7 Appendix A: GQM results

**Goal: Governments and societies are not negatively impacted if cryptocurrency adoption continues to increase**

Question	Metrics
1. What is the rate of cryptocurrency adoption?	<ul style="list-style-type: none"> <li>• Number of wallet downloads by cryptocurrency over time</li> <li>• Number of wallet types and wallet vendors available to users over time</li> <li>• Number of vendors accepting cryptocurrency or offering financial services</li> <li>• Number and value of cryptocurrency transactions over time</li> <li>• Market capitalization of the cryptocurrency economy.</li> </ul>
2. What is the rate of cryptocurrency ecosystem maturity?	<ul style="list-style-type: none"> <li>• Number of ATMs by country</li> <li>• Number of cryptocurrency lawyers and accountants</li> <li>• Number of institutional investors and insurers</li> <li>• Number of regulated, unregulated, decentralized cryptocurrency exchanges including number of transactions.</li> </ul>
3. What is the likelihood that cryptocurrency will continue to be adopted?	<ul style="list-style-type: none"> <li>• Inflation rates of fiat and cryptocurrency</li> <li>• What is the cryptocurrency volatility?</li> </ul>
4. How much do tax policies impact adoption?	<ul style="list-style-type: none"> <li>• What countries require reporting capital gains compared to crypto transactions in that country?</li> <li>• How many vendors accept crypto compared to capital gains tax requirements?</li> </ul>
5. At what rate will cryptocurrencies continue to be adopted?	
6. What is the impact and threshold of cryptocurrency adoption before it negatively impacts governments?	<ul style="list-style-type: none"> <li>• Currency strength by country</li> </ul>
7. When is it estimated that cryptocurrency adoption will negatively impact nations and fiat currencies?	
8. What can be done to mitigate the risks of wide-scale cryptocurrency adoption?	
9. What contingencies should be prepared if the risk is realized?	

## 8 Appendix B: Types of cryptocurrency

Bitcoin is the main cryptocurrency that gave birth to all other cryptocurrencies. Cryptocurrency can be created at any time and can have varying uses such as privacy transactions or lower exchange fees. This study found that there are over 2850 cryptocurrencies in the world. Cryptocurrency types, for example Bitcoin, altcoins, and tokens, can be grouped into categories based on the coins’ or tokens’ use and functionality. The categories represent all major cryptocurrencies in circulation.

When the value of a currency appreciates, more people acquire the currency. However, they are less likely to spend it because they believe that it is more advantageous to hold it than spend it. However, when the value of a cryptocurrency depreciates, people are more likely to spend them than hold them. For this study, the term ‘cryptocurrency adoption’ includes both the acquisition of cryptocurrency and the spending of cryptocurrency.

Currency name	Description
Bitcoin	The archetype for all cryptocurrency with true decentralization, distributed consensus, transparency, open-source code, and a permanent public ledger. A public ledger is an electronic record of all transactions on the blockchain accessible to anyone.
Altcoins	All coins other than Bitcoin are considered (alt)ernative coins. The open-source programmable nature of altcoins provides many, wide range use cases, functionality, and applications including their own blockchain networks.
Tokens	Tokens (aka platform tokens) are like tickets in an amusement park or shopping rewards at a grocery store. The tokens can only be used with a certain blockchain network and only serve a function within that blockchain network only. Ethereum and Ripple are examples of tokens and they vary in application.
Sovereign currencies	The supply is determined by the issuing government. Since most governments spend more than they collect in revenues, they solve this problem by creating additional currency. This effectively creates an unlimited supply of money. The demand is driven by several factors including gross domestic product and the exchange rate of other currencies. However, typically the value of sovereign currencies diminishes over time because governments continue to create more money without limitations.
Public cryptocurrencies	Currencies that are governed by algorithms like Bitcoin have a fixed total supply of money. The inflation rate of these currencies is primarily impacted by demand.
Private cryptocurrencies	These tokens can be controlled by the issuer and may rise or fall in value based on the decisions and actions of the issuer and the communities that use them.



