

Research Report

What's Driving Bitcoin Adoption in 2025?



Introduction

Trust in bitcoin has grown faster than that of any asset in history. While bitcoin is a form of money, its rate of adoption mirrors that of the internet.

Yet, despite its remarkable success, Bitcoin's adoption is at a fraction of its full potential for savings and payments.

In this report we lay out the primary factors driving Bitcoin's emergence as the next global reserve asset.

In addition, we cover the evolution of the Bitcoin protocol, the Lightning Network, and Bitcoin's custody landscape.

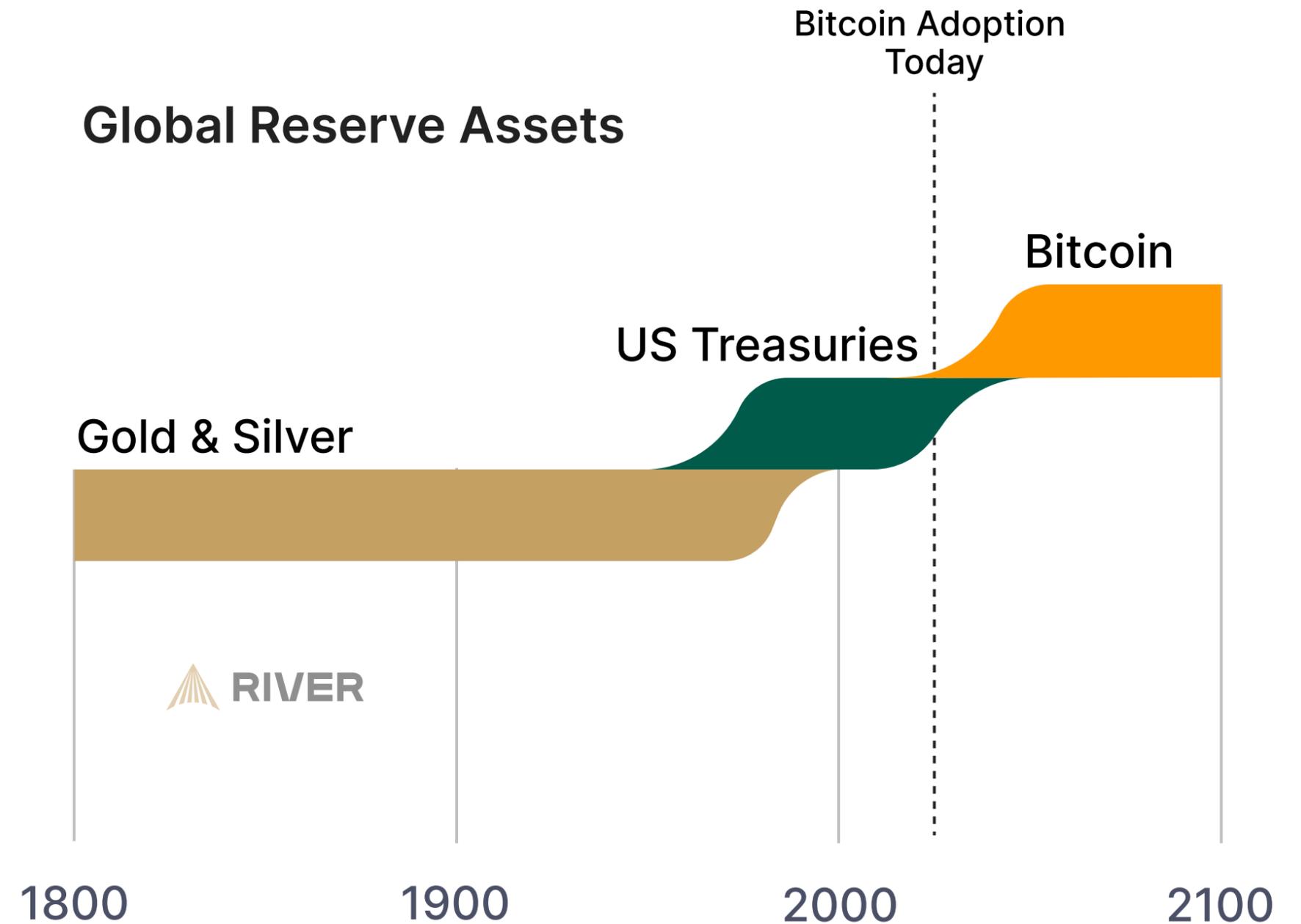


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1.

The State of Bitcoin



The Bitcoin Protocol

The Bitcoin protocol, now 16 years old, is still seeing high levels of ongoing development:

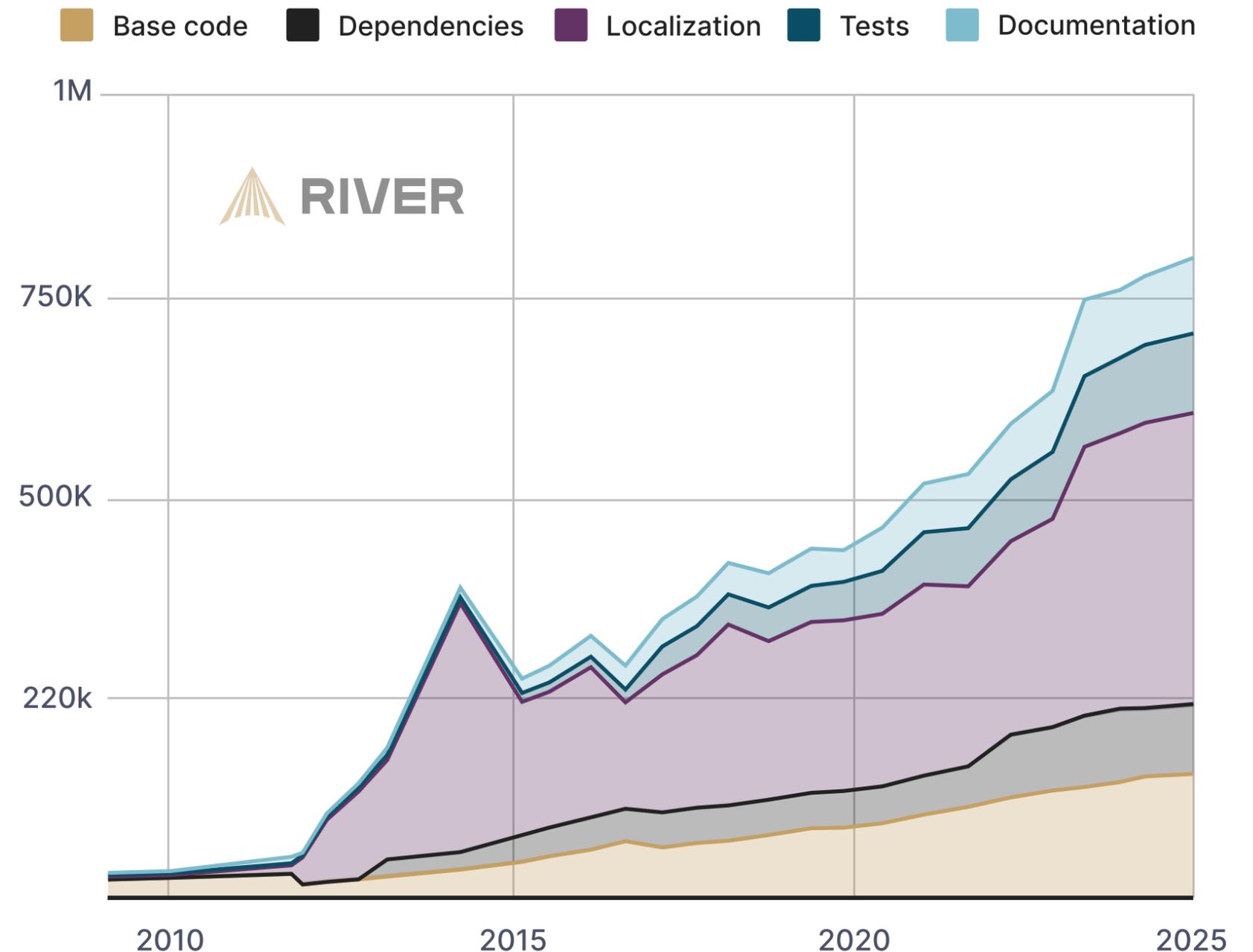
- **115 active Bitcoin Core contributors**
+2 since 2023
- **2,500 Bitcoin Core code commits in 2024**
+8.5% year-over-year
- **276,000 lines of code** changed to Bitcoin Core in 2024
- **13 organizations** are now funding development, with three new entrants in 2024

Bitcoin Developer Funding Organizations

 Blockstream	 brink	 Btrust	 chaincode
 digital currency initiative	 Human Rights Foundation	 okcoin	 >_OpenSats
 Spiral	 vinteum		

New in 2024 —  **2140**  **B40S**  **Maelstrom**

Bitcoin Core: Lines of Code



The Bitcoin Protocol: Potential Upgrades

Proposed changes to the Bitcoin protocol focus on three key areas:

-  **Programmability:** Enhancing flexibility in Bitcoin storage and transactions.
-  **Scaling:** Increasing transaction throughput both on and off the Bitcoin blockchain.
-  **Security:** Strengthening Bitcoin's resilience against threats and reducing technical debt.

Until developers and the broader community reach consensus on which protocol enhancement to adopt, the likelihood, timeline, and implementation of proposed changes remain uncertain.

			Bigint Arithmetic
			Drive Chains
			Great Consensus Cleanup
			Great Script Restoration
			LNHANCE
			OP_CAT
			OP_CHECKCONTRACTVERIFY
			OP_CHECKSIGFROMSTACK
			OP_CHECKTEMPLATEVERIFY
			OP_EXPIRE
			OP_TXHASH/OP_TX
			OP_VAULT
			QuBit
			SIGHASH_ANYPREVOUT
			TapLeafUpdateVerify
			TX Introspection

The Bitcoin Network: Nodes and Hashrate

Bitcoin operates on a decentralized network of nodes and miners. By most metrics, the health of the Bitcoin network is more robust than ever.

Roughly 21,700 reachable nodes comprise the Bitcoin network, growing by 11% in 2024. Bitcoin Core has 98% market share among node implementations.

