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The experimentation of Bitcoin as legal tender in El Salvador (2021-2025) and prospects for Digital Finance

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INTRODUCTION

Cryptocurrencies have experienced an accelerated process of diffusion over the past few years, initiating a process that could lead to a paradigm shift in the world's financial and monetary order. In particular, Bitcoin – once a technology-driven curiosity in 2009 – is now a global symbol of what could be called the new frontiers of digital finance and monetary decentralization. The issue is currently in the spotlight: governments, central banks, investment funds and financial institutions are showing a growing interest in the potential and risks of digital assets like Bitcoin. El Salvador's initiative to recognize Bitcoin as legal tender in 2021, the first country ever to do so, has made this debate more concrete, by allowing to measure in real time the impact of such a disruptive innovation on the scale of a national economy. El Salvador's adoption of Bitcoin alongside the US dollar as a second official currency represents an unprecedented experiment, the economic, political and social consequences of which are of considerable magnitude. A few years after the start of this pioneering initiative, it is now possible to take stock of its evolution over the period 2021–2025: from the level of adoption by the population, to the macroeconomic effects observed on the domestic market, up to the reactions and controversies of the International Monetary Fund and other international financial institutions. In this context, a detailed analysis of the “El Salvador case” constitutes an exceptional opportunity to closely analyze the challenges and potential of integrating a cryptocurrency in a national monetary system. This thesis is divided into four chapters. Chapter 1 sets the theoretical context on cryptocurrencies, by explaining the origins of Bitcoin and how it functions. It recounts the history of the birth of Bitcoin and the fundamentals of blockchain technology and the mining mechanism, then provides a presentation of the main categories of digital assets (altcoins, stablecoins) and the concept of central bank digital currencies (CBDCs). Chapter 2 is entirely dedicated to the case study of El Salvador, where the decision to adopt Bitcoin as legal tender was taken under President Nayib Bukele's administration. It first details the socio-economic context of El Salvador and the various motivations for the move towards Bitcoin, before analyzing the

provisions of the law passed in June 2021 (Bitcoin Law), as well as the measures taken to promote the use of the cryptocurrency (national wallet app, various incentives, etc.), including the challenges and criticisms that accompanied the experiment. The chapter then traces the evolution of the situation over the following years up to 2025, including the reform of the Bitcoin Law adopted in January 2025, and the development of the relationship with the International Monetary Fund, marked by certain tensions over the implications of the experiment. Chapter 3 presents an economic analysis of the macroeconomic impact of Bitcoin adoption on the Salvadoran economy over the period 2021–2025. It studies the main economic indicators to measure the results of the experiment: GDP growth and overall economic performance, inflation and price stability, flows of foreign direct investment and investment climate, volume of remittances received from abroad, as well as the effects on financial inclusion and the actual usage rate of Bitcoin among the population. Drawing on this data, the thesis assesses the degree to which the unconventional monetary policy based on Bitcoin has had repercussions on the country's financial stability and economic development. Finally, *Chapter 4* adopts a comparative and experimental perspective. On the one hand, it introduces a Bitcoin Readiness Index (BRI) that allows to compare El Salvador's level of preparedness for Bitcoin adoption with the one of a sample of advanced economies; on the other hand, it conducts counterfactual simulations by imagining a scenario in which a developed country would adopt Bitcoin as legal tender, to try to assess the likely effects in a different economic environment. In addition, the chapter also looks at a crypto adoption experiment at the local level (Plan B of the city of Lugano, Switzerland) to widen the field of observation on the impact of such initiatives in a regional context. In conclusion, the general objective of this work is to study the experiment carried out by El Salvador with Bitcoin as a real case to better understand the potential and the limits of such a cryptocurrency adoption at the level of a State. The results of this analysis should contribute to a better understanding of the challenges and opportunities associated with the integration of a digital currency in the economic policies of a country, in order to be able to assess in which conditions – if any – innovations such as Bitcoin can have a place in the future of the world's financial system.

CHAPTER 1: THE NEW FINANCE

1.1 Historical background of cryptocurrencies

Cryptocurrencies first appeared in the late 2000s. On October 31, 2008, a person (or persons) using the pseudonym *Satoshi Nakamoto* published a whitepaper titled “Bitcoin: *A Peer-to-Peer Electronic Cash System*”. This whitepaper proposed a “peer-to-peer network” for value transfer that didn't depend on a trusted third party. Bitcoin was released in January 2009, with the mining of the genesis block on January 3, 2009. Nakamoto developed a system for a new type of currency called a cryptocurrency, which is also known as a crypto. Nakamoto solved the "double-spending problem" by maintaining a decentralized ledger (called the blockchain) and using a proof-of-work mechanism to form a consensus over the current state of the ledger. This ensured that no coin could be double-spent without detection. Nakamoto's system allowed for the transmission of online payments directly between two parties without needing a financial institution or middleman to validate the transactions, allowing digital cash to be transferred without the need of a trusted third party. Bitcoin was adopted and used mostly by hobbyists and cryptography enthusiasts in its first few years and had little to no actual use case or perceived value. However, in the subsequent years Bitcoin was adopted and evolved into a new asset class; in the mid-2010s, it was referred to as "digital gold" or "the hedge". In the wake of Bitcoin's success, other cryptocurrencies were developed. By the early 2020s, cryptocurrencies entered mainstream discussion. El Salvador became the first country to make Bitcoin legal tender in 2021.

1.2 The Blockchain

Central to Bitcoin and most other cryptocurrencies is a new kind of distributed ledger: a blockchain. Simply put, a blockchain is an append-only database that is managed not by a central authority, but by a network of computers (*nodes*) working in concert. The data

to be stored, which in Bitcoin's case is the transaction data, is aggregated into blocks and these blocks are cryptographically linked together in a chain, with each block including the hash of the previous block. The European Securities and Markets Authority (ESMA¹) defined blockchain as follows: “Blockchain is a type of distributed ledger in which the information recorded on it is bundled in blocks of information”. The new blocks are added after validation and are cryptographically linked to the previous block in a chain. The information recorded in the blocks is validated through a computerized consensus process. The structure of a blockchain, where the database is updated and managed by a distributed network of nodes, results in a tamper-resistant and immutable ledger. Once the data has been added to a block in the chain, it cannot be changed without making changes to that block as well as all of the following blocks, which would require a collusion of a majority of nodes in the network. In short, an attacker wishing to reverse a past transaction would need to redo the proof-of-work for the block containing the transaction and all subsequent blocks, and also control >50% of the network's computing power, which is effectively impossible in a large decentralized network. A blockchain's defining properties are *decentralization* (absence of a central operator), *transparency* (transaction history is available for viewing by all participants), transaction *traceability* (any output can be traced back through the blockchain, providing auditability), and *consensus-enforced integrity* (network state is updated only if the prescribed consensus rules are satisfied). These properties enable mutually unknown or untrusted parties to agree on a ledger's state without a centralized trust agent, which is a key innovation. In conclusion, a blockchain is an open, distributed ledger that can record transactions between two or more parties in a manner that is verifiable and permanent.

1.3 The Mining

In Bitcoin's blockchain network, the Proof-of-Work consensus mechanism is the process that confirms transactions and adds new blocks to the chain, a process known as mining. Mining is the activity of specialized network participants known as miners, which compete to solve an intentionally difficult cryptographic puzzle to validate a block of unconfirmed transactions. The miners solve the puzzle by finding a *nonce* (a number)

¹ Independent EU authority that supervises financial markets and protects investors.

such that, when hashed with the candidate block's data (including the hash of the previous block), produces a hash that is less than a given target (equivalently, the hash must have a sufficient number of leading zeros). The process of searching for this nonce in a brute-force manner is known as proof of work, since it requires a considerable amount of computing power to find, on average. The Bitcoin network adjusts the difficulty of this puzzle, so that, on average, a new block is found every 10 minutes or so. The Pow consensus mechanism secures the network by making it extremely costly, in terms of computing power and electricity, to attempt to rewrite history (hence the term proof-of-work): a bad actor would have to redo the "work" of not just one block, but all the subsequent ones, faster than the rest of the network combined. The miner who solves the puzzle first (finds a nonce) for a new block announces it to the network. The nodes verify the new block, and, if it is valid, the new block is attached to the blockchain and the miner is rewarded with newly created bitcoins (this is known as the block reward) and the transaction fees of the transactions included in the block. Thus, while miners confirm transactions and record them on the blockchain, the proof of work consensus mechanism is how they compete for the right to do that, and the protocol incentivizes them to expend resources to do so, to secure the network. Anyone who has the necessary hardware and software can become a miner in Bitcoin, as it is permissionless and does not require joining a mining pool to get mining rights. However, as the Bitcoin network has become more competitive, effective mining participation requires specialized hardware (ASIC² miners) and a steady supply of electricity. In short, Bitcoin's mining consensus mechanism is the competitive race to find the nonce that allows a block to be appended to the chain, as every node in the network independently verifies which miner won that race.

1.4 Bitcoin

Bitcoin is the first and most famous cryptocurrency, and it is a large example of the typical concepts of "new finance" in the digital world. Invented in 2009 by a pseudonymous

² An Application-Specific Integrated Circuit is a chip designed to perform a specific task in an optimized and highly efficient manner. In the case of Bitcoin mining, this task is the calculation of the hash algorithm (SHA-256)

person or group of people known as Satoshi Nakamoto, Bitcoin is a decentralized digital currency that is used to send peer-to-peer (online) payments without going through a financial institution. Bitcoin is a global cryptocurrency that works on a network that is accessible to the public and is not backed or governed by a central bank or government, instead its consensus rules (rules and protocols that are built in and enforced by the software and the participants in the network) define its issuance and monetary policy and transaction validation is performed by participants in the network known as miners. It has a capped supply, as per its code which has hard-capped the maximum number of bitcoins that can ever be mined to 21 million and it is believed that the cap of 21 million will be reached in the year 2140. This and the absence of any central authority have led to Bitcoin being considered to be similar to gold and the adoption of the coin as a store of value for some. Transactions on Bitcoin's blockchain are cryptographically secured (each user on Bitcoin's network has an address and a private key with which they can sign transactions) and are publicly recorded on its open ledger called a blockchain. As has been mentioned, the Bitcoin blockchain is maintained by a decentralized network of miners who use Proof-of-Work to verify transactions and secure the network. Since its creation, it has increased in value and from being a cryptographically and experimentally-based project it has emerged to be a known asset and payment network in the world today, with a sizeable level of volatility for example, for instance, it hit an all-time high in late 2021 when it reached a value (exchange rate against the US dollar) of over \$60,000 per bitcoin but has seen many drawdowns and sharp corrections from this valuation yet remains to be the largest cryptocurrency by market capitalization and continues to receive attention from both individual investors (retail) and institutional investors. Bitcoin has also seen wide adoption over time, with millions of people around the world currently holding bitcoin as an investment and/or to use as a medium of exchange and an increasing number of merchants and payment processors accepting the cryptocurrency. In 2021 El Salvador became the first nation to make Bitcoin legal tender, mandating merchants to accept it in trade along with the US dollar. This marked an unprecedented step in the adoption of the cryptocurrency and drew mixed reviews on the potential and risks that Bitcoin may have as a possible inclusion for national economies. To sum up, Bitcoin has been the first to introduce the world to the idea of a digital and decentralized currency, and it was the beginning of the concept that then led to the larger cryptocurrency industry. The open-

source code and concept of Bitcoin have been taken by and influenced a multitude of new projects but it has remained the most well-known archetype of a deflationary, blockchain-based and decentralized (trustless) currency.

1.5 The security of Bitcoin's blockchain

Bitcoin's blockchain is the platform upon which the Bitcoin protocol runs, and the security of the blockchain is therefore the most fundamental component of the system. The primary reasons why the blockchain can be trusted to accurately reflect the current and past state of Bitcoin are the cryptographic techniques, game-theoretic incentives, and network decentralization, that ensure integrity of the consensus process. Each individual transaction in the Bitcoin network is signed with the private key of the owner of the Bitcoins being spent, and the authentication and non-repudiation provided by the digital signature (only the person in possession of the corresponding private key is able to successfully create that specific signature) prevent unauthorized double spending of Bitcoins (without also breaking the private key). After transactions are selected and combined into blocks, the previous block's hash is added into the block being created and then the new block's hash is calculated, cryptographically chaining blocks together. The result is that each block not only points to the hash of its predecessor, but actually includes that hash as part of its own data. In this way, the validity of one block depends on the validity of its predecessor (if the previous block were changed, its hash will no longer match what is stored in the next block), forming a cryptographic link. Since altering any aspect of a past transaction, even by a tiny amount, for example one bit, would change the hash of that block, it would then no longer be valid in the next block. The second block could then also be changed, and so on down the chain, until an adversary with modified transactions would form an alternate version of the blockchain. This kind of attack becomes harder the deeper a block is in the chain, as that would require re-computing the proof-of-work for the current block plus all blocks beneath it. The re-computation cost of a deep block would quickly outstrip any gains from an attack, unless a majority of the total network hash power is controlled by the attacker. It is this principle that is described in the Bitcoin whitepaper, where it says that to modify any of the "bank's" publicly visible information (in this case the blockchain) an attacker must have more CPU

power³ than all the honest nodes in the network put together. As a practical matter, a confirmed transaction cannot be altered by any miner or group of miners working alone (exceptions to this are a matter of game theory and trust, such as the choice of whether to upgrade the protocol with BIPs⁴ or not). Instead, security is a property of the network as a whole (in this case of its distributed nature and economic reality of attack costs); this is one of the ways in which "trust" is "earned" by the network. Each block also effectively resets the cost to attack the blockchain, because each subsequent block is in a sense a new race to perform the proof-of-work. The average interval between blocks in the network is 10 minutes, so the cost of an attack effectively goes up by one "step" every 10 minutes or so. This is a process that is sometimes referred to as "archiving" or "depth of successive confirmations". A second important feature of the Bitcoin blockchain is that it is open and transparent (as noted, the entire ledger of past transactions is publicly visible), which means that irregularities or suspicious activity can be more easily detected by the community, for example someone with a large fraction of the hash rate beginning a suspiciously large fork and attempting to rewrite the chain. Finally, the system is decentralized and therefore more robust (there is no central server to attack), and it is geographically distributed around the world with tens of thousands of individual nodes, meaning that even if part of the network goes offline or is attacked, the rest of the network will continue to function. To date, the Bitcoin core blockchain has been successfully attacked exactly zero times (all incidents of "Bitcoin hacks" have been instead thefts from exchanges or users wallets, not from the protocol itself). There are, of course, limits to this; if enough computing power were acquired by a group of miners, it could in theory become more profitable to attack than to simply continue mining honestly. A so-called 51% attack, where such a majority of hash power has been obtained, is known to be theoretically possible and could allow double spending, but not, for instance, break the underlying cryptography or allow creation of bitcoins out of thin air (note that this would be an extremely costly thing to do in practice and in practice the most likely scenario would be a double-spend). The security of the Bitcoin network is closely tied to mining, which is the economic underpinning of the entire protocol. As long as the honest miners

³ The total processing power of nodes donated to perform the cryptographic calculations needed for validating a block.

⁴ Technical documents through which developers and community members propose changes or improvements to the Bitcoin protocol.

in the network together represent a supermajority of the hash rate, then new blocks will only be added to the end of the chain, and a single version of the blockchain will be used and seen by all. The principal risks to this model are political and social, such as regulatory efforts to ban or seize mining equipment rather than technological; the technical problems have so far mainly been about scaling and efficiency. In conclusion, the security and trust of the blockchain are the result of properties of the Bitcoin network as a whole, and the design of the protocol means that a successful attack requires infeasible amounts of computing power or collusion by the majority of miners, neither of which is likely (so far) to materialize in the Bitcoin network. Immutability and security are the product of the structure of the blocks (hash linked and required by consensus rules to be accepted in order) and the computational cost of reversing blocks which grows geometrically with the number of blocks, hence with time. Consensus is the property that all honest parties are in general able to agree on the blockchain they see, within small tolerances, accounting for propagation delays and other temporary network anomalies.

1.6 The Altcoins

Bitcoin's success has since spawned a large number of alternative cryptocurrencies, sometimes called “*altcoins*.” The term altcoin is a blanket one, with the only shared feature being that it is not the Bitcoin cryptocurrency. In general, altcoins are other cryptocurrency projects with various tweaks to or extensions of Bitcoin's functionality, consensus algorithm, or underlying use case. The earliest altcoins (Namecoin and Litecoin) were developed around 2011–2013, but the altcoin ecosystem has since grown many thousands-strong, mushrooming from slightly over 2,400 cryptocurrencies in 2020 to just over 10,300 by April 2022. Each altcoin typically has its own blockchain or runs on another blockchain and set of protocol rules. Many altcoins have been launched as improved or more specialized versions of Bitcoin, either to scale up transaction speed and processing throughput, or to increase privacy, or to add smart contract functionality, or for other features. For instance, Ripple (*XRP*), launched in 2012, was designed as a cryptocurrency for interbank payments that can be processed quickly. Ripple's technology has been used by some banks and payment providers for cross-border transactions. Ethereum (*ETH*), launched in 2015, features a programmable blockchain with Turing-

complete ⁵smart contracts, which means that developers can build decentralized applications on Ethereum's blockchain (Ethereum's blockchain runs code, thus it is “more than a cryptocurrency” as it can also serve as a decentralized computing platform). Bitcoin Cash (*BCH*), launched in 2017, is a hard fork of Bitcoin with a larger block size to process more transactions per block, and was designed to increase payment speed and efficiency thus it has been referred to as a “more agile and fast” version of Bitcoin for regular purchases. IOTA (*MIOTA*), launched in 2016, uses a different ledger (a DAG called the “Tangle” instead of a blockchain) and feeless micro-transaction mechanism, and is often used for Internet of Things devices. These few examples show a diversity in application (one altcoin is targeted at banks and payment efficiency, one at computational generality, one at transaction throughput, one at the Internet of Things), and altcoins in general have expanded the cryptocurrency space into an eclectic range of digital assets: payment coins, utility tokens, governance tokens for decentralized organizations, privacy coins ⁶and more. While Bitcoin's market capitalization and “brand name” have consistently been larger than altcoins in total, the altcoin space has been a source of innovation, leading the way to Proof-of-Stake consensus (as in Cardano or in Ethereum after 2022), to new economic models, and to DeFi and other types of blockchain-based services. It is worth noting that the vast majority of altcoins are small in usage, and many have been short-lived, or have been used primarily for speculative purposes. However, a number of leading altcoins (Ethereum, Binance Coin, Cardano, Solana, and others) have attracted large user bases and substantial ecosystems. In conclusion, the altcoin space has been a form of rapid experimentation and diversification that has occurred since Bitcoin's creation. By testing different technical trade-offs, exploring use cases and alternatives to Bitcoin, altcoins have both complemented and in many ways competed with bitcoin's position in the cryptocurrency space and in the process driven forward the possibilities of digital finance.

⁵ A system of rules or language capable of performing any computation that can be described algorithmically, given enough time and resources.

⁶ Cryptocurrencies with a specific focus on maintaining the anonymity of transactions, by obscuring some or all of the information about them, such as the sender, recipient, or amount.

1.7 The Stablecoins

One category of cryptocurrency that has become particularly significant is the stablecoin. The original price volatility of cryptocurrencies like Bitcoin has been one of the major perceived weaknesses of the asset class – if the price can swing up or down by 10% or more in the course of a single day, then it is not a particularly attractive medium of exchange. Stablecoins are cryptocurrencies that attempt to solve this problem by remaining stable in value, typically pegged to some reference such as a fiat currency (USD, EUR, JPY, etc) or physical commodity like gold. In practice, most stablecoins are backed or “collateralized” by reserves of the relevant reference asset: a stablecoin issuer will typically keep, say, \$1 million in a bank account and issue 1 million stablecoin tokens, each pegged and redeemable for \$1; investors or users can redeem the token for a real dollar, and this redemptions-issuances mechanism should keep the price stable around the target value. Houben and Snyers ⁷(2018) provide the following definition: Stablecoins are mostly “privately issued cryptocurrencies, usually collateralized with fiat money (EUR, USD), physical goods or financial assets”. The best-known stablecoins, Tether (USDT) and USD Coin (USDC), are each backed by reserves of traditional financial assets (cash or cash equivalents) and attempt to maintain a 1:1 peg with the US dollar. There are also stablecoins pegged to other currencies (EUR, JPY), as well as other stablecoins that use crypto collateral or algorithmic techniques to maintain a dollar parity, the latter have a more mixed and fragile track record to date. Stablecoins have become important components of the digital asset markets and offer various perceived benefits. They are a stable means of exchange and unit of account within the crypto sphere, providing traders with a “park” for their value in a cryptocurrency that is not subject to large price fluctuations. For example, on crypto exchanges, many trading pairs will use a stablecoin (e.g. BTC/USDT) to quote prices in dollar-equivalents. Stablecoins also enable relatively easy cross-border transactions and remittances; any internet user can hold or send a USDC token to another individual and obtain a dollar-value transaction without having a bank account or intermediary. This could help to serve the unbanked population and businesses by offering a digital alternative to bank money. Other oft-cited advantages

⁷ Authors of a European Parliament study on cryptocurrencies and blockchain, providing definitions and analysis of stablecoins and their regulatory implications.

include ease of understanding (one token consistently equal, say, one dollar, making the concept intuitive), use as a low-volatility store of value for crypto users, and utility in DeFi protocols (eg. for lending, borrowing, yield farming, where a stable unit of account is useful). Stablecoins have seen explosive growth over the years, for example Tether's market capitalization rose to tens of billions of dollars, and billions in stablecoins are transacted daily. However, stablecoins also present major risks and challenges, and have drawn significant regulatory scrutiny. A key risk is whether reserves are properly managed and transparent; previously there were questions raised as to Tether's dollar reserves and whether each USDT was actually fully backed 1: 1, and a lack of reserves audits or transparency can lead to a lack of confidence. Stablecoins can also concentrate certain risks in a way; for example whereas cryptocurrencies like Bitcoin derive trust from a decentralized protocol, stablecoins introduce issuer risk (must the user trust that the central issuer actually holds the reserves and will redeem the token in case of a problem, if necessary). Regulators have also warned that large-scale use of stablecoins could have systemic implications; for example, they are often used for speculative trading and arbitrage across crypto exchanges, which authorities warn could amplify volatility and/or could be used to circumvent capital controls. There are also concerns regarding market integrity and investor protection: a run on an undercollateralized stablecoin could crash its value and harm consumers, and certain stablecoin arrangements could be subject to fraud, mismanagement etc. A high-profile example of a stablecoin failure occurred in May 2022, with the implosion of TerraUSD (UST), an algorithmic stablecoin that lost its dollar peg and lost \$40 billion of value in a matter of days, sparking wider crypto-market chaos. The UST implosion served as a warning that not all stablecoins are created equal in terms of stability. To address this, authorities and policymakers around the world (Financial Stability Board, US Treasury, EU regulators under MiCAR) have been developing approaches to regulate stablecoins: setting up frameworks to supervise issuers, mandating reserve standards and audits, as well as to protect users. Stablecoins remain a key part of the crypto liquidity framework and a conduit between crypto and traditional finance. By combining the perceived stability of fiat money with the technological advantages of cryptocurrency (fast settlement, global reach, programmability through smart contracts), stablecoins both represent the potential of

“new finance” in action but also illustrate the importance of effective governance and oversight in this new industry.

1.8 Central Bank Digital Currencies (CBDCs)

Interest in cryptocurrencies and stablecoins issued by private sector actors has motivated many central banks to research and/or develop their own digital currencies, in the form of Central Bank Digital Currencies (CBDC). CBDCs are digital forms of a nation's sovereign currency, which are issued and/or guaranteed by the central bank. A CBDC is not exactly the same thing as the electronic central bank money reserves that already exist: a CBDC may be made available for retail use by the general public. In theory, a retail CBDC is the equivalent of cash in digital form: a central bank liability that people and firms could use for payments, but in electronic rather than physical form. The rationale for CBDCs is several-fold. Central banks seek to “provide regulatory oversight and financial stability while promoting innovation” in light of decentralized trends such as cryptocurrencies and the reduction in the use of physical cash. In other words, a CBDC would be an adaptation of official money for the digital age in the face of privately issued digital assets: it would ensure that public money keeps up with the digitalization of finance. A CBDC could bring various potential benefits. It could increase the efficiency and/or inclusiveness of payments: for example, a CBDC that is widely accessible could potentially enable anyone to make instant and low-cost electronic payments without the need for a bank account, just like cash but in digital form. In practice, this could be most useful in emerging markets with large unbanked or underbanked populations. CBDCs may be designed in ways that allow for interoperability and innovation in financial services: for example, programmable CBDC money could support new forms of smart payments or financial contracts. A CBDC could also be designed as a digital alternative to cash, ensuring the continued role of sovereign currency if privately issued digital coins like global stablecoins start to crowd out transactions using central bank money. In sum, over 70% of central banks globally are now exploring CBDCs in various stages of research or development. The most visible initiatives include the e-CNY (*digital yuan*) pilot in China that is currently the largest-scale CBDC trial to date, the European Central

Bank's work on a digital euro, as well as some small jurisdictions that have already launched a version of a retail CBDC for domestic use, such as The Bahamas with its Sand Dollar. The major policy and technical design questions around CBDCs remain significant. For example, one question is around how CBDCs would interact with the banking system: if citizens could keep their savings directly with the central bank in the form of CBDC, there is a risk that people could move their deposits away from commercial banks to the central bank, especially during financial crises, in effect disintermediating the banks (since banks rely on deposits for their funding and lending operations). Central banks are researching ways to manage this risk, for example via limits to individual CBDC holdings or via non-interest bearing CBDC (so that it is not "too attractive" against bank deposits). Other technical questions are around how to preserve some degree of privacy of CBDC transactions like cash transactions are anonymous, but digital transactions leave a record; some CBDC proposals use token-based approaches that could give a degree of privacy for low-value transactions, cybersecurity of the CBDC platform, and whether the CBDC is to be implemented via accounts (each user would have an account at the central bank or an intermediary) or via tokens (distributed in some way). A cross-border dimension is also non-trivial: bilateral agreements may need to be made to permit or restrict use of a country's CBDC abroad, for example given implications for capital flow control and currency substitution. Importantly, unlike cryptocurrencies that exist on public, decentralized networks, a CBDC is centrally managed by the central bank and just represents the digital form of existing fiat money. In that sense, it is a "digital" but not a "crypto" currency. However, a CBDC may make use of some of the technologies pioneered by cryptocurrencies, such as distributed ledgers or cryptographic proofs, in its implementation. The IMF and World Bank have both been involved in researching CBDCs, and in recent years have provided various resources to countries interested in CBDCs, including guidelines as well as "sandboxes" for experimentation. As of 2025, only a few CBDCs have been launched and the majority in small economies, though many larger central banks are in pilot or development phase. It is generally expected that a well-designed introduction of CBDCs to the monetary system would strengthen the system, by ensuring that the desirable properties of central bank money (safety, trust) can be combined with the benefits of digital payment features of convenience and efficiency. To that end, central banks seek to

“replicate some of the desirable properties of cash” (universal accessibility, zero credit risk, instant settlement) in digital form, while also using the technology to build financial inclusion and payment infrastructure. In the coming years, it will become clearer how CBDCs develop from a concept to practice, and how they coexist or compete with private cryptocurrencies in the world of digital finance.

1.9 General strengths and weaknesses of cryptocurrencies

Strengths, advantages, and positive arguments in favor of cryptocurrencies include: First, and in many ways the most important innovation of the crypto asset class, is disintermediation: cryptocurrencies allow peer-to-peer transactions without the involvement of banks, payment companies, or any other intermediaries. As a result, transacting in crypto can be cheaper and faster (settlement time), especially for cross-border payments. For users, this represents more financial autonomy. For users of unstable local currencies or countries with weak banking systems, crypto offers an alternative option for storing value and transacting with the global economy. Another of crypto’s key strengths is decentralization and censorship-resistance of public blockchain networks: no one whether a company, government, or individual has unilateral authority to freeze accounts or reverse transactions on a public network like Bitcoin. This can be attractive in environments of high distrust in institutions, for example, in countries with capital controls. Closely related is the high degree of user control and privacy (though this varies by cryptocurrency). Users store their own funds in their own crypto wallets secured by private cryptographic keys; transactions on Bitcoin’s public blockchain are visible to all, but are pseudonymous carried out with non-personally identifiable addresses. For coins that are designed to be more private (e.g. Monero or Zcash), financial data is not exposed to mass surveillance at all, and users can transact with strong anonymity. Transparency is another important positive feature: public blockchains like Bitcoin are an immutable audit log of all transactions, available in full for anyone to view. This can eliminate certain types of fraud (anonymity, or “trustless” automation, makes transactions provably real and not forged or “double spent”). Open-source software nature of most crypto projects allows for rapid innovation and inclusion

and new developers can contribute to the project's codebase and create additional applications and services on top of it like DeFi. The launch of smart contract platforms has expanded the possibilities further. Cryptocurrencies have also had positive secondary effects on society: advancement of other fields, especially cryptography and distributed computing, increase in financial literacy as the public learns about related concepts (inflation, monetary policy, e.g. Bitcoin's halving, diversification, etc.). Weaknesses, disadvantages, and criticisms of cryptocurrencies include: price volatility. Major cryptocurrencies are not pegged or backed by any other asset, and trade in open markets 24 hours per day, 7 days a week, all around the world. This results in very high price volatility, with values sometimes swinging by tens of percentage points in a single day. Bitcoin's volatility, for instance, is far higher than that of fiat currencies or other commodities. In 2017 and 2021 the price of bitcoin rose by over 1,000%, and in March 2020 and May 2021 it dropped by more than 50% in two weeks. Such volatility undermines the usefulness of cryptocurrencies as a unit of account or a store of value: businesses are unable to easily price their goods and services in bitcoin or other crypto, due to their value changing too rapidly, and savings stored in crypto cannot be expected to retain purchasing power for any length of time (risk of loss); this is one of the reasons that traditional currencies are still preferred for accounting and contracts. Volatility is closely related to lack of acceptance as legal tender. With the exception of a few countries like El Salvador and more recently the Central African Republic that have declared Bitcoin to be legal tender, crypto is not an official currency in most jurisdictions; its use is optional and often limited to early adopters and technology-friendly population groups. This limits day-to-day usability, and ultimately most users still need to convert to fiat at some point if they wish to use their wealth to purchase goods and services in the larger economy. Regulatory uncertainty, and lack of consumer protections is a major weakness and source of risk in the crypto industry. Historically, most exchanges and service providers have been unregulated or lightly regulated, with limited reporting requirements or controls over user's funds. As a result, customers have been exposed to risks from which they are protected in other industries: exchanges have been hacked or went out of

business (notably Mt. Gox⁸ in 2014, but more recently also FTX⁹ in 2022), and because exchanges have often been unregulated or overseas operations, consumers have no official entity to hold accountable when their funds are lost. Other operational failures short of hacks have also occurred: some exchanges have suffered system outages during volatile market periods, for example, leaving users unable to trade or withdraw their funds at critical times. Wallet thefts, phishing attacks, and smart contract exploits have also caused consumer losses. In contrast to bank deposits (which are generally legally protected and insured), cryptocurrency funds held by users carry no implicit guarantee: users are fully responsible for their own security (backup and protection of private keys), and there is generally no FDIC¹⁰-like insurance coverage if the funds are lost. Finally, the pseudonymity of crypto transactions, while attractive for user privacy, has enabled many illicit activities like money laundering, ransomware payments and purchases of illicit goods on dark web marketplaces. This reputation as a criminal enabler has fueled regulatory crackdowns and created a negative public perception. Energy consumption of certain cryptocurrencies is also a common criticism. Bitcoin, for example, has significant electricity usage, comparable to that of a medium-sized country, especially given the energy intensity of its Proof-of-Work mining mechanism, and its environmental impact in terms of carbon emissions has raised concerns of sustainability. Other blockchains have adopted less energy-intensive consensus algorithms (Bitcoin has a limited scope for reducing energy usage without a network upgrade), but the issue still lingers as a public concern. Scalability and transaction throughput is another major weakness for early cryptocurrencies: Bitcoin and Ethereum in their native blockchains can only process a limited number of transactions per second, compared to thousands for Visa. This has resulted in network congestion and high transaction fees during periods of high demand; solutions such as the Lightning Network for Bitcoin and Ethereum's network upgrades (moving to Ethereum 2.0) are being developed to address scalability. Lastly, decentralization as a feature is also a weakness: the trade-off of disintermediation is in the complexity of the user experience, it is not easy to use cryptocurrencies for regular

⁸ At the time the world's largest Bitcoin exchange, Japan-based, that filed for bankruptcy following a huge hack that saw the loss of approximately 850,000 bitcoins.