<p>Private company digital currency</p>	<p>Facebook’s Diem will become the first major corporation to create a private sector managed coin. At first Facebook considered Diem a stablecoin but has since moved to a more global approach for its coin.</p> <p>Although Christine Lagarde, then head of the International Monetary Fund, first called on central banks to begin seriously exploring digital currencies in late 2018, interest in central bank digital currencies (CBDC) only really increased following the Diem announcement last summer. Since then, the prospect of a private currency initiative has accelerated central bank research and development into digital currencies.<sup>377</sup></p>
<p>Public digital currency</p>	<p>The Agricultural Bank of China (ABC), one of the nation's four state-owned banking giants, is trialing a test interface for the country's central bank digital currency (CBDC),<sup>378</sup> also known as ‘e-RMB’. The move hints at the acceleration of the development and deployment work of rolling out the DCEP.<sup>379</sup> Digital currencies are more likely to be adopted by governments than cryptocurrencies, with tokens cryptoassets coming in close second.</p>
<p>Community-based digital currencies<sup>381</sup></p>	<p>Coins that have the ability to program the values of a community.</p>
<p>Privacy coins</p>	<p>An altcoin that has increased privacy attributes programmed into the coin’s functionality. The attributes include stealth addresses and invisible transaction routing.</p>
<p>Stablecoins</p>	<p>An altcoin that is tied one-for-one to a government fiat currency such as the US dollar or the European euro. Stablecoins are used to offset the volatility of cryptocurrency and to help stabilize risk in loans collateralized using cryptocurrency.</p> <p>JP Morgan Chase became the first bank to create an institutionally managed stablecoin (JP Coin) for use in retail interbank transactions.</p>
<p>Central bank digital currency</p>	<p>Central bank digital currency (CBDC) is not a cryptocurrency or a stablecoin. CBDC is essentially digital currencies, or a fully digitized version of a government fiat currency, which is more like PayPal than a cryptocurrency. Many central banks are researching the viability of digital currency to lessen printing, maintenance and fees associated with traditional fiat currency. The COVID-19 has not only heightened awareness of cryptocurrency, but also exposed the slow response of the traditional global monetary system.</p> <p>Six central banks have formed a working group with the Bank for International Settlements (BIS) to share findings as each investigates potential cases for central bank digital currencies (CBDCs).<sup>382</sup></p> <p>The group will be comprised of the central banks of Sweden, Canada, Switzerland, the UK, and Japan, as well as the European Central Bank (ECB) and the BIS. Announced by all seven members, each institution</p>



	<p>will continue assessing the "economic, functional and technical design choices, including cross-border interoperability" of CBDCs and will sharing any findings.</p>
<p>Security tokens<sup>383</sup></p>	<p>Security tokens derive their value from an external, tradable asset, for example stocks or real estate. If you buy a tokenized version of a stock, you will acquire the same rights that you would get when you buy a stock via a traditional stockbroker — profit share and voting rights. The only difference is that a token comes in digital form.</p> <p>The major distinction to utility tokens is that security tokens are designed to be investments. Thus, they fall under the same regulatory oversight as other investment products.</p>
<p>Utility tokens<sup>384</sup></p>	<p>Utility tokens are digital tokens that are used for a blockchain-based product or service. They run on a blockchain platform, or in other words, are part of a blockchain economy. A utility token has a wider functionality than a coin.</p> <p>Utility tokens can provide value to investors in different ways. They give users access to a future product or service.</p> <p>Typically, a tech start-up develops a digital product or service and initiates an initial coin offering (ICO). During the ICO, the company sells utility tokens. Investors can buy these tokens and use them as a means of payment on the platform developed by the issuing company. An Uber token, for example, could be used to pay for a ride with an Uber car ride. But not for anything else. If you wanted to use the Uber token to buy another product or service, you would first have to exchange it against either fiat money or a crypto coin such as Bitcoin.</p> <p>Dapp token is a special utility token that is programmed to operate in a network to provide unique services to developers of distributed applications.</p>

9 Appendix C: Cryptocurrency wallets

Wallets<sup>385</sup> offer privacy in a variety of ways. Most wallets are open source and do not collect location or other metadata. However, to properly display balances, some wallets may store a list of public keys in a central server, meaning anyone with access to that server has full visibility into the wallet’s entire transaction history.

Top example of desktop software wallets	Top example of mobile software wallets	Top example of hardware wallets
Armory	Blockstream Green, BRD, Edge (iOS)	Ledger
Electrum	Samourai Wallet, Bitcoin Wallet, Electrum (Android)	Trezor
Wasabi Wallet (Full Bitcoin Knots implementation available)		Coldcard (Bitcoin only)
Bitcoin Core (Full Bitcoin implementation)		OpenDime (Bitcoin only)
Bitcoin Knots (Full Bitcoin implementation)		KeepKey

Cryptocurrency wallets are software programs that store your public and private keys and interface with various [blockchains](#) so users can monitor their balance, send money, and conduct other operations. When a person sends you [Bitcoins](#) or any other type of digital currency, they are essentially signing off ownership of the coins to your wallet’s address. To be able to spend those coins and unlock the funds, the private key stored in your wallet must match the public key to which the currency is assigned. If the public and private keys match, you can sign the transaction and broadcast it. The money will now be assigned to the receiver’s address. There is no actual exchange of real coins. The transaction is signified merely by a transaction record on the [blockchain](#) and a change in balance in your cryptocurrency wallet.