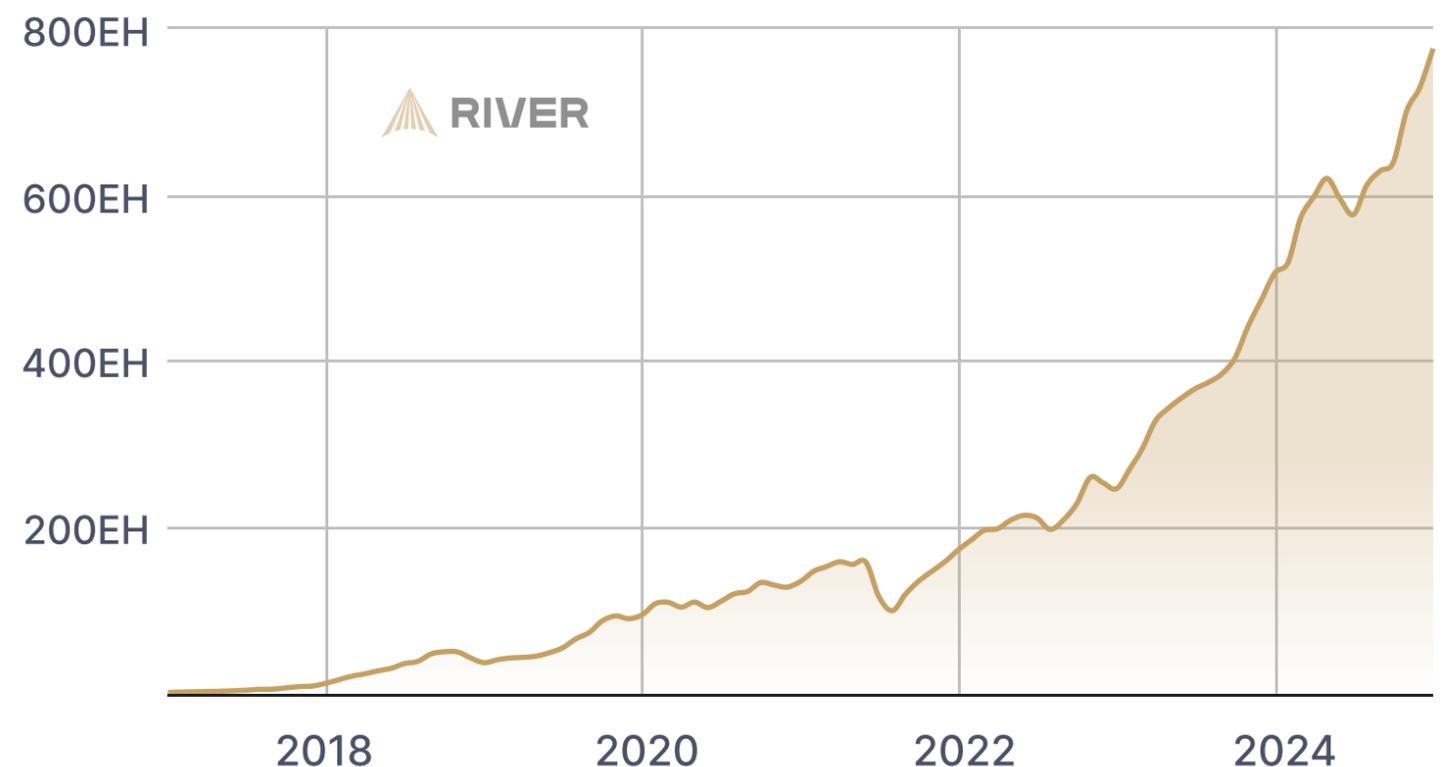
The Bitcoin network is secured by almost 800 exahash of computational power, meaning every second there are 800 quintillion computations being done to secure the network.

Miner hashrate has grown by an average of 107% per year since 2016, with 55% growth in 2024.

Node Count



Total Hashrate



Source: Bitnodes.org

Bitcoin's Hashrate Is Decentralizing

Hashrate distribution is an important indicator of Bitcoin's network health. Hashrate centralization increases the risk of threats like a 51% attack, which could compromise the network's security.

Geographic Distribution:

- Trend of decentralization over time. China and the US decline in share of global hashrate
- 28 countries > 0.1% hashrate
- 9 countries > 1% hashrate

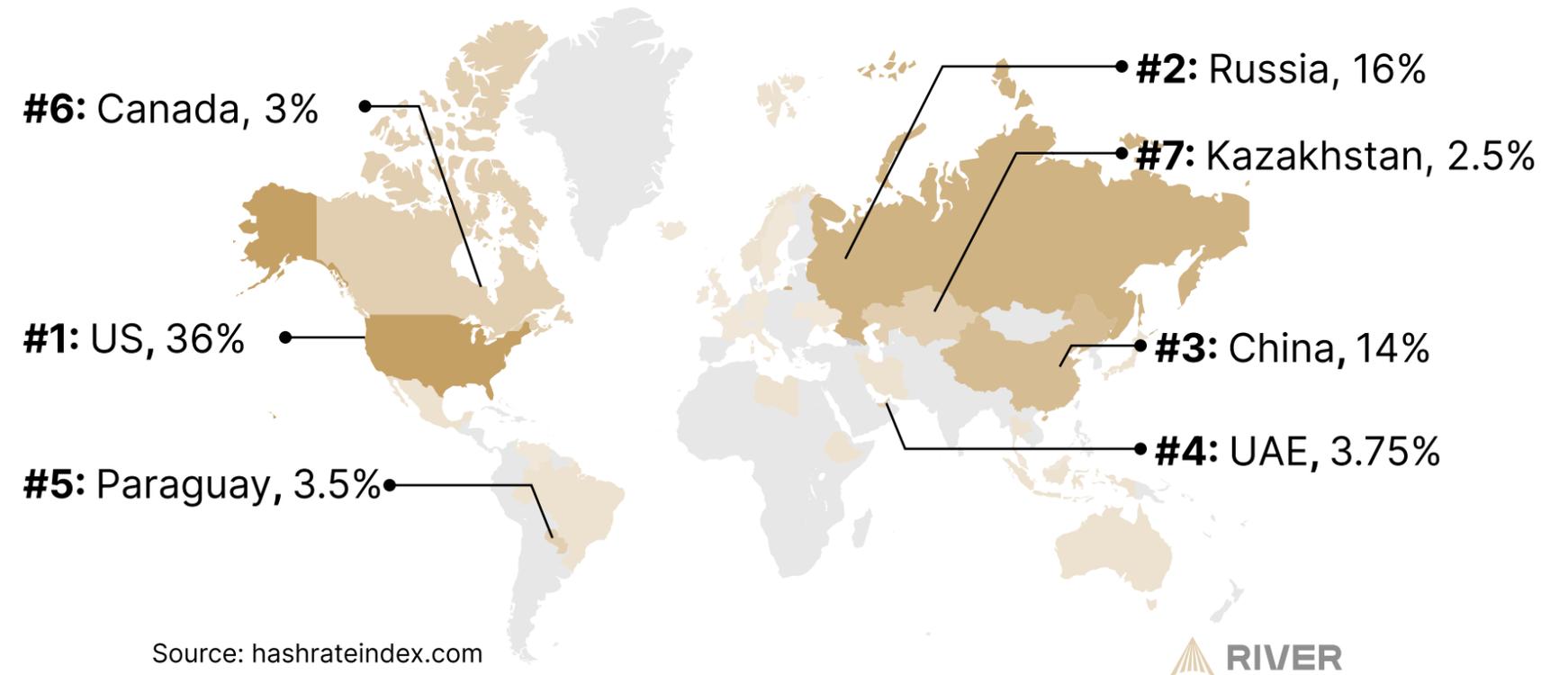
Mining Pool Distribution:

- Remains Bitcoin's largest point of centralization, but showing signs of improvement
- Hashrate in the top 3, 5, and 10 pools fell in 2024

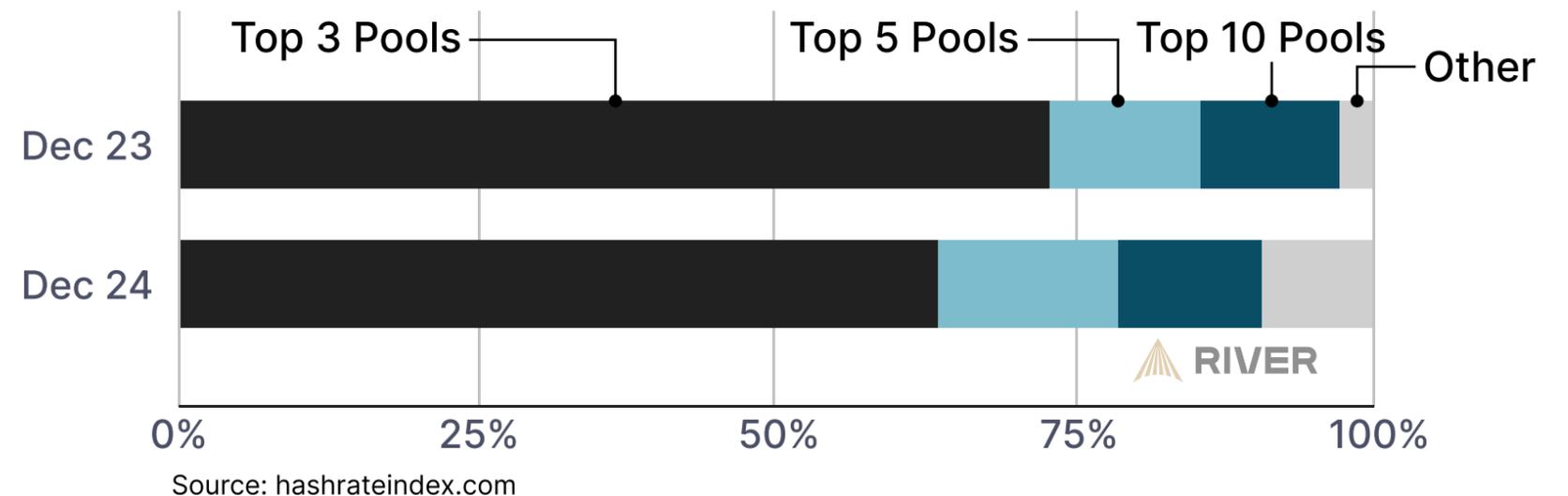
Hashrate Ownership Distribution:

- Public companies account for 35.2% of total hashrate, +11% since 2022

Geographic Hashrate Distribution



Mining Pool Distribution

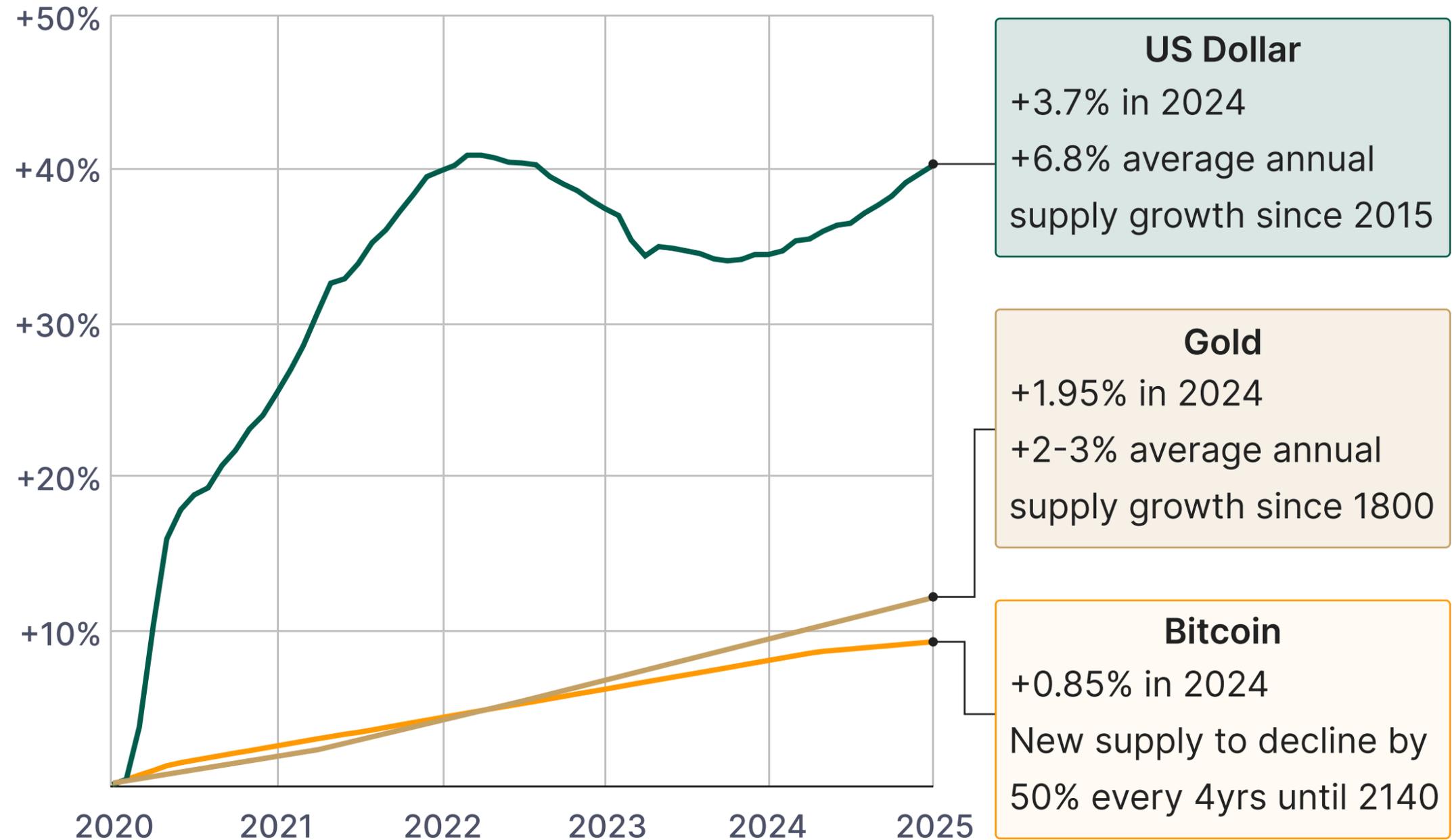


Bitcoin's Supply Growth Is Now Below the Dollar and Gold

Bitcoin as a monetary system continues to function as designed, with zero downtime over the past decade and a highly predictable supply schedule:

- 94% of all 21 million bitcoin have been mined, with the remaining 6% to be mined over the next ~115 years
- Monetary issuance decreased from ~900 to ~450 BTC/day after the April 2024 halving
- 2024 bitcoin supply growth was 0.8%, lower than all major fiat currencies and gold

Supply Growth Since 2020



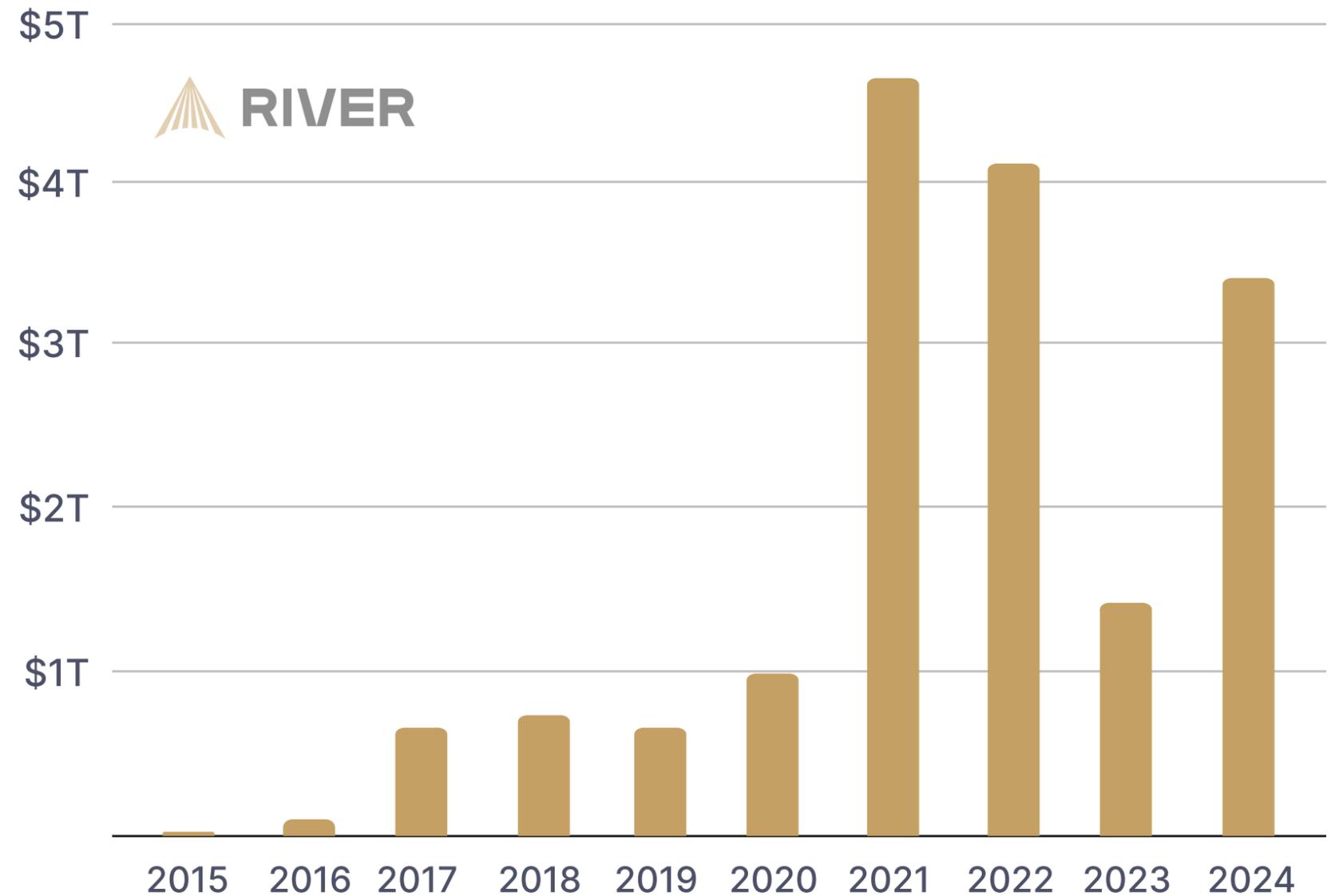
["What Happens After All Bitcoin Are Mined?"](#)

Bitcoin Is Settling Higher-Value Transactions

While the Bitcoin blockchain is not designed for everyday payments, there has been a significant increase usage to settle high-value transactions.

	2024	Y/y Change
Total Value Transferred	\$3.43T	+140%
Average Tx Size	\$17.8K	+91.8%
Median Tx Fee	\$2.28	+4.0%

Value Transferred on the Bitcoin Network

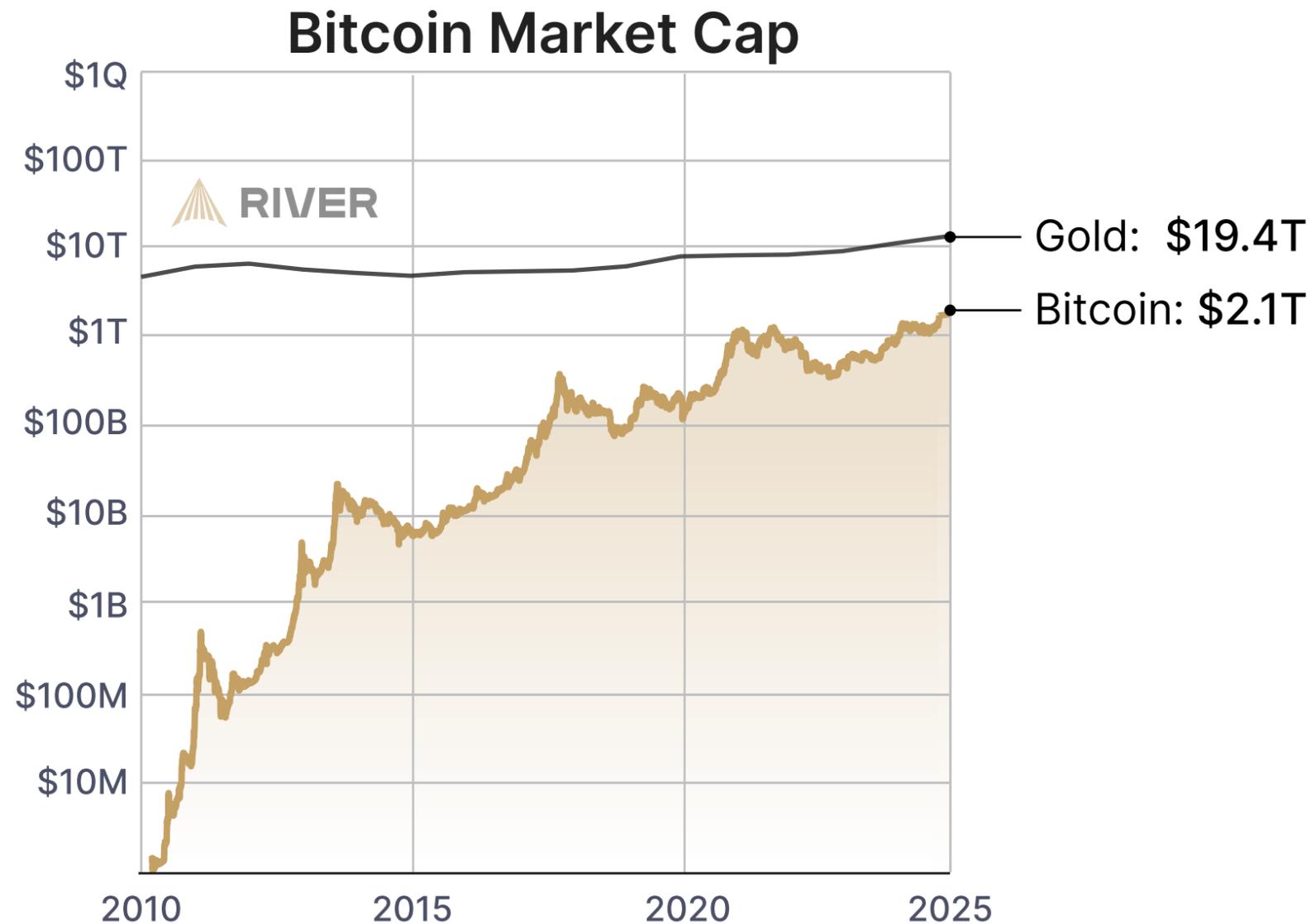


Source: CoinMetrics

*Excludes internal movements within the same owner's wallets

The Bitcoin Monetary System: Market Size

Bitcoin's market cap surpassed \$2 trillion for the first time in 2024, placing it among the world's largest currencies and safe-haven assets.