⁹ A significant global cryptocurrency exchange that failed due to fraudulent management and liquidity issues, causing billions of dollars in customer losses.

¹⁰ A United States government agency that protects bank depositors by insuring deposits up to a certain limit in case of bank failure.

purchases. To transact directly on the blockchain, users must learn to manage long alphanumeric addresses, transact fees in cryptocurrency, and take full responsibility for secure backups and avoiding scams. If a mistake is made like sending funds to the wrong address or losing the private key, there is no central support to contact or intervene on the user's behalf. These risks and additional hurdles are far higher than the bank-mediated fiat system that the average consumer is familiar with, and which offers error corrections and other soft user protections. Overall, cryptocurrency represents a trade-off between increased financial autonomy, access, and innovation and greater user risks. They are in many ways a realization of the fintech ideals of open and permissionless finance. But, unlike other financial services, there are also serious limitations and risks that cryptocurrencies pose to their users and to the rest of the financial system, that regulators and the wider industry are still working to overcome.

1.10 The Exchanges

Crypto exchanges are companies that allow users to buy, sell, and trade cryptocurrencies. Exchanges are a key part of crypto infrastructure: they provide liquidity and price discovery to the market and often act as the primary on and off ramps for users looking to trade fiat money to crypto assets or vice versa. Broadly speaking, there are two main types of exchanges: centralized exchanges (CEXs), and decentralized exchanges (DEXs). A centralized exchange is a platform for crypto trading that is operated by a company, which also often provides custody of users' funds (somewhat analogous to a traditional stock exchange or broker, but for crypto trading). Users typically sign up for an account with the exchange, deposit funds or crypto into the exchange's wallets, and trade with others through the exchange's internal trading engine. The exchange keeps track of all trades on its own ledger and only later settles the net on-chain transfers when users withdraw funds. Centralized exchanges also typically maintain an order book with posted buy and sell orders which are matched when a trade occurs. CEXs often provide advanced trading features, high performance and customer support, which appeal to a wide user base. Many centralized exchanges also provide fiat-to-crypto on-ramps, so, for example, a user can deposit USD into the exchange via a bank transfer or credit card, and immediately buy Bitcoin, etc. from the exchange through the same platform. However,

centralized exchanges require users to trust the exchange both as a custodian of their funds, and as a counterparty to their trades. The exchange has full control of the private keys to the deposited funds, which creates counterparty risk, meaning that the users need to trust that the exchange will not misuse their assets, and will keep them safe and secure. We have unfortunately seen several high-profile failures in this area in recent years, ranging from outright hacks to embezzlement by management (see below). When a CEX is poorly managed or is hacked, users can lose assets – for example, the 2014 Mt. Gox hack where 850,000 BTC were stolen, or more recent cases of insider mismanagement. These risks are now starting to be mitigated by regulators in some countries for major exchanges. This means that exchanges are being required to set aside capital reserves, pass security audits, and comply with various financial laws. However, regulated or not, centralized exchanges are currently by far the most popular way for users to trade crypto, due to their convenience and liquidity. Binance, Coinbase, Kraken, and FTX (prior to its own collapse in 2022) are some of the most well-known centralized exchanges. In addition to trading crypto, these exchanges often provide a suite of related services such as futures, options, staking, lending, etc. The key benefits of a centralized exchange are liquidity, speed, and ease of use – come at the price of centralization: users cede some control and privacy in return. As one source put it, CEXs “require trust in an operator for fund security, price accuracy, trade matching, settlement, and monitoring”, and traders have no custody over their funds, instead trading through custodial accounts at the exchange. Decentralized exchanges, on the other hand, are exchanges that do not have any central intermediary to take custody of funds. Trades are executed directly on a blockchain, through smart contracts. Users control their own private keys, and store their funds in their own wallets, only interacting with the exchange’s smart contract in the moments when they want to initiate a trade. In the early days of DEXs (examples of early DEXs include EtherDelta in 2017), the exchanges typically used on-chain order books. The dominant model for DEXs today, however, is the Automated Market Maker (AMM), popularized by DEX platforms such as Uniswap and SushiSwap on Ethereum. In an AMM-based DEX, users trade against liquidity pools, as opposed to other traders via an order book. For example, on Uniswap, a liquidity pool for ETH/USDC pair will hold reserves of both ETH and USDC contributed by users (liquidity providers). The price is not determined by order book of posted buy and sell orders but algorithmically according

to a constant product formula ($xy = k^*$), where x and y are the reserves of the two assets. Thus, a trade that takes some ETH from the pool and adds some USDC to it will adjust the price of ETH/USDC according to the ratio of the two reserves. This constant product formula ensures that any trade against a liquidity pool is always possible, as long as the pool has some reserves of both currencies, and thus enables continuous liquidity. For a trade to happen it's no longer required for there to be a specific buyer and seller, and that quantity of both assets, willing to trade at the same time. AMMs are also used on other blockchains besides Ethereum. DEXs provide a non-custodial trading experience, which greatly reduces the risk of hacking at the exchange level (there are no centralized funds to steal; however, smart contract bugs or exploits are still a potential attack vector). DEXs also provide more privacy, as users typically do not need to register an account or KYC¹¹ to use a DEX – using a DEX can be as simple as connecting one's wallet app to it. Finally, DEXs are in the spirit of crypto in a more fundamental way: they are open, permissionless, and anyone can list their token simply by creating a liquidity pool for it. This makes DEXs a natural home for many new and experimental tokens that may be denied listing on big centralized exchanges. The downside of decentralized exchanges: they suffer from their own set of problems. Liquidity tends to be more fragmented (major pairs will have good liquidity, but more obscure pairs will have shallow pools and therefore high slippage). Transaction speeds and fees depend on the underlying blockchain (unavoidable when using a DEX on Ethereum during a congestion event, it can be slow and entail high gas fees), and without any central authority to bail users out, errors (such as sending funds to a wrong address or contract) are permanent. AMMs also have their own set of issues, such as impermanent loss for liquidity providers, as well as being subject to certain exploits. Despite their problems, DEXs have grown massively in recent years, in particular during the DeFi boom of 2020-2021. As of 2022, Uniswap was routinely processing volumes on par with major centralized exchanges for certain trading pairs. DEX technology is also rapidly evolving to improve performance and user experience. In summary, exchanges whether centralized or decentralized are a crucial component of cryptocurrency markets, serving as the bridges between different currencies, between crypto and fiat, and ultimately between various users and networks

¹¹ The regulatory process which verifies a user's identity via personal information and documents; usually required by centralized exchanges to comply with anti-money laundering legislation.

in the crypto ecosystem. Centralized exchanges provide a user-friendly, fast, and familiar way to trade at the cost of centralization and custodial risk, whereas decentralized exchanges enable greater autonomy and censorship-resistance but at the cost of some efficiency and ease of use. In terms of the industry's overall trend, the industry as a whole perhaps has a little bit of both: some users will be more comfortable with regulated centralized exchanges, while more sophisticated users and DeFi enthusiasts can use DEXs for greater control. It's also interesting to note that even centralized exchanges are starting to borrow DeFi-like features and vice versa for example, some centralized exchanges provide non-custodial trading options, while some DEXs are exploring hybrid models in order to improve performance. Overall, the space of exchanges exemplifies the larger theme of "new finance": new models of trading and finance that bypass traditional stock exchanges and banking systems, enabled by blockchain technology.

1.11 Legal regulation of the industry

The phenomenon of cryptoassets has developed with great speed, sometimes outpacing legal and regulatory responses. Cryptoassets at their inception were effectively in a state of regulatory arbitrage: they were difficult to pin down as a currency, a commodity, a security or other financial instrument (and still are, in many cases), and many aspects of activity (operating a crypto exchange, ICO¹², etc.) were legal grey areas. Over the last decade, regulators have become much more active on this front, going from early advisories and statements to enacting new, more formal, laws and regulations to try and oversee the space. Early statements in the 2010s from authorities, such as the European Banking Authority were mostly warnings to consumers about the risks of using cryptocurrencies and buying into ICOs. The European Central Bank (2012), in one of the first official studies on virtual currency schemes¹³, stated: "Bitcoin is a type of unregulated digital money, issued and usually controlled by its developers, and used and accepted among the members of a specific virtual community. It is not a legal tender, like the euro, which means that central banks and the governments do not stand behind it and

¹²A fundraising method in which a project sells newly issued crypto tokens to investors, often in exchange for established cryptocurrencies like Bitcoin or Ethereum

¹³ European Central Bank, *Virtual Currency Schemes* (Frankfurt am Main: European Central Bank, 2012)

do not guarantee its value.” Around the same time, FinCEN¹⁴ in the United States and similar agencies in other countries started issuing guidance and interpretative notices that established that certain actor in the cryptoasset space ¹⁵(exchanges, or money transmitters accepting and transmitting in crypto, for example) would be covered by the existing regulations on money service businesses. Later, during the large crypto market expansion of 2017-2018, authorities in various jurisdictions became more vocal. The European Supervisory Authorities (EBA, ESMA and EIOPA) published a joint consumer warning to EU residents in February 2018 on the “high risks of buying and/or holding so-called virtual currencies (VCs)”, highlighting in particular extreme volatility (VCs can be highly speculative and risk of bubbles); lack of specific EU regulation or investor protections; operational problems at crypto exchanges; and risks of fraud and other misconduct. In the United States, this period saw more active enforcement on fraudulent ICOs and related scams. After this, jurisdictions have begun moving in various ways toward clarifying the legal status of cryptoassets and subjecting them to financial regulation regimes. An important milestone and example of a cryptoasset regulatory framework is the European Union’s Markets in Crypto-Assets Regulation (MiCAR). MiCAR was first proposed in 2020 and adopted in 2023. It is one of the first comprehensive sets of rules for cryptocurrencies adopted by a major jurisdiction. MiCAR harmonizes rules on the issuance and offering of cryptoassets, as well as requirements for cryptoasset service providers (CASPs) including exchanges, custodians, and wallet providers, across all EU member states. The main provisions of MiCAR include transparency (crypto issuers must publish a white paper equivalent to a prospectus); disclosure of risks to investors; prudential and organizational requirements for CASPs (including capital requirements, operational standards, consumer protection); and specific rules for so-called “stablecoins” (asset-referenced tokens and e-money tokens in the regulation) including strict requirements on reserve management and supervision. The goal with these provisions is to provide a regulated framework for such activities, support innovation on these terms, and avoid problems like market abuse and collapses of poorly-managed crypto companies. MiCAR has entered into force in 2023, with a phased approach for the

¹⁴ A bureau of the U.S. Department of the Treasury responsible for safeguarding the financial system from money laundering, terrorist financing, and other illicit use

¹⁵ FinCEN¹⁵ in the United States and similar agencies in other countries started issuing guidance and interpretative notices that established that certain actor in the cryptoasset space

application of most rules starting in 2024-2025. MiCAR is not the only regulatory effort at the European level addressing cryptoassets. Global standard-setters have considered crypto in the context of AML¹⁶/CFT¹⁷ regulations. The FATF¹⁸ has issued recommendations¹⁹ for countries to regulate virtual asset service providers (VASPs) and implement the “Travel Rule” for transfers of cryptocurrencies (requiring identifying information to be shared for transfers between exchanges, analogously to bank wire transfers). Many countries have implemented these standards. For instance, the EU’s 5th and 6th AML Directives extended the AML obligations to crypto exchanges and custodial wallet providers. These apply know-your-customer and due diligence requirements (KYC), as well as transaction monitoring, and suspicious activity reporting obligations. By 2020, all major crypto-fiat exchanges had KYC procedures for their users. At a national level, different countries have also taken various approaches to this regulation, with some countries at times taking a stricter approach and outright banning some crypto activities. A major example of this is China. After years of tolerating and even sporadically regulating crypto mining and trading, the Chinese government introduced a ban on cryptocurrency trading platforms and mining operations starting in 2021, effectively criminalizing the use of foreign crypto exchanges or Bitcoin mining by Chinese residents. The government cited reasons including financial stability, risk of fraud, energy waste, and capital outflows. In another approach, Japan has moved to regulate crypto by introducing a licensing regime for crypto exchanges in the country as early as 2017 – Japanese exchanges have to register with the FSA and are subject to many rules (segregation of customer assets, cybersecurity, etc.). Japan also legalized Bitcoin and certain other cryptoassets as a kind of property value usable for payments (but not “legal tender”, leaving the legal technical status of certain other cryptos a bit unclear) as early as 2017, which at least in theory clarified their legal status. In the United States, a patchwork of different agencies have applied their existing authorities to crypto, while legislative proposals have also been percolating but not yet resulted in comprehensive

¹⁶ Regulations and procedures that are intended to keep criminals from making illegally obtained money appear to be from a legitimate source.

¹⁷ Regulations and measures that are used to stop and detect the flow of funds for terrorist activities.

¹⁸ An intergovernmental body that sets international standards to combat money laundering, terrorist financing and related threats to the integrity of the financial system.

¹⁹ Guidance for a Risk-Based Approach to Virtual Assets and Virtual Asset Service Providers. Paris: FATF, June 2019.

laws: the SEC (Securities and Exchange Commission) has targeted many token issuers and crypto exchanges for unregistered securities offerings (interpreting many crypto tokens as securities under the Howey test²⁰), the CFTC (Commodity Futures Trading Commission) considers Bitcoin and Ether as commodities and has regulated derivatives markets based on them, and the IRS²¹ treats crypto as taxable property (subject to capital gains tax). The US banking regulators have also issued guidance on how banks can engage with crypto (for example, for a period the OCC²² allowed banks to custody crypto or use stablecoins for settlement). In some states, like New York, special licenses (the “BitLicense”) are additionally required for crypto businesses. This fragmented regulatory environment is currently in flux, with a number of proposals in Congress to more formally bring exchanges and stablecoin issuers under federal oversight. The approach of El Salvador in 2021, making Bitcoin legal tender via the Bitcoin Law, is an outlier but an interesting development: the law required businesses to accept Bitcoin for payment and effectively placed Bitcoin on par with the dollar in the country. This has created a number of complex international law issues (how IMF or other countries view El Salvador’s Bitcoin reserves, for example), but also raised consumer protection and other questions (the government had to issue a wallet and educate citizens on volatility and usage, for instance). Taxation is another area of legal regulation. In the early years, most tax codes were silent on crypto and its use was an interpretative question. Jurisdictions are increasingly providing guidance on taxation of cryptoassets: typically, trading crypto for fiat or spending crypto for goods are taxable events (capital gains). However, some countries have more favorable regimes (Germany for instance after a one-year holding period, crypto gains can be tax-free for individuals; Portugal had historically lenient tax treatment of individual crypto gains, but that is changing). Italy, in its 2025 Budget Law, updated the crypto framework: Art. 1, comm 23 et seq. of the law, confirmed that a crypto-asset was to be understood as "a digital representation of value or rights that can be issued, transferred and stored electronically, using distributed ledger technology or similar technology"; the same provisions eliminated the previous €2,000 exemption threshold

²⁰ A legal test created by the U.S. Supreme Court to decide whether a particular transaction can be deemed an “investment contract” and thus a security under U.S. law.

²¹ The U.S. government agency in charge of tax collection and tax law enforcement, which currently classifies cryptocurrencies as taxable property subject to capital gains tax.

²² A bureau of the U.S. Department of the Treasury that supervises and regulates national banks and federal savings associations.

and established that all capital gains from crypto trading were to be taxable, at a 26% flat tax in 2025 and 33% from 2026, introducing a one-off option to revalue holdings as of 1 January 2025 by paying an 18% substitute tax. This is one example of how countries are starting to define how crypto fits into existing legal categories and can be taxed. Consumer and investor protection law are also areas where regulators are stepping in. Misleading and overstated advertising of crypto investments is one area of concern, and proper risk disclosures are a focus for regulators. And like other parts of the market at times, the retail frenzy and speculation around cryptoassets have drawn attention from authorities. There have been numerous enforcement actions on fraudulent crypto schemes and Ponzi-like operators hiding behind a crypto facade. In the EU, MiCAR will require crypto-asset white papers to provide key information for investors, similar to a prospectus for securities. Retail crypto derivatives and leveraged trading have been either banned or tightly restricted for customers in many jurisdictions, deemed too risky. In summary, legal regulation of the cryptocurrency industry is heading toward greater clarity and some degree of supervision, but at a different pace in different regions. Earlier regulatory statements by authorities (crypto as an unregulated, risky asset, speculative, not a currency, etc.) are gradually giving way to more formal regulation, both international and at national levels. The aim of regulation is to enable the development of the industry and the potential uses of cryptocurrency and blockchain technology, but with rules that mitigate the risk to users and overall financial stability. This process of giving legal form to crypto and blockchain is likely to continue and be refined further in the coming years (2025 and beyond), including through harmonization of international standards (via IOSCO, BIS, FATF, etc.) and countries adapting their laws as the industry grows and changes. Crypto companies that previously operated in the grey area of the financial system are increasingly turning to regulators and seeking licenses (many crypto exchanges have been registering under securities or banking laws where they fall within their jurisdictions, for example). In this sense, regulation is likely one important step in this industry's path toward more widespread use and greater interconnection with traditional finance. However, it will remain an active area as regulators also face new niches that crypto innovators continue to develop, such as decentralized finance (DeFi) and non-fungible tokens (NFTs), which raise additional questions for law and policy.

CHAPTER 2: THE EL SALVADOR CASE (ANALYSIS OF THE BITCOIN EXPERIMENT 2021-2025)

2.1 El Salvador: Geographical, Economic and Geopolitical Background

El Salvador is Central America's smallest and most densely populated country, with roughly 6.3 million residents. The nation is closely integrated with the United States, its major trade partner, as well as remittances from the US-based Salvadoran diaspora. El Salvador became an officially dollarized economy when it adopted the US dollar as legal tender (replacing the Salvadoran colon) in 2001, in an attempt to stabilize and rebuild public trust in the monetary system after years of civil war and economic turbulence. The move to officially adopt the dollar, known as dollarization, resulted in relatively low inflation and monetary stability, though at the cost of surrendering its own monetary policy. Dollarization's costs and benefits are debated; some studies find the macroeconomic stability gains from dollarization came at relatively low short-term costs, given El Salvador's characteristics as a small open economy, while others found the promised increases to investment and growth did not materialize in a clear way. Economically, El Salvador has seen slow growth and significant development challenges over the decades. On average from 2000 to 2023, GDP growth has been a modest 2.1% per year. The economy has low productivity and investment, and it has seen only gradual progress on living standards. Official poverty rates are high – around 30% of the population were below the national poverty line in 2023 (up from 26.8% in 2019, in part due to the pandemic). However, income inequality is moderate by regional standards (Gini coefficient²³ ~0.40). A large portion of the workforce is employed in informal or

²³ A statistical measure of income inequality within a population, ranging from 0 (perfect equality) to 1 (maximum inequality)

low-wage jobs, and there is significant emigration as Salvadorans seek better opportunities abroad. The Salvadoran diaspora especially in the United States is an important driver of the economy, through remittances. Remittances are a vital pillar of the Salvadoran economy, consistently making up 20–25% of GDP in recent years. In 2021, remittance inflows equated to roughly 26% of GDP – one of the highest remittance ratios globally. These remittances sent home by Salvadorans abroad support household consumption and provide foreign exchange for the economy. But this is one part of the economy that has traditionally been highly intermediated and taxed via money transmitters with substantial fees. For example, in the second quarter of 2023, the average fee for sending a \$200 remittance from the United States to El Salvador was 4.3% (about \$8.60). Although a few percentage points may not sound substantial, these fees have long been a concern given their sheer scale: it is estimated that intermediaries were earning around 1% of El Salvador’s GDP in remittance fees per year. For this reason, reducing remittance costs has long been seen as a development priority to unlock resources for Salvadoran families. Financial inclusion in El Salvador is low, which is part of the rationale for looking for digital finance solutions. About 70% of Salvadorans do not have access to traditional bank accounts or financial services. This means a large part of the adult population is unbanked, including much of the rural poor and informal sector workforce. Successive governments have recognized that extending access to financial services is a necessary condition for inclusive economic growth. Prior to 2021, some efforts to improve access had been made (e.g. expanding microfinance, mobile banking) but had not achieved broad reach. With widespread mobile phone ownership, there was an obvious platform to reach most Salvadorans with digital financial services, but the existing conventional banks had not successfully reached the unbanked population with much coverage. Geopolitically, El Salvador has long been closely tied to the United States, but it also has regional security and economic concerns. El Salvador suffered a 12-year civil war (1979-1992) before transitioning to electoral democracy. Since then, politics has been mostly competitive but dominated by two parties: the right-wing ARENA and the left-wing FMLN. Issues such as corruption, crime, and stagnant economic growth under both governments eroded popular faith in the political class. Gang violence and crime were major social problems (most infamously the maras such

as MS-13²⁴) by the 2010s, making El Salvador one of the world’s most violent countries. This insecurity hurt investment and continued to drive emigration. The extreme gang violence was also one reason past Salvadoran governments have cooperated so closely with the United States on security and accepted aid billions of dollars from the US government in recent years, but that has not led to decisive improvements. By the late 2010s, El Salvador was in a somewhat precarious situation: its economic performance was lagging, public debt was high and growing (70% of GDP by 2020, heading towards 90% of GDP by 2024), and international pressure for stronger democratic governance and rule of law was building. But there were some positive trends as well. Adopting the US dollar and otherwise exercising prudent macroeconomic management had maintained low inflation and a degree of investor confidence in the country’s stability. El Salvador had a history of meeting its debt obligations, but its lack of monetary independence meant it was reliant on external financing and growth to finance deficits. In 2021, El Salvador sought an IMF Extended Fund Facility loan worth around \$1.3–\$1.4 billion to help manage its obligations. But that potential agreement was complicated by an imminent monetary experiment, making Bitcoin legal tender.

2.2 The Nayib Bukele Presidency and Related Controversies

Nayib Bukele has been El Salvador’s president since June 2019, coming to power as a young, populist outsider promising a “new era” for the country. Bukele, who had previously been mayor of San Salvador, won the 2019 election in the first round with 53% of the vote, breaking the previous three-decade duopoly of ARENA and FMLN. Bukele was 38 years old when he was elected – the youngest president in El Salvador’s modern history – and he has marketed himself as a modern, media-savvy reformer different from the traditional parties. His campaign tapped into public discontent with corruption, crime, and lack of economic opportunity. Bukele’s victory (running as a small new party after being expelled from FMLN) was a signal that the public wanted change and helped him gain a strong mandate from the electorate. Despite his popularity,

²⁴ A Los Angeles-originated and then Central America-based transnational criminal gang of the 1980s that was known for its extreme violence and for organized crime.

Bukele's actions as president have demonstrated serious democratic backsliding and authoritarian instincts. In February 2020, early in his term, he deployed armed soldiers in the Legislative Assembly to force congressmen to approve a loan for security equipment. He sat in the assembly chamber with troops blocking the doors, an intimidation tactic unprecedented in the post-war period. The entire episode, essentially using force to override legislative independence, set an alarming precedent and was a foretaste of Bukele's disregard for institutional checks on his power. Bukele then consolidated power after the February 2021 legislative elections, when his new party Nueva Ideas (New Ideas) won an absolute supermajority in the Assembly. New Ideas and allied parties took about 56 of the 84 seats (2/3+), giving Bukele's movement control of virtually all the government for the first time since democratization. Bukele quickly used his dominance of the legislature to purge the top of the country's highest court (the Constitutional Chamber of the Supreme Court) on May 1, 2021. The Legislative Assembly ousted the five magistrates (Attorney General as well) of the chamber in one night, with a simple majority vote and no technical vetting, and replaced them with new ones. The packed court, which now has Bukele appointees, almost immediately ratified the summary removals in a ruling seen as legitimizing a self-coup. The United States criticized the maneuver as a "strategy to undermine judicial independence" and a major setback to the rule of law. Bukele has rationalized it as necessary to eliminate corrupt or obstructive officials, and his polling at the time showed he had the public on his side. Surveys indicated over 70% of Salvadorans actually supported the magistrates' removal, showing how the public was fed up with the status quo institutions and believed in Bukele's reform rhetoric. With the judiciary and legislature now firmly in his pocket, Bukele has amassed an unprecedented concentration of power in the executive branch. A key result is that he can now push through any initiative with minimal scrutiny or debate. Bukele was thus able to quickly pursue his agenda, including the audacious Bitcoin experiment, with effectively no institutional opposition. Later in 2021, the Bukele-aligned Constitutional Chamber also issued a surprise ruling in which it interpreted the constitution to allow for presidential re-election in consecutive terms. This overturns a longstanding ban on immediate re-election in the constitution and is a gift to Bukele, who can now run in the 2024 elections. It directly violates Article 152 of the Salvadoran constitution, which is one-term limit only and has long been understood as no re-election. The U.S. Embassy

condemned the ruling as “unconstitutional” and proof that “democracy in El Salvador is on the edge of the abyss”. But the electoral authorities quickly accepted the ruling and Bukele then announced he would indeed run in 2024, entrenching concerns about an emerging personalist regime. Another feature of the Bukele presidency has been an iron-fisted, militarized response to gang violence. While this draconian approach has tamed crime (homicide rates fell to all-time lows in 2022–2023), it has come at the expense of civil liberties and basic human rights. In March 2022, after an uptick in homicides, Bukele’s government declared a state of emergency (*régimen de excepción*) that suspended certain constitutional rights. This emergency has been extended several times and as of the end of 2023 was still in effect. Under it, the government has detained over 70,000 people for alleged gang affiliation – about 1% of the adult population – often without due process. The prisons are now at the highest incarceration rate in the world, and a new “mega-prison” has been built to hold 40,000 inmates. While the government claims credit for its success in virtually ending the rampant gang violence that plagued the country in 2019–2021, human rights groups like Amnesty International and Human Rights Watch have documented large-scale arbitrary detentions, torture, and deaths in custody from the sweeping policy. The *estado de excepción* has weakened judicial protections: most of the detainees are being held in indefinite pre-trial detention, and the legislature even authorized mass trials to process the large number of cases. Bukele’s heavy-handed anti-gang campaign, carried out with extensive militarization and many credible reports of abuses, has been decried as exchanging civil liberties for security. The policy is nonetheless hugely popular domestically – Bukele’s poll numbers surged during the crackdown and he has consistently maintained approval ratings above 80%, reflecting how much Salvadorans have welcomed the fall in violence. To summarize, Bukele’s presidency (2019–2024) has been characterized by the centralization of power and backsliding on liberal democratic norms. Checks on the executive – including from the legislature and courts – have been sidelined or neutralized. Bukele instead rules largely through executive decrees and Twitter. Journalists and civil society face harassment and surveillance: for example, reporters who have investigated corruption or criticized the government have reported intimidation, and digital forensics showed that dozens were infected with Pegasus spyware in 2020–2021. The government has also been opaque in its management of public funds, including those used for the Bitcoin project (treating the

state Bitcoin wallet operations as a state secret not subject to transparency laws). Bukele’s authoritarian tendencies have strained El Salvador’s relationship with traditional partners like the United States. The Biden administration 2021–22 made public statements of concern over the democratic backsliding and even put some of Bukele’s associates on corruption watchlists. Bukele responded defiantly, at one point ironically self-describing himself as the “coolest dictator in the world” in a social media post. Despite these controversies, Bukele is extremely popular at home, seen as a decisive leader who is getting results. His style has been dubbed “millennial authoritarianism” by some observers, blending classic populist strongman politics with social media fluency and a youthful anti-establishment image. This strong domestic control over political life has given Bukele the leeway to try risky and controversial policies that would have been unthinkable in previous governments. The most notable of these policy experiments has been the adoption of Bitcoin as legal tender in 2021. Bukele’s control of the legislature and other institutions has allowed him to implement the Bitcoin experiment from the top down with effectively no domestic oversight – even as it raises questions and resistance abroad. It is thus important to understand the political context of the Bukele government when thinking about how and why the Bitcoin legal tender project was launched and how it has developed under conditions of both support and controversy.