**Wallet types**

<p><b>Online (hosted)</b></p>	<p>Wallets are run on the cloud and are accessible from any computing device in any location. While they are more convenient to access, online wallets store your private keys online and are controlled by a third party which makes them more vulnerable to hacking attacks and theft. They should not be trusted with any significant funds. Unlike other options, hosted wallets give a third party custody of your funds. You have no control or recourse if they lose or steal your coins.</p>
<p><b>Desktop (software)</b></p>	<p>Wallets are downloaded and installed on a PC or laptop. They are only accessible from the single computer in which they are downloaded. Desktop wallets offer one of the highest levels of security; however, if your computer is hacked or gets a virus, there is the possibility that you may lose all your funds.</p>
<p><b>Mobile (software)</b></p>	<p>Wallets are run on an app on your phone and are useful because they can be used anywhere Bitcoin is accepted. Mobile wallets are usually much smaller and simpler than desktop wallets because of the limited space available on mobile.</p>
<p><b>Hardware</b></p>	<p>Wallets differ from software wallets in that they store a user’s private keys on a hardware device like a USB. Although hardware wallets make transactions online, they are stored offline which delivers increased security. Hardware wallets can be compatible with several web interfaces and can support different currencies; it just depends on which one you decide to use. What’s more, making a transaction is easy. Users simply plug in their device to any internet-enabled computer or device, enter a pin, send currency, and confirm. Hardware wallets make it possible to easily transact while also keeping your money offline and away from danger. The danger is that companies stop to provide hardware wallets, because you cannot see your private keys on them (ledger) you will not be able to access your funds if the service stops.</p>
<p><b>Paper</b></p>	<p>Wallets are easy to use and provide a very high level of security. While the term ‘paper wallet’ can simply refer to a physical copy or printout of your public and private keys, it can also refer to a piece of software that is used to securely generate a pair of keys, which is then printed. Using a paper wallet is relatively straightforward. Transferring Bitcoin or any other currency to a paper wallet is accomplished by the transfer of funds to the public key shown on the paper wallet. Alternatively, if one wants to withdraw or spend currency, all one needs to do is transfer funds from their paper wallet to their software wallet. This process, often referred to as ‘sweeping’, can either be done manually by entering the private keys or by scanning the QR code on the paper wallet. When sweeping a paper wallet, one should empty it entirely to avoid security risks. Paper wallets, like money, once they have been sold or spend, they should be burned.</p>

### Security

Wallets are secure to varying degrees. The level of security depends on the type of wallet you use (desktop, mobile, online, paper, hardware) and the service provider. A web server is an intrinsically riskier environment to keep your currency compared to offline. Online wallets can expose users to possible vulnerabilities in the wallet platform which can be exploited by hackers to steal your funds. Offline wallets, on the other hand, cannot be hacked because they simply are not connected to an online network and do not rely on a third party for security.

Although online wallets have proven the most vulnerable and prone to hacking attacks, diligent security precautions need to be implemented and followed when using any wallet. Remember that no matter which wallet you use, losing your private keys will lead you to losing your money. Similarly, if your wallet gets hacked or you send money to a scammer, there is no way to reclaim lost currency or reverse the transaction.

## 10 Appendix D: Privacy and anonymity

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“Privacy is necessary for an open society in the electronic age.”

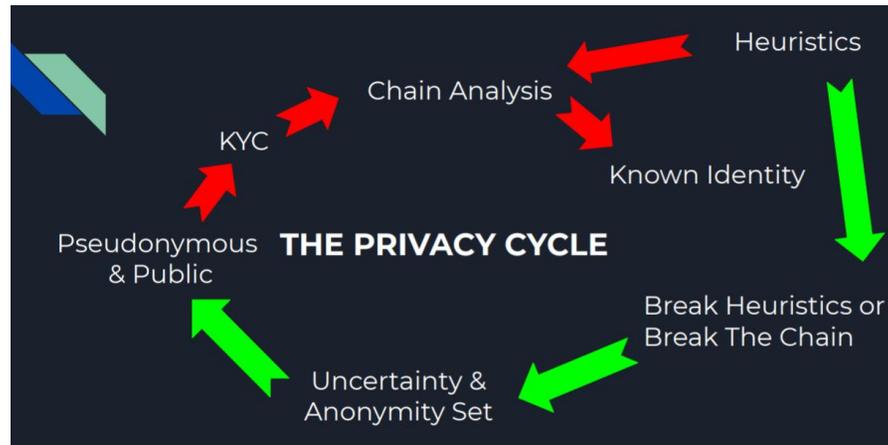
Eric Hughes’s opening statement in [A Cypherpunk’s Manifesto](#) still rings as true today as it did in 1993. Placing privacy back in the hands of the public is the major implication offered by a pseudonymous system that allows secure electronic transactions in an adversarial environment without the involvement of an intermediary. This vision is laid out in Bitcoin’s whitepaper. Individuals have become comfortable managing their own finances and will soon be comfortable enough able to manage their own [privacy using the blockchain](#) and crypto tokens.