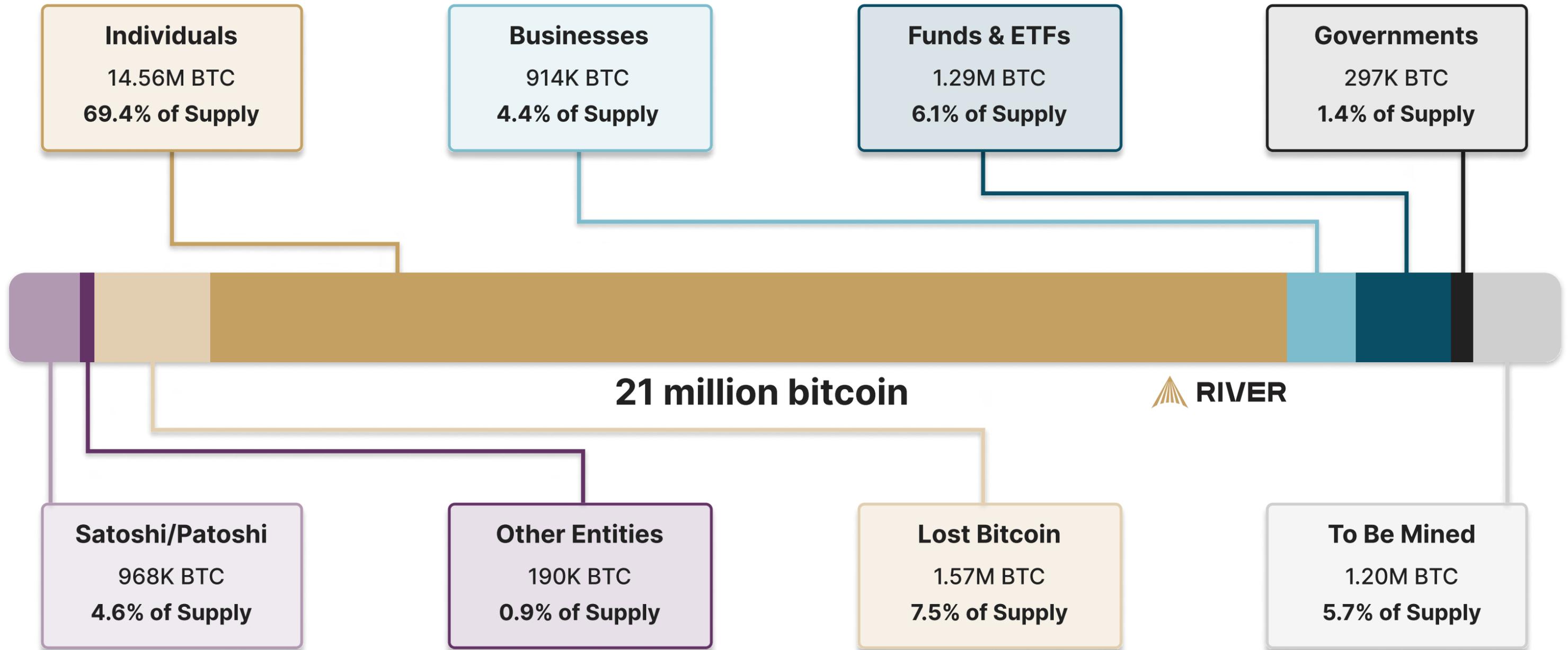


Bitcoin Is the World's 11th Largest Currency

	Currency	Money Supply (in USD)
1.	Chinese Yuan	\$43.1T
2.	US Dollar	\$21.7T
3.	Euro	\$16.2T
4.	Japanese Yen	\$10.6T
5.	British Pound	\$4.5T
6.	Korean Won	\$3.9T
7.	Indian Rupee	\$3.1T
8.	Canadian Dollar	\$2.6T
9.	Hong Kong Dollar	\$2.4T
10.	Brazilian Real	\$2.1T
11.	Bitcoin	\$1.9T

Source: fiatmarketcap.com

Bitcoin Ownership Distribution (Dec 31, 2024)



Estimated by BitMEX
 Research based on
 analysis of hashing in 2009

Includes bankrupt
 estates and BTC on
 DeFi/smart contracts

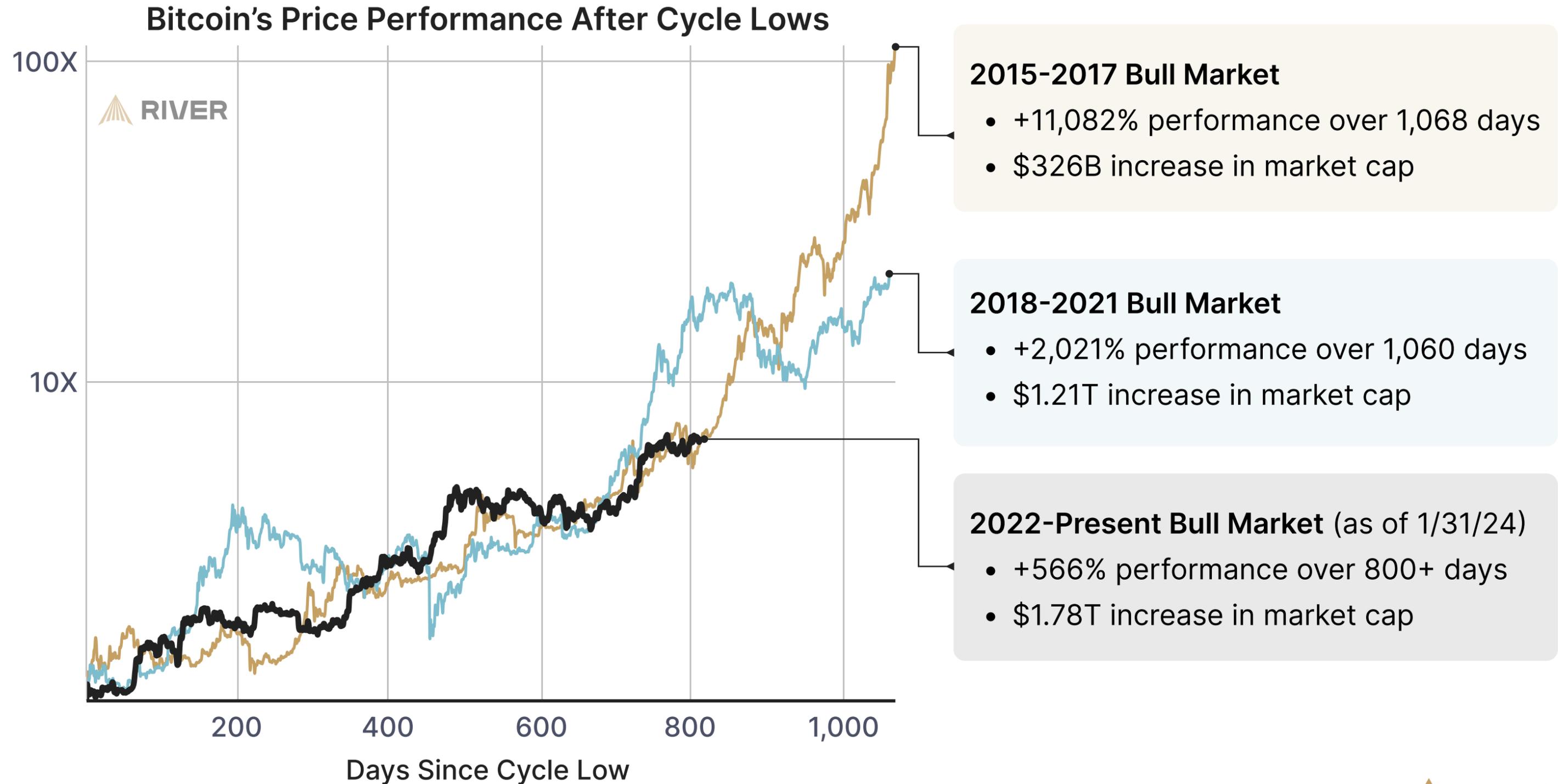
Estimated based on
 supply by UTXO age
 cohort

2.

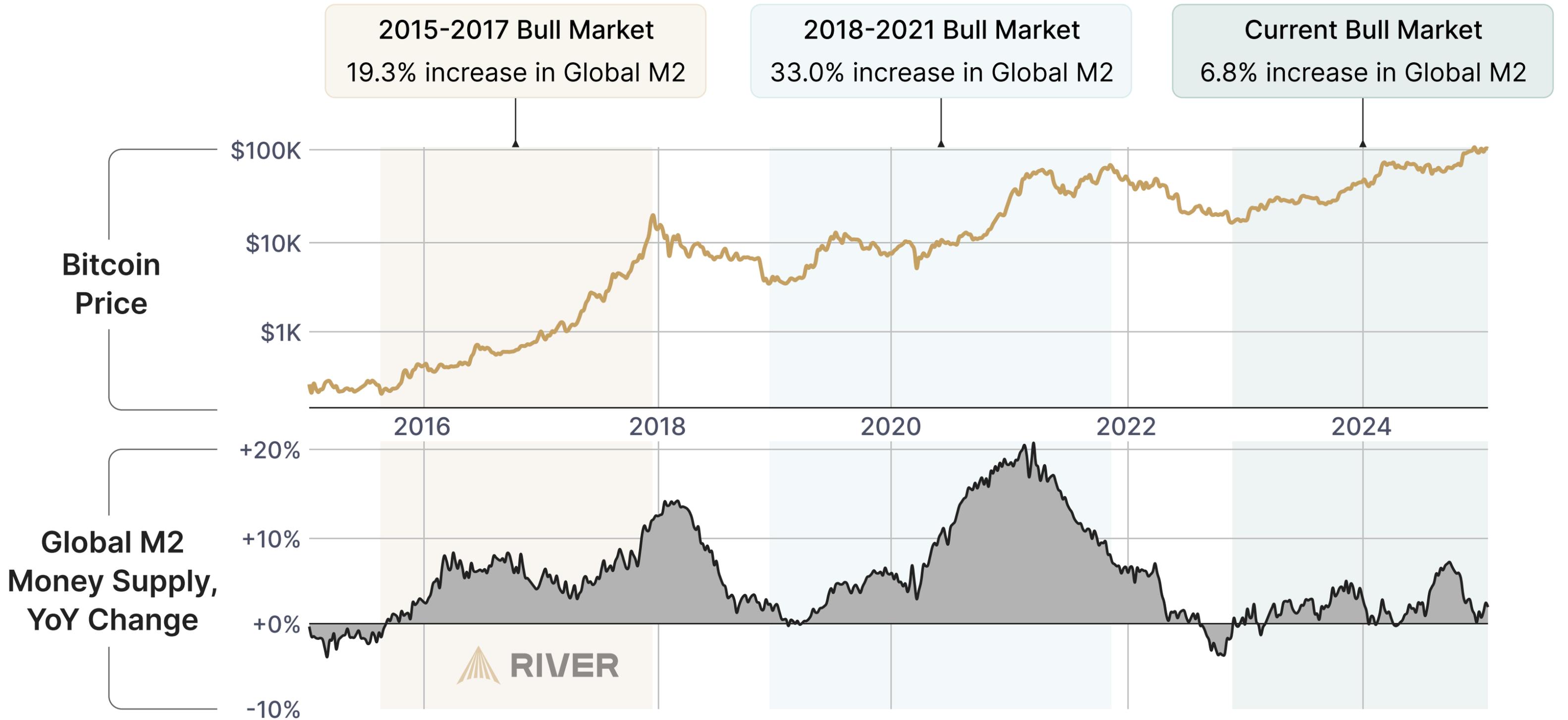
This Bull Market is Different



Comparing Bitcoin's Bull Markets



Current Bull Market Not Driven By Global Money Supply Growth (Yet)