2.3 The Law of 9 June 2021 to Adopt Bitcoin as Legal Tender

On June 9, 2021, El Salvador’s Legislative Assembly passed with relative haste the law to make Bitcoin legal tender in El Salvador (alongside the dollar), officially known as “Ley Bitcoin” or “Bitcoin Law”. With 62 out of 84 deputies voting in favor (a supermajority given over by Bukele’s allies), the bill was adopted after a few hours of debate, only days after the idea was first floated by President Bukele. El Salvador thus became the first country in the world to give a cryptocurrency official currency status. The move was as audacious as it was polarizing: on the one hand, during the parliamentary session and in the days leading up to it, opponents in the legislature and outside in the financial community warned the law would have negative impacts on

financial stability and El Salvador's IMF loan talks. On the other hand, buoyed by his supermajority, Bukele had little trouble getting the bill through parliament. Genesis and Rationale: The Bitcoin Law was of Bukele's own making and was introduced in a highly unusual way. On June 5, 2021, Bukele unexpectedly announced during a video address to a cryptocurrency conference in Miami that El Salvador would adopt Bitcoin as legal tender. This move surprised many – including, by his own admission, some members of his cabinet and Central Bank – as there had not been any prior public consultations or impact studies preceding the decision. Bukele emphasized that the new cryptocurrency would be a nation-branding innovation and ignite economic growth. He argued the adoption of Bitcoin would make remittances cheaper and faster, serve to bring financial inclusion to those without bank accounts, and bring investment and tourists from the crypto industry. Indeed, during the tweetstorm around the bill's passage, Bukele himself also asserted that Bitcoin adoption would “bring financial inclusion, investment, tourism, innovation, and economic development for our country”. These claims about the benefits of Bitcoin were not completely new, but were echoed in the preamble to the Bitcoin Law itself, which noted ~70% of Salvadorans were not part of the formal banking system and that the state therefore had a responsibility to enable their financial inclusion. The preamble also alluded to the cost of remittances (26% of GDP) and noted that Bitcoin could be used to make sending money “cheaper and faster” for Salvadoran diaspora and their families back home. In short, the official rationale for the Bitcoin experiment combined social goals (bringing the unbanked into the financial system) and economic goals (boosting growth with investment and lower transaction costs). Key Provisions of the Bitcoin Law: The Bitcoin Law is a short law, 16 articles in all, that formally established Bitcoin as an official currency in El Salvador and set forth the basic regulatory and practical framework for its use. The main stipulations were as follows:)Legal Tender Status: Bitcoin was defined as “unrestricted legal tender” in El Salvador, with liberating power for all debts. In practice, this put Bitcoin on an equal legal footing with the US dollar. *Article 6* of the law did make a qualification that for accounting purposes the US dollar would remain the “reference currency” for record-keeping and financial reporting, and companies would be able to report in USD in their books. However, the law was meant to enable the use of Bitcoin for everyday transactions as an accepted currency.) Mandatory Acceptance: *Article 7* was to become one of the most controversial of the law

– it established that “every economic agent must accept Bitcoin as payment when it is offered by a purchaser of a good or service”. In other words, every single business or seller in El Salvador would be legally obliged to accept Bitcoin as payment if offered, save in the narrow circumstances where they genuinely did not have the technology to do. This forced tender clause is a curious one – even when countries adopt a currency as legal tender, that does not always automatically translate into a legal obligation to accept it. The law did make one important exception, namely Article 12 which specifically exempted from the acceptance requirement those who “by evident and notorious fact” did not have access to the internet or a smartphone and could not receive or make Bitcoin payments. Nonetheless, the Bitcoin Law’s general obligation on all businesses to accept Bitcoin was a high-stakes move in essence nudging an entire economy onto a new crypto currency.)Taxation Rules: The law made several provisions about Bitcoin’s tax treatment. Article 4 for example stated that taxes can be paid in Bitcoin if the taxpayer so desires. Article 5 further clarified that exchanges between BTC and USD would not be subject to capital gains tax. This is to be expected since as a currency, Bitcoin does not incur capital gains. This capital gains exemption was also meant to serve to incentivize foreign crypto investors and entrepreneurs to come and set up shop in El Salvador; if your Bitcoin holding goes up in price, you do not have to pay tax on the capital gain in El Salvador. Moreover, as part of the wider incentive package to attract investment, President Bukele announced separately that El Salvador would grant fast-track permanent residency, even citizenship, to foreign investors who put a minimum amount into the country – specifically, if you invest 3 BTC (Bitcoin) in El Salvador you qualify for residency.)Convertibility Guarantee: The law took on board that Bitcoin’s volatility is a major challenge for its use in everyday transactions and for businesses that are accepting it. To tackle this, Article 8 and Article 14 jointly set up a so-called convertibility guarantee mechanism. The government promised to automatically and instantly convert Bitcoin to US dollars upon demand for a user or a merchant. This was put into practice by the creation of a special \$150 million trust at the state development bank (*Bandesal*). This trust, variously called *FIDEBITCOIN* or *Chivo Trust*, would serve as liquidity pool: if a shopkeeper for example is paid in Bitcoin but fears it will go down the next second, they can immediately exchange it for the equivalent USD from the trust. The government would bear the exchange risk and hold the Bitcoin. The \$150 million was communicated

by officials as an initial endowment for this trust – that is, an initial allocation by the government. That number, around 2% of annual government budget, signals a strong public commitment to backstop this experiment. The law gave the Executive Branch the power to establish any institutional framework necessary for the implementation of the law (Article 10). This of course implicitly includes setting up this trust and the corresponding operations.)Effective Date: The Bitcoin Law included a short deadline for coming into effect. Article 16 simply stated the law would enter into force 90 days after publication in the Official Gazette. Given that publication date of June 9, 2021, the start date was set to be September 7, 2021. This left the government with a three month period to put in place the necessary digital and regulatory infrastructure for using Bitcoin in practice and in effect to become the new currency in the economy, a rather ambitious timeline. Immediate implementation and international response: following the bill’s passage, the Bukele administration scrambled to set up a national Bitcoin ecosystem. The government created a digital wallet platform Chivo (Salvadoran slang for “cool”) to operationalize Bitcoin in practice. Chivo, introduced by a newly created state-owned entity, was envisaged as a convenient mobile wallet for citizens to use to make their Bitcoin transactions, and designed to enable instant convertibility between BTC and USD. To promote adoption, Bukele stated that each citizen that downloaded the Chivo wallet will receive \$30 in Bitcoin from the government. The budgetary costs of this incentive, potentially for millions of users, were up to \$75 million from the treasury if all signed up. These funds were provided out of public budgets and indeed, some questioned the legality of this spending given the lack of any specific legislative appropriation for this incentive. The government also installed a network of *Bitcoin ATMs* and point of sale machines across the country and even in some U.S. cities with large Salvadoran communities, to enable people to deposit or withdraw cash against their Chivo wallets. The international reaction to El Salvador’s Bitcoin Law was swift and divided. Crypto evangelists around the world welcomed it as a major breakthrough for cryptocurrency adoption, and a number of prominent crypto figures made moves to relocate or expand business to El Salvador. At the other end of the spectrum, major banks and multilateral development agencies were far more skeptical and wary. The World Bank declined El Salvador’s request for technical assistance to help it implement Bitcoin as legal tender, citing transparency and environmental concerns with Bitcoin mining. The IMF, which

was in negotiations with El Salvador over the IMF loan, offered a guarded reaction. An IMF spokesperson pointed out the “macroeconomic, financial and legal issues” raised by the Bitcoin Law, and later the IMF Executive Board went further in formally urging El Salvador to “narrow the scope of the Bitcoin law by removing Bitcoin’s legal tender status.”. In a review of El Salvador’s policies in January 2022, IMF directors went further citing “large risks associated with the use of Bitcoin on financial stability, financial integrity, and consumer protection, as well as the associated fiscal contingent liabilities” and warned that continuation on this course could threaten the IMF loan. Moreover, global credit rating agencies reacted negatively as well: Moody’s²⁵ downgraded El Salvador’s sovereign credit rating in July 2021, explicitly citing the Bitcoin law and Bukele’s fiscal management as new factors that raise risks for bondholders. S&P and Fitch ²⁶also downgraded or issued warnings, also to reflect investor concerns at El Salvador’s unorthodox economic decision-making. Among the general population, the announcement of the Bitcoin Law had been made with no public consultation in advance. Polls showed that most Salvadorans were skeptical or opposed to Bitcoin. A survey by the Universidad Centro Americana (UCA) in late August 2021 found that ~68% of Salvadorans disagreed with the decision to make Bitcoin legal tender and 90% did not have a clear idea of what Bitcoin was even. Thousands of protestors gathered in the capital San Salvador on 7 September 2021 to protest the Bitcoin rollout. The protestors included retirees, workers, opposition groups, and grievances against the Bitcoin rollout ranged from the lack of transparency in how the law was drafted and the Chivo system built, to complaints that public money was being used to buy Bitcoin ,which they saw as a speculative, volatile asset or used by the elites. Some demonstrators burned a Bitcoin Atm and waved signs saying “No to Bitcoin” or that Bukele was a dictator. This domestic backlash underscored that, to many citizens, the Bitcoin experiment was being imposed from above in the service of Bukele’s international profile, and was not a grassroots demand. Despite the law now being in effect, Bukele and the administration continued with their plan, leading El Salvador into uncharted monetary waters. Under the mandate of the Bitcoin Law, prices could be displayed in Bitcoin, taxes could be paid in Bitcoin,

²⁵ A United States-based credit rating agency that rates the creditworthiness of sovereign and corporate borrowers globally.

²⁶ Two other major international credit rating agencies that evaluate the financial strength of issuers and the risk of default on their debt.

and all economic agents would be required to accept Bitcoin when offered, though in practice as we will see later in this paper enforcement of this latter requirement has been extremely weak. The strong backing of the government and state institutions (the convertibility guarantee, the user incentive, and so on) gave the experiment initial momentum. President Bukele celebrated the first “*Bitcoin Day*” on September 7, 2021, by announcing that El Salvador had purchased its first 400 Bitcoins (BTC), worth around \$20 million at the time, to hold in reserve. Over the subsequent months, the government continued buying at each dip in price, and Bukele would often tweet announcements of further purchases by the public treasury. As of January 2022, El Salvador had amassed at least 1,801 BTC in its reserve, with an average purchase price of around \$90,000, suggesting a total spent of \$85–90 million in treasury funds. To summarize, the Bitcoin Law of June 9, 2021, was a watershed moment for lawmaking in El Salvador. By one piece of legislation, it instantly transformed the monetary and regulatory landscape, made El Salvador the first in the world to embrace a cryptocurrency on a national scale, and gave itself a very ambitious legal mandate to integrate Bitcoin into society and the economy. The law’s articles established a bold but experimental legal framework for this integration that required acceptance of Bitcoin and put trust in a combination of new technology, the Chivo wallet, and government support (trust fund, convertibility promise, and education/training) to overcome obstacles.

2.4 Incentive decisions taken by President Bukele for the adoption of Bitcoin

A series of support measures and incentives followed to spur Bitcoin adoption. Many of these were launched in the lead-up to and following the BTC Law in June–September 2021, and continued in 2022 as well. The combined policy package consisted of direct and indirect inducements to adopt and use Bitcoin, including free BTC for citizens, fuel subsidies for the BTC-wallet, exemptions from capital gains tax, a visa program, direct marketing by Bukele and more. The following list is not comprehensive, but highlights many of the most discussed steps and interventions, including more recent moves that reinforce the earlier measures.)\$30 Bitcoin “Signing Bonus” through Chivo Wallet: The

primary direct incentive offered to citizens was \$30 worth of Bitcoin that the government said would be deposited in every Salvadoran's official Chivo digital wallet, upon registration and verification of their identity through the app. As \$30 is a significant amount in a lower-middle-income country where minimum wage monthly salaries were roughly \$300, this "digital airdrop" had the potential to encourage rapid onboarding and a positive first experience with Bitcoin in a way that simply mandating it as legal tender could not. Essentially, it was a bounty to download the app and get used to Bitcoin transactions. Bukele claimed in late September 2021 that over 2 million Salvadorans (about a third of the adult population) had downloaded the Chivo app and claimed the \$30 BTC bonus. The veracity of the \$30 airdrop figures was doubted by some, but it is undeniable that the free BTC incentive resulted in many millions of wallet downloads in the first few weeks of release (matching the installed base of registered Salvadorans the company reported). The total program's cost was around \$75 million, capped if 2.5 million people claimed the bonus, and was funded from a government trust. The free money undeniably succeeded in its goal of getting people to download the app, initially spiking the wallet's adoption numbers (monthly active users, number of transactions, dollar volume). As we will see later, data and interviews from later months revealed that many who downloaded Chivo did not keep the app and instead cashed out the \$30, the bonus may have worked as a giveaway rather than as a long-term adoption driver.)Zero Capital Gains Tax & Investment Incentives for Bitcoin: For the purposes of investment and financial entrepreneurship, the government emphasized the tax-free nature of Bitcoin as legal tender. Since Bitcoin and any profits in BTC were declared tax-exempt as currency, El Salvador became a potentially attractive locale for crypto traders or companies that would otherwise pay capital gains tax on the trading of other foreign currencies. By exempting Bitcoin from a capital gains tax, the Salvadoran government positioned the country as a tax-free haven for cryptocurrencies and related financial products (businesses using Bitcoin as a payment method are a different matter). This became a sort of "golden visa" or at least a form of tax arbitrage open to the crypto-rich: by lowering the barriers to entry, the country hoped to draw an influx of digital nomads, tech startups and financiers who would put money into the Salvadoran economy. Indeed, in the wake of the Bitcoin Law, several well-known figures from the international crypto scene visited or moved to El Salvador, in part attracted by the government's crypto-

friendly rhetoric and by the various incentives listed here.)Fuel Subsidy for Bitcoin Payments (Bitcoin City): In October 2021 the Bukele government announced and implemented a further incentive to encourage everyday use of the Chivo wallet: a fuel subsidy of 20 cents per gallon for gas purchases made with the Chivo wallet . Announced via a tweet by Bukele, the policy was applicable to anyone, not just Chivo wallet users: individual drivers or businesses that paid for petrol at participating gas stations using the Chivo wallet would save 20 cents per gallon, with the government reimbursing the gas station for the lost margin. Bukele introduced the subsidy as relief to the citizenry amid rising global oil prices, but conditioned it on Chivo/Bitcoin usage. There was no announced limit on the size of the discount, theoretically creating a large potential subsidy for heavy fuel consumers, and the discount was available to all citizens regardless of whether or not they signed up for Chivo and got the \$30 bonus. This consumer incentive directly cost the government and was therefore another form of subsidy with public funds, but unlike some other policies was a mechanism to incentivize real, frequent transactions in Bitcoin. Critics noted that the subsidy was paid “by all taxpayers” and wondered why the government did not just lower the general fuel price instead. The policy’s initial expiration date was reportedly on 15 November, so it provided a reason for drivers and fuel-hungry transport and delivery businesses at least to try out paying in Bitcoin, at least while the subsidy was in place.)Volcano Energy (“Bitcoin Volcano”) and Mining Bitcoin: Bukele also linked the Bitcoin Law to a project to leverage the country’s untapped geothermal energy resources for Bitcoin mining. He ordered the state-run geothermal energy company “*LaGeo*” to set up mining facilities, powered by renewable energy from geothermal volcanoes. *LaGeo* had a subsidiary specializing in geothermal energy production from volcanoes, called *LaGeoGeo*, and it was *LaGeoGeo* that Bukele tapped to get Bitcoin mining started in the country. The concept of a “Bitcoin mining hub” that would run on “energy from our volcanoes” (the idea quickly became known as the “Bitcoin Volcano”) was presented by Bukele alongside the Bitcoin Law and the new BTC Office. By mining Bitcoin using geothermal energy, Bukele promised El Salvador could turn energy surplus into digital assets and “more than fully” integrate Bitcoin into the economy. This idea was largely symbolic and aspirational at the time, but was useful to signal to the crypto community that El Salvador planned to support the Bitcoin ecosystem throughout the value chain, not just by accepting it as legal tender, but by building out a

Bitcoin mining industry in parallel. A pilot mining project was reported underway at a geothermal plant by the end of 2021, and by 2022 the government reported some “small-scale” Bitcoin mining already underway using volcanic geothermal energy; no official data or even estimates of mining capacity were ever released. It was a modest amount of mining at the start, but potent symbolism for Bitcoin advocates, helping to solidify the image of El Salvador as a “crypto-friendly” jurisdiction.)“Bitcoin City” Plan and Volcano Bonds: In November 2021, Bukele held a dramatic press event to announce Bitcoin City, a new city near the Conchagua volcano that he said would be built with Bitcoin funding and dedicated to crypto innovation and businesses. Bitcoin City was to be a new special economic zone with an attractive tax regime: Bukele said it would have “zero income tax, capital gains tax, no property tax, no payroll taxes” – just a VAT²⁷ would be levied to fund the city’s infrastructure. It would tap the geothermal energy from the volcano to power itself and host extensive Bitcoin mining. To fund Bitcoin City’s construction, in addition to the existing Bitcoin purchases, the government would issue \$1 billion of new sovereign bonds denominated in USD but tokenized and sold to crypto investors, known as the “*Volcano Bonds*” after their connection to the volcano energy project. These 10-year sovereign bonds were to have half their proceeds (\$500 million) earmarked for the city’s infrastructure and the other half for buying more Bitcoin, which would then be locked for 5 years. The bond’s investors would share in dividends from the Bitcoin sales after year 5, and perhaps from the economic growth of the city as well. The Volcano Bond concept, pitched by the Salvadoran government in partnership with blockchain firms like Blockstream was a novel but risky idea to source external financing for the government from the crypto markets, particularly at a time when the government was having limited success in conventional sovereign debt markets of European and US in late 2021. The mere announcement of the Volcano Bonds concept itself jolted traditional investors – in December 2021, after Bukele’s Bitcoin City speech, the prices of El Salvador’s existing Eurobonds fell sharply, and one Eurobond’s market value declined by about 30% within days. This volatility reflected doubts about the plan’s credibility and concerns that embracing unorthodox sources of funding would make the country less attractive to traditional lenders. Issuance of the Volcano Bonds was

²⁷ Is a consumption tax on the value added at each stage of the production and distribution of goods and services, ultimately passed on to the final consumer.

postponed several times into 2022 due to “market conditions” after the crypto crash, and the first tranche of Volcano Bonds was only issued in 2023, after the IMF had left the country.)Supportive Institutions and Regulatory Framework: In addition to Bitcoin-specific inducements, Bukele’s government began to create an institutional and legal infrastructure to support the crypto ecosystem. In November 2022, a new Bitcoin office was created, the National Bitcoin Office (*ONBTC*), by means of a legislative decree. The *ONBTC* was headed by a cryptocurrency advocate, and functioned in a promotional and advisory capacity, marketing El Salvador’s Bitcoin story to the outside world and coordinating various Bitcoin initiatives across government agencies. In early 2023, the Legislative Assembly passed the Digital Assets Issuance Law, which provides the regulatory framework to issue other cryptocurrencies or tokens in El Salvador. This law also establishes a new regulatory agency “*The National Commission for Digital Assets*” to oversee the nascent industry. The Volcano Bonds, discussed above, were issued under the authority of this new law which is explicitly meant to enable the government to issue Volcano Bonds, although there are also provisions for the ICO of other digital assets. This was also the law that laid the ground for plans to offer additional crypto-related financial products in the future. In April 2023, a third law was passed: the *Innovation and Technology Manufacturing Incentives Act*, which essentially exempts investments in technology and innovation such as software, hardware manufacturing, AI, and blockchain from income tax, capital gains tax, municipal taxes and import duties. While this law is not directly about Bitcoin, it is part of a larger trend in El Salvador under Bukele to use tax policy to make the country extremely attractive to tech and blockchain companies. Bukele’s earlier law that exempts all companies from income and payroll taxes also applies to software development and hardware manufacturing. Taken together, Bukele’s government was working to create one of the world’s most welcoming regulatory and tax environments for crypto/blockchain and related technology companies: as favorable as possible to attract global investment and expertise.)Further Purchases & Rhetoric from Bukele: In addition to the tangible incentives above, Bukele himself became an advertisement for Bitcoin adoption. He repeatedly changed his Twitter profile picture to an image of his own eyes with a laser-beam effect, tweeted “*Buy the dip*” when BTC prices fell and announced further Bitcoin purchases by the government on Twitter, often timing BTC purchases during dips to signal government conviction. For example, in late

2021 he tweeted about buying 150 BTC at one such dip, and during a large bear market in mid-2022 he purchased 80 BTC at around \$19k each, with the comment “El Salvador bought the dip”. In October 2022, as Bitcoin’s price fell sharply in a prolonged crypto bear market, he announced that the government would begin buying 1 BTC per day in a dollar-cost-average strategy to build its position over time. These gestures, while indirect, were also designed to shore up the public’s confidence in the project and make people believe that the government had skin in the game and long-term faith in Bitcoin. Bukele’s near-constant promotion and marketing of Bitcoin, in combination with the more direct inducements above, was part of a branding campaign to establish El Salvador as the “Crypto Capital” of the world. In the following section we will turn to the opposition, criticism and risks that have emerged around the initiative. Many economists, technologists and Salvadoran citizens have raised questions and concerns about the project’s economic and technical viability.

2.5 Criticism and Risks of the Bitcoin Experiment

El Salvador’s Bitcoin as legal tender experiment was highly controversial and risky from the start, both at home and abroad. The bold move put the country on the hook for potentially large financial and legal liabilities. The early hiccups in the implementation added fuel to critics’ arguments. In this section, we discuss the key lines of criticism and risks that came to light as the policy unfolded: these included operational and technical problems with the Chivo rollout; low adoption/use by Salvadorans for actual transactions, which defeated the purpose; macroeconomic and fiscal risks (currency volatility, debt, monetary policy, external financing); transparency and governance concerns; financial integrity and AML/CFT risks; concerns over national sovereignty. Low adoption and Public resistance: a central problem with the Bitcoin experiment is that it failed to catch on with most Salvadorans despite the authorities’ efforts to promote and incentivize it. The majority of Salvadorans never adopted Bitcoin as a medium of exchange in any significant way. Survey and usage data from 2021–2022 tells a consistent story: Outside of the initial rush to download the Chivo wallet (motivated largely by the \$30 incentive,

discussed below), actual use of Bitcoin has remained very low. A study by researchers (*Alvarez et al., 2022*²⁸) found that over 60% of those who downloaded the Chivo wallet stopped using it after they had spent the \$30 bonus. In other words, a majority of users cashed out their free \$30 or made one transaction/experiment with Bitcoin and then uninstalled the app. Similarly, U.S. National Bureau of Economic Research (*NBER*²⁹) survey data found that 20% of Salvadorans who downloaded Chivo never even spent the bonus at all, and a further 61% used it but did not continue using the wallet after the \$30 was used up. Most people reverted to cash or US dollars for their transactions. By late 2022, only an estimated 20% of businesses were accepting Bitcoin, despite being legally required to do so. A survey by El Salvador's Chamber of Commerce (*CAN*) found that between September 2021 and July 2022, only 14% of the 332 businesses surveyed had sold at least one product or service for Bitcoin. Notably, when *CAN* asked the businesses why they accepted BTC, 3% said it had added any real value to their operations implying 97% saw no benefit. Meanwhile, over 90% of consumers still preferred to use U.S. dollars for their day to day transactions over Bitcoin. At the end of 2021, two-thirds of Salvadorans said the Bitcoin adoption was not good for El Salvador when asked in a survey. This public resistance was rooted in several factors: lack of understanding/knowledge (most people had not heard of blockchain/crypto before 2021), a lack of trust in a highly volatile asset, especially given the price drop in mid-2022, and simple convenience for many users, dollars were working just fine and were far less confusing to use than having to deal with exchange rate changes in a phone app. Technical glitches and User experience: the initial rollout of the Chivo wallet had its share of technical problems, which undermined confidence in the system from the start. On Chivo's launch day, September 7, 2021, the app was not yet available on app stores (due to last-minute development issues but you could download it via unofficial methods. Hours after the government announced Chivo went live, the government took it offline and fixed a last-minute bug because the servers could not handle the high user volume on day one. The government scrambled to add server capacity. Users who managed to access the app experienced several bugs (failures in transactions, incomplete installations, etc.)

²⁸ A study on the uptake of El Salvador's Chivo wallet, which concluded the majority of users abandoned the app after claiming the \$30 Bitcoin incentive.

²⁹ A private non-profit U.S. research organization that creates economic studies and data used in both policy and academia.

and a major identity verification issue. A more serious problem was identity theft, where unknown parties were allegedly registering using other people's national ID numbers (DUI) in order to collect the \$30 signup bonus, preventing the real Salvadoran citizens from claiming it. Many Salvadorans complained that their DUI had been used by someone to open a Chivo account and claim the \$30, a clear sign of lax security and identity controls in the onboarding process. Chivo also had user experience issues, for instance it was initially set up to allow arbitrage "scalping" of the BTC/USD spread differentials, as users quickly realized they could game the system for profit. So Chivo had to make a sudden unilateral change to its exchange rate mechanism in the app, which displeased legitimate traders/users trying to buy and sell or "day-count" on the app. The Financial Times reported that Bitcoin transactions at one major Salvadoran bank, in the first week of Chivo's launch, were 0.00099% of total transactions, which highlights the tepid uptake even if most Salvadorans had downloaded the app. By 2022 and 2023, the Chivo wallet's user base had stagnated; many people who had downloaded the Chivo app stopped using it after these negative first experiences with the app. Compounding matters were a rash of Chivo wallet hacks in late 2021 and 2022, where scammers socially engineered or directly hacked their way into users' wallets and stole their funds. By 2023, news reports were highlighting that hundreds of Chivo wallets had been hacked/stolen from by criminals, which "scared many" Salvadorans away from using the app to seriously store savings. The government had to regularly patch and update Chivo to fix issues and improve security; by mid-2022 it brought in a U.S. technology company (*AlphaPoint*) to redevelop the whole platform after the original developer's product turned out subpar. Despite later improvements, these early technical failures cast a long shadow of doubt on the project among the general public.

Volatility and Financial risk: Bitcoin's well-known price volatility has been a major risk both for users and government. Bitcoin price fluctuated dramatically in the first two months after El Salvador's adoption. After hitting an all-time high of around \$68,000 in November 2021, Bitcoin plunged by more than 50% in a matter of months, falling to around \$30,000 by May 2022 and then to about \$20,000 in June 2022. This crypto market crash meant that the Salvadoran government's Bitcoin purchases suddenly had large latent losses on its books. By mid-2022, the government had purchased approximately 2,300 BTC for a cumulative cost of around \$105 million; the value of that holding was only around \$50 million at June 2022 prices.