Bitcoin and most cryptocurrencies are pseudonymous, not anonymous. Every coin has a full history, traceable through the blockchain, all the way back to its creation. Thus, moving coins from one wallet to another does not always hide the trail.

The loss of privacy occurs with exchanges, who hold both real-life identities and the blockchain data for all their customers. When a user withdraws coins from an exchange to a personal wallet, the exchange can tie that wallet to their know your customer (KYC) information (name, address, social security number, etc.). KYC/AML regulation imposed on most exchanges enables the deanonymization of many Bitcoin holders. Several companies called ‘chain analysis companies’ perform this sleuthing work to reduce the privacy of cryptocurrencies.

Many developers design software to reclaim privacy in a variety of ways. This arms race is illustrated in the figure below. Chain analysis companies develop heuristics for tying digital and physical identities together, while various projects attempt to break these heuristics and re-anonymize transactions and coins. See a full PowerPoint presentation [here](#).

Privacy Cycle



Source: Sachin Meier

**CoinJoin**

Wallets such as Samurai Wallet and Wasabi Wallet offer unique methods for regaining extra privacy. CoinJoin is a process through which mutually anonymous, uncoordinated users craft a special transaction which pools all their coins and returns identical amounts to each user, but at different addresses. This breaks the connection between each user’s coins. CoinJoin is legal because custody of the coins is never transferred to a third party. A CoinJoin is simply a multi-party transaction.

**Mixing**

Coin mixing is a centralized process different from CoinJoin. A centralized party collected coins from users and returns different coins, such that the chain of custody is obscured. Several coin-mixing services have been shut down by authorities on money laundering charges.

**Other methods**

Teams of developers are currently working on a variety of other methods to combat chain analysis, including PayJoin, which has recently been implemented in several Bitcoin wallets and services.

### 11 Appendix E: Tax havens

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Tax and financial havens have a central role in the universe of illicit finance (assets that come from criminal and illicit activities), because they are ‘money laundering laboratories’. These welcoming territories launder and monetize dirty money of crime and corruption.

It has been stated that cryptocurrency and financial havens go hand in hand.<sup>389</sup> Some tax jurisdictions have imposed restrictions on investments in cryptocurrencies, the extent of which varies from one jurisdiction to another.

According to the most common definition, ‘tax havens’ are those countries or territories with lower taxation or where, in many cases, there is no taxation. The aim of these tax havens is to attract non-residents, companies, or natural persons, to let them start commercial activities or move their assets, avoiding or bypassing the regulations of the countries where they carry out their activities. The expression ‘haven or offshore financial center’ is related to islands such as Cayman or Bahamas, and the states of the hinterland such as Switzerland. Tax havens are offshore activities where a subject resident in a country – falsely – holds the assets or domiciles of the business in another country to benefit from tax breaks. Many tax havens provide secrecy or opacity that guarantees the anonymity of these financial activities and commercial companies. There are six countries where cryptocurrency is not taxed:<sup>390</sup> Malta, Singapore, Malaysia, Belarus, Switzerland, and Portugal.

Research and investigations have, in fact, allowed to observe that tax havens, carry out an essential function in the globalization of the activities related to financial crime because they ensure to their client's tax reliefs, banking secrecy and judicial immunity. Those criminal activities generate important profits, that subsequently can destabilize economic, industrial, and financial sectors, in other words impeding both national and international policies. Criminal organizations take advantage and abuse of the discrepancies of the legislative, regulatory, legal, and judicial systems. In this way they can prosper without being regulated by common laws to which legal activities must comply.

Portugal is an example of a country that at first was cautioned against the use of cryptocurrency and lessened its stance as time went on. Portugal applies taxes only if you earn income as a trading company or services for yourself. A casual trader does not have to pay taxes. The Portuguese Central Bank still does not monitor the issuing or trading of digital currencies.

The way these territories or states work is relatively simple, although each of them is regulated by a specific legislation. Many banks receive money from all over the world – without any preclusion related to the identity of the owners often requesting moderate bank charges compared to those applied by others credit institutions. In this way they can let money ‘work’ legally on international financial markets, and clients do not have the obligation to justify the origin of their capitals. The protection of the anonymity is guaranteed. Therefore, these places are far from

being little faraway lands; rather, the offshore areas are represented by a geography that closely corresponds to the main centers of the economic activity: United States, Europe, Asia.

## 12 Acknowledgements

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To the blockchain and cryptocurrency community, a very wise maiden once said, “Realize you're living in the golden years.”