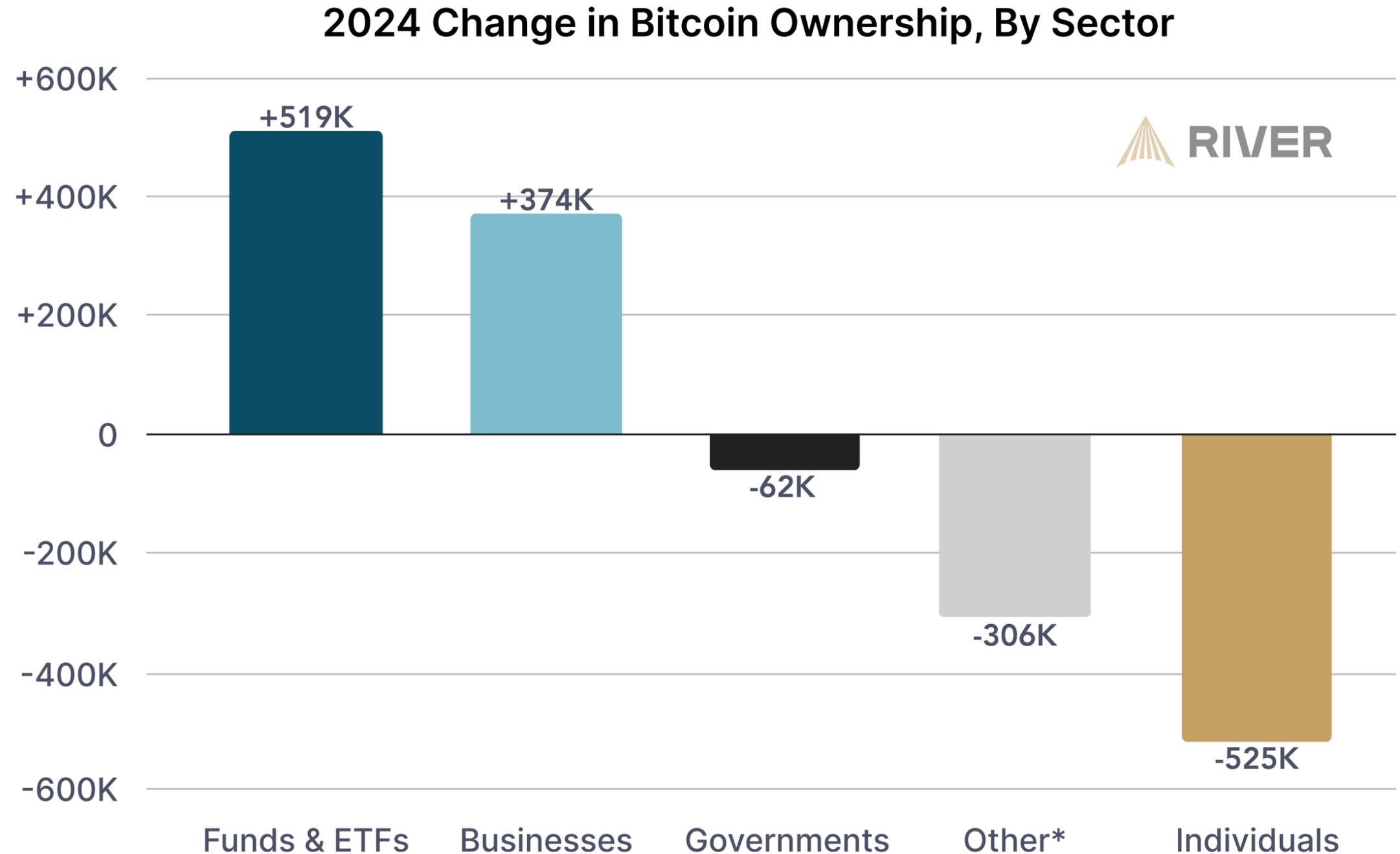


Data source: BGeometrics.com

A Dramatic Shift in Bitcoin Accumulation Occurred in 2024

Previous cycles were driven by individuals, but ETFs and businesses were the primary bitcoin accumulators in 2024.

- Bitcoin ETFs had record breaking launches, adding 519K BTC in 2024
- Businesses added 374K BTC in 2024, 31% more than in 2020



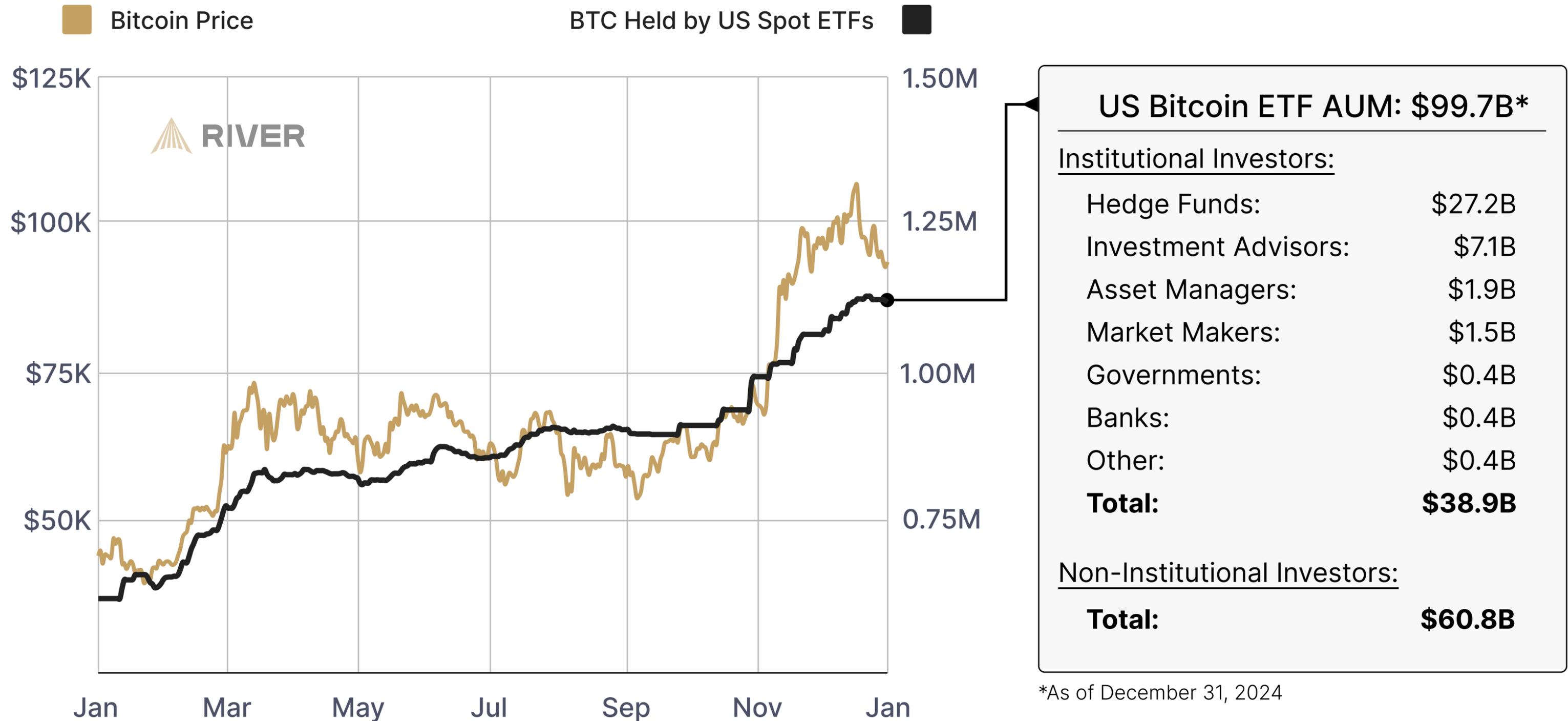
*Includes change in bitcoin to be mined, BTC held smart contracts, and estimated bitcoin lost

3.