The Ministry of Finance downplayed the issue, with Minister Alejandro Zelaya stating that “we haven’t sold any, so we haven’t lost any money”, which is technically true from an accounting perspective but did not address mark to market losses or the opportunity cost of locking up large amounts of public money in a speculative asset. For the fiscal budget, these paper losses (roughly \$40–50 million) were not game changing but were notable enough to draw international attention and validate fears that Bukele was speculating with taxpayers’ money. It also put potential pressure on the Bitcoin Trust fund (FIDEBITCOIN) which was initially \$150 million and mostly earmarked to back the convertibility promise. If Bitcoin fell in price and a significant number of people had all redeemed their BTC for dollars at once, the trust could have been wiped out. In other words, this is a fiscal contingent liability that the IMF has highlighted: government might have to bear the losses if BTC collapses in value and the fund has to make whole all those conversions. Bitcoin’s volatility also obviously deterred the use of Bitcoin for ordinary transactions: how is a shopkeeper or taxi driver supposed to use Bitcoin received from sales given that the price can drop 10% or more in a single day? In fact, survey data found that over 90% of Chivo users immediately convert any received Bitcoin to dollars to avoid that exchange rate risk. This obviously undercuts the whole rationale of putting Bitcoin into circulation in the domestic economy, in reality it was mostly just used as a vehicle to conduct dollar transactions or it was not used at all. Marginal benefits for Policy goals (Inclusion, Remittances): perhaps the two main public policy goals of this experiment, financial inclusion and reducing remittance costs, have not improved much, if at all, in the year of adoption. On financial inclusion: it is true that more Salvadorans now have a Chivo e-wallet than had bank accounts, but active use is low. According to World Bank’s Global Findex dataset³⁰, the share of Salvadorans with a financial account (bank or mobile money) did rise from 30% in 2017 to about 46% in 2021, but this is partly just due to Chivo registration. Most of those registered do not seem to use Chivo as their main digital wallet or have additional ones. A Salvadoran government financial access survey in 2022 found even a lower share (28% with financial access, which may have been using stricter criteria to count active accounts). The more important number is how many are still unbanked without any access, and that remained stubbornly high among poorer, older,

³⁰ Large-scale database of survey data collected by the World Bank about how adults save, borrow, make payments, and manage risk worldwide.

rural Salvadorans. There is no evidence that Bitcoin was seen as an attractive alternative for the true unbanked population. The demographic profile of Bitcoin users in El Salvador so far has been studies that show they are younger, male, already banked, or at least more financially literate (privately, a former IMF economist in charge of Salvadoran policy told us most Bitcoin users were already having some extra fun with crypto prior to September 2021, even if Chivo has expanded the pool). In other words, those who were already more likely to be relatively financially included were the ones who used Bitcoin the ones who truly had no access were not being reached, for whom having internet access or digital literacy is an issue (internet penetration in El Salvador is only about 50-60%). The IMF succinctly put it in a January 2023 assessment: “more than one year after implementation, the adoption of Bitcoin as official currency with legal tender status has thus far not led to visible improvements in financial inclusion...there is no evidence of any beneficial use case of Bitcoin for the unbanked population.”. For remittances, the results have also been lackluster so far. The idea was that expatriates would use Bitcoin or the Chivo wallet to send money home at lower cost than Western Union/MoneyGram – thus savings would flow to the recipients. Chivo would have attracted users through no fee remittance – it indeed did not charge for transfers. The government even established Chivo ATMs in the U.S. to target Salvadorans, where they could deposit dollars and send them to their Chivo wallets in El Salvador. However, the use of this channel has been very low. In fact, according to data from El Salvador’s Central Bank, just 2.1% of remittances in October 2021, the month after Chivo launch, were through digital wallets (most likely Chivo), and it declined after that. For example, between September 2021 and April 2022, only 1.9% of all remittance payments were sent via Bitcoin or a digital wallet. By 2023, this share dropped even further – one news article reported that only 1.3% of remittances in El Salvador used crypto/digital wallets in 2023. In December 2024, out of a total of \$6.78 billion in remittances that month, just \$7.22 million ,less than 1%, was done in crypto wallets. The majority of the \$6 billion Salvadorans receive in remittances every year still goes through traditional channels, despite the government’s hope they would use crypto. The likely reason is that the majority of Salvadorans and their loved ones in the U.S. prefer to send and receive dollars in cash and still view that as the most convenient and trustworthy option Bukele’s team grossly overestimated demand for crypto as an alternative. Furthermore, using Chivo requires both sender and receiver to download and

set up the app, and potentially have to go through a conversion to dollars, which is a process many found unnecessarily cumbersome relative to existing cash pick-up services. The supposed gains on remittance fees, one of the main purported economic justifications for the policy, have thus failed to materialize at scale. While individual people may have benefited from lower fees here and there, the Salvadoran government has still been paying hundreds of millions of dollars per year in remittance fees to Western Union and others, and crypto alternatives have not managed to cut into their market share. Fiscal and Macroeconomic Risks; Relations with IMF: Bitcoin has also at times caused ripples to El Salvador's fiscal and debt stability. In 2022, foreign investors began to see El Salvador's Bitcoin gambit as an additional risk on top of an already high public debt burden. Credit rating agencies downgraded El Salvador deep into junk status for its debts, partly citing the Bitcoin policy as a reason (Moody's downgraded the rating in July 2021 and again in 2022, Fitch downgraded in 2022 to *CCC*, etc.). They pointed to potential roadblocks to reaching an IMF deal and potential fiscal costs of Bitcoin policy. As a result, El Salvador's bond yields soared by late 2022, yields on Eurobonds were in the 20-30% range, which implied investors had high fears that El Salvador could default. The situation was also compounded by El Salvador's failure to reach an IMF deal in 2021–2022, for reasons which included the IMF's disapproval of Bitcoin. For many months Bukele's government took a hard line and said it did not need the IMF because it had found alternative funding (Volcano bond, regional development banks, etc.). However, in practice the lack of an IMF program contributed to a liquidity crunch. By early 2022, El Salvador was locked out of international markets and forced to rely on short-term domestic debt or CABEI³¹ (Central American Bank) loans. The prospect of an \$800 million bond maturing in January 2023 caused major alarm it was feared El Salvador could not make the payment and would be forced to default. In fact, the government scraped together enough to repay the bond in full in January 2023 (buying it back at a steep discount for part of it, and paying out the rest from foreign exchange reserves). However, the move further depleted international reserves. The episode demonstrated that the Bitcoin policy had increased the country's perceived risk and narrowed its financing options. The IMF repeatedly warned El Salvador that it should reverse course to restore fiscal and debt sustainability. As early

³¹ A multilateral development bank that offers financing and technical cooperation to encourage economic and social development in Central America.

as January 2022, the IMF Executive Board statement explicitly called on El Salvador to revoke Bitcoin's legal tender status to restore fiscal and debt sustainability. Bukele responded furiously on Twitter with memes, images of Jesus Christ, etc. and dismissed these warnings. However, by mid-2022, El Salvador was quietly opening the door to negotiating a deal with the IMF as the economic outlook darkened (oil shock, global financial tightening, etc.). Bitcoin thus led to a major diplomatic and financial rift with the IMF and the international community more broadly, isolating El Salvador at a time when external support might have been needed most. Money laundering and Legal risks: the decision to make Bitcoin legal tender also created potential legal and financial integrity risks. Bitcoin's pseudonymous transactions make it possible to move money without leaving a clear trail. This raised concerns that El Salvador would become a center for money laundering, tax evasion, or sanctions evasion using Bitcoin and other cryptocurrencies. The Financial Action Task Force (FATF) and other international bodies have long warned countries considering making crypto a legal tender to ensure robust AML/CFT controls were put in place, especially around Chivo and any crypto exchange. Critics also noted that Bitcoin was attractive to organized crime – a real concern in El Salvador, which has had its own problems with gangs and narco-trafficking. In fact, some people in the U.S. government feared that transnational criminal groups (MS-13, cartels) would find Bitcoin a convenient way to move their funds, receive ransoms, etc. within El Salvador's borders. Salvadoran economists noted that if cartels began using El Salvador as a base to wash their drug proceeds using crypto, that could provoke international sanctions or other penalties against El Salvador. The Bukele administration has stated that it would respect all compliance requirements and did implement KYC (know-your-customer) checks for Chivo users. The law also allows anyone in the world to download Chivo with a Salvadoran ID number, which could include non-residents if they somehow get one as of yet there are no controls on on-chain Bitcoin transactions. It thus remains a potential risk that nefarious actors could abuse this system, which in turn could provoke sanctions, for example correspondent banks might curtail relationships with Salvadoran banks if they suspect lax crypto controls. There have been no high-profile reports of large-scale money laundering using Chivo in the public domain, but the risk remains in policy discussions. Governance and transparency critiques: the implementation of the Bitcoin project also invited criticism for lack of transparency and potential corruption. The

contract to build the Chivo wallet and ATMs was not an open tender; it was reportedly given to a foreign firm with little public transparency over the terms. The government then made the whole operation of Chivo a state secret via an executive order that classified its transactions and technical aspects. This secrecy fed suspicions of potential mismanagement or misuse of public funds. In fact, one opposition lawmaker even claimed that tens of millions in payments from the Chivo app had gone missing. The independent anti-corruption body the “OAS” had set up to monitor graft in El Salvador (CICIES³²) was also closed by Bukele in 2021, so less government oversight. International think tanks like CSIS argued that any IMF deal should require full transparency and audit of the Bitcoin project and Chivo wallet. There is also the issue of cybersecurity; if the government custody of Bitcoin were hacked or there is internal fraud, it could lose those funds with no recourse. There are serious questions about the transparency of how those private keys are stored, who has custody of El Salvador’s BTC, etc. that have not been publicly answered due to government secrecy on the matter. Opportunity cost and efficacy: beyond the direct risks of the Bitcoin Law, many economists simply argued that the whole Bitcoin experiment was a costly distraction from the country’s more immediate economic needs. The trust alone, plus bonuses, infrastructure and purchases of Bitcoin, were estimated to have cost at least \$300 million by the end of 2022 – funds that arguably could have been better spent on productive investment, such as education, physical infrastructure or specific poverty reduction programs. By mid-2023, an analysis by The Economist concluded that El Salvador’s “wild crypto experiment” had “brought more costs than benefits” to the country overall. There has been no discernible positive effect from Bitcoin on key economic performance metrics such as GDP growth, investment, employment or poverty rates. Private foreign direct investment (FDI) flows, which the government had hoped would increase with a “crypto friendlier” regulatory environment, have not significantly improved – with official data showing no rise attributable to the crypto law or ensuing projects. While the government announced a 30% increase in tourism in early 2022 and boasted that Bitcoin curiosity had driven some of this increase, it is hard to disentangle from broader post-pandemic travel demand recovery and the positive impact of a newly improved security

³² Anti-corruption commission established in 2019 as part of an agreement between the Salvadoran government and the Organization of American States (OAS) and dissolved in 2021 by President Bukele.

situation. Outside of a subsector “Bitcoin tourist” flow to the surf town of El Zonte (*Bitcoin Beach*), where anecdotal evidence showed that some local businesses enjoyed as much as a 30% boost from crypto enthusiasts coming to visit, it did not create a crypto-driven windfall in mainstream Salvadoran tourist locations. In short, the opportunity cost of channeling so much political capital into Bitcoin has been criticized: El Salvador continues to face long-standing and deep structural problems – high public debt, anemic economic growth, education gaps, climate-vulnerable agriculture – none of which were directly or immediately addressed by Bitcoin. Indeed, by 2022–2023, Bukele’s own government appeared to pivot attention to the harder policing and gang crackdown, and to the next electoral cycle, tacitly acknowledging that Bitcoin had not produced rapid popular benefits. In conclusion, the Bitcoin experiment in El Salvador has been met with a broad array of criticisms and real risks. Technologically, the whole initiative suffered from an undercooked implementation that disenfranchised potential users from the start. Economically, the promised inclusion and remittances benefits have so far failed to materialize, while the debt and fiscal downsides became real when country risk premiums spiked. The added volatility of Bitcoin exposure introduced a new kind of financial risk for one of the region’s poorer countries – in effect speculating on an asset class that even advanced economies treat gingerly. Internationally, it created a rift with multilateral lenders and reputational risks. Domestically, while there is a dedicated minority of Bitcoin evangelists, the general public appears to remain unconvinced: as of 2022–24, surveys consistently showed that over two-thirds of Salvadorans viewed the Bitcoin adoption as “not successful” or expressed little to no confidence in it. Many of these criticisms and risk assessments proved prescient as by 2023–2024 the government itself took steps to dial back parts of the Bitcoin initiative. Nonetheless, President Bukele has continued to defend the policy and insists that its benefits will pay off in the long term, an argument that remains to be substantiated.

2.6 Situation as of December 2024

By the end of 2024, three and a quarter year into El Salvador's Bitcoin experiment, the "state of play" was mixed. On the one hand, the government publicly reaffirmed support for Bitcoin and had firmly enshrined it in some aspects of economic policy (treasury holdings, government office, regulatory framework). On the other hand, the use of Bitcoin in the day-to-day economy was extremely low and the administration quietly started to soften some of the law's most controversial provisions under international pressure. This section reviews the status quo as of December 2024 in terms of key adoption metrics, economic impact, regulatory and legal developments, and the public and official discourse. Public adoption and usage levels: as of late 2024, all evidence suggested that Bitcoin was far from being a means of mass payment in El Salvador. Surveys showed that the share of Salvadorans using Bitcoin for transactions had been gradually declining each year since 2021 as the initial honeymoon and incentives wore off. The polling by the UCA's Institute of Public Opinion, found that the share of respondents using Bitcoin in any transaction was 25.7% in 2021, then decreased to 21% in 2022, 12% in 2023, and hit a low of 8.1% in 2024. In other words, by 2024, more than 90% of Salvadorans had never used Bitcoin. Indeed, in a January 2025 survey by the UCA, 92% of respondents reported they had not used Bitcoin at all in 2024. Even among that 8%, Bitcoin usage was very limited – less than 1 transaction per month on average per user and amounting to only about 14 transactions in the entire year on average per user. This coincides with anecdotal reports that outside of a few enclaves like some business owners in Bitcoin Beach, a subset of wealthier or more tech-savvy youth in San Salvador, the majority of people essentially ignored Bitcoin in day-to-day life and continued to use dollars. The Chivo wallet, after an early surge, had seen relatively little activity: by 2024 it was not even among the 5 most used finance apps in the country. The government had not released official figures on active users, but several sources close to the administration suggested that of the ~4 million downloads reported, only a few hundred thousand might be active users, and mostly for sporadic transfers. Businesses also for the most part refrained from pricing in BTC that it was hard to find price tags in BTC outside of Bitcoin Beach, and many smaller merchants put up signs de facto saying "USD only". The mandatory acceptance aspect of the law had become a dead letter, as enforcement was zero. In

practice, by December 2024, using Bitcoin in El Salvador was more of a tourist practice than a mainstream phenomenon. Macroeconomic impact: on a macro level, the Bitcoin experiment had neither delivered a visible economic boom nor caused an obvious financial crisis. Its effects were relatively limited and dwarfed by other factors (e.g. the post-pandemic recovery, the impact of the security crackdown on commerce and consumption). GDP growth in 2021–2022 was driven more by traditional factors (e.g. reopening of the economy, robust remittances, U.S. stimulus spillover) than by Bitcoin. The 2022 growth of around 2.8% and 2023 of about 3.5% was respectable, but in line with the region and attributable mainly to improved security (which boosted local investment and consumer confidence). The direct impact of Bitcoin-related tourism or investment was marginal. For instance, the government boasted that tourism in 2022 was up 30% versus 2019 (breaking the 1.4 million visitor’s barrier), and the tourism minister explicitly credited Bitcoin and its international PR for part of that increase. This is partly true because El Salvador’s stunt put it on the map for some travelers, and a few crypto conferences were hosted in San Salvador or Bitcoin Beach bringing foreign visitors. However, other factors such as the sharp decline in crime (El Salvador went from one of the most violent countries to significantly safer by 2023) and pent-up travel demand likely had a bigger role in the tourism increase. Similarly, the anticipation of a surge in foreign crypto investment and businesses did not come to pass in any significant way. Aside from a few crypto companies opening small offices in San Salvador and some high-net-worth Bitcoin enthusiasts buying real estate, some taking advantage of the citizenship-by-investment program, there were no signs of major job-creating FDI attributable to Bitcoin. In fact, FDI figures more generally remained low and volatile, with the central bank’s data for 2022–2024 showing no obvious increase that could be linked to Bitcoin. Government Bitcoin holdings and Fiscal situation: at end-2024, the Salvadoran government held a pile of Bitcoin whose value had fluctuated greatly. After sporadic purchases in 2021-2022 (totaling perhaps 2,381 BTC by some estimates), the government stopped buying for a time as it entered talks with the IMF in 2023.

In late 2024, the Bitcoin price experienced a large rally – in fact, by December 2024, Bitcoin price broke above its prior all-time high of \$69,000 and reportedly traded above \$100,000. This sharp increase, driven in part by global market cycles and speculation about favorable crypto regulations (e.g. the election of a perceived crypto-friendly U.S.

president) ironically put El Salvador's Bitcoin holdings back "in the black." Whereas in mid-2022 the government had been sitting on large unrealized losses, by December 2023 it was reported that the government's Bitcoin portfolio was worth about \$3.7 million more than its total cost. By March 2024, with Bitcoin at new all-time highs (~\$70k), the government's Bitcoin holdings were at a reported ~50% profit (paper profit). For example, if El Salvador spent ~\$106 million on its BTC, the value by early 2024 may be ~\$160 million. As of late 2024, officials reported that the country held about 688 BTC in reserve (sources differ; this number may not include those in the trust), for an estimated value of \$574 million at current prices, of which about \$287 million is profit. These numbers vary depending on sources; the government itself has not provided transparent public updates on the exact size of holdings since early 2022. Regardless of the exact figures, the surge in 2024 gave Bukele a rhetorical boost because he could point to "profit now" after having to weather a long multi-year drawdown. Note, however, that even a few hundred million in gains is small in the context of El Salvador's overall finances (public debt was around \$25 billion). Moreover, these gains were unrealized because the government had not sold any significant portion of its Bitcoin, so the profit was only on paper. And under the IMF deal, the government committed not to further increase its crypto holdings. On the fiscal side, El Salvador's situation had normalized somewhat by end-2024, but more due to orthodox policy and external support rather than because of Bitcoin. The government had undertaken some fiscal consolidation as reducing expenditures, passing an austere 2024 budget, and conducting liability management (buying back short-term bonds at a discount). Bond spreads which were over 30 percentage points in mid-2022 (indicating a state of distress), narrowed sharply after El Salvador demonstrated willingness to pay on its 2023 bond and as it edged toward a IMF agreement. By Feb 2025, bond yield spreads had narrowed by over 3,100 basis points from the peak, reflecting restored investor confidence. This normalization was not due to Bitcoin at all, in fact, it coincided with actions to dial down the Bitcoin experiment in order to appease creditors. So the macroeconomic narrative by end-2024 is that El Salvador avoided financial crisis, but despite the Bitcoin adventure, not because of it. The fiscal impact of Bitcoin per se had been the one-time 1% of GDP of various expenses, and an ongoing contingent risk that was being addressed by policy changes. Legal and Regulatory status: as of Dec 2024, Bitcoin was still an official currency by law, but several

practical changes were in the works. The government had introduced a reform bill in late 2024 to amend the Bitcoin Law, which was later passed in January 2025. In anticipation of that, the business acceptance requirement was in practice not being enforced, and officials were signaling it would be made voluntary. For instance, President Bukele in a press conference in December 2024 said Bitcoin was “totally optional” to use, and admitted it was among the “most unpopular” measures of his government. He still tried to justify it as a forward-looking policy, but admitted he did not see broad support for it domestically. Meanwhile, payment of taxes in Bitcoin had decreased to almost zero. Few people were paying any taxes in BTC, and the Ministry of Finance was preparing to formally reverse the provision allowing it. The secondary legislation and institutions for digital assets were in place: by 2024, the Digital Assets Commission had issued its regulations for crypto service providers, and the Volcano Bonds (officially renamed as “Digital Volcano Token”) was ready to be launched. In fact, the first tranche of the Volcano token reportedly launched in early 2023, seeking to raise \$500 million, but few details are available (it’s believed only a portion was actually placed given the looming IMF pressure). Meanwhile, the National Bitcoin Office was still around, it often posted upbeat social media content about Bitcoin education or meetings with foreign crypto enthusiasts. However, the office’s focus was increasingly on promoting El Salvador as a tech and financial hub in a broader sense, in line with Bukele’s rhetoric about transforming the country into a regional tech hub. It’s also worth noting a contrast in agenda-setting by 2024: President Bukele’s attention and public appearances were increasingly focused on the general elections in February 2024 (where he was running for re-election) and on the ongoing security policy. The Bitcoin issue was a far less prominent part of his 2023 public communication than in 2021. This suggests politically, the Bitcoin experiment had become a lower priority, possibly because it did not bring popular benefits and was a target for opposition attacks. As a matter of fact, opposition politicians routinely attacked it as a failure and a waste. For instance, an opposition lawmaker from the FMLN party called it “Bukele’s fantasy” and pointed to the fact that nearly no one used Chivo any more as evidence of its failure. On the international stage, by end-2024, the narrative about El Salvador had also shifted. Initially, Bukele was seen as a crypto hero in certain crypto circles, but after the 2022 Bitcoin crash and given El Salvador’s U-turn, some crypto commentators perceived it as a cautionary tale of premature adoption. Public

Opinion and Sociopolitical Effects: As mentioned, polls in late 2023 and 2024 consistently showed a lack of public support or understanding of Bitcoin. The UCA's Jan 2025 poll found that while 100% of respondents were aware of Bitcoin only 17% believed it had been good for the economy. A majority of Salvadorans viewed Bitcoin as “not very successful” or an outright. However, there is a small community of Salvadoran Bitcoin supporters who remain quite optimistic, and in fact some have learned about coding or finance from the Bitcoin Beach initiatives but they are a tiny minority. In the broader public, the initial vehement backlash (protests in 2021) had subsided into indifference: people realized they could simply opt out of using Bitcoin and suffer no consequence. This apathy is one of the critical outcomes: it suggests the population at large was not significantly affected by the Bitcoin policy, which is why Bukele has paid little political cost for it aside from momentary unrest. Cost of living, security, jobs – not crypto – were their primary concerns. In short, as of December 2024, the “Bitcoin experiment” in El Salvador was largely dormant in day-to-day reality, even as the government continued to hold Bitcoin and court crypto investment rhetorically. The country had established itself symbolically as a crypto pioneer, which might have long-term reputational effects (some positive, some negative, e.g. drawing a trickle of crypto tourism, or being seen as an outlier by traditional financial institutions). But at home, the experiment was all but dormant: very low adoption and use, a law about to be rolled back, and a public that has moved on. Meanwhile, more pressing economic issues (securing external financing, reducing debt, improving the investment climate) took precedence for policymakers. This state of affairs set the stage for the change of law on January 29, 2025, when El Salvador partially rolled back the mandatory aspects of Bitcoin's legal tender status. We turn to that next, looking at how and why El Salvador amended the Bitcoin Law.

2.7 The New Law of 29 January 2025

On January 29, 2025, El Salvador's Legislative Assembly approved a set of amendments to the Bitcoin Law, effectively repealing Bitcoin's mandatory acceptance and significantly downgrading its legal tender status. The controversial and accelerated

reform, pushed through by President Bukele, marked a u-turn for the country that had made headlines around the world by adopting Bitcoin. After three and a half years, the crypto experiment was dialed back to address International Monetary Fund (IMF) conditions and ground realities. This section covers what the January 2025 reform says, the motivations for it (primarily the IMF loan), and some of the immediate consequences.

Content of the January 2025 Amendments: the reform (Decree No. 199 of 2025) made the following main changes to the original Bitcoin Law:) Voluntary Acceptance: the key change was the removal of the Article 7 clause “every economic agent must accept Bitcoin.” After the reform, businesses and individuals are not legally required to accept Bitcoin as payment. In other words, the acceptance of Bitcoin as legal tender became completely voluntary. The law now explicitly states that “the acceptance of Bitcoin by any person or entity is voluntary, without prejudice to the right of such persons or entities to reject Bitcoin and to request payment in dollars.” This brought the legal framework in line with the de facto reality, addressing IMF concerns that mandatory acceptance violated economic freedom and posed financial risks.)Bitcoin’s Legal Tender Status Downgraded: while the government avoided directly repealing Bitcoin’s legal tender status (presumably for political reasons and not wanting to fully admit failure), the reform changed Bitcoin’s semantic status in law. The law no longer refers to Bitcoin as “currency”. As one legislator stated, “Bitcoin no longer has the strength of legal tender” after the reform. Effectively, Bitcoin was reclassified from an official currency to a permitted virtual asset. The reform kept the part of the law saying Bitcoin can be freely used and transferred in El Salvador and it is not banned, but it is no longer on equal footing with USD. This means the government can now treat USD as the unit of account, currency of reference, and primary fiat currency in accounting and public operations. Bitcoin becomes more of an opt-in alternative medium of exchange. The IMF, in its communiqués, stated that El Salvador “removed [Bitcoin’s] status as legal tender” as part of the reforms, which implies that from an external perspective Bitcoin is no longer considered an official currency of El Salvador starting 2025.)End of Tax Payments in Bitcoin: the reform also repealed the clause that had allowed tax obligations to be denominated and paid in Bitcoin. The Ministry of Finance has returned to exclusively accepting taxes in USD. This, again, was an IMF demand to simplify tax administration and avoid budget revenues denominated in a volatile asset. It also symbolically reinforced

that USD is the anchor currency.)Unwinding of Government’s Bitcoin Role: although not all of this is explicitly written in the reform law itself, there are also additional commitments by the government to “gradually unwind the public sector’s role in the Chivo wallet and related activities and confine it to certain activities”. In other words, the government will pull back from further promotion or subsidization of Bitcoin use. As per the letter of intent with the IMF, by mid-2025, the Ministry of Finance will stop funding Chivo’s operations, and it may even consider turning the wallet over to private management. The convertibility trust fund (the \$150 million mechanism) will remain for a transitional period, but in the medium-term, the idea is to have the government “remove any automatic subsidy to the use of Bitcoin” and let any Bitcoin use be purely private and market-based. The amended law still keeps the trust mechanism in a placeholder form, but the government made clear it would not be putting more money into it beyond what was needed to facilitate swaps.)Ensuring Permanence (Political Spin): Interestingly, however, President Bukele’s allies framed the reform not as a retreat, but as a way to “guarantee Bitcoin’s permanence as legal tender while facilitating its practical implementation.”. This political spin was driven by the view that making Bitcoin optional made it more sustainable in the long run, since forcing businesses to use it had proven counterproductive, and that now Bitcoin would be able to coexist without friction long-term. This was likely more spin for political consumption than substantive economic logic, but it does reflect the government’s desire to present the reform in a positive light instead of framing it as an outright capitulation or admission of failure. In fact, the law still nominally has Bitcoin as legal tender on its books even if in an emptied-out form.)Effective Date of Changes: The amendments were approved 55 to 2 by the Assembly on Jan 29, 2025 (many opposition legislators were absent or abstained, possibly not wanting to legitimize the process). The changes would take effect 90 days after publication by May 1, 2025. This period was likely set as a formal transition period to allow for any regulatory adjustments and public messaging. In reality, however, even between the January approval and the May effective date, Bitcoin acceptance in El Salvador was already effectively voluntary. Motivation: The IMF Deal, the primary driver of the reform was El Salvador’s need to secure a \$1.4 billion loan agreement with the IMF and unlock other financing. In December 2024, the Bukele administration signed a staff-level

agreement with the IMF on a 40-month Extended Fund Facility (EFF) ³³program. An explicit condition of the agreement was the reversal of key aspects of the Bitcoin policy the IMF saw as a risk. The IMF had made it very clear: they wanted Bitcoin use to be voluntary and not mandated, and for the government to “confine its bitcoin-related operations, stop accumulating bitcoin” and remove the legal tender privileges like tax payments. Basically, they wanted the public sector to be neutralized in its Bitcoin involvement to reduce fiscal and financial exposure. For Bukele’s administration, this was pragmatic trade-off. By late 2024, El Salvador needed to address heavy bond redemptions in 2025–2027, and it needed the IMF’s approval to access other. The \$1.4 billion IMF loan would provide a big part of the financing needs to close the gap and allow an orderly adjustment to bring the debt down from nearly 90% of GDP and back to a sustainable level. Compared to that, maintaining the Bitcoin law in its original form was just too costly. Bukele had to choose: economic pragmatism and survival, or ideology and Bitcoin. The choice was not difficult. The Bitcoin Law had long been a sore point with the IMF; in fact, it was implicitly one of the reasons negotiations had stalled in 2021. Now with default a very real risk, Bukele was willing to compromise significantly on Bitcoin to get the deal. The way in which the reform was passed underscores how closely it was tied to the IMF deadline. On Jan 29, 2025, hours before the Assembly vote, President Bukele sent a draft of the reform bill to the Assembly just minutes before the vote and then, using the New Ideas supermajority, it was approved rapidly with very limited debate. The reason for this urgency is likely because the government had already made a commitment to the IMF that it would deliver on these prior actions before the IMF Board meeting to approve the loan program. In fact, the IMF Executive Board gave final approval to the loan in February 2025 after having confirmed that El Salvador had fulfilled the prior action of amending the Bitcoin Law. Implications of the Reform: The new law of Jan 2025 means the legal tender experiment with Bitcoin is effectively over in its coercive form. Businesses in El Salvador are now free to refuse Bitcoin, which most are doing already without technically being in violation of the law. This should remove any legal ambiguity for merchants and banks that were unsure what to do about mandatory use. The other implication is appeasing concerns of traditional businesses and

³³ A lending arrangement with the International Monetary Fund that provides financial support to member countries experiencing medium- to long-term balance of payments issues, subject to policy reforms.

foreign investors who did not want to be forced to take crypto currency. The removal of tax payment in BTC also simplifies government accounting – no more need to have budget revenues in two currencies or worry about conversion. For the general public, this change likely had little immediate noticeable impact since Bitcoin use was already voluntary de facto. But it did give formal validation that it is not required to use Bitcoin, and as noted earlier that could further dissuade use. Another implication is on the government’s own use of Bitcoin: by making a commitment to not buy any more Bitcoin with taxpayer funds and wind down Chivo, the administration is signaling fiscal discipline and a pivot back to orthodoxy. The IMF program explicitly says the government will “stop accumulating Bitcoin using taxpayer money”. In fact, the IMF noted in a July 2025 report that according to the data from El Salvador’s central bank, the public sector had not purchased any additional Bitcoin since the loan agreement in Dec 2024, directly contradicting the claims of Bukele’s Bitcoin Office which kept posting on social media that they were buying 1 BTC per day. The IMF later explained that this discrepancy was due to Chivo just moving around wallets internally, not actual new purchases. The reform also has interesting implications on Bitcoin’s legal tender status from an international and technical standpoint. After Jan 2025, one could say that in practice Bitcoin is no longer really legal tender in El Salvador. Sure, it’s still technically listed as such in the law, but since it is not mandatory and you cannot use it for taxes or official government payments, it lacks the essential functions of legal tender. Economist Rafael Lemus³⁴ said it succinctly: “It should have always been that way... the government tried to force (Bitcoin) into existence, and it didn’t work.”. His statement captures the lesson: voluntary adoption may have been slow, but forcing Bitcoin bred resentment and non-compliance. The market and Bitcoin community reaction: the news of El Salvador’s Bitcoin amendments was met with mixed reactions. The international investor and multilateral community welcomed the reform as a long overdue sensible step. The IMF explicitly said El Salvador “mitigated Bitcoin-related risks” and included that in the press releases about the new program. Many critical economists felt vindicated that the mandatory aspect was dropped. The Bitcoin community had more varied reactions: some hardcore Bitcoin maximalists condemned Bukele for “bowing to the IMF” and

³⁴ Salvadoran economist and political analyst known for his commentary on public policy, governance, and economic issues in El Salvador.

“retreating” on Bitcoin. For them, the reform validated fears that an IMF deal would force El Salvador to curtail Bitcoin, making it almost an attack on. Others in the crypto sphere were more pragmatic, noting that Bitcoin is still legal to use in El Salvador (the country hasn’t banned it or anything), and the idea that it is purely voluntary may even be healthier for Bitcoin adoption in the long-term. Bukele himself, who was sensitive to being seen to turn his back on Bitcoin by his supporters in the Bitcoin community, played down the significance of the reform in public statements. The administration continued to reaffirm El Salvador is pro-Bitcoin, for instance noting that “we still have the Bitcoin Law, Bitcoin can still be used in El Salvador”, “we still have the Bitcoin Law” and other statements emphasizing that the country wasn’t giving up on Bitcoin, just making its use more convenient. The National Bitcoin Office also assured that work will continue on initiatives like mining promotion and continuing Bitcoin promotion, and stated that “it has not been an easy road” but this is not the end of the journey with Bitcoin in El Salvador. Legally, the reform is historic: it is the de facto end of the world’s first national cryptocurrency legal tender experiment, or at least its transformation into something far more limited. It is a case study in international financial diplomacy where the monetary experiment of a small country was effectively forced to roll back its currency by a global lender. Legally speaking, El Salvador’s monetary law after May 2025 reverts to looking like any country with a parallel currency allowed to circulate (USD + Balboa in Panama is a good comparison), except that in El Salvador the parallel currency is Bitcoin and it is not used much. In conclusion, the amendments of January 29, 2025, were a strategic retreat. The country got the crucial IMF-backed financing by making Bitcoin usage purely voluntary and removing the government obligation around it. While officially keeping Bitcoin as legal tender, the practical effect is that the Bitcoin Law was neutered. This is the moment where the experiment hit its limits: domestic use was very low, and external economic shocks, requiring an IMF rescue, forced El Salvador to prioritize financial stability over its crypto ambitions. The Bitcoin experiment did not end because El Salvador still has the Bitcoin Law and favorable regulatory environment for Bitcoin but it enters a new phase where Bitcoin’s fate in the country will depend on organic adoption and market forces, not government mandates or subsidies. In the final section, we look in more detail at how the experiment affected and was affected by El Salvador’s relationship with the IMF and other monetary authorities.