Institutions Are Driving Bitcoin's Price



US Spot Bitcoin ETFs Reached \$100B, Driving 2024 Price Action

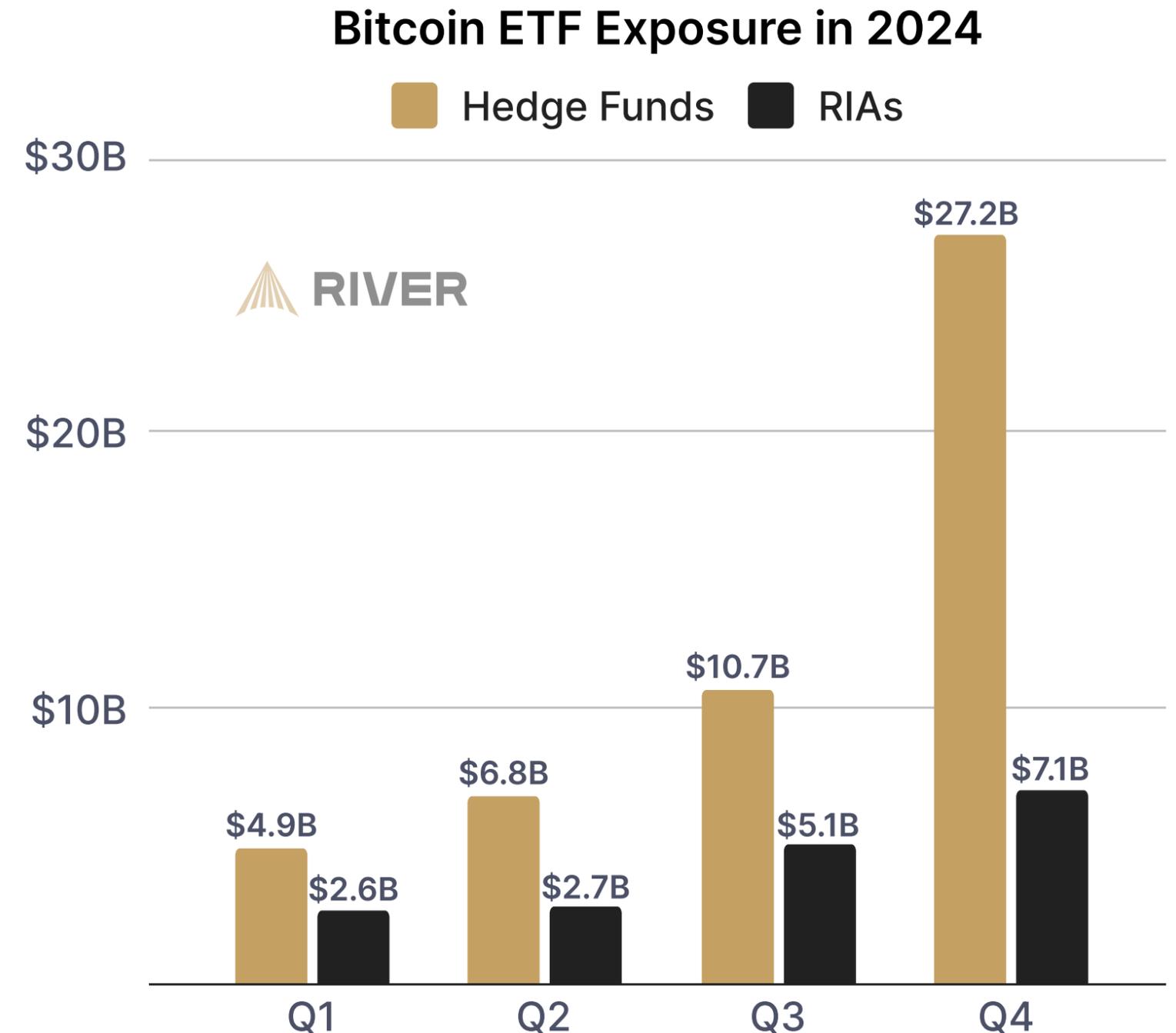


52% of the Top 25 Hedge Funds and RIAs Own Bitcoin ETFs

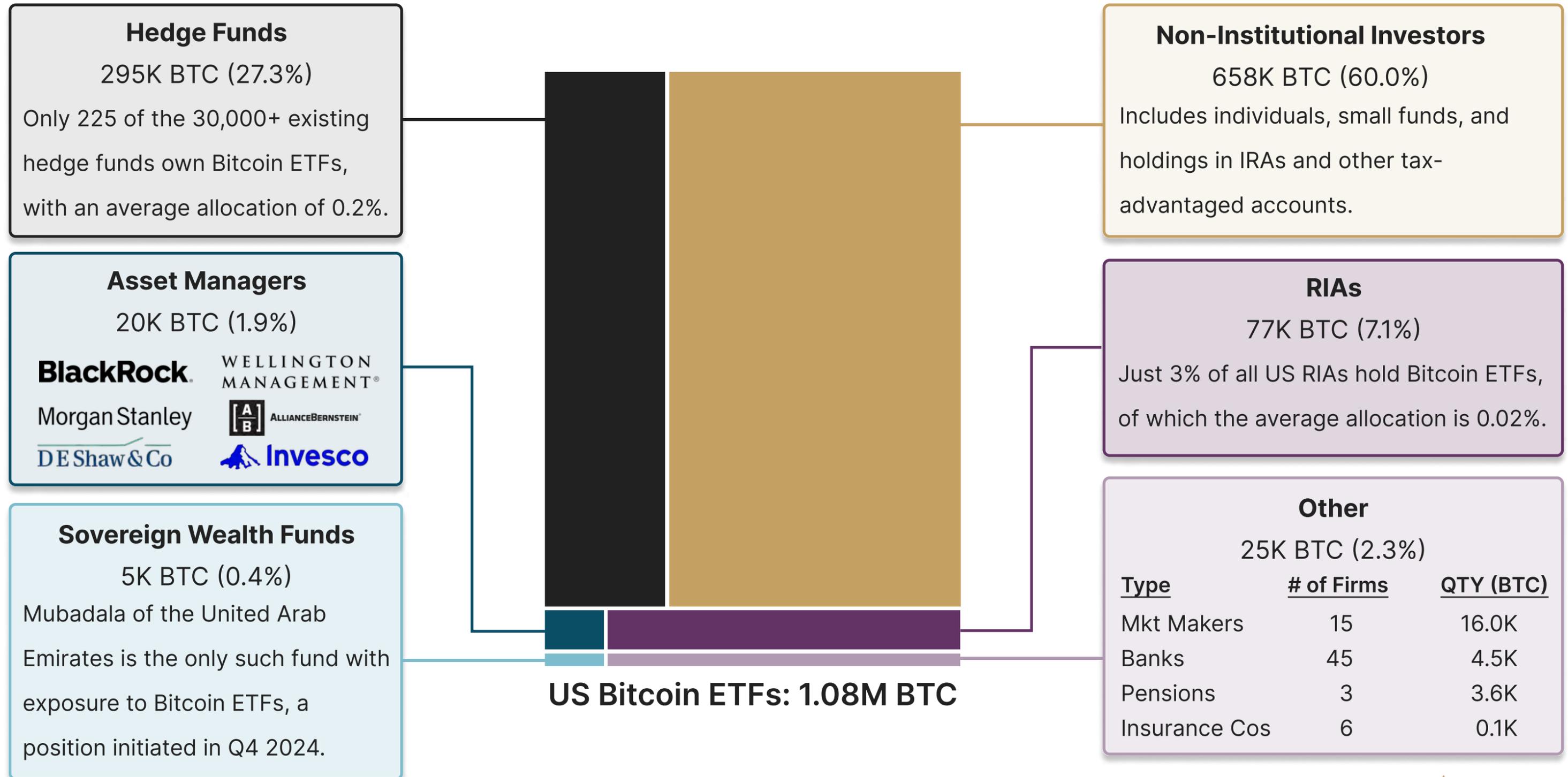
Hedge funds and Registered Investment Advisors (RIAs) collectively manage over \$135 trillion in the US alone.

While total exposure exceeds \$30 billion, allocation sizes remain relatively small. However, they have increased each quarter since the launch of the ETFs.

	Hedge Funds	RIAs
Firms >\$1B AUM with Exposure	143	458
% of Top 25 Largest Firms by AUM with Exposure	52%	52%
Weighted Average Bitcoin Allocation Size	0.24%	0.02%



Bitcoin ETF Ownership Distribution



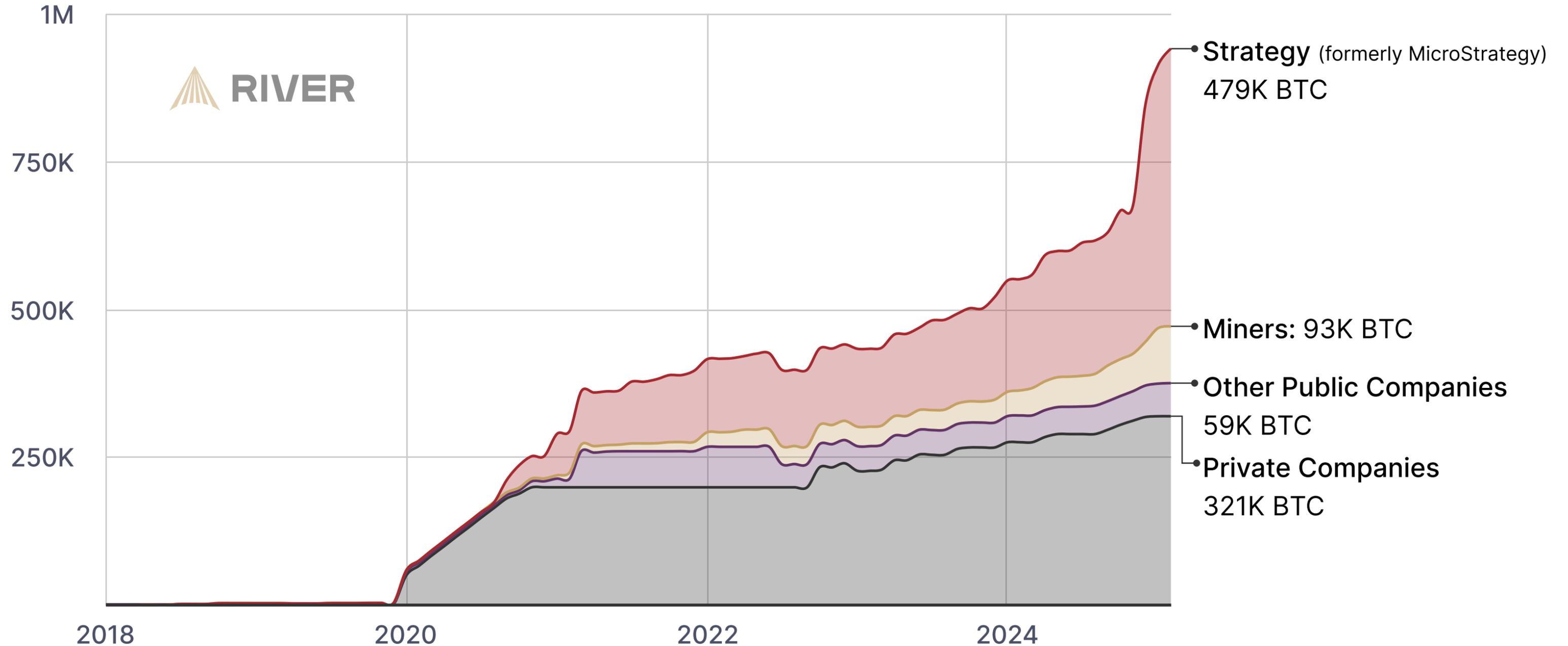
4.

**Business Bitcoin
Adoption is
Accelerating**



Businesses Have Accumulated Over 1,000 BTC Per Day Since January 2024

Aggregate Business Bitcoin Holdings

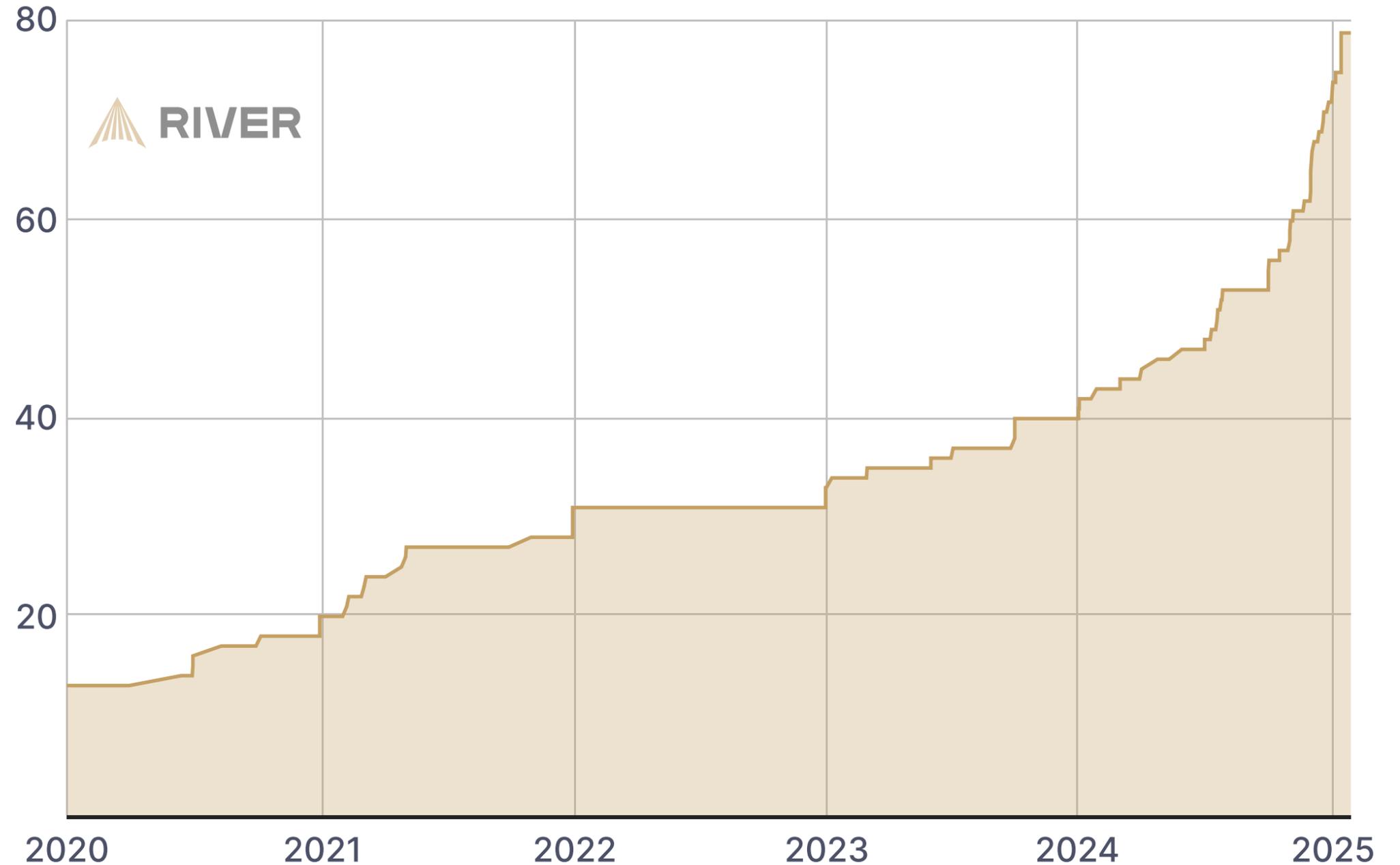


Public Companies Holding Bitcoin Grew by 80% in 2024

The number of public companies holding bitcoin grew by 139% since 2023, even though its adoption as a treasury asset remains below 1% of all publicly traded firms.

The S&P 500 and NASDAQ 100 have 2 and 3 companies with bitcoin holdings, respectively.