2.8 Relations and Tensions with the International Monetary Fund

El Salvador's Bitcoin as legal tender experiment has been inextricably linked with its relations with the International Monetary Fund (IMF). The journey from initial engagement to confrontation and eventual rapprochement by late 2024 is detailed in this section. This narrative will analyze how the Bitcoin policy affected El Salvador's relationship with the IMF and other international financial institutions, from the escalation of tensions in 2021–2022 to a compromise reached when El Salvador reduced the scale of its Bitcoin policy as part of a program supported by the IMF in 2025.)Initial Engagement and Warnings (2021): even before the Bitcoin Law, El Salvador was in active discussions with the IMF for a significant loan, approximately \$1.3 billion, to finance budget deficits and pandemic recovery efforts. The surprise announcement of the Bitcoin plan in June 2021 appeared to catch the IMF off guard. On June 10, 2021, the day after the law's approval, an IMF spokesman diplomatically stated they saw “macroeconomic, financial and legal issues” with Bitcoin's legal tender status. In other words, the IMF was on high alert from the very beginning. The IMF's technical staff no doubt spoke up during the Article IV consultations (annual economic checkups) over the following months as El Salvador forged ahead with implementation. The 2021 Article IV IMF staff report, completed in November 2021 and presented to the IMF Executive Board in January 2022, was a major inflection point. In that report, the IMF staff gave a fairly blunt assessment of the Bitcoin law, highlighting “large risks” posed for financial stability and consumer protection, and they explicitly called on Salvadoran authorities to eliminate Bitcoin's legal tender status. The IMF Executive Board echoed these staff concerns in its public statement on January 25, 2022. The language used by the Board was unusually direct and blunt: “They (Executive Directors) urged the authorities to narrow the scope of the Bitcoin law by removing Bitcoin's legal tender status”. Some Directors (likely those representing countries more friendly to crypto) may have been more mild, but overall there was a clear consensus on the experimental and risky nature of El Salvador's foray into Bitcoin. The IMF specifically cited volatility concerns, financial integrity (AML/CFT issues), and fiscal contingencies, essentially parroting many of the critiques from Section 2.5. The report also made clear that moving forward with Bitcoin would likely be a showstopper for El Salvador's request for an IMF arrangement. Indeed, the

Article IV report stated plainly that “it would make it less likely that the IMF would provide the requested \$1.3 billion loan.”. This was a shot across the bow: the IMF was now tying its support to El Salvador’s course reversal on Bitcoin. President Bukele responded combatively to the IMF, a tone he maintained up to the time of writing this paper in late 2024. In the days after the IMF Board statement in Jan 2022, Bukele tweeted a meme of the IMF as Homer Simpson and El Salvador as a bar patron tossing Homer out, captioned “I see you, IMF. That’s very nice.” sarcastically. In another tweet he said, “No international organization is going to make us do anything, anything at all” around the same time. This defiant messaging may have resonated with Bukele’s domestic base and Bitcoin maximalists abroad, but it clearly signaled an impasse in negotiations. Indeed, in early 2022, talks for the IMF loan package were effectively at a standstill. El Salvador turned instead to other sources of funding. In the short term it managed to extract higher-interest borrowing from local banks (which, as noted above, Bukele’s government leaned on to buy the bonds). It also used its reserves and took smaller loans from friends like CABI³⁵. More expensive, more short-term, and much less than the IMF was offering. Credit rating agencies and investment analysts frequently cited the lack of an IMF program as a major cause for concern – a sign that El Salvador lacked an external “discipline” on its fiscal policy and guaranteed financing. The Bitcoin policy itself was repeatedly singled out as a roadblock to an IMF deal. For example, Moody’s explicitly said the adoption of Bitcoin was complicating negotiations with the IMF and adding uncertainty to El Salvador’s outlook.)Rising tensions and Market backlash (2022): throughout 2022, the IMF continued to raise concerns in private and through public statements. After Bitcoin’s price crash in July 2022, the IMF’s Western Hemisphere director openly stated that “the risks of Bitcoin have materialized” in El Salvador and that “there are better policy options to improve financial inclusion than cryptoassets”. The IMF’s 2022 Article IV Consultation, concluded in early 2023, again pushed back, reiterating that given El Salvador’s fragile economic outlook “the use of crypto should be discouraged”. In that article IV consultation, the IMF staff interestingly noted that Bitcoin adoption remained low and so far “no concrete gains” were observed, while the risks remained. This essentially reinforced the IMF’s prior position but with more evidence. El

³⁵ A multilateral development bank that finances projects and provides support to foster economic and social development in Central America.

Salvador's economic team did some signaling over 2022 that they were trying to reassure international partners. They moved to draft tighter crypto regulation (the Digital Assets law to cover bond issuance and AML norms, probably to signal to the IMF that rules were being put in place). But the government also doubled down on Bitcoin symbolically, for example Bukele hosted a Bitcoin maximalist event in El Salvador in spring 2022. The government also invited central bankers from other developing countries to El Salvador to attend a Bitcoin "conference", in practice a less radical Bitcoin educational event. But the official line remained that El Salvador would not rescind the Bitcoin law. Bukele protected his government's ability to make such decisions from domestic court challenges by passing a law that explicitly shields it (the Constitutional Court, stacked with his appointees, dismissed the lawsuit anyway that said the Bitcoin law was unconstitutional). The deterioration in the relationship with the IMF arguably contributed to El Salvador's high-risk premium in 2022. Without the IMF's blessing or financing, El Salvador had to rely on local banks (pushed by Bukele's government to buy the bonds), resort to reserves, and take smaller loans from allies like CABEI. A much more expensive and short-term solution. The fact that it did not have the IMF's approval contributed to a negative view among rating agencies, investors, and independent analysts, which saw no external discipline on fiscal policy and no assured financing. They also cited the Bitcoin policy itself as a barrier to an IMF deal.)Improving Dialogue (2023) and Loan Agreement (2024): by 2023, the acute crisis in El Salvador had subsided with the repayment of the large bond and the security situation improving. But the medium-term solvency question was still in doubt, and the IMF clearly had not budged on its stance toward Bitcoin. But the government did some signaling of intent to compromise. Notably, in November 2023, the National Assembly passed a comprehensive AML/CFT law, and Bukele gave some interviews about improving transparency. Moves that were very likely aimed at Washington and the IMF (the CSIS commentary from Feb 2025 notes a new anti-corruption law and also that this law needs to be implemented for real). And of course, the dramatic drop in homicide rates combined with Bukele's very high popularity probably gave him sufficient political space to strike a deal with the IMF without fearing a domestic backlash. In fact, many Salvadorans were probably glad to make up with the IMF, since that would lower the country risk and interest rates. Informal contact between El Salvador and the IMF likely resumed in mid-2023, a year after Bukele had said no

organization could tell him what to do. The IMF itself also in press briefings and the conclusions of the Executive Board toned down the shrillness and threatened language of 2022/2023, and instead noted they were in talks and acknowledged El Salvador's desire to maintain macro stability (interestingly, the successful passing of the Digital Assets law in January 2023 that regulated crypto service providers seemed to have earned some credit – the fact that El Salvador was putting regulation in place in line with international standards was seen as a positive). Crucially, the external context had changed by late 2023. The Bitcoin price was on the rise again, which in fact helped El Salvador's balance sheet a little. More importantly, Bukele was running for re-election in Feb 2024 and would want to get the IMF issue off the table so as not to risk financial volatility around the vote. He likely also wanted the \$1.4 billion in hand to show success and spend on infrastructure and poor neighborhoods. The IMF too may have recalculated: rather than effectively cut off El Salvador (risking it turn to alternative lenders like China or even resulting in default) and taking a big sovereign-risks hit itself, it might be better to strike a pragmatic deal where Bukele concedes on Bitcoin and in return receives financial support. It's also not clear the U.S. saw an IMF deal as on its national security interest – more stable El Salvador and exchange rate is also likely fine with Washington. The upshot was that on December 18, 2024, the IMF announced a Staff-Level Agreement ³⁶with El Salvador on a 40-month EFF³⁷ for about \$1.4 billion. In the IMF press release, the headline that “Bitcoin-related risks are being mitigated” was put in bold, with the specific prior actions: the legal reform to make acceptance voluntary and confine public sector involvement. It also noted a commitment to stop purchases of Bitcoin, require taxes only in USD, and unwind Chivo. In other words, everything the IMF wanted from El Salvador was written into the EFF program and subsequently implemented, as we described in Section 2.7. The staff-level agreement was conditional on the prior actions being completed and on the formal approval of the IMF Executive Board. Bukele's government moved rapidly. By February 2025 the IMF Executive Board formally approved the \$1.4B EFF. The Board approval announcement from the IMF praised El Salvador's fiscal consolidation efforts in its text, as well as “measures to protect financial stability, including making the use of

³⁶ An agreement reached between the IMF's staff and a member country (subject to IMF management and Executive Board approval) on the policies and actions needed for a lending program.

³⁷ A financial tool that offers medium- and long-term financial aid to countries experiencing balance of payments difficulties as a result of structural issues.

Bitcoin voluntary” as part of the IMF press release in early 2025.)Current Relations and Future Prospects: relations between El Salvador and the IMF after the agreement have improved dramatically on the surface. The IMF’s tone became positive, emphasizing the country’s strong recovery after the pandemic (giving some credit to government policies for improved security and tourism). The IMF loan disbursements, conditional on quarterly reviews, now require El Salvador to maintain discipline – including not reversing the Bitcoin policy changes. In fact, the letter of intent that El Salvador submitted as part of the agreement(signed by the Finance Minister and Central Bank President³⁸) likely formalized that position: “the stock of public sector Bitcoin remains unchanged” and “we will reduce the public sector’s role in Chivo and reframe the Bitcoin project”. Indeed, that quote is in an IMF report. These are binding commitments in the sense that deviation would likely cause the IMF to object and could risk the entire EFF program (\$1.4B + \$2B from other donors). But there is a bit of ongoing subtext: Bukele’s public rhetoric on Bitcoin versus his policy actions. Even after signing on the dotted line with the IMF and receiving the funds, Bukele has publicly insisted that he is continuing daily Bitcoin purchases in public (saying “No, it’s not stopping... it won’t stop now or in the future” in March 2025 in response to rumors that the purchases were stopping). This of course was in response to an IMF reminder not to be accumulating more Bitcoin, given the commitment to halt purchases in the EFF program. The IMF noticed that the Bitcoin Office continued to tweet about accumulating BTC and they sent a diplomatic note to El Salvador reiterating the request to respect their agreement and tone down their Bitcoin bravado. Bukele’s defiant tweet seemed to double down. Probably for domestic or crypto-audience politics. The IMF instead interpreted it charitably as bluster that Bukele is at most pushing in order to stay popular with supporters. The IMF relies on actual data that shows the situation, and that data indicates no further purchases (the central bank of El Salvador is presumably showing them public-sector stock of Bitcoin held is unchanged). If Bukele were truly to go rogue and buy a significant amount with public funds, it would risk derailing the IMF program and all the larger financial flows (\$1.4B from the IMF, \$2B more from other sources). Given Bukele’s pragmatism so far, it is assumed he will

³⁸ As per the letter of intent dated June 11, 2025, included in the IMF report ("IMF Executive Board Concludes 2025 Article IV Consultation and First Review Under the Extended Fund Facility for El Salvador"), signed by Jerson Rogelio Posada Molina (Minister of Finance) and Douglas Pablo Rodríguez Fuentes (President of the Central Bank)

quietly stick to the spirit and letter of the EFF program despite bluster and posturing to the contrary. In a broader sense, El Salvador's IMF experience may be instructive for how the Fund will treat other countries flirting with crypto adoption. The IMF has so far been fairly blunt that no country should grant crypto assets legal tender status, having agreed in March 2023 on a statement by the IMF Executive Board. El Salvador's experience was no doubt highly influential in crafting and passing that guidance. For El Salvador itself, by mid-2025, relations with the IMF, the World Bank, and the other multilateral development banks are back to normalized and even friendly. The next six years will see El Salvador deliver on the structural reforms and fiscal targets of the EFF program, which requires cuts to the deficit, increased transparency (the EFF program talks about anti-corruption as well, with the CSIS piece making a strong case for an audit of Chivo etc). It would not be surprising if the IMF pushes them on all that and El Salvador ends up releasing data and even an audit on what exactly was spent on the Bitcoin initiative, and how the trust fund was used – despite the lack of public oversight of Chivo in the government so far. This will be politically tricky, but could remove lingering doubts. In conclusion, the IMF journey has come full circle. What started as a major confrontation (with the IMF at one point holding out a \$1.3 billion in exchange for scrapping Bitcoin) ended with a compromise where El Salvador didn't have to fully scrap the Bitcoin initiative but did need to concede to the IMF's demands to render the legal tender aspect benign. It is a stark example of the power dynamics in global finance: a small heavily-indebted country essentially found it could only go so far in challenging the world financial order, particularly when its own experiment in monetary independence failed to create alternative sources of funding and solvency. The tension between national financial sovereignty and the global financial system's rules was on full display in El Salvador. A country flirting with the idea of independent monetary policy (some saw it as “poking the U.S.” by weakening dollar hegemony) clearly has its limits when the hard math of debt sustainability sets in. That said, Bukele has managed to integrate IMF leverage while largely avoiding domestic political cost to this point (he can always point to the lower taxes, the growth of Bitcoin use, and as of late 2024 the \$1.4B from the IMF too). The IMF, for its part, can point to the fact that through gentle pressure it has won adherence to its principles (crypto cannot be legal tender in a program country) and nudged El Salvador back from a risky and unsustainable path.)Prospects for Digital Finance: in the

longer term, El Salvador is still a digital finance innovator, just without pushing Bitcoin on the public. Legal frameworks for fintech, stablecoins, and a possible CBDC are being developed. For example, El Salvador's Digital Assets law could enable asset-backed stablecoins or tokenization (there was talk in 2021 of a "Colon-Dollar"³⁹ stablecoin in 2021, but that was set aside in favor of Bitcoin; there's no reason to think it would not resurface). The Central Bank is also moving forward to strengthen regulation and implement more financial technology in a safe and prudent way. Ironically then, the Bitcoin experiment, which catalyzed legal reforms but got partly reversed may yet have created a path for more mainstream financial digitization reforms in El Salvador (none of which the IMF would object to if done safely). In summary, El Salvador's relations with the IMF moved from testy to normalized. The Bitcoin experiment's fate was in the balance and, by mid-2025, the IMF's disapproval of that initiative had a huge influence on its policy reversal in El Salvador. The relationship of a sovereign nation and the global financial system is on stark display, with the IMF, in the end, flexing its muscle to rein El Salvador in. On the other hand, El Salvador has not exactly been denied fiscal space to innovate or reformed its entire financial sector in line with international financial norms. The case of El Salvador will be closely watched by other countries mulling similar experiments and by scholars interested in the intersection of crypto and international economics.

³⁹ A would-be stablecoin to be issued by the Salvadoran government, described in 2021 as a potential government-backed digital currency pegged to the U.S. dollar, pre-dating the use of Bitcoin as legal tender.

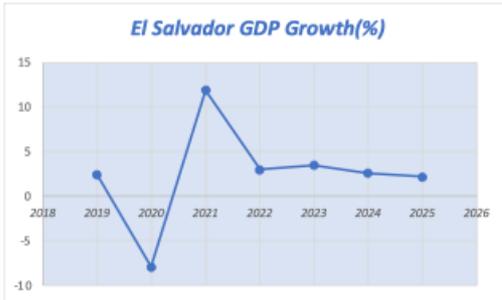
CHAPTER 3: MACROECONOMIC IMPACT IN EL SALVADOR 2021–2025

3.1 GDP Growth and Economic Performance

The Salvadoran economy's growth rate has evolved dynamically between 2021 and 2025, reflecting both pandemic recovery trends and domestic factors, including the impact of Bitcoin adoption. The economy contracted sharply in 2020 by -7.9% due to the COVID-19 pandemic but rebounded with robust growth of +11.9% in 2021 as one of the highest on record. However, this impressive recovery was due to a mechanical rebound effect from the prior year's contraction, supported by the economy's reopening, U.S. stimulus spillovers, and high remittances, rather than the immediate impact of Bitcoin legal tender adoption. 2021's double-digit growth was more a reflection of the low base effect and pent-up demand after the pandemic rather than Bitcoin. The growth rate then moderated to 3.0% in 2022 and 3.5% in 2023, reverting to the more modest levels characteristic of El Salvador, in line with regional averages. These years were driven primarily by traditional factors, such as improved security, rather than the Bitcoin experiment. In 2024, growth further decelerated to a projected 2.6% due to external headwinds and fiscal tightening.

Year	GDP Growth(%)
2019	2,4
2020	-7,9
2021	11,9
2022	3
2023	3,5
2024	2,6
2025	2,2

Table 1: GDP Growth of El Salvador between 2019-2025
Sources: World Bank. GDP growth (annual %) El Salvador. World Bank Open Data.
IMF 2025 Article IV Consultation, First Review under the Extended Fund
Facility. Washington, DC: IMF, 27 giugno 2025



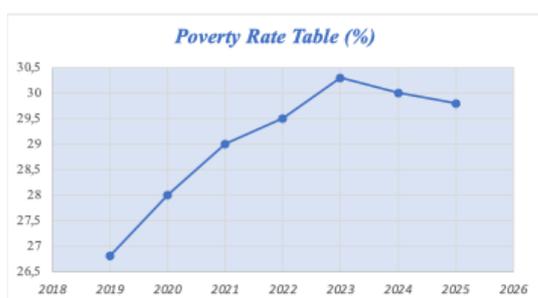
Graph 1: GDP Growth of El Salvador between 2019-2025
 Sources: World Bank. GDP growth (annual %) El Salvador. World Bank Open Data.
 IMF 2025 Article IV Consultation, First Review under the Extended Fund
 Facility. Washington, DC: IMF, 27 giugno 2025

The economy rebounded strongly in 2021 after the pandemic shock, then reverted to moderate growth rates around 2–3% annually. (Data source: World Bank, IMF) Salvadoran economic growth has long been held back by structural constraints. Between 2000 and 2023, the average annual GDP growth rate has been only around ~2.1%, reflecting persistent issues of low productivity and investment. The period post-2021 has not fundamentally altered this growth trajectory. In fact, the growth of 2.8% in 2022 and 3.5% in 2023 “is respectable, but is in line with the region” and reflects traditional growth drivers (improved security, recovering confidence) more than the influence of crypto. In particular, President Bukele’s hardline security crackdown on gangs and violence since 2022 had significantly reduced crime, “boosting confidence in markets and removing a key barrier to prosperity,” as the economy opened back up. This improved security has been a significant part of the growth story in 2022-2024, and the confidence it’s restored in consumers and businesses has helped to drive domestic investment and tourism. By contrast, the legal tender law has not measurably accelerated GDP growth beyond the influence of these normal factors; the hoped-for impact of Bitcoin on real economic output has so far proved limited or elusive, per assessments by the IMF and World Bank. In terms of growth composition, 2021 saw broad-based reactivation of services, manufacturing, and construction sectors that had contracted in 2020; in 2022-2024, GDP growth has been led by solid household consumption (supported by record remittances) and recovering private investment, whereas government consumption has been held down by fiscal consolidation. The tourism sector also partially recovered from pandemic lows, and Bukele claimed to have received a boost in visitors from Bitcoin enthusiasts, but it still only makes up a small share of GDP. Exports also expanded as the global economy

recovered, but high import bills (driven by fuel and food imports in 2022) weighed on net trade. Overall, the economic performance 2021–2025 was far better than the depressed growth rate of 2020, but in the normal range of El Salvador’s pre-Bitcoin growth history. As a reminder of the depth of the country’s growth challenges, this return to positive growth has been insufficient to reverse the rise in poverty: official statistics show poverty worsening from 26.8% in 2019 to 30.3% in 2023, and has not visibly improved since. In short, the post-2021 growth has not been high enough to dent poverty yet.

Year	Poverty Rate (%)
2019	26,8
2020	28
2021	29
2022	29,5
2023	30,3
2024	30
2025	29,8

Table 2: Poverty Rate of El Salvador between 2019-2025
 Source: Dirección General de Estadística y Censos (DIGESTYC), official statistics of El Salvador



Graph 2: Poverty Rate of El Salvador between 2019-2025
 Source: Dirección General de Estadística y Censos (DIGESTYC), official statistics of El Salvador

The economic growth forecast going forward into the medium term is also cautious. The consensus among international institutions is for El Salvador’s GDP growth to hover around the 2%–3% range through 2026. For example, the World Bank forecasts growth to come in at 2.2% in 2025, rising to around ~2.9% in 2027 as the government’s fiscal reforms slowly build investor confidence. The IMF published its last Article IV

consultation on El Salvador in 2025, noting a fragile near-term outlook, with 2.4% growth in 2023 and around 2.5% in 2024. This would put 2026 at around the mid-2% range, barring shocks. This modest growth outlook is predicated on prudent macroeconomic management continuing, continued fiscal consolidation under the new IMF agreement, and the sustained benefits of the improved security environment. Upside potential could come from a faster pickup in private investment (driven by the tech/tourism sectors) or from some unexpected positive effect of the Bitcoin initiatives. Downside risks, which are also flagged as material, include a U.S. growth slowdown (remittances, trade) or financial tightening. In conclusion, El Salvador's GDP growth rate from 2021 to 2025 has been quite dynamic: from a dramatic recovery to low but steady expansion, and is projected to return to around the 2–3% range in the near term. This is about where it would have been without Bitcoin, consistent with the country's historical low-growth trend. So far, this suggests that the bold Bitcoin experiment has neither meaningfully accelerated nor derailed the country's overall growth rate, which continues to be driven by traditional sectors and fundamentals.

3.2 Inflation and Price Stability

Price stability is one of the basic principles of El Salvador's dollarized monetary framework. El Salvador does not have an independent monetary policy, so the country's inflation rate tends to track the U.S. inflation rate in the medium run. Inflation was mild during the first part of the analyzed period: after spiking during the reopening phase of the COVID-19 pandemic, consumer prices rose only 3.5% in 2021 (annual average), which was moderate by historical standards. This was partly due to the stability of the dollar and the well-anchored expectations after more than two decades of dollarization. However, supply shocks from pandemic reopening and Russia's war in Ukraine pushed up inflation globally in 2022 and El Salvador was no exception. Inflation surged to about 7.2% in 2022, the highest level in El Salvador's recent history. Prices were driven up

primarily by imported food and fuel (energy prices surged as well): for instance, oil and grain price hikes in the global market translated into higher local prices. Even so, Salvadoran inflation was lower than that of many of its peers: this was to some extent a result of policy responses. The government enacted sweeping fuel and electricity subsidies, as well as price controls on some staples, to mitigate the shock. These subsidies, for example freezing fuel prices and granting a gas price subsidy, succeeded in “moderating fuel price inflation” so the headline rate stayed a couple of percentage points below where it otherwise would have been. El Salvador’s 7.2% inflation in 2022 was therefore high by its own historical standards (the country had averaged only ~1.7% inflation in the previous decade), but on the lower end compared to regional neighbors that suffered double-digit inflation in 2022. Notably, the adoption of Bitcoin as legal tender did not lead to any obvious instability. Prices are still quoted in USD (per the Bitcoin Law, the dollar is still the reference currency for accounting purposes), and Bitcoin’s usage was too limited to have any material impact on aggregate price levels. There were some concerns that having a volatile cryptocurrency in circulation could complicate price quotations or require conversion rate guarantees (indeed the government set up the \$150 million trust fund to convert Bitcoin to dollars to guarantee price stability for merchants). In reality however, most transactions remained dollarized, and Bitcoin’s price volatility did not have any apparent pass-through into consumer price inflation. The IMF in 2022 recognized that Bitcoin’s volatility “introduces a new kind of financial risk” to the Salvadoran economy but also noted that banks had little direct exposure and the US dollar anchor remained intact. In conclusion, El Salvador’s inflation dynamics during the 2021–2025 period can be summarized without having to consider any crypto-currency effect – they were driven almost entirely by exogenous inflation and domestic fiscal policies. Inflation began to ease in 2023, in line with global disinflation as supply chains eased and commodity prices moderated from their peaks. The headline CPI decelerated to 4.0% in 2023, back within normal ranges. Inflation fell sharply in 2024 to only 0.9% on average, which is close to price stability, and even included periods of deflation. Several factors explain this rapid cooldown: international fuel and food prices moderated from their 2022 highs, the Federal Reserve’s monetary tightening helped bring down US inflation (transmitted to El Salvador through the dollar), and El Salvador’s government continued to keep some price interventions in place for a time. Indeed, as of mid-2025,

El Salvador was in fact experiencing slight deflation (consumer prices down 0.17% year-on-year in June 2025), which put it among the lowest inflation countries in the world. This highlights the benefit of dollarization in anchoring long-run inflation expectations – since switching to the USD in 2001, El Salvador has had relatively low inflation in general, with annual averages of less than 2% per year (compared to ~5–6% for non-dollarized Latin peers). It also reflects the government’s prudent fiscal management of those subsidies; when global inflation pressures subsided, it phased out the extraordinary subsidies, which allowed domestic fuel prices to fall back and contributed to the near-zero reading in 2024–25. Annual inflation rate in El Salvador, 2019–2024. After peaking in 2022 (driven by global price shocks) at 7.2% CPI, inflation declined sharply to under 1% in 2024, reflecting the country’s dollarized stability and reduction of external pressures. From the monetary policy perspective, it is thus clear that price stability was preserved during the Bitcoin experiment period, and arguably even strengthened by 2024 (having below 1% inflation). The Central Reserve Bank (BCR) ⁴⁰ has had no monetary policy levers in place and has focused instead on banking supervision and facilitating the economic recovery through credit operations. The Ministry of Finance’s (MHCP) ⁴¹ ability to affect prices lies in the area of subsidies and taxation. The sole exception/policy novelty was the fuel subsidy for Chivo wallet users in late 2021: as an incentive to use Bitcoin, the government gave a \$0.20 per gallon discount on gasoline purchases by those paying through the Chivo (Bitcoin) wallet. This was in effect a targeted price subsidy to promote Bitcoin adoption. It did result in temporarily cheaper fuel prices for users, but the macroeconomic impact on inflation was negligible given the short time horizon and low uptake of that payment method. In other words, it is a temporary and targeted measure that does not threaten the general price stability of the dollarized economy. In fact, such measures reveal the care that the government took not to give any impression that Bitcoin adoption would undermine monetary stability. The IMF has consistently urged El Salvador to “safeguard financial stability and consumer protection” regarding Bitcoin, and explicitly recommended making the law voluntary. By January 2025, this advice was taken when El Salvador amended the Bitcoin Law to no

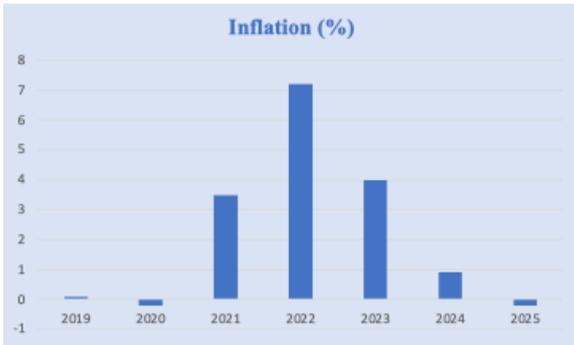
⁴⁰ The country’s central bank, responsible for financial system supervision, monetary stability under dollarization and the performance of credit operations to support the economy.

⁴¹ Ministry of Finance in charge of the administration of the public finances, taxes, the national budget and economic policy.

longer mandate that all businesses accept Bitcoin. This further ensures that pricing and transactions can remain as dollarized as agents would like. Looking ahead, it is expected that inflation will revert to the U.S. Federal Reserve’s 2% target in the medium term. IMF analysis indicates that with U.S. inflation returning to normal, El Salvador’s inflation will also stabilize around ~2% in the medium term, given the dollar peg and the deep integration with the U.S. economy. For 2025 and 2026, forecasts point to inflation moving back up from the near-zero level of 2024 to a more modest 1–2% range. Too-low inflation is of course not a good sign per se, as it can be indicative of low demand. But in El Salvador’s case, the near-zero inflation of 2024 was largely a supply-side correction (adjusting for earlier price spikes) rather than a sign of collapsing demand, for instance private consumption grew ~3% in 2024. So a gentle re-inflation to ~2% would be consistent with a healthy normalization. Crucially, no second-round inflationary pressure from the Bitcoin side is expected: the cryptocurrency’s usage is still a tiny fraction of all transactions, and the government is on record (via its IMF program) not to monetize expenses by either crypto or dollar creation. In sum, El Salvador successfully maintained price stability between 2021 and 2025, successfully navigated a global inflation shock with temporary subsidies and benefiting from its dollarized anchor. The Bitcoin experiment had no destabilizing effect on prices, and going forward, the country’s inflation is expected to remain low and in line with its traditional anchor – the U.S. price level.

Year	Inflation (%)
2019	0,1
2020	-0,2
2021	3,5
2022	7,2
2023	4
2024	0,9
2025	-0,2

Table 3: Inflation Rate of El Salvador between 2019-2025
Source: World Bank



Graph 3: Inflation Rate of El Salvador between 2019-2025
Source: World Bank

3.3 Foreign Direct Investment and Investment Climate

A third objective that the Salvadoran authorities were hoping for from Bitcoin was to improve the country's image as an open, forward-looking, and innovation-friendly economy; attracting foreign direct investment (FDI) in tech and fintech. On this front, the data for 2021–2025 do not show a strong positive shock, particularly in 2022. FDI actually collapsed in 2022 before rebounding in 2023. El Salvador has historically been a very weak recipient of FDI relative to peers, and during the Bitcoin experiment, FDI flows remain fairly low and volatile. Net FDI inflows in El Salvador averaged \$386 million in 2021, then fell to just \$171 million in 2022, before climbing back to about \$760 million in 2023, according to UNCTAD⁴². To give some sense of scale, in 2022, the level of net FDI was only about 0.5% of GDP, down 97% from the prior year. In effect, FDI into El Salvador ground to a near standstill in 2022; indeed some reports suggest that net FDI actually turned negative that year (capital outflows). For context, investor skittishness was interpreted as in part due to concerns over the Bitcoin law and the attendant political and macro-financial risks. This shift came in the midst of a risk-off period for emerging markets broadly in 2022, but the fall in FDI to El Salvador was much

⁴² UN agency that aims to integrate developing countries into the global economy and publishes important statistics on trade, investment and development, including FDI flows.

sharper than in its regional neighbors (Guatemala and Honduras both saw strong FDI inflows in 2022), suggesting a country-specific element. FDI flows to El Salvador, 2018–2023 (USD millions). After rebounding after the pandemic in 2021, FDI dropped precipitously in 2022 to historically low levels (~\$171m) before recovering in 2023. Several events in 2021–2022 may have compounded these negative effects on the investment climate. Credit ratings agencies downgraded El Salvador soon after the Bitcoin law was passed. For example, Moody’s downgraded the country’s credit rating in July 2021, citing “the adoption of bitcoin as legal tender” as one of several new factors negatively affecting fiscal sustainability. The downgrade to Caa1 (roughly CCC) was due to fears that the government’s unconventional policies might scuttle an IMF deal and thus its access to finance. Moreover, the IMF negotiations over a \$1.3 billion loan were stalemated throughout 2021–2022, with the Fund strongly opposed to the Bitcoin experiment on macro financial stability grounds. The absence of an IMF backstop and high debt led to a sharp widening of El Salvador’s sovereign bond spreads in 2022. By mid-2022, the market’s risk premia had reached extreme levels: El Salvador’s EMBI⁴³ spread topped 30 percentage points (3000+ basis points), a level suggesting that investors are pricing in a high probability of default. “The difference between government bond interest rates and benchmark rates”, in fact, spiked to such a level that El Salvador was shut out of international capital markets. This toxic market environment in 2022 certainly chilled the enthusiasm of potential foreign investors. Risk averse investors were concerned about the government’s policy agenda and capacity to service its debt (discussions of possible default were rife in 2022–23). At the same time, the Bitcoin enthusiasts and crypto firms which the government hoped would be the new wave of investors adopted a wait-and-see approach, especially after Bitcoin’s price declined in 2022. The hoped-for influx of crypto entrepreneurs has been slow to develop beyond a trickle of boutique startups and expat enthusiasts. The year 2022, therefore, was “when the negative effect of the Bitcoin initiative on the country’s investment climate became apparent”, according to one account, with FDI flows collapsing to zero. In fairness, FDI inflows in El Salvador have underperformed regional peers for years due to structural issues – crime, a small economy, policy instability – but the Bitcoin law added another

⁴³ A benchmark index published by J.P. Morgan that measures the performance and risk premiums of sovereign bonds issued by emerging market countries. It is commonly used to measure default risk.

dimension of perceived risk. Business surveys showed concerns about regulatory uncertainty and potential AML/CFT risks tied to the Bitcoin initiative. Some foreign companies reportedly delayed or paused investment plans pending more clarity on the new system's implications. It is also worth noting that no big multinational announced a new factory or regional operation that was clearly attributable to Bitcoin adoption. On the contrary, there were anecdotal reports of investors delaying decisions or shifting regional headquarters elsewhere due to reputational risk concerns and El Salvador's difficulties with institutions like the IMF. The one area of FDI that did attract foreign interest was renewable energy and Bitcoin mining. For instance, in 2023 the stablecoin issuer Tether invested in a planned 241 MW renewable energy park ("Volcano Energy") to power Bitcoin mining. This announced in mid-2023, and brings foreign capital and technology into the energy sector. While relatively small, this is the type of crypto-related investment the government has targeted and courted. Additionally, there were a handful of crypto exchanges and fintech startups that have opened small offices in San Salvador, seeking to leverage the government's welcoming stance and regulatory/tax incentives. However, these investments are quite small and have not moved the needle on aggregate FDI. The turning point was in 2023–2024. El Salvador's investment climate improved as the government addressed macroeconomic imbalances and repaired ties with multilateral lenders. In 2023, the near-term risk of default subsided: the government organized bond buybacks and secured alternative financing to demonstrate that it would honor its debts. Most importantly, in early 2025 El Salvador signed a \$1.4 billion Extended Fund Facility (EFF) with the IMF after agreeing to reforms, including on transparency and on making Bitcoin voluntary rather than mandatory. This agreement was a strong positive signal for investors. Even before its formal approval, the anticipated IMF program helped El Salvador's sovereign bond spreads collapse by over 3,100 basis points between July 2022 and Feb 2025. Bond yields on Salvadoran Eurobonds, which had spiked above 20% in 2022, returned to the single digits by 2023–2024, as the risk of default receded and investor confidence returned. Credit rating agencies also reacted: Moody's had downgraded El Salvador in 2021 but then upgraded the country's rating in 2023 from Caa3 to B3 (still highly speculative, but a nod to improved outlook). All of this stabilization of the financial outlook likely contributed to the FDI rebound to \$760 million in 2023 (about 2.2% of GDP). Indeed, foreign investors warmed to El Salvador after

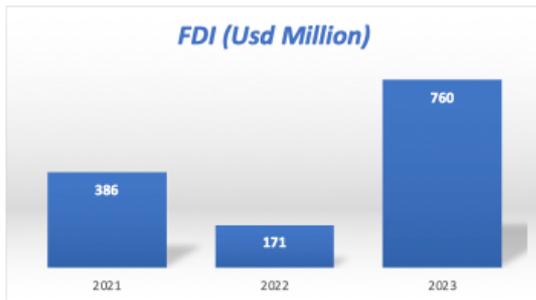
macro risks receded. Local analysts noted that some investors who were previously holding back put their projects back on track after El Salvador averted default and committed to orthodox fiscal measures in 2023. Even so, the improved FDI in 2023 was far below its potential. For comparison, FDI in neighboring Honduras (a much smaller economy) exceeded \$1 billion in 2023, and Guatemala received \$1.55 billion. FDI into El Salvador between 2021–2024 was modest, and focused in traditional sectors: manufacturing, telecom, energy. The crypto sector FDI, while much publicized, was a small subset of overall FDI (investments in Bitcoin ATMs, tech startups, and the “Bitcoin Beach” tourism and real estate project were in the tens of millions of dollars, not hundreds). An interesting development in the period was an uptick in diaspora and regional investors. Some Salvadoran-Americans and regional companies increased investments in El Salvador, betting on an improved security and tourism rather than Bitcoin per se. For instance, the dramatic drop in crime by 2023 made certain sectors like hospitality and real estate much more attractive, and drew investment from regional hotel chains, restaurants and others. This underscores how reforms like the massive drop in crime likely had more direct and visible impact on the investment climate than the Bitcoin as legal tender decision. Looking back on the investment climate in El Salvador between 2021–2025, what’s clear is that the government sent mixed signals. On the one hand, El Salvador branded itself as a “crypto-friendly” country with aggressive initiatives: zero capital gains tax on Bitcoin, streamlined residency for crypto investors, plans for a tax-free “Bitcoin City” that would be funded by “Volcano bonds”. These policies clearly brought in a small set of foreign investors very interested in cryptocurrency. The country received an influx of crypto influencers, boutique investment funds and “BTCmaxis⁴⁴”, and companies like Strike (a Bitcoin payments firm) engaging with the Salvadoran market. However, these investors were in niche sectors, and more traditional investors and multilateral institutions balked at what they saw as a cavalier attitude towards prudent policymaking. The World Bank, for instance, refused to assist in the Bitcoin implementation in 2021 over transparency and environmental concerns. The U.S. State Department’s Investment Climate reports in 2022–2023 emphasized rule-of-law and governance issues (democratic backsliding, executive overreach in the removal of

⁴⁴ Shorthand for “Bitcoin maximalists,” a group of cryptocurrency advocates who believe Bitcoin is the only legitimate digital asset and reject the value of alternative cryptocurrencies.

supreme court judges, etc.) that weighed on investor perceptions separate from Bitcoin. Thus, while the Bitcoin experiment put El Salvador on the map, it may have also worsened perceptions of policy unpredictability. It was only after the government demonstrated fiscal discipline and diluted some of the more coercive elements of the Bitcoin law for example salary payment and tax payment by businesses in BTC made voluntary, that the broader investment climate started to turn positive. Looking ahead to FDI in 2025–2026, the outlook is cautiously optimistic now that an IMF program is in place and the worst fears of a financial crisis have receded. The World Bank concludes that “comprehensive reforms are needed to diversify the economy and attract FDI”, particularly by improving human capital, infrastructure, and the overall business climate. If the government continues to pursue macroeconomic stability and good governance, El Salvador could leverage its improved security situation to attract investment in sectors like tourism, manufacturing and renewable energy. The Bitcoin initiative may also pay dividends in the longer term if it helps catalyze a fintech sector or more broadly a tech innovation hub, but in the 2021–2025 time horizon, those benefits remain marginal. Some notable near-future developments that could drive FDI in 2025–2026 include the issuance of “Volcano bonds” which was delayed but reportedly is in motion in 2023/24 under a new Digital Assets law. If successful, this could raise \$1 billion from crypto-investors and provide similar inflows of FDI to fund public projects. Additionally, projects like Volcano could lead to new investments of hundreds of millions in energy infrastructure, and also possibly position El Salvador as a regional leader of green Bitcoin mining. In summary, El Salvador’s investment climate took a hit in 2021–2022 partly due to the turmoil of the Bitcoin experiment, but began stabilizing in 2023–2025. With Bitcoin usage made voluntary and an IMF deal in place by the end of 2025, El Salvador is projecting a more reassuring signal to investors: that it seeks to enjoy the benefits of Bitcoin’s innovation without sacrificing macroeconomic stability and a good faith approach to contractual obligations. The uptick in FDI in 2023 may be the first sign of investors tentatively coming back to the table, but the government will need to continue to make pro-investor reforms, improve transparency, and demonstrate the overall success of its digital finance efforts to achieve a more sustained improvement in FDI.

Year	FDI (Usd Million)
2021	386
2022	171
2023	760

Table 4: Foreign Direct Investment of El Salvador between 2021-2023
Source: UNCTAD World Investment Report



Graph 4: Foreign Direct Investment of El Salvador between 2021-2023
Source: UNCTAD World Investment Report

3.4 Remittances from Abroad

Remittances, which had been a key support for the Salvadoran economy even before the Bitcoin experiment, are “wire transfers” from Salvadorans abroad to their families back home. Before 2021, El Salvador had already been one of the world’s top recipients of remittances as a share of GDP (the measure that the government focused on when claiming that Bitcoin would reduce costs for Salvadoran migrants), usually in the range of 20–25% of GDP. The rapid recovery of the U.S. economy and pandemic stimulus there boosted remittances significantly in 2021: they came in at ~26% of GDP, as immigrants sent home record amounts of cash (for example, in Q1–Q2 2021 El Salvador had already received more remittances than in all of 2020). In absolute terms, El Salvador received about \$7.0 billion in remittances in 2021, compared with ~\$5.9 billion in 2020. This

provided a large and very welcome boost to household incomes and consumption, and was one reason for the strong growth in 2021. In 2022–2025, remittances continued to increase in nominal terms, reaching new all-time highs every year. They were \$8.182 billion in 2023, and the forecast for 2024 is that they will be about \$8.5 billion. This has been a secular trend (growth of around 6–8% per year), driven by a strong U.S. labor market for Salvadoran immigrants and by the gradual growth of the size and earnings of the Salvadoran diaspora. This has allowed remittances to continue to increase even though their ratio to GDP has fallen back a bit to ~24% in 2022 and ~23.9% in 2023. Despite this small decline, that is still a very high ratio by international standards, and it underscores the country’s dependence on remittances. One explicit claim made by the President and the government about the Bitcoin Law was that it would make it “cheaper and faster” to send remittances for Salvadorans abroad. The logic was that existing remittance channels (like Western Union or MoneyGram) involve non-trivial fees averaging around 3–5% of the transaction amount. For example, in Q2 2023 the average fee to send \$200 from the US to El Salvador was about 4.3% (or \$8.60). Annual remittance volumes are around the \$7–8 billion range, so those fees amount to hundreds of millions of dollars. That’s about 1% of GDP being siphoned off by intermediaries each year, which could be worth billions in cumulative terms. If those fees could be reduced significantly, the resulting disposable income gains would be material for receiving families. President Bukele has claimed that Bitcoin and the state-run Chivo wallet could be used to send remittances “for free”, thus allowing Salvadorans to “save themselves billions of dollars” in aggregate remittance fees. The central bank began installing Chivo ATMs in various U.S. cities with large Salvadoran populations to facilitate these transfers (sending Bitcoin from the U.S. directly to a wallet in El Salvador without paying any fees, and immediately converting it to dollars). In practice, the use of Bitcoin to send remittances has been vanishingly small. Central Bank of El Salvador and NBER confirm that remittances continue to overwhelmingly flow in U.S. dollars through traditional channels. The preliminary data for January 2021 to April 2022, compiled by the Chivo wallet from anonymized users, also indicates that very few digital wallets are used. For example, in the first two months after Chivo launched in September 2021, it was estimated that about 2.5% of remittances by value used digital wallets (almost certainly Chivo) as early adopters tried the new system. But this quickly dwindled – over the period

from September 2021 through April 2022, it averaged only 1.6–1.9% of transactions monthly. In late 2022 and through 2023, this share had fallen further. The IMF reported in a 2023 news article that “only 1.3% of remittances in El Salvador used crypto/digital wallets” that year. And in December 2024, out of total remittances for the year of about \$7 billion, only \$7.22 million was sent using crypto wallets – that’s about 0.1%. In other words, Bitcoin is used for less than 0.1% of all remittances into El Salvador. This means that the vast majority (>99%) of Salvadoran families are not using Bitcoin to receive remittances in any way. The reasons for the diaspora’s low uptake of Bitcoin are probably a mix of many factors, including user preferences and trust. Salvadoran families themselves “still prefer to receive dollars in cash and see it as the most convenient and trustworthy method”. Many recipients “feel more comfortable going to a store or bank they know to pick up dollars in person” rather than using an unfamiliar app or ATM to withdraw Bitcoin (or even dollars) from a Chivo wallet. The population for whom remittances are most important in El Salvador includes many older adults or rural residents with low digital literacy, who may not understand or trust Bitcoin or the wallet apps. Technology and access: even though mobile phone ownership in El Salvador is around 90%, not everyone (especially among the poor) has a smartphone and internet connection needed to use Chivo or similar apps. The early glitches and poor performance with the Chivo wallet (persistent downtime, app bugs, reports of identity fraud to get the \$30 bonus) may have made many skeptical of the service and unwilling to try it if there were working alternatives. Sender-side friction: for a remittance to go through via Bitcoin, the sender (generally a worker in the U.S.) needs to first buy Bitcoin or use a crypto exchange to fund the transaction – which has its own fees, security risks, and learning curve. Most migrants will have formed long-standing habits about going to a Western Union store or doing an online transfer; the extra steps of buying Bitcoin at an exchange to send to Chivo will deter most people who are not crypto enthusiasts. El Salvador’s own government did a relatively limited outreach effort to the Salvadoran diaspora in the U.S., and without a large education campaign and effort to drive awareness and adoption, usage is likely to remain low. Volatility is an issue as well – even though transfers are near-instant and can be cashed out immediately, the risk that the dollar value will change or the sender or receiver will somehow mishandle the process has been off-putting. In short, the diaspora and their families have so far not widely adopted Bitcoin,

and they send the same way that they always have. This lack of adoption might be hard to overcome even if Bitcoin/LSD provides a genuine lower-cost channel – reversing user behavior in financial services is difficult once people have settled on a service they trust and are comfortable with. The continued high level of remittances, despite the Bitcoin rollout, reflects several factors. The most important is the broader U.S. economic cycle: the U.S. labor market and wage gains for immigrant workers are a primary driver of Salvadoran remittance levels. As Bukele mentioned in a speech in November 2023, this immigrant group (generally low-wage workers) “don’t use bitcoin because we forced them to” but they are “doing everything in their power” to send money home to their families as the U.S. economy recovers and they get back to work. Thus El Salvador’s main economic lever to stimulate remittances from abroad is foreign economic policy and support for migrant Salvadorans and their jobs – something largely outside its direct control. A related factor is “forced remittances” due to the difficult economic conditions faced by the diaspora in the U.S., such as high housing and living costs, along with perceived family obligation and a sense of duty to help back home. One survey from 2022 found that Salvadoran families receiving remittances back home in El Salvador “view remittances as a long-term obligation” – this sense of duty (from both the family abroad and the family receiving the support) is another reason why total remittances have remained so high. The cost of remittances has not changed much, according to World Bank data, the average fee % for sending remittances to El Salvador remained at mid-single-digit levels (though somewhat better than a decade ago, as fee competition has improved). Bitcoin/Chivo, even if they are a free zero-fee option, remain a tiny fraction of the overall market, and so Western Union and others do not face significant fee competition from them and their prices have not fallen materially. The Inter-American Development Bank (IDB)⁴⁵ noted that “digital remittances” had been growing across Latin America, but in practice this mostly meant the arrival of a number of fintech firms that reduced frictions in the same traditional remittance/currency channel, not a large-scale crypto substitution effect. From a macroeconomic point of view, the inability of Bitcoin to disintermediate the remittance sector means that El Salvador has not yet captured the gains in disposable income that lower fees would provide. The country is

⁴⁵ A regional multilateral development bank that finances economic and social development projects in Latin America and the Caribbean.

still “losing” on the order of \$200–\$400 million a year in fees to financial intermediaries that could instead be adding to domestic consumption or investment. This has been the case throughout 2021–2025. On the other hand, even without any adoption of crypto, remittances have still provided a large amount of foreign exchange to El Salvador, allowing the country to finance its trade deficit and supporting the balance of payments. El Salvador has a large trade/import deficit (currently a couple billion dollars a year) but this is “comfortably covered by remittance inflows of ~24% of GDP and other transfers”, according to IMF staff. This reduces external pressures and gives the central bank more leeway. The bank’s international reserves have remained in the lower \$1 billion to \$2 billion range, relatively modest but adequate thanks in part to remittances and other inflows covering the external account. As shown in the table, remittances in 2021–2024 grew in nominal terms and in aggregate have been a major source of support to the Salvadoran economy, but the channel for doing so has not shifted at all in response to the Bitcoin Law.

Year	Remittances (Usd Billions)	Remittances/GDP (%)
2021	7	26
2022	7,6	24
2023	8,182	23,9
2024	8,48	24

Table 5: El Salvador Remittances (USD billion and % of GDP), 2021–2024
Source: Central Bank of El Salvador

Remittances rose steadily from about \$5.5–6 billion in the late 2010s to over \$8 billion by 2023, and have remained at well above 20% of GDP. As seen in the table, only a small fraction (less than 2%) of this is in Bitcoin-based transfers to crypto wallets; the data shows that most Salvadorans receiving remittances are not using crypto. (The share of transactions via digital wallets is close to zero, although the survey data does indicate some Salvadorans did experiment with Chivo for remittances at small amounts. But for most of these recipients it was a one-off or experimental; they often took the dollars from the wallet and didn’t necessarily keep using the app for other transactions.) The median

Chivo user in El Salvador does not appear to be regularly receiving remittances in Bitcoin. The overall geography of remittance inflows has not changed: most come from the United States (over 90%), followed by Canada and Spain, and this remains the case post-Bitcoin. A more limited positive impact on fees is possible – some in the crypto world have argued that the threat of Bitcoin/Chivo was a factor that led Western Union to change its fees. There is probably some merit to this claim: if so, it is one of the few microeconomic changes that has resulted from the policy. But attributing any fee decline by incumbents directly to Bitcoin is difficult (and it's also not clear how low Bitcoin/LSD could go, if their own fees were unprofitably close to zero). Overall, the average cost of sending money to El Salvador has declined in the last decade, but that trend predated Bitcoin and is more a product of the expansion of fintech firms and digital/mobile banking services competing in the same traditional remittance space. In conclusion, while remittances from 2021 to 2025 grew in size and remained an essential economic lifeline, the method of sending and receiving did not change in any significant way as a result of the Bitcoin law. Salvadorans abroad have not widely adopted Bitcoin to send money, due to a variety of factors like trust, accessibility and preferences for receiving dollars. The government's promise to slash the cost of remittances has so far not been fulfilled – a notable disappointment versus its own goals. On the other hand, the continued strength of remittance flows (driven by the diaspora's efforts and the U.S. economic conditions) has been a key pillar of El Salvador's post-pandemic recovery and support for domestic demand. Policymakers have acknowledged that any future reduction in remittance costs (whether using lower-cost fintech or via crypto) will need to be accompanied by building trust and ease-of-use to the point where the average user feels comfortable with a digital wallet as an alternative to cash pickup. For now, the Bitcoin experiment's impact on macro aggregates like GNI or household consumption via remittances has been close to zero. Remittances remain high and vital, and this period may have reinforced how dependent many Salvadoran households are on them – a fact that policymakers need to consider as they debate financial innovations like Bitcoin. The focus going forward may be more on simply integrating lower-cost digital remittance services (not necessarily crypto-based) and improving financial inclusion so that more Salvadoran families can receive funds directly into accounts or wallets in a form that they trust.

3.5 Financial Inclusion and Bitcoin Usage in the Population

One of the main justifications for El Salvador's Bitcoin experiment has been the promise of financial inclusion. At the time of its Bitcoin rollout, El Salvador had one of the largest unbanked populations in the world: the International Monetary Fund (IMF) estimated that ~70% of Salvadorans adults lacked a bank account or access to the traditional financial system. This included much of the rural poor and the informal sector. The government's theory was that a national mobile wallet (the Chivo wallet) that could hold both Bitcoin and dollars would allow millions of unbanked Salvadorans to quickly join the formal financial system. With just an app and a government ID, a person could instantly become "banked" with a digital transaction account. Indeed, the Bitcoin Law's preamble openly cited that the ~70% of Salvadorans unbanked and framed its adoption as a means to inclusion. With \$30 signup bonus Bitcoin given to every citizen, the initial roll-out of the Chivo wallet in September 2021 saw a flood of sign-ups. Within a month, the government claimed, ~3–4 million people had downloaded the Chivo wallet (that would be 50–65% of the population over 14 years old). This was a remarkable achievement in financial inclusion in a single bound – for a brief moment, more Salvadorans had a digital wallet than had ever had a bank account. It appeared that El Salvador had vaulted its citizens into the 21st century in a matter of weeks. But if we dig into actual usage and sustained inclusion, it is much less of a success story. As independent economists surveyed those who downloaded the app, they found that most active usage by these people ceased after the novelty of Chivo faded. The National Bureau of Economic Research (NBER) published survey results of 1,800 households. The IMF did its own analysis of this NBER study in a report, which helps us see where Salvadorans actually stand in terms of being Bitcoin (and digital financial) users. The key finding from the survey: for most people, adoption was not adoption for actual usage of Bitcoin, but just to claim the signup bonus: "most registered users downloaded Chivo only to cash the \$30 allowance and 60 percent did not make any other transaction" (according to the IMF's paper on the survey). By the way, "downloaded" might be a better term than "registered". Most people got the app and left it on their phone without bothering to set up an actual account with Chivo, further evidence of the superficial nature of the signup surge. The implication is that the sudden jump in apparent "financial inclusion" was not real inclusion, but just a free giveaway. When the novelty of Bitcoin wore off, people stopped using it. The Salvadoran

government and the Bukele administration claimed in the first months that millions of Salvadorans had become “financially included” by adopting the Chivo wallet. By the IMF’s findings, however, most of those Chivo users stopped using the app actively after a few months, making Chivo no different in practice from a traditional bank. By mid-2022, active usage had stagnated – the number of downloads of Chivo (virtually all of which occurred during the first three months of 2021) had peaked, and the fraction of the population that used Chivo (what the IMF paper refers to as “registered users” active on the app) had come down to around 1 in 5 Salvadorans (20%). The remaining users that stuck with it were more likely to be urban, educated, and already banked Salvadorans who had some utility in using the app. On the other hand, the truly unbanked, poor, rural people for whom this policy was designed were mostly left out – often they found the technology too intimidating to learn and try, or simply did not see enough benefit after the free \$30 was spent to keep on using the app. What’s telling is that those who did stick with Chivo are overwhelmingly using it to hold/store dollars, not Bitcoin. Despite being designed to incentivize Bitcoin use, the Chivo wallet actually does not “force” people to use or hold Bitcoin. Instead, it’s a smooth experience to transact in dollars with the app as well, seamlessly. Researchers found that Salvadorans who continued to use Chivo primarily use it like a basic digital wallet or dollar debit-card account. They might get their salary or make payments in Chivo, but in dollars, or just store some dollars in it as a kind of savings account (but digital). It is a form of financial inclusion, they now have an electronic account, but not crypto adoption per se. As the IMF report phrases it, “registered users” of Chivo are most likely “simply storing their money in a convenient digital wallet, something like a zero-fee checking account, without the hassle of dealing with cash”. In fact, according to the NBER survey and IMF study, the median active Chivo user is making 0 Bitcoin transactions per month: people are sticking with the app but using it without touching any Bitcoin. In that sense, Chivo has morphed into a kind of quasi-bank account for certain Salvadorans (but, again, only a minority), while the revolutionary aspect of Bitcoin has become ancillary and mostly ignored for normal transactions. Why is Bitcoin usage so low among the population? Similar to the reasons from the remittances use case, the key factors seem to be trust and understanding. At the point of launch, Bitcoin was extremely novel and conceptually difficult for Salvadorans to understand. A poll at the time of Bitcoin adoption found 9 out of 10 Salvadorans did

not know or understand what Bitcoin was. That, of course, translates into a deep mistrust of using it. Fear of losing money through volatility or getting ripped off has been a big reason people have been slow to adopt. The Chivo app itself was not very user-friendly, with frequent crashes reported and long times to complete transactions in the early months, which turned off users. Then there were reports of failed transactions and generally poor customer service or no customer service, which turned more users off trying to transact on the platform. There's also the issue of merchant acceptance. While legally all businesses in El Salvador must accept Bitcoin, in practice, enforcement is weak. It was widely reported anecdotally in El Salvador that if someone tried to pay in Bitcoin in a small mom and pop shop, the owner would just pretend their QR code reader was broken or their phone was dead and take cash instead. An informal Chamber of Commerce survey of businesses a few months into the rollout found over 80% had never made a Bitcoin sale. By late 2022, a survey of businesses estimated only 20% of businesses were accepting Bitcoin nationwide, and those were largely bigger chains and those in tourist areas. Without being able to actually spend Bitcoin reliably for everyday purchases, there is little incentive for the average person to earn it or hold it. This limited adoption by merchants (despite the law's strictures) is thus the chicken-and-egg issue on the demand side of Chivo and Bitcoin use. If we only look at raw financial inclusion numbers, the picture is positive but slightly overblown. Yes, tens of thousands of unbanked Salvadorans have downloaded the Chivo wallet. Yes, it is likely that a rural farmer or street vendor who has never had a bank account in their life signed up for Chivo in order to get the free \$30, but that's it. Despite the government claims in the first months that the Chivo wallet was "banking" more people than traditional banks did in 10 years, the reality is more muted. The Chivo wallet does have that potential. Where mobile wallets and crypto have advantages over brick and mortar banks is when they can reach the completely unbanked. No one would expect a village street vendor who has never had a bank account to immediately become a heavy Bitcoin user, making regular cross-border remittances or P2P payments in BTC. What's feasible is that people like that – the truly unbanked – would download Chivo as a curiosity, get the free \$30 (possibly by exchanging it for dollars, given the volatility), and then maybe continue to use the wallet for basic things like P2P or to just keep some savings in electronic form instead of having to manage it in cash. Indeed, the Ministry of Economy claimed Chivo has "banked" more

people than traditional banks in 10 years. The app likely did bring tens of thousands of truly unbanked people into at least a form of the formal financial system, whether they continue using it or not. This is important in the aggregate. There is some evidence that digital financial services can leapfrog traditional banking and inclusion (e.g. Rwanda). But on the other hand, because many have simply abandoned the platform, the increase in financial inclusion (as measured by active account ownership) has been modest. Global Findex ⁴⁶data from the World Bank is not yet updated for 2023, but it would not show a dramatic increase for El Salvador between 2017 (last measurement) and 2023. For example, if in 2017 30% of Salvadorans were banked in the traditional sense and in 2023 perhaps an additional ~20% of adults had become active Chivo users (leaving aside that many of those would also be banked already), then the share of adults in El Salvador with either a bank or mobile money account would have moved up from ~30% to perhaps ~50% (this is a rough back-of-envelope guesstimate, not from official data). This is good! Financial inclusion doubled. But still means 50% of the population remains financially excluded in practice. Financial inclusion is not just an account, but using it for useful functions: saving securely, borrowing, making payments, etc. On all of these fronts, the Bitcoin experiment in El Salvador did not appear to make much of a difference. There is no evidence that Chivo users have begun to access loans or other financial products/services through the wallet. While the government has pushed measures to offer certain functions in Bitcoin (tax payments in BTC, some small scale BTC loans for entrepreneurs), actual usage of those is limited. It is clear most Salvadorans still prefer to transact in cash for most purposes; the amount of currency in circulation (paper U.S. dollar cash) in El Salvador did not measurably decrease in the two years after Bitcoin's introduction. Cash remains king. A potential positive indirect outcome of the experiment is a broader education and familiarity with digital finance. The government and crypto community sponsored curricula and programs like "Mi Primer Bitcoin" ("My First Bitcoin") in the early years to create textbooks for students to learn about Bitcoin and financial literacy as part of school classes. This process continued in 2022 as the Bitcoin Diploma was introduced to a handful of high schools with support from the Salvadoran Ministry of Education to start students on a path to understanding crypto and digital

⁴⁶ A World Bank database based on nationally representative household surveys which tracks how adults worldwide save, borrow, make payments, and manage risk. It is frequently used as a primary source for financial inclusion indicators.

finance. There's a potential for this to have real long-term positive impact: as a younger generation becomes more familiar with these concepts in school, they are more likely to be comfortable using technologies like mobile banking apps or even crypto in the future. It's also worth noting that local banks and telecoms were "forced" by El Salvador's experiment to start to compete and invest more in their own digital payment and money transfer services, having seen the government's aggressive play. Seeing Chivo come along and have a large potential customer base, certain banks have actually upped their mobile banking apps and money transfer services in direct response. Looking at public sentiment from the Salvadoran population, repeated surveys throughout 2022–2023 have shown very little interest or even skepticism about Bitcoin. Most people did not see how it had benefited them. In a July 2022 poll by El Universidad Centro Americana, the respondents said that the Bitcoin policy had "not improved their family's economic situation" at all was 71% (with a majority viewing it as a failure). Public opinion data in this country is highly correlated with the issue of security/policing; salvadorans blame or support the government based on crime rates and personal security above almost all other factors. Bukele remains overwhelmingly popular for that reason, even as Bitcoin failed to meet expectations for most people. The overall feeling by the end of 2023, after two years of the law in force, was that Bitcoin is something of a niche thing in daily life: the country legally has it, it's here and always will be. But in daily life for most people, transactions and use cases remain the same: dollars in cash or via traditional means (phone banking, etc). A striking stat: in 2023, over 90% of Salvadorans prefer to use U.S. dollars over Bitcoin to make transactions, virtually unchanged from before the Bitcoin Law. It has not pushed the population towards financial inclusion or crypto, and this is a key reminder of the inutility of Bitcoin in the lives of most citizens. In certain niche communities, Salvadorans have begun to use Bitcoin regularly. Tech-savvy youth and younger professionals use it more than older Salvadorans. A handful of businesses have started up that focus on Bitcoin and blockchain services, and target the regional market (e.g. payment processors, consulting, etc). This includes using El Salvador's legal status as an early test case for these products. Bitcoin Beach, the tourist town with a circular Bitcoin economy since 2019 that partly inspired the law, continues to exist. Bitcoin Beach has reportedly seen a bump in tourism and investment by crypto enthusiasts who travel to El Salvador to see it. Anecdotal evidence shows a small minority of Salvadorans

learned to use Bitcoin for e-commerce and cross-border freelancing work, taking advantage of a globally accepted digital currency to get paid for work online, whereas before they had struggled to receive international payments. These use cases, while not widespread, show some potential upsides of a more digitally included population.