Public Companies With Bitcoin Holdings

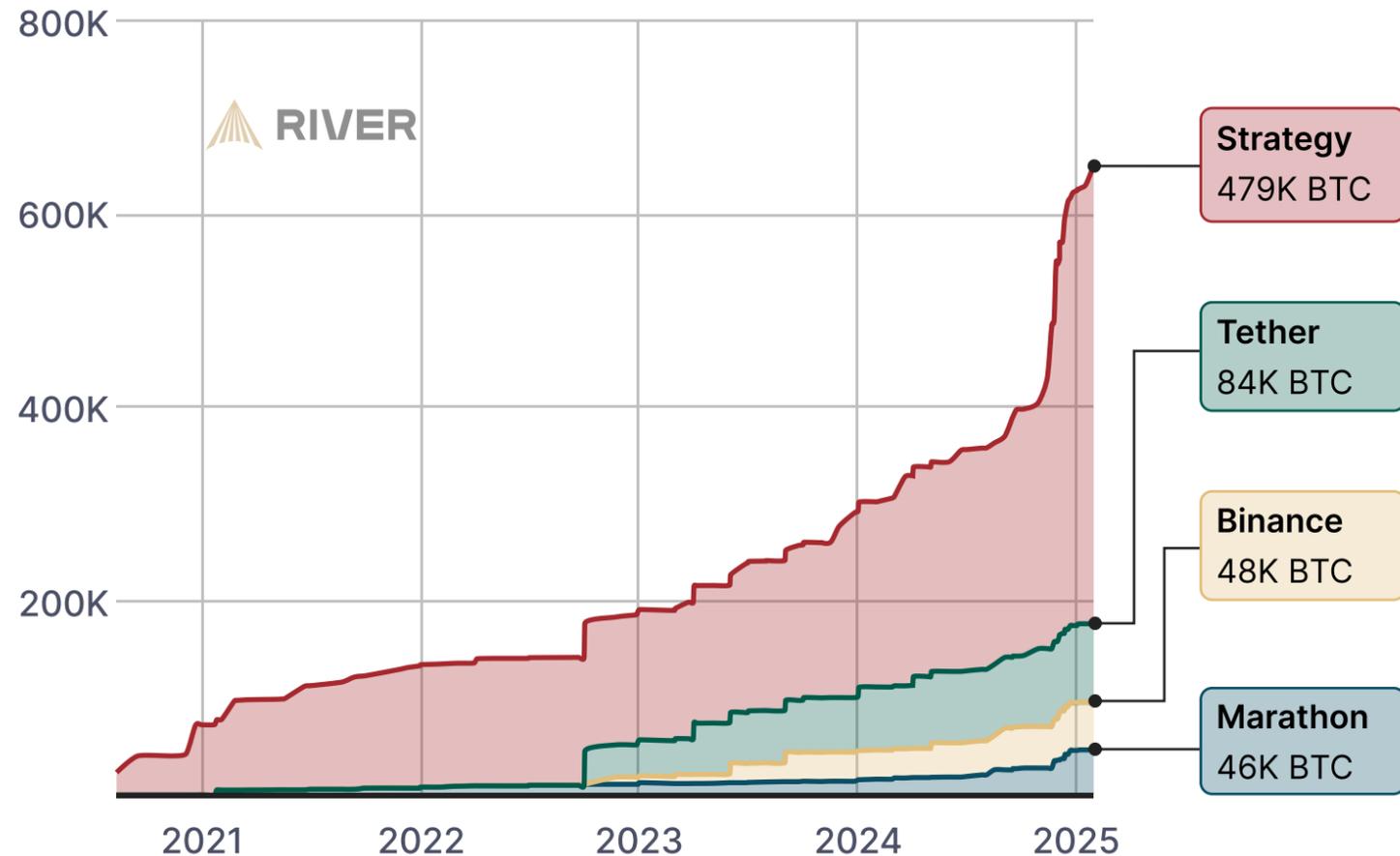


The Rise of the Bitcoin Standard Company

An increasing number of companies are using bitcoin as their primary treasury asset and the main vehicle for holding retained earnings, rather than distributing earnings through dividends or share buybacks.

This has given rise to a novel indicator known as **BTC Yield**, measuring a company's performance based on their ability to increase bitcoin holdings per share.

BTC Holdings of Select Bitcoin Standard Companies



Strategy (formerly MicroStrategy) Sats per Share



5.

Lightning Network Growth Continues



Rising Volume, Fewer Transactions

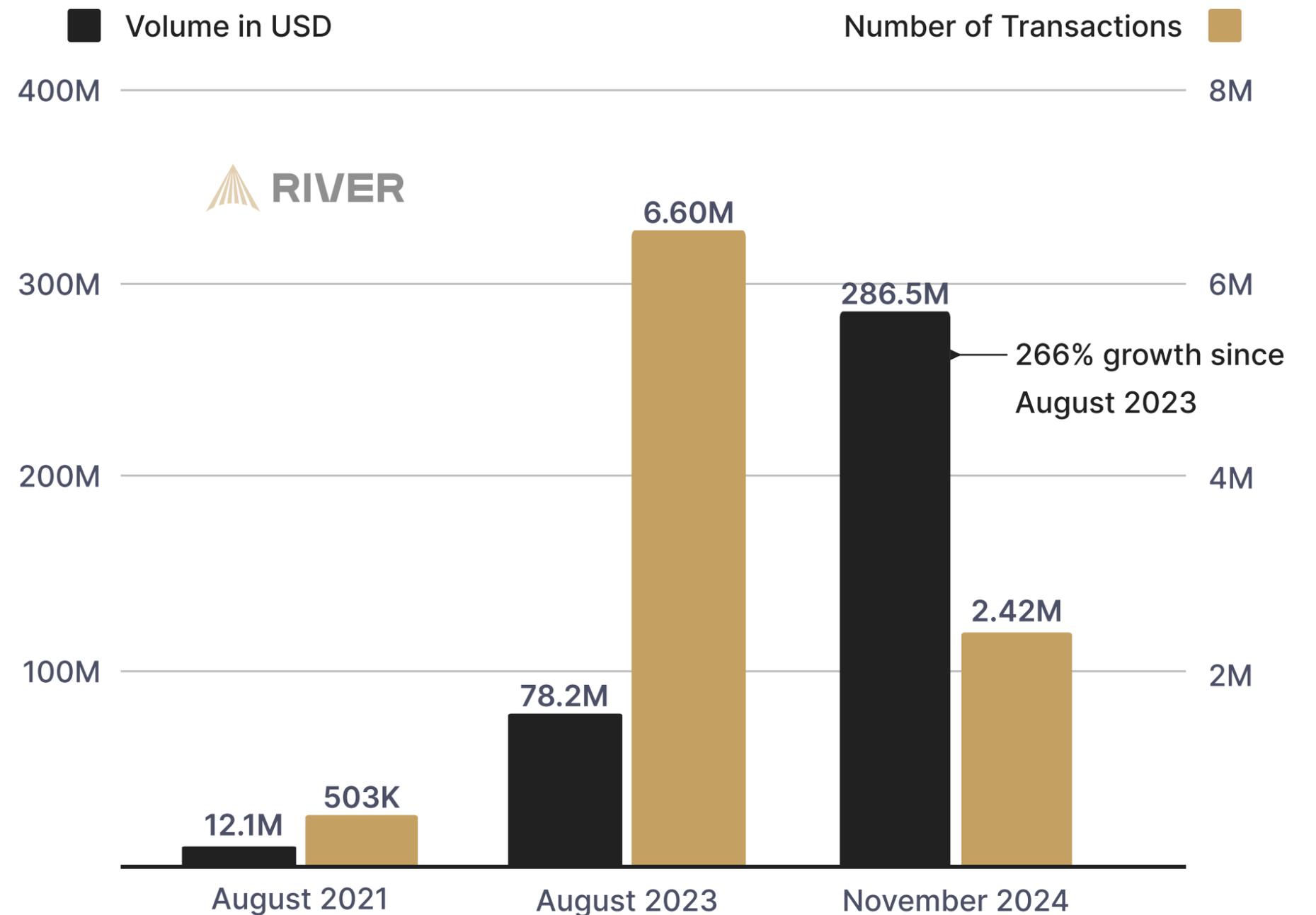
The Lightning Network has continued its growth despite a lower transaction count, according to our network usage estimates for the month of November 2024.

This change in network usage is likely due to evolving spending behavior: Exchange deposits and withdrawals have grown, while micropayments use-cases are still in their infancy.

Based on Data Shared By:



Estimated Monthly Lightning Network Usage



*All values are for routed transactions. Lower bound estimates as private transactions are excluded

Lightning Methodology to Determine Transactions and Volume

Due to the architecture of the Lightning Network, an outside observer can't determine exactly how many transactions are happening on the network.

Our estimates are derived by aggregating data from many large nodes within the network. To ensure accuracy, we first adjust this data downward to account for overlapping transactions before extrapolating to arrive at network-wide estimates.

Our November 2024 dataset was made possible by 14 data providers, representing 79.4% of Lightning Network capacity.

Based on the transaction data received, we estimated that 48.8% of all transactions overlapped, necessitating a downward adjustment of 24.4% to both the total transaction count and volume.

After applying this adjustment, we extrapolated the refined dataset to cover the remaining 20.6% of the Lightning Network's capacity not included in our data.

River's [2023 Lightning Network Report](#) provides an expanded explanation of our methodology and how the Lightning Network works.



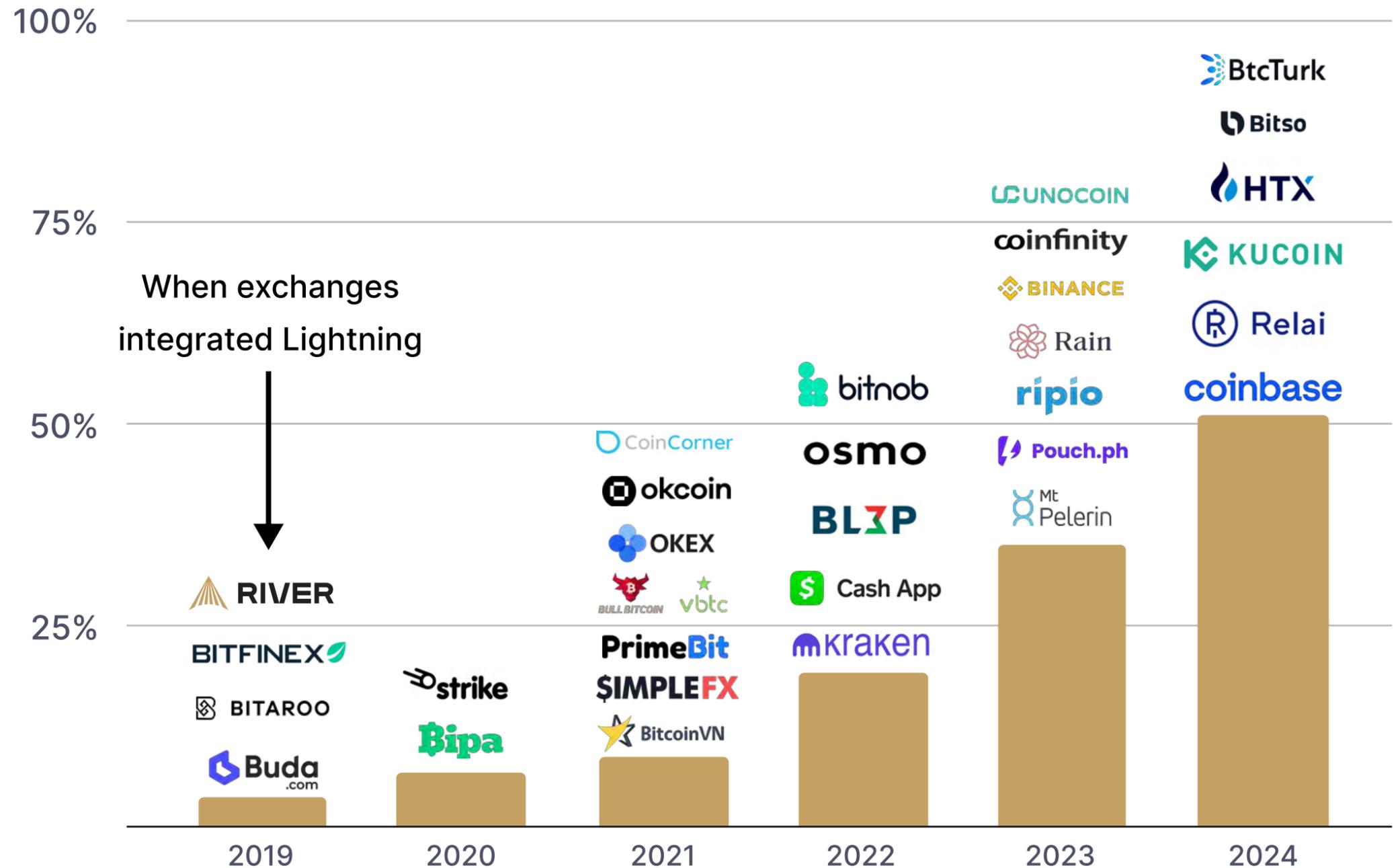
Exchanges Are a Large Driver of Lightning Network Growth

Exchange deposits and withdrawals involve higher-value transactions than other Lightning use cases such as tipping, gaming, and small purchases, with the average deposit/withdrawal size over \$100.