Financial Inclusion in Numbers

While the NBER survey and IMF report reveal that the mass signup was mostly illusory and superficial, it does give us hard numbers of how many people were active on Chivo from that point forward – how many Salvadorans were digitally included, to a limited extent. Here are the key takeaways. Note that many of the specific raw numbers here will update or change slightly as Chivo adds users – the key thing to remember is that virtually all (80%+) downloads occurred in the first three months, then it stagnated. (The IMF study does not actually break out exactly how many people have downloaded Chivo, but from the table in its report, it's over 4 million unique registered users, and an estimated 3.4 million who use it somewhat actively)

Active User Profiles

From its deep dive into Chivo usage from its survey results, the IMF also classified Salvadoran Chivo “registered users” into active usage profiles. In simple terms, there are three distinct clusters of those who use Chivo regularly. Active User Profiles: how salvadorans use Chivo. In other words, Salvadorans use Chivo: as a zero-fee digital dollar account (debit card), or to transact/send BTC in certain situations they need to (buying/selling goods on platforms that accept it, remittances from abroad), or most simply to hold dollars in digital form (and receive the savings) but without a true interest-bearing account.

Financial Inclusion Summary

Overall, the numbers show El Salvador has not made major gains in financial inclusion. When one of the world's most financially excluded populations was given the keys to a national digital wallet with a free signup bonus, the large number who signed up initially did not represent the poor/actually unbanked majority, as had been hoped. Instead it was a who's who of Salvadorans who were already connected to the economy in some form: more banked, educated, urbanites. The poor and informal economy continued to struggle to access financial inclusion, either due to education and familiarity gaps or tech literacy. Those who did join, disproportionately, kept using the Chivo wallet at least to some degree as a zero-fee dollar account. This represents financial inclusion to an extent, in the sense that digital financial services exist for the first time in parts of the unbanked. But the other potential gains (interest-bearing digital accounts, using crypto to receive remittances/earn extra income,

or even payment adoption) remain low. The overall metric of financial inclusion, World Findex stats, remain only moderately improved by El Salvador’s Bitcoin Law to date.

Metric	Value
<i>Adults unbanked pre-2021</i>	<i>≈70% of adults</i>
<i>Adults with Chivo wallet (Sep-Oct 2021, downloads)</i>	<i>3–4 million (~50–65% adults)</i>
<i>Users abandoning after bonus</i>	<i>61% of downloaders</i>
<i>Active regular Chivo users (2022)</i>	<i>≈20% of population</i>
<i>Businesses accepting Bitcoin (2022 est.)</i>	<i>≈20% of businesses</i>
<i>Population preferring USD (2023)</i>	<i>≈90% of population</i>
<i>Survey: Bitcoin policy not improved family economy (2022)</i>	<i>≈71% of households</i>

Table 6: The spread and use of Chivo Wallet and financial/digital tools in El Salvador
Source: Central Bank of El Salvador, IMF, World Bank

3.6 ESG Impacts

Beyond these economic effects, El Salvador’s Bitcoin experiment has had some interesting effects in Environmental, Social, and Governance (ESG) terms. Policymakers, investors, and international actors have assessed the experiment not just from a financial stability/sovereign risk perspective, but also on its ESG performance. Looking at 2021–2025 through an ESG lens: Environmental (E): a frequently heard criticism of Bitcoin is its environmental footprint: the electricity consumed in proof-of-work mining, and thus the carbon emissions if that power is not clean. El Salvador partly tried to pre-empt this criticism by running its Bitcoin mining off renewable geothermal power. At the time of the Bitcoin Law, President Bukele had already announced he planned to set up “volcano-powered” mining. A pilot was quickly launched: a small operation at the Tecapa

geothermal⁴⁷ plant began small-scale mining in 2022. By May 2024, official data shows that El Salvador had mined 473.5 bitcoins using geothermal energy (worth about \$29 million) since 2021 – a small total, achieved by dedicating about 1.5 MW of the national power grid (out of 102 MW generated by the state geothermal plant) to mine about 300 mining rigs. 1.5 MW is not huge – enough to power, say, 1,000 Salvadoran homes. And 474 BTC is not a massive amount either. But symbolically it established El Salvador’s commitment to “green” Bitcoin mining and showcased its renewable credentials. And the government is marketing this as zero-emissions Bitcoin mining, so that has gone down well in crypto circles. The private sector has since also engaged in 2023 with the launch of the “Volcano Energy” project: a planned \$1 billion green investment to set up a new 241 MW renewable energy park (169 MW solar + 72 MW wind) in Metapán⁴⁸, funded by foreign investors including crypto companies like Tether. The project will use part of its output for Bitcoin mining (targeting 8000+ mining rigs) and the rest for the national grid – with ambition of making El Salvador a world leader in large-scale renewables crypto mining. From a climate perspective, it could be argued this has been a net positive: it mobilizes investment in additional renewable capacity that otherwise might not have been built. If the Volcano Energy project materializes, it would also be a boost to El Salvador’s renewable generation and a useful diversification away from the current overreliance on fossil fuel (especially diesel) and existing geothermal. So, it fits ESG goals by building out clean energy. The caveat is: what about the opportunity cost of dedicating even a small share of national power to mining? In 2022, El Salvador had some power rationing and is partly dependent on imported electricity – critics say that energy could have gone to Salvadoran homes or factories instead. The counterargument is: these projects are additive to existing supply, not just redirecting supply from other uses. There is also an environmental consideration here of e-waste: equipment like Bitcoin ATMs and mining rigs are electronic waste eventually. Not a major concern yet, but worth keeping an eye on in the future given the growth in crypto infrastructure. Overall, for 2021–2025, El Salvador did a reasonable job of framing its Bitcoin adoption as something relatively friendly to the climate, which may have neutralized some of the environmental ESG

⁴⁷ A geothermal power plant in El Salvador near the Tecapa volcano, which the Salvadoran government piloted in 2022 as a “volcano-powered” source of Bitcoin mining.

⁴⁸ A municipality in the department of Santa Ana, El Salvador located near the border with Guatemala, selected as the location for the proposed “Volcano Energy” renewable energy project.

concerns. In fact the World Bank's initial decision to not help El Salvador with Chivo wallet or other Bitcoin development was partly due to environmental concerns, but the public narrative of green geothermal mining assuaged some of that criticism and helped put the issue of Bitcoin's carbon intensity on the map. El Salvador has been frequently pointed to in global forums as an example of Bitcoin mining being possible at 100% renewable power, which helps the broader argument that Bitcoin need not be a carbon-spewing activity. So the E impact of the Bitcoin experiment is mixed but positive on balance in terms of innovation: it incentivized green energy projects, but created a new energy demand that needs to be scaled and managed prudently. Social (S): The social impact of El Salvador's Bitcoin policy broadly tracks some of the discussion on financial inclusion in the previous subchapter. The lofty social goals of financial inclusion were only partly met – most lower-income Salvadorans were not helped by Bitcoin and may even have been left more confused than before. But there were some social benefits in terms of education, empowerment and awareness for some groups. The government and NGOs⁴⁹ did some work educating people about digital currencies and blockchain (Mi Primer Bitcoin⁵⁰ diploma program), which improved financial literacy for a generation of Salvadoran youth. The experiment also put El Salvador's tech scene on the map – it could have the long-term social impact of inspiring a generation of Salvadorans to learn coding/blockchain/crypto and financial technology more broadly. This is a potentially valuable source of human capital development in the digital realm. On the other hand, at the time of its adoption the Bitcoin policy did spark a social controversy. The people who actually took to the streets in September 2021 in protests were from groups fearing Bitcoin was destabilizing the economy or would facilitate corruption. Most domestic opposition came from groups who felt the policy was imposed from on high with zero consultation. This touches on the G factor below, but socially it caused polarization in society. In time, as it became clear Bitcoin was not disrupting daily life (salaries still in USD, no weird prices in Bitcoin, etc.) this public outrage faded, but was replaced by apathy from the public. The aggregate social impact of the Bitcoin experiment for the average Salvadoran family was actually very limited: surveys show that the great majority

⁴⁹ A non-profit organization that does not receive government funding and is typically oriented towards humanitarian, educational or social goals

⁵⁰ A Salvadoran educational program initiated in 2021 that provides free courses and a "Bitcoin Diploma" to students and communities that want to learn the fundamentals of Bitcoin and blockchain technology.

saw no change in their economic conditions as a result of Bitcoin. The poverty and inequality data in El Salvador from 2021 to 2024 has moved mostly due to pandemic/inflation/etc. factors, not Bitcoin usage. In 2020 poverty rose, then slightly worsened through 2022 (real incomes eroded by inflation), then only began to recover in 2023 once inflation fell and growth continued. None of these trends can be attributed in any meaningful way to Bitcoin usage since it has low penetration among the public. One positive social effect cited by the government is in tourism: President Bukele claimed that Bitcoin would bring crypto enthusiasts and tourists to El Salvador, which would create jobs for Salvadorans. In fact, the Ministry of Tourism Morena Valdez ⁵¹at one point said tourism was up 30% in early 2022 and attributed part of that increase to the global attention El Salvador received from Bitcoin. Some of this was surely seasonal: tourist arrivals increased post-pandemic (especially international tourists and Salvadorans coming back to visit family). But it's hard to really tell how much was down to Bitcoin, or just because borders reopened and Bukele's crackdown on gangs made the country feel safer to visit. Some anecdotal tourism growth happened linked to Bitcoin (tourists to El Zonte, people coming for conferences in San Salvador), but tourism remains a small slice of the economy (~\$2.5B or 6-7% of GDP) and any crypto-fueled uptick has been marginal. On the social equity side, a common critique of Bitcoin has been that it inherently (Bitcoin: basic facts) or in practice disproportionately benefits the better off and more tech-savvy – wealthier, urban, educated Salvadorans or foreigners, not the poor campesinos. The data so far bears this out: the most likely to trade and own Bitcoin and profit from price movements are Salvadorans on the higher end of the income/education distribution. Meanwhile, the government's own Bitcoin holdings – which by end-2024 had an unrealized gain of \$300 million or more as Bitcoin's price rose above \$50,000 again – are a windfall for the state's coffers (and by extension the public if used for services), but has little direct benefit for vulnerable segments outside of perhaps the indirect macro stability benefits. On a related social risk note, Bitcoin's enabling of cross-border remittances had a fear of opening money laundering or crime risks which could undermine social fabric. In practice, Salvadorans using Bitcoin for remittances find it more efficient/transparent than traditional channels. The government did KYC on Chivo

⁵¹ Minister of Tourism since 2019, who publicly attributed Bitcoin's adoption to an increase in international tourism to El Salvador in 2022.

and other Bitcoin transactions, and gangs in El Salvador historically operated on cash, so the Bitcoin law did not noticeably change crime patterns (deaths fell due to policing, not Bitcoin). Indeed, there have been no prominent examples of Bitcoin-fueled crime in El Salvador. The key social risk has been apathy, which disincentivizes adoption for legitimate business/individual purposes and therefore holds back some potential benefits. In summary, the social impacts of the Bitcoin experiment are limited: for the poorest Salvadorans, financial inclusion did not meaningfully improve with Chivo and most other Salvadorans have largely not changed their social or economic conditions as a result of Bitcoin. The policy neither materially helped nor hurt most key social indicators in the short term. A subtle intangible social impact has been to build an international reputation (in some tech/crypto/EUD circles) as a forward-looking, technology-positive society – but domestically that has not yet translated into widespread social gains. Governance (G): Governance was among the more controversial aspects of El Salvador’s Bitcoin policy. The rapid adoption without extensive consultation or technical scrutiny, and in the context of a President who has otherwise been centralizing power, raised some eyebrows on democratic governance. The Bitcoin Law was rushed through in a matter of hours in June 2021 by a pro-Bukele majority legislature, with no debate or technical discussions. Coupled with other exemptions the government took from standard transparency rules for both the Bitcoin Trust and Chivo operations (effectively treating them as a state secret under national security and not open to freedom of information requests), it prompted concerns of opacity and circumvention of democratic institutions. In fact, by 2022 there were emerging reports (like from El Faro newspaper) alleging nobody even knows things like who exactly owns the Chivo wallet (it’s some private company set up by the state to run it) or how the wallet’s software development contracts were awarded. Allegations of conflict of interest, corruption, or misuse of funds have been in the background but hard to prove in part due to this lack of transparency. The IMF and other international actors in 2021–2024 repeatedly harped on the need for better governance in their discussions with El Salvador. In the final agreement for the IMF’s Extended Fund Facility in 2024, it explicitly noted “improve governance and transparency” in dealing with digital assets, and limited public sector exposure. A concrete governance change was the change in the Bitcoin Law in January 2025 to make Bitcoin use voluntary in the private sector. This was at IMF request and was rushed through Congress as a condition of the program –

indicating some willingness to change course under international guidance, which is a plus for institutions and governance checks. Governance indicators have generally trended down in El Salvador 2021-2024 in parallel with the Bitcoin rollout, but not really due to Bitcoin – they are instead mostly about Bukele’s moves to concentrate authority (attacks on judges, changes to re-election rules, etc.) and clamp down on civil society criticism. The Bitcoin policy was a case study of Bukele’s top-down, personalist style of governing: audacious and a national economic experiment, but also not consultative and with authoritarian shades in its implementation. International groups like Transparency International have also voiced concerns that without adequate governance and transparency, Bitcoin’s enabling of anonymous transactions could become a channel for corruption or money laundering. To address some of these issues, El Salvador passed a new Digital Assets Issuance Law in 2023, creating a framework for crypto offerings in the country, and in October 2023 the country also passed a law to create a commission to regulate digital asset service providers. A specific mandate of the new law and commission is to license virtual asset service providers and presumably apply FATF-compliant (KYC/AML) rules to the activity of crypto businesses in El Salvador, presumably with the aim of reducing illicit finance risks and showing the world El Salvador is not going to be some unregulated “crypto haven” allowing dirty money. On the international relations front, which is also a G factor: El Salvador’s Bitcoin push initially rubbed traditional partners like the IMF and World Bank the wrong way (recall the World Bank refused to help with Chivo or Bitcoin development, and IMF in Jan 2022 said El Salvador should drop Bitcoin’s legal tender status). This created some diplomatic/financial frictions that have had to be managed. El Salvador’s international relationships have been managed over time with a mixture of some non-traditional partnerships (talks with various crypto companies, diplomatic and funding overtures to China) but in 2023-2024 El Salvador made clear it is re-engaging with the IMF and returning to traditional development partners. That the IMF gave El Salvador a green light with the Extended Fund Facility in 2024-2025 indicates El Salvador was willing to make some course corrections and has shown it values restoring good governance standards to retain international backing. Rapidly tightening bond spreads in 2024-2025, then the actual IMF deal in 2025, show the country was able to satisfy the international community enough on transparency and governance to open new financing. On an ESG investor’s

screen, at its adoption El Salvador's Bitcoin experiment would likely have been a governance red flag: a destabilizing abrupt change in the monetary regime with no institutional debate/scrutiny. By 2025, that ESG perspective on governance may be less harsh since the law was changed, and course corrections have been made that show a willingness to put the experiment within a more normal policy framework. ESG-oriented funds would still likely be cautious on El Salvador's bonds (due to broader rule-of-law concerns), but the specific Bitcoin governance risk has been mitigated by removing legal tender status and clarifying some regulatory transparency in law. In sum, ESG impacts of El Salvador's Bitcoin era (2021-2025) have a mixed bag of positives and negatives. Environmentally, the country turned a potential negative into a cautious positive by pivoting to renewable energy for mining and courting green investment, though scale remains small so far. Socially the project had aspirational goals in terms of inclusion but with little uptake that element of the experiment largely did not materialize and did not dramatically help or hurt social indicators, except in some communities which leveraged it for small-scale development. On governance, the Bitcoin experiment tested some institutions: it exposed some cracks in transparency practices and highlighted the need for strong regulatory frameworks. Bukele's approach to the policy drew criticism for authoritarianism and secrecy, but in the end, he made policy adjustments to realign Bitcoin with international standards (voluntary usage, regulatory agency). For the future of digital finance, these ESG factors provide lessons: sustainable and inclusive deployment of these kinds of technologies and services requires good planning and execution, education for end-users, and safeguarding of institutional integrity. El Salvador's experiment has put it on the leading edge of that learning curve. But by the end of 2025, it appears El Salvador is integrating Bitcoin into a more normal policy context – treating it as a tool that is an option rather than a silver bullet – and will be focusing on deeper fundamental development and security issues that ultimately determine ESG outcomes. The ESG balance sheet for El Salvador's Bitcoin experiment thus shows some environmental innovation and a learning curve, limited social gains, and initially weak but improving governance in the policy's framing and execution. How that evolves beyond 2025 will depend on continued commitment to transparency, inclusion, and environmental factors as El Salvador navigates this still-emerging domain of digital finance within its overall development strategy.

CHAPTER 4: EXPERIMENTAL AND COMPARATIVE ANALYSIS (BITCOIN READINESS INDEX AND COUNTERFACTUAL SIMULATION)

4.1 Bitcoin Readiness Index (BRI) –Country’s Readiness for Bitcoin Adoption

Before a country can adopt Bitcoin as legal tender, it must also have a suitable environment for its adoption. We build a Bitcoin Readiness Index (BRI) to measure the “readiness” of a country to adopt Bitcoin as legal tender. The BRI is composed of several indicators that help to provide a complete picture of a country’s technological and economic incentive to adopt cryptocurrency and the regulatory environment. The table below lists the indicators used in the index with its justification for inclusion as well as the weight given to it in the composite index.

Indicator	Description	Weight
Smartphone Penetration	% of population using smartphones (access to mobile apps for Bitcoin wallets) – A high rate indicates strong technological capability for using digital currencies	10%
Internet Access	% of population with internet access (connectivity) – Widespread internet is essential for blockchain transactions and using Bitcoin services	10%
Digital Payments Usage	% of adults using digital payments (digital literacy and habit) – A proxy for familiarity with cashless transactions; higher usage suggests the populace is comfortable with digital finance	10%
Financial Inclusion (%Unbanked)	% of adult population <i>without</i> a bank account (unbanked) – A high unbanked rate signals greater <i>need</i> for alternatives like Bitcoin to provide financial services. (In BRI, a higher unbanked percentage increases readiness score, reflecting potential benefit from Bitcoin adoption.)	10%
Macroeconomic Volatility	Variability in GDP growth and economic stability – Countries with frequent booms/busts or external shocks may seek currency alternatives as a stabilizing tool. (Higher volatility → higher BRI score to reflect greater impetus for change.)	10%
Currency Instability	History of currency crises or depreciation – If a country’s fiat currency is unstable or has lost public confidence, there is more motivation to adopt an alternative like Bitcoin. (For example, countries that have dollarized due to past instability would score high on this indicator.)	10%
Remittance Dependence	Remittances received as % of GDP – A large reliance on remittance inflows means high international transfer fees and inefficiencies that Bitcoin could potentially alleviate. (Higher remittance share increases readiness score. El Salvador, for instance, receives over 20% of GDP in remittances, indicating a strong incentive to integrate cheaper crypto remittances.)	10%
Inflation Stability	Inversely related to average inflation volatility – If a country suffers chronic high inflation or hyperinflation, it has more to gain from a currency with a fixed supply like Bitcoin. Conversely, countries with stable low inflation (e.g. ~2% annually) have less incentive. (In the BRI, more <i>unstable</i> inflation yields a higher score.)	10%
Legal Crypto Environment	Regulatory stance on cryptocurrency – A qualitative measure of how supportive or permissive the legal and policy environment is. A country that outright bans crypto would score 0, whereas one that makes Bitcoin legal tender (like El Salvador) scores 10. Intermediate scores reflect factors like legality of crypto exchanges, tax treatment, and government promotion of fintech innovation	20%

Table 7: Bitcoin Readiness Index (BRI) Indicators and Weights
Source: Made by the Author

Methodology: Each indicator is standardized to a 0–100 scale, multiplied by its weight, and then summed to arrive at the BRI (0-100). We give greater total weight to economic need factors (50% for financial inclusion, volatility, currency stability, remittances,

inflation), since the key drivers for alternative currency adoption are usually macroeconomic and social necessity. Technological readiness factors (30% for smartphones, internet, and digital payment usage) are also essential – the population must have access to the technology and the know-how to use Bitcoin – but even the most sophisticated, world-class tech is useless in the absence of economic imperative. Lastly, the legal/regulatory framework (20%) has been given non-trivial weight, as an enabling policy is a necessary condition for a country to pass a legal tender law (a country cannot make Bitcoin legal without a law passed by the government, regardless of public interest). We put 20% here because while policy is a door-opener, it by itself cannot succeed if the citizens lack the need or the means to use Bitcoin. The choice of each indicator is motivated by El Salvador’s case and the broader literature. For instance, El Salvador’s government pointed to the country’s low banking penetration and high remittance fees as part of its rationale for the Bitcoin Law. These factors created a local demand for Bitcoin to solve problems of financial inclusion and high transfer costs. Similarly, widespread mobile phone ownership and internet connectivity were viewed as an enabler – by 2021, about 75% of Salvadorans used the internet and ~60–70% were estimated to own smartphones, which offered some baseline for the Chivo wallet. At the same time, El Salvador’s macroeconomic environment (e.g. its history of currency instability that resulted in dollarization in 2001) and moderate GDP volatility made the country’s leadership more open to the idea of bold monetary experimentation. The BRI distills these multiple factors. A caveat is that a high BRI score does not by itself imply that Bitcoin adoption will be successful or a good idea in the first place, it just means that the country has more characteristics that make adoption relatively easier or more likely. By contrast, a low BRI score means the country lacks a strong enough need or ability for a Bitcoin legal tender experiment. In the next section, we use the BRI to score El Salvador and some advanced economies, which helps put these points into stark contrast.

4.2 BRI Comparison: El Salvador and Developed Economies (USA, Italy, Germany, Japan, Switzerland)

We will now compare the Bitcoin readiness profile of El Salvador to those of five developed countries – the United States, Italy, Germany, Japan, and Switzerland. The table 8 below lists the BRI components and scores for the six countries, and table 9 depicts the overall index results. Figure 4.1: Bitcoin Readiness Index (BRI) scores for El Salvador and five developed economies. El Salvador ranks the highest in this group with a BRI score of 82 out of 100. This score reflects El Salvador’s exceptional set of Bitcoin drivers. In contrast, all of the developed economies have substantially lower scores (in the range of 50–60), reflecting less readiness or incentive to adopt Bitcoin as legal tender under the current conditions

Indicator (Weight)	El Salvador	United States	Italy	Germany	Japan	Switzerland
Smartphone Penetration (10%)	~75% (moderate)	~82%	~85%	~83% (est.)	~79%	~85% (est.)
Internet Access (10%)	77% of population online	91% (high)	84–85%	0.93	92% (high)	~90% (high)
Used Digital Payments (10%)	28% of adults (very low)	93% of adults	~70% (modest)	~85% (high)	~80% (high)	~90% (high)
Unbanked Adults % (10%)	64% unbanked (majority)	5% unbanked	0.03	~0%	1.5%	0.5%
Macro Volatility (10%)	High (volatile growth, external shocks) (undp.org)	Low (stable growth)	Low (stable EU economy)	Low	Low	Low
Currency Stability (10%)	Moderate (dollarized; no sovereign currency since 2001)	High (US dollar issuer)	High (Euro area)	High (Euro)	High (yen stable)	High (franc stable)
Remittances (% of GDP) (10%)	24% of GDP (very high)	0.03% of GDP (negligible)	0.5%	0.2% (est.)	0.1%	0.1% (est.)
Inflation Stability (10%)	High (stable prices; ~2% avg. inflation under USD)	High (low inflation until 2021)	High (Eurozone stability)	High	High (often near 0%)	High (very low inflation)
Legal Crypto Environment (20%)	Max (10) – Bitcoin is legal tender (pro-crypto law, no capital gains tax on BTC)	7 – Generally legal (crypto trading and ownership allowed, some banks offer crypto services) but not legal tender (regulatory uncertainty in 2023)	5 – Legal to own/trade under EU law, no special status (taxed and regulated)	6 – Legal to own/trade, some favorable tax rules (no tender status)	8 – Regulated and legal; early adopter of exchange regulation, recognized Bitcoin as payment method (not legal tender)	9 – Very supportive (crypto-friendly Swiss regulations; some cities accept crypto for taxes)

Table 8: Bitcoin Readiness Index (BRI) components and scores for Countries

Sources: Author's calculations. Data on mobile and internet penetration from DataReportal and the World Bank; data on financial inclusion from Global Findex (World Bank); use of digital payments from Global Findex and FinDev Gateway; data on remittances from the World Bank; legal and regulatory framework from national legislation and reports.

Country	BRI Score	Rank (of 6)
El Salvador	82	1
USA	55	3 (tied)
Italy	50	5
Germany	51	4
Japan	55	3 (tied)
Switzerland	57	2

Table 9: Overall results of the Bitcoin Readiness Index (BRI)

Source: Made by the Author

At a glance, the results are intuitive. El Salvador stands head and shoulders above the others in BRI. Drilling down into the components, this divergence is driven almost entirely by the need-based factors. El Salvador has the highest BRI in the unbanked population indicator (about 64% of adults do not have a bank account, compared to under 5% in the U.S. and effectively 0% in Germany and Switzerland). This translates into a potential user base of the majority of the population, who could (in theory) benefit from a non-bank, financial alternative. By contrast, in the advanced economies, almost everyone is already served by the traditional system. El Salvador also trounces the other countries in the remittance dependence indicator, with a diaspora population sending anywhere between one-fifth and one-quarter of the country's GDP back home. Developed economies, meanwhile, see remittances contribute 0.1–0.5% of GDP at most, if even that. This matters because Bitcoin and other cryptocurrencies theoretically offer a much cheaper and easier way to send money across borders. The BRI therefore awards El Salvador an outsized “readiness” bump for having a real-world use case for Bitcoin: facilitating cheap remittances and providing financial services to unbanked Salvadorans. The other area where El Salvador's macroeconomic conditions give it a strong push is the macroeconomic and currency stability component. El Salvador has seen low inflation rates since adopting the dollar in 2001 (on average, inflation was at around 2% annually in the past two decades), but it has no monetary sovereignty – dollarization means domestic policymakers are completely unable to adjust currency supply or interest rates. This may have incentivized policymakers to “experiment” with a tool like Bitcoin to have some monetary policy independence or to attract investment dollars. More generally, emerging markets that have seen more bouts of volatility and currency crises in the past are more amenable to currency innovation. Latin America's business cycles (GDP up and down) are, on average, about twice as large as those in advanced economies. This (negative) volatility similarly translates into a higher BRI score (the thinking being that people in a more unstable macroeconomic environment have more incentive to use alternative stores of value like crypto). By contrast, all five developed countries have had relatively stable business cycles and inflation rates and exchange rates in the last few decades. Their inflation rates have been low (within 1–3% range) before the recent

COVID era and, while inflation is running hot worldwide in 2022, advanced economies' central banks and fiat currencies still enjoy far more credibility on average than those in developing countries. As the IMF put it, "cryptoassets are unlikely to catch on in countries with stable inflation and exchange rates and credible institutions". This is reflected in our BRI, where the developed economies receive little to no positive adjustment from these need-based factors since their populations and businesses have little to no reason to abandon a relatively well-functioning monetary system in favor of Bitcoin. Conversely, all of the technological readiness components of the BRI heavily favor the developed nations. The U.S., Japan, and Western Europe all have near-universal internet access (around 90% or above), and smartphone adoption is similarly near-universal (around 80–85% of people have smartphones in these countries). Moreover, digital payment usage is also the norm – in the United States, 93% of adults had made or received a digital payment in 2021, and in Switzerland and Japan the share is comparably high (80–90% range). Italy is a bit of an outlier among the developed group; despite having 97% account ownership, digital payment usage is much lower at about 70%. This is a cultural artifact of Italians still preferring to use cash. In any case, this is still way above El Salvador, where digital payment adoption was low even before adopting Bitcoin – only 28% of adults had made a digital payment of any kind as of 2021. In El Salvador's still-cash-oriented economy, adopting Bitcoin as legal tender represented a significant behavioral change in terms of consumer preferences and habits. The Salvadoran government took some positive steps, such as issuing a national Chivo wallet app and giving all Salvadorans a \$30 Bitcoin bonus for downloading the app, but usage among the population unused to digital money has been much lower than expected. A month after the launch, only 12% of Salvadoran consumers had used Bitcoin and 93% of surveyed businesses said they had not received a single Bitcoin payment. This demonstrates that having a theoretical need (for example, unbanked population or high remittance costs) does not automatically translate to frictionless mass adoption if the population is not digitally ready. All the developed nations, by contrast, have populations already primed for using mobile banking apps and digital payments in their day-to-day lives – which, if circumstances change and they had the need/use-case, could provide a very hospitable environment for crypto adoption. The Legal Crypto Environment is the final main ingredient. El Salvador of course maxes out this part of the index, being (as of 2025) the only country in the world besides a brief

experiment in the Central African Republic to make Bitcoin unlimited legal tender. The U.S., Switzerland and Japan, and all have regulations that permit cryptocurrency ownership and trading (of a varying strictness) but stop short of making any crypto legal tender (although all of them accept cryptocurrency on a business level). Switzerland is the closest to El Salvador's level of crypto openness – it has very crypto-friendly regulations, several Swiss cantons and municipalities (notably Zug and Lugano) accept cryptocurrency as payment for taxes, and the country actively courts crypto businesses. Japan was an early regulator of cryptocurrency exchanges and legally recognized cryptocurrency as a method of payment (without being legal tender) all the way back in 2017, which is why we score Japan relatively high on this indicator as well. The U.S. has a patchwork of state and federal laws – cryptocurrency is legal to own and trade, some banks offer custody services for crypto, and as of 2021 the U.S. had 17,251 crypto ATMs deployed but the U.S. has not endorsed cryptocurrencies as legal tender; in fact, regulators have recently emphasized that the dollar is the only official currency and have ratcheted up oversight of crypto markets. Therefore, we would consider the regulatory framework in the U.S. moderately supportive (score ~7/10). Italy and Germany are roughly in the middle of the spectrum as EU member-states: crypto is legal to own and trade in the EU and the new MiCAR regulations will provide a uniform regulatory framework, but none of the countries give any crypto special legal tender status and all treat crypto for what it is – a highly speculative asset class. In short, the developed world has so far only treated Bitcoin as an investment or novelty asset, not as an actual currency for day-to-day commerce. Tallying all these factors, it should come as no surprise that the BRI rank order makes intuitive sense. El Salvador's outsized score reflects its unique position in merging a deep, actionable economic need for an alternative currency (large unbanked population, high remittance needs) and government will to pass pro-Bitcoin policies. By contrast, the developed economies score much lower not because they lack the ability, in fact their ability to support an experiment is superior by most technical measures but because they have no use-case for doing so. Their populations are largely banked, they have stable fiat currencies, and they have low-cost and easy digital payment systems. In short, the opportunity cost of giving up the status quo (fiat money) is very high for them, whereas El Salvador's status quo had demonstrable flaws that Bitcoin was imagined to solve. The implications are that an high BRI score does not guarantee that an adoption

will succeed, but it does mean the necessary conditions are at least in place for it to be plausible. The comparison with the five developed countries implies that it was not a random coincidence that the first Bitcoin legal tender experiment came from a developing economy, not a rich one. El Salvador's readiness profile is in many ways the opposite of a rich country's: it has a young, relatively unbanked population who may be more eager for financial inclusion, an economy where international remittances and dollarization shape everyday life, and an executive branch willing to bet on financial innovation. Developed countries attempting Bitcoin adoption, by contrast, would be coming from a position of relative strength in their own monetary systems – and hence, have little to gain or economic rationale for doing so. This helps explain, some years on, why no rich country has emulated El Salvador and (within the developing world) few other countries have tried a similar experiment. The BRI also suggests that while the developed nations would face far fewer technical readiness hurdles (their citizens could readily learn to use the crypto apps and payment systems) they might face even bigger political and public acceptance hurdles, since the perceived benefit would be lower. In summary, the readiness analysis here serves to reinforce a crucial point: Bitcoin as legal tender is a much more attractive proposition to those who feel poorly served by the global financial status quo, a condition far more common in the developing than the developed world.

4.3 What if a Developed Country adopted Bitcoin? (Counterfactual simulation)

The above analysis raises the following question: what if in 2021 the above mentioned countries had announced that it would make Bitcoin legal tender? This section will extrapolate from the BRI and other real-world evidence, and offer some speculation on what might have happened if they had. This is obviously a counterfactual, so the analysis is necessarily speculative but doing so will help to explain why, in the view of most observers, legal tender status for Bitcoin is more likely to cause trouble than to bring

benefit, especially in a large developed economy. To structure the discussion, let's walk through the various functions of money and other aspects of the economy, and explore the impact a Bitcoin LT policy would have on each financial stability. The first effect to note is on the advanced economy's financial system, which is adapted to operate with that country's fiat currency. For example, if tomorrow the U.S. government announces Bitcoin is an official currency, that would not immediately mean that the dollar is out, it just means that BTC also circulates as legal tender (as indeed happened in El Salvador, where the U.S. dollar is still used). Even in that limited scenario, it would be destabilizing from one day to the next, all households and businesses must decide: at what currency do I price goods, accept savings, repay loans? Bitcoin is far more volatile than the dollar – think, 5–10% movements up or down, within a single day. Using BTC as a currency would inject great noise into pricing decisions. The IMF recently made clear its view: if a crypto asset is legal tender alongside fiat, “participants would spend more time and resources choosing which money to hold and use than producing goods and services.” There would be everyday inefficiency and confusion as businesses must constantly adjust prices to keep up with BTC changes, or workers insist to be paid in the faster-appreciating currency of the day. The point-of-sale (unit of account) function of money (as a stable money or unit of value) would be weakened. The introduction of such volatility into an advanced economy, where inflation had previously been low and stable, would be a shock to price stability. In fact, if a significant share of prices were quoted in Bitcoin, the internal price level of the economy could become much more volatile, with fluctuations driven by Bitcoin's market whims. For an economy accustomed to 2% inflation or less, it would be as if overnight it were to board a wild cryptocurrency rollercoaster, with Bitcoin's past volatility (annualized 60–80%) imported into its economy. Monetary policy transmission would also be derailed. Central banks in rich countries (like the Fed or ECB⁵²) conduct monetary policy, meaning that they keep their economy on an even keel by managing interest rates and the supply of national currency (fiat). They cannot manage the supply of BTC, nor do they have a lever to move its price – Bitcoin's supply is predetermined by software rules, and its market price is set by global demand and investor sentiment. If Bitcoin were to make up a significant share of the medium of exchange in the economy,

⁵² The central bank of the euro area, responsible for the monetary policy and management of the euro currency and for maintaining price stability in the member states of the European Union.

the central bank's interest-rate leverages would lose their bite, according to IMF researchers. For instance, normally a central bank can counter inflation by raising rates, incentivizing people to hold more of the national currency. But if it is freely possible for individuals to switch to Bitcoin (over which no central bank has control), that policy lever becomes less effective. In short, the monetary policy of a foreign country is imported with Bitcoin. Normally, when a country dollarizes (uses a foreign currency as legal tender), it "imports" the effective monetary policy of the central bank that issues that currency. With Bitcoin, by contrast, that imported monetary policy would have no stability at all, because Bitcoin is not backed by any central bank, whose policymakers might smooth out bumps and head off panics. Bitcoin has no lender of last resort, that is a crucial difference. If, for instance, a government promises to accept taxes in Bitcoin, its revenue could swing up or down dramatically with Bitcoin market swings. Imagine a government budgeted in BTC that ends up collecting hundreds of billions less in revenue because BTC crashed overnight before tax receipts could be collected. Or imagine if the treasury planned its expenditures in domestic currency but receives taxes in BTC. If BTC rises in value against the domestic currency, the treasury might be effectively 'taxed' to the benefit of BTC holders. An absurd game of chance. The government would be exposed to unprecedented exchange-rate risk. Normally, central banks and finance ministries face foreign exchange risk, but that risk is limited to typical +/-10% annual moves in bilateral exchange rates between developed country currencies. Making Bitcoin legal tender would superimpose on that a much more ferocious level of exchange-rate risk and volatility – and this on a fiat currency that previously had stable purchasing power. From a consumer/business habits point of view, the probable outcome in a rich country is that 99% of the population would stick to the familiar national fiat currency. We saw a hint of this in El Salvador. There, we saw that even in a population that is unbanked (so in theory crypto might bring some value), actual use of the "official Bitcoin" remains minimal, as the vast majority of consumers and businesses simply continue to use dollars for most transactions (Bitcoin use among businesses was below 10% in the first months after its launch). In a high-income country, consumers already have convenient electronic means of payment like credit cards, Apple Pay, Venmo, instant bank transfers, etc. – all very convenient, and all denominated in the familiar stable unit of account. Bitcoin would bring them little or no advantage, and in fact have downsides: more price volatility risk

(loss or gain, but volatility nonetheless), and more fees (miners' fees). If there is no popular demand for a second currency (as we have seen), the choice for an average person is simple: stick with the existing national currency. Of course, if the hypothetical legal tender law also mandated that merchants must accept Bitcoin, as El Salvador's initial law did in Article 7, then the result is a huge burden on everyone and an invitation to confusion and pushback. Large retailers and even local banks in developed markets would accept BTC from customers by instantly converting to the local currency. This is the approach that many Salvadoran businesses quickly adopted, by using the Chivo wallet's instant conversion tool to convert to USD. It also appears to be the approach taken by most large businesses in El Salvador. But for small businesses or those who do not want to spend time setting up Chivo, would they take the time and risk learning to use a wallet, and then accept BTC payments? Or would they face a random selection of customers who, for whatever reason, want to pay in BTC, and must then deal with the corresponding volatility risk? Most of the time, it seems likely the answer would be that they simply don't see any customers who want to pay with BTC, so they do not bother with it at all. The result is a costly rollout of national crypto infrastructure that is not actually used, except by a small group of enthusiasts who push payments in that channel. And in the meantime, the business-acceptance mandate could create a huge legal and regulatory headache for example, is the Eurozone compatible with making BTC legal tender (the treaty says the euro is the sole currency of legal tender)? That seems a resounding no, and would imply lawsuits or treaty-violation penalties from the EU. Central banks financial regulations and financial regulators in the rich world are not oblivious to financial stability. If a government were to make an unstable and volatile cryptocurrency legal tender, that would be likely to alarm them – because it could be seen as a backdoor opening for financial crime. It would be a huge shock to the status quo, which is replete with anti-money-laundering (AML) and know-your-customer (KYC) barriers. A mass-mobilization of anonymous crypto transfers would be alarming to regulators, because the FIU⁵³ would have no way to check if those transfers are illicit (money laundering, sanctions evasion, drug proceeds, etc). Bitcoin transactions are public on the blockchain, but it is hard to know the origin of funds (identity of sender). Under international FATF standards, any

⁵³ A national agency that collects, analyzes, and shares information on suspicious financial transactions to combat money laundering, terrorist financing, and other financial crimes.

government that mainstreams Bitcoin would be under immediate pressure to ensure that all Bitcoin transactions can be traced and reported on (KYCed). That is a practically impossible goal, given Bitcoin's original design and use cases because one purpose of Bitcoin is precisely to facilitate anonymous transactions. Banks would have additional concerns. If they are exposed to Bitcoin, through deposits or payment services, then a market downturn in the cryptoasset (bear market) could hit their balance sheets. The tricky issue is that bank regulation (prudential regulation, capital requirements, etc) is predicated on banks holding assets that are under the central bank's jurisdiction. If Bitcoin is official currency, is that treated as cash (with zero capital charges on holding it in bank vaults), or a risky asset that requires capital to be held against it? Regulators would likely err on the side of the latter: that is, they would levy large capital charges on banks that hold Bitcoin, as a way to restrict their appetite for it. We see the attitude of regulators towards cryptoassets in statements by the Bank of England, the Fed, and the ECB. All have been emphatic that stablecoins and other cryptoassets have no intrinsic value and their widespread use in financial institutions could cause destabilizing runs or bank failures. We can extrapolate from this that the banking industry in a rich country, whose central bank is emphasizing these concerns, would strongly lobby against Bitcoin legal tender status, or at least to be ring-fenced with no risk to the traditional financial system. This is also an important part of the "it isn't broken" argument – that the existing well-functioning financial system (central bank, commercial banks, institutional investors) in a rich economy would see little benefit and significant risk in replacing or augmenting the fiat currency with Bitcoin. Consumer protection is also an important part of financial regulation in the developed world. Citizens in those countries have an expectation of certain protections: their bank deposits are covered by insurance, their consumer credit cards have recourse for fraudulent transactions, their salaries are reliably stable in purchasing power. Bitcoin provides exactly none of these protections. Bitcoin's price can swing by 5%+ within hours or days. Users can lose their coins by human error (sending to a wrong address, or private key exposed by a phishing attack, or just forgotten password) and there is no recourse to get it back. A government that endorsed the use of Bitcoin as legal tender would therefore be implicitly encouraging citizens to use a product with no safety net. There would likely be reputational consequences if citizens are duped into adopting Bitcoin in payments, savings, or remittances – and then lose large fortunes

to volatility swings or outright hacks. If retirees receive their pensions in BTC and then the value suddenly halves the level of injury to those on fixed incomes would be enormous and cause major political consequences. A fiat currency is issued and managed by a central bank that can stabilize its value and compensate fraud victims. In contrast, a government making an official move to accept Bitcoin is abdicating that responsibility. It would have to put in place consumer-protection legislation, which is a complex topic and nontrivial to get right – but doing so would likely compromise the properties of Bitcoin that users like, for instance its decentralization, irreversible transactions, no AML rules. This would create a protection/regulation paradox that to make Bitcoin legal tender, new consumer protections are necessary, which would in turn likely undermine the basic properties of Bitcoin that most Bitcoiners hold dear. If a government has no intention to protect citizens who adopt Bitcoin, it would also need to be clear about that: that is, to say no safety net if you use it. This again is in contrast to normal practice, where any legal tender is assumed to be a safe and stable unit of account, suitable for all members of the public. As legal scholars have noted, legal tender status usually requires that a currency is widely accessible and sufficiently stable, two preconditions Bitcoin fails to satisfy. In a developed country, there are also international and geopolitical considerations. If a country like Italy were to make BTC legal tender, it would violate EU laws that the euro is the sole legal tender in Eurozone member countries. The ECB would object, and the country in question would likely face EU fines or sanctions, for violating the treaty that it agreed to when adopting the euro. If it were the US doing so might, in theory, start to challenge the supremacy of the dollar – something the US government is in no position to do given the dollar's important role as a source of global leverage. In fact, a long-term trend has been for the US to discourage other countries from dollarizing (El Salvador is the rare exception to a pattern of the US opposing dollarization) and there has been some open concern from the US about dollarized countries leaning too hard into Bitcoin, perhaps partly out of concerns for AML enforcement but also for political and strategic reasons (diminishing the dollar's reach). Developed economies are also global systemically important economies, or global reserve currency issuers. The dollar, euro, yen, etc are held as reserves by banks in many countries and are used for international trade invoicing. It would be the height of irresponsibility for one of those reserve-currency economies to make Bitcoin legal tender. It could easily export volatility and speculation

to the global financial system. Tellingly, no G7⁵⁴ economy has even seriously considered the idea (even in Japan, which was once rumored to be developing some kind of national digital currency based on Bitcoin). Instead, many developed countries are at the pilot or research stage for what are called CBDCs, central bank digital currencies, but those are digital currencies fully under the central bank's control, denominated in the existing fiat currency. In conclusion if a rich country were to declare Bitcoin to be legal tender, the result would be chaos. The policy would need to overcome widespread public indifference and skepticism in the developed economy (we have seen that this is the case in El Salvador too), it would import exchange-rate volatility into every corner of the economy, it would undermine the central bank's ability to conduct monetary policy or manage recessions and inflation, it would increase the risk of financial crimes and losses to consumers, and make the banking system vulnerable to runs and political shocks. An advanced economy would not be so lucky as an unbanked, dollarized, high-inflation or small developing economy. For the "it isn't broken" argument, the policy in a large rich economy is "a step too far" with the probable outcome that the risks and costs of the policy far outweigh any potential benefit, to the extent that it even has any benefit. After all, a positive use case for Bitcoin is pretty scarce in rich countries. A best-case scenario is that if a rich country were to do it, almost no one would use it (BTC), and the economy would just groan under this costly unnecessary policy, and in the end the program would quietly be shelved. The worst-case scenario is that if there were significant Bitcoin adoption in a large economy, it could lead to a destabilizing speculative bubble, bank runs (BTC-moving consumers shift balances from bank deposits in an unpredictable way), and a general loss of confidence in the economy. In any case, the outcome in a rich country would almost certainly be a policy disaster. A distressed developing economy (high inflation or unbanked) on the other hand, is more willing to gamble on the upside – because the status quo is so bad, because those countries are less integrated in the global financial system, and because their central banks are more likely to be state-owned enterprises. In short, by all rational analysis, it is virtually impossible for a big rich country to make this jump to Bitcoin because it just doesn't have the necessary condition of a sufficiently dissatisfied population that wants an alternative. So the analysis in this

⁵⁴ An intergovernmental group of seven large advanced economies (Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States) that collaborate on economic and governance matters.

section supports our central proposition that Bitcoin as legal tender in a developed economy is both highly improbable and inadvisable. The more pragmatic and rational approach for rich countries that want to improve their financial systems is to instead channel the digital revolution into digital payment innovations in a well-regulated sandbox (like El Salvador with Chivo), or even digital currencies issued by the central bank itself (CBDCs), rather than to adopt a decentralized cryptocurrency as their legal tender.

4.4 Lugano’s Plan B – A Localized Experiment in Crypto Adoption

If developed-nation states have been unwilling to follow in El Salvador’s steps, have smaller political jurisdictions considered such crypto experiments at a local level? One well-known case of “crypto at city level” is Lugano’s “Plan B” in Switzerland (*PlanBTC*). Lugano is a city with approximately 63,000 residents in Switzerland’s Canton of Ticino. It adopted Plan B in 2022 as a municipal-level initiative to trial crypto adoption and use for economic development. As with El Salvador, Lugano’s experiment with cryptocurrency in many ways serves as an illuminating real-world example to test BRI. In fact, its context is almost the inverse of El Salvador’s because Plan B is a local-level experiment in the world’s most developed country. Lugano provides a counterpoint to El Salvador because its government is not trying to force everyone to adopt a cryptocurrency by law, but rather experimenting with creating incentives to use Bitcoin and other crypto at the local level. Lugano’s mayor ⁵⁵says the program’s goal is not to replace fiat money with digital currency but rather “make our city a welcoming place for Bitcoin”. Lugano’s plan is a bottom-up community-level project that can be compared to El Salvador’s top-down national policy. This gives Lugano Plan B potential relevance for the developed

⁵⁵ Michele Foletti: Lugano Mayor Since 2021 in Switzerland Backed Plans to Make the City a Bitcoin and Blockchain Innovation Hub

world, including Chinese cities, as it shows one model of how a city could move toward decentralized digital money as an option alongside the national currency. Plan B aims to position Lugano as a hub for “Bitcoin, blockchain and decentralized technology” (PlanBTC.n). Lugano’s program is the creation of the city’s government in cooperation with Tether, the company behind the USDT stablecoin. Under Plan B, Bitcoin (BTC) and Tether (USDT stablecoin) are the de facto legal tender in Lugano alongside the Swiss Franc⁵⁶. This means Lugano residents can now use BTC or USDT to pay for municipal taxes and fees to the city government. Lugano has also onboarded over 360 local merchants who will accept these coins in exchange for goods and services. In practice, how does this work? The city has partnered with crypto-payment companies to help merchants accept crypto. Shops and services get technology (e.g. GoCrypto POS terminals) that can accept Bitcoin Lightning payments as well as stablecoins with near-instant final settlement, and instantly convert the crypto to francs if the merchant prefers. This on-ramp into crypto works by making transactions with Bitcoin and stablecoins as close to frictionless as possible for the merchant. Since both BTC and Tether are very volatile, the technology and business models involved are different from the Salvadoran government’s one-size-fits-all approach. In Lugano, the shop or restaurant is shielded from this volatility because the point of sale technology will automatically exchange the Bitcoin payment into francs at the current rate (crypto exchanges also offer this service but with higher fees). This is what makes accepting Bitcoin in Lugano not all that different from using the city’s existing loyalty card or gift card system (LVGA⁵⁷), or even just the franc. For the merchant, accepting Bitcoin is completely seamless and risk-free, because there is no exchange-rate exposure and it’s easy to use (no new knowledge or equipment needed). The difference is that a shop in Lugano now has the option of a crypto-dollar (Tether) or a crypto-silver (BTC) payment alongside the usual Swiss franc. The shops don’t need to accept this new currency, and for the Lugano government, it’s not the objective to have people all of a sudden abandon the franc. What Lugano is trying to do, instead, is create a parallel crypto-friendly economy on top of the existing system. There is a local token too, the LVGA. Incentives to use crypto include a rewards program: when people shop and pay in Bitcoin or USDT, they can get LVGA tokens back as a kind of

⁵⁶ Switzerland's and Liechtenstein's official currency, which is issued by the Swiss National Bank.

⁵⁷ A local points-based rewards system introduced by Lugano which essentially acts like a digital gift card or voucher which can be used to pay for various things in the city.

cashback, and spend those as well. Another difference from El Salvador is Plan B has a very strong education component. Through the Plan B Foundation, the city is creating scholarships and internship programs for blockchain and Bitcoin education, hosting hackathons and an annual “Plan B Forum” conference, supporting blockchain start-up hubs and university research, etc. These are all initiatives to support not only local residents using and spending cryptocurrency, but also to attract talent and investment to build a reputation as a “Bitcoin City.” Lugano’s program doesn’t mandate the use of crypto, it heavily subsidizes and incentivizes it. Another difference from El Salvador is, of course, Lugano’s partnership with Tether. For its part, Tether (a private USDT stablecoin issuer) will use the partnership as a testbed for its technology and innovation (payment systems, merchant onboarding, wallet apps, etc.) and to provide resources for implementation in Lugano (reportedly a multi-million-dollar fund). The combination of these two factors – public sector (city government) and private sector (Tether/USDT) partnering, and incentives instead of mandates – changes the dynamic of crypto adoption in Lugano versus El Salvador. Plan B implementation: Lugano has combined Bitcoin with a stable-value crypto (Tether USDT) that is also legal tender in the city. Tether is a cryptocurrency stablecoin pegged 1:1 to the US dollar. It is also worth noting that Lugano also introduced its own city loyalty token (LVGA) which is also accepted by merchants and given as cashback rewards to users who pay with digital currency. By giving people incentives and having the two digital currencies (Bitcoin and Tether) alongside the franc, the city government has created a three currency system, where one digital currency is stable (USDT) and one is not (BTC). People can choose to transact in the stable one – it fulfills all the characteristics of a currency, and because it is 1: 1 pegged to the US dollar, it functions just as well as francs. Bitcoin in this plan is more a flagship, an investment and novelty asset to drive tourism and marketing. Bitcoin is accepted in Lugano, but it’s not like the Swiss government has decided to put it into all ATMs and people can’t use francs anymore. It’s one currency among several, and no one is forced to use it or stop using the franc. Scale and goals: the project’s size and scope are one of the biggest distinctions compared to El Salvador. Lugano is only one city, albeit the capital of Ticino, and its adoption program is the exception within the wider national financial system. Switzerland’s currency, the CHF, is legal tender and is the default and only legal tender for all purposes. The Swiss national government is not pro-Bitcoin and

would not recognize Bitcoin as legal tender, but Lugano has simply chosen to create a sandbox within its municipal area. This local level is crucial – it means that the scale of adoption and risk are minimized. Crypto does not need to be used by Lugano’s population en masse, adoption levels can be modest and still be a success from the city government’s perspective. The approach can be thought of as one city among many competing in the Swiss federal system, trying to differentiate itself and attract residents or visitors, with Bitcoin being one angle. The other part is that risks are more contained. Even if crypto causes problems in Lugano, it won’t impact the Swiss franc or macroeconomic stability or banking system of the whole country, since all federal/state-level uses are franc-denominated. Lugano also has local autonomy to experiment and doesn’t need to coordinate nationwide. The local government, city council, and business community there were in broad agreement about the plan and had the mandate to go ahead, so Lugano rolled it out relatively quickly, getting merchants on board and the technical infrastructure set up within a few months. There is another advantage of this size of initiative – it doesn’t require political consensus on a national level, it just needs to get the local council and voters to agree, which is easier. Lugano did this without a problem, but it’s hard to imagine a plan like this passing the national parliament in a big economy. Lugano also has ample resources to devote to the project, there is a dedicated team, and the city’s “readiness” for Plan B (technological, social, financial) is already very high. All Swiss residents are connected, nearly 100% have smartphones, all have bank accounts. Literacy and digital skills are also very high. There is a high degree of “readiness” in El Salvador as well, especially on the technology side. Mobile phone and internet access are the lowest factor in the BRI, but even so the country is not at the bottom of the table and nearly everyone has the tech to use crypto. Where Lugano and Switzerland more generally score very low in “need” (because there is not much of an unmet use case or a stable currency/franc to replace), the upside is that there is political will and vision, a desire to be a pioneer to some extent and to establish a hub for the Bitcoin industry (for tourists, investment, education). Lugano’s motivation is not coming from need (El Salvador’s remittances and financial inclusion needs) but from opportunity, because crypto is an emerging asset and industry with tourism and innovation value. Comparison with El Salvador: Lugano’s Plan B is in many ways almost a mirror image of the El Salvador experiment. El Salvador’s national Bitcoin adoption was top-down (a presidential

executive order), at a national scale, and mandatory for everyone (legally). It was an abrupt regime change – people were used to the dollar and had no prior experience using cryptocurrency or digital money before the law. El Salvador’s people were not yet technically ready for the change – the whole country had to become Bitcoin users by fiat, with much infrastructure, education, and marketing to go before that was possible. On the other hand, Lugano’s initiative is bottom-up, at a municipal level, completely voluntary, with a soft onramp for businesses and residents that has very low risks if people choose not to use crypto. This is how we would expect technology to naturally be adopted – voluntarily, incentivized by perceived value and convenience, but not forced by law. This is in contrast to El Salvador where no one wants or expects to pay for a pizza or loaf of bread in Bitcoin, so residents have had to be enticed with state incentives and payments to open national wallets, and even then, usage has been very low. In Lugano, people and businesses can decide if they want to be part of the program – and the default answer for residents will probably be “no” (there is no need or strong benefit in most people’s eyes). That is fine because Lugano’s goal is more to build an ecosystem of investment and industry and residents can always use the franc. Lugano’s goal is not to replace fiat money with digital currency but rather “make our city a welcoming place for Bitcoin.

CONCLUSIONS

El Salvador's Bitcoin adoption as legal tender (2021–2025) is a singular experience. After more than four years, the final balance of a still-unfinished experiment appears to have been mixed. While the hyperbole in both directions gave way to a reality that was often below expectations, the overall outcome appears to be fairly neutral: on the one hand, the expected economic “miracle” or financial collapse have not happened, instead a largely modest impact prevails. In particular, the daily use of Bitcoin by citizens has been very low: over 90% of Salvadorans do not use it at all for regular purchases, especially with high incentives and over time, and this inertia prevailed over initial expectations, likely as a result of distrust and inertia. At the macroeconomic level, GDP growth resumed its pre-2021 trend, and inflation dynamics remained closely linked to external variables. Neither money creation nor the launch of a new parallel currency have so far disrupted price stability or accelerated development. Similarly, flows of foreign investment and remittances have not changed in any significant way directly related to Bitcoin: some ventures in the crypto sphere have been realized, but few (and many more remain in the planning phase), while the great bulk of money sent from abroad continues to transit through traditional channels in US dollars, without the reduction in transaction costs that was announced. In short, the three main benefits promoted (financial inclusion for the unbanked, foreign investment and cheaper remittances) have not materialized on a broad scale in 2025. On the regulatory side, the Salvadoran authorities were also obliged to correct the original course: in the face of domestic opposition and international financial pressure, in 2025 the mandate to accept Bitcoin was suspended, making its use entirely voluntary. This “retraction” would then mark the limits of the experiment: a measure deemed necessary to unlock external financial assistance and ensure fiscal sustainability, but without repealing the Bitcoin Law in substance. So, the Salvadoran experiment proved that it is possible to make a cryptocurrency legal tender, but the actual effects so far have been limited and have largely been conditioned by the country's socio-economic and institutional context. This empirical study offers significant insights for the academic literature on the economic-financial impact of innovations in digital currencies, as well as for decision-makers in both the public and private spheres. For the academic

community, the “El Salvador case” can provide a unique source of real-world data on the potential and limits of integrating a cryptocurrency into a national monetary system. The observed results, partially convergent with some forecasts but also contrasting with others, are consistent with some of the theoretical expectations. For example, it seems that without a real economic demand and a strong level of public trust, a legal obligation is not enough to encourage mass adoption of a new currency. Similarly, it emerges that basic macroeconomic elements (sound public finances, institutional credibility, currency anchoring) continue to be dominant, attenuating the potential impact of an additional digital asset placed in parallel with the dollar. These elements provide further nuances to the ongoing academic debate on financial innovation and unconventional monetary policies, by delimiting the conditions in which comparable experiences could potentially succeed or fail. For the world of public policies and corporate management, the Salvadoran experiment can in turn be both a warning and a guide. On one hand, the case confirms that the expectation of a sort of “magic formula” to solve structural problems through a cryptocurrency adoption is very high-risk: as things stand, forcing the adoption of Bitcoin in El Salvador has had a cost (financial reputation and relationships with the international community) but has not yet produced benefits for the population in general. On the other hand, on the basis of the knowledge that is being gradually acquired, there are indications of how to better approach such innovations. A gradual approach and voluntariness – supported by solid digital infrastructure, transparency and public awareness – are essential to ensure a critical mass of user trust and the effective use of new financial tools. In the same vein, the need to balance innovation with macroeconomic sustainability is underlined: the Salvadoran authorities were obliged to align with the rules and expectations of the international financial community (securing an agreement with the IMF, improving transparency) to avoid even more severe negative consequences, an aspect which shows that no monetary policy is an island. In short, the Salvadoran case overall seems to indicate that cryptocurrencies can play a role in the financial future, but are not an immediate substitute for existing money. Rather, they should be considered as complementary financial instruments to be implemented cautiously, on a case-by-case basis and accompanied by structural reforms and support measures. In this sense, this conclusion may provide guidance for future decision-makers and the research community

by offering a more complete picture of the limited benefits and the more concrete risks of a pioneering and still-unfinished experience.

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Graph 1: GDP Growth of El Salvador between 2019-2025

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Graph 4: Foreign Direct Investment of El Salvador between 2021-2023

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Scrivendo questi nomi voglio rimarcare che questo traguardo è anche loro e per ricordare che nessuno di loro è stato o sarà mai dimenticato.

Infine vorrei dedicare questo traguardo a me stesso citando questa frase che ha accompagnato per tutta la vita sia me stesso che la gente che mi vuole bene “Noi non ci Inchiniamo”.