Since 2023, exchange adoption has driven Lightning Network growth, now accounting for at least two-thirds of total value routed based on our estimations.

Share of Exchanges with Lightning Integration

(based on trading volume)

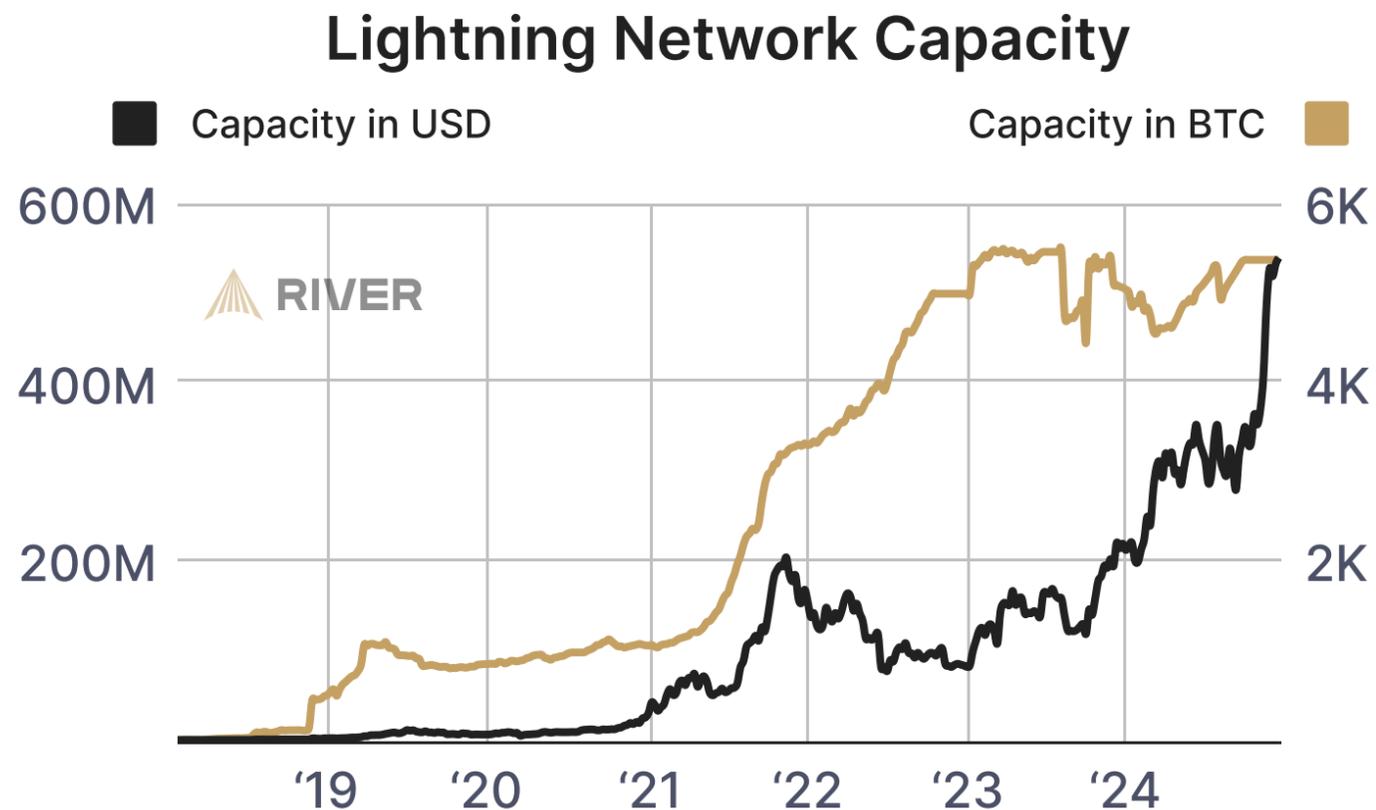


Data source: Messari

Lightning Network Architecture is Evolving

Lightning Network capacity has remained flat since 2023 in BTC terms, indicating that capacity is sufficient to handle current levels of transaction demand.

With the professionalization of channel management, transaction routing efficiency has likely improved, enabling the same capacity to support higher throughput.

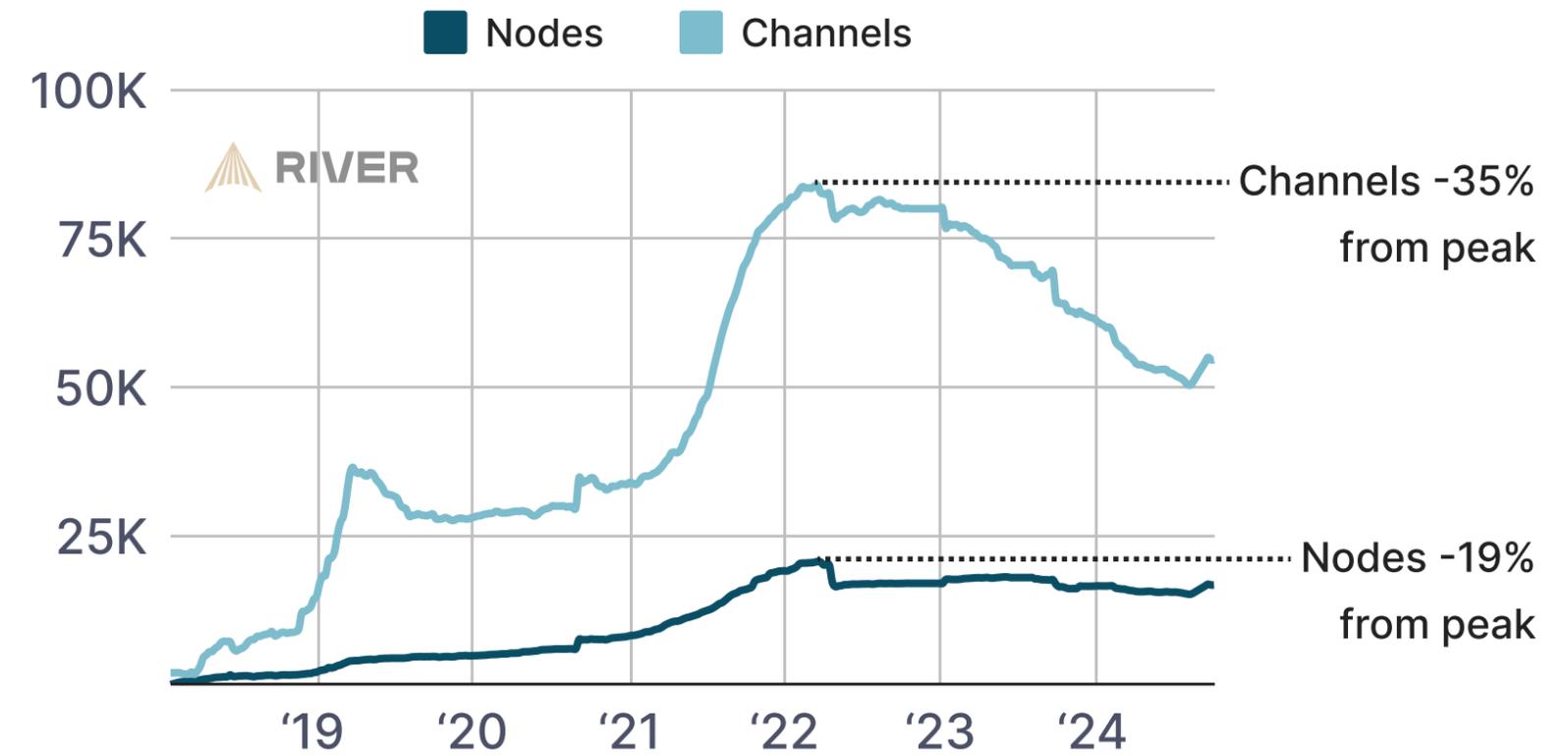


Data source: Bitcoinvisuals.com

Increased competition in transaction routing services has led to a consolidation of the number of nodes and channels across the network.

While routing efficiency has improved, centralization has increased, with the top 10 nodes by capacity now controlling 84.6% of the total network capacity.

Public Lightning Network Nodes and Channels



Data source: Bitcoinvisuals.com

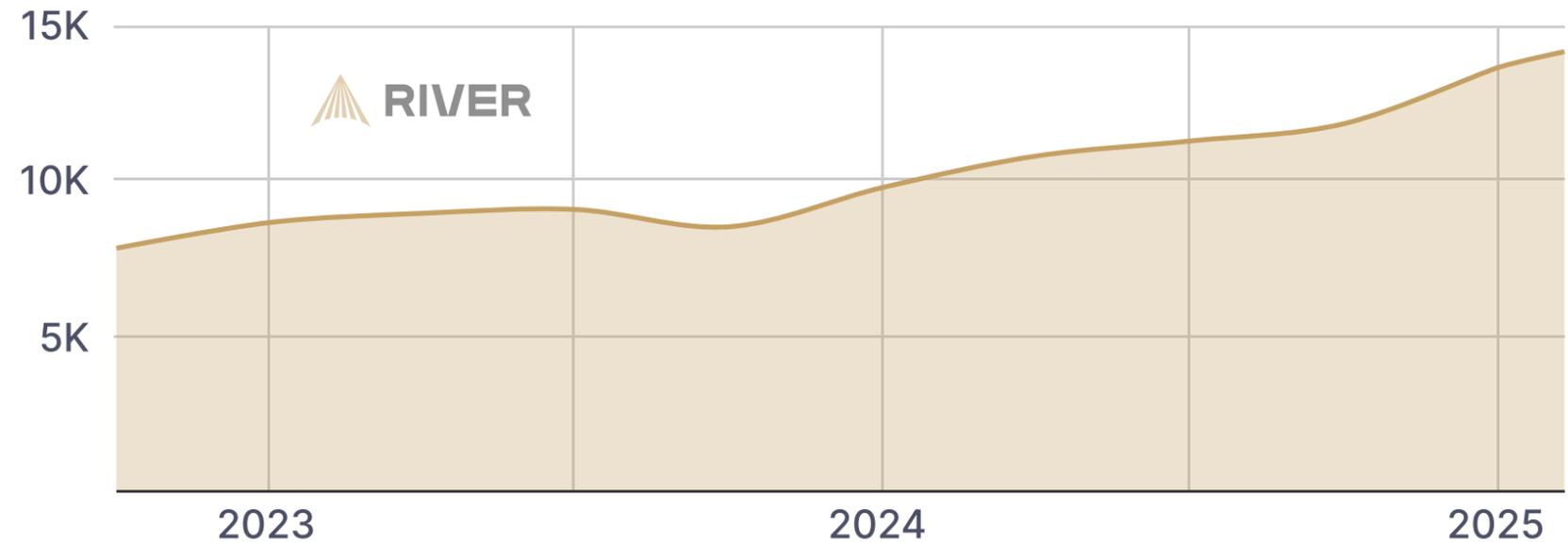
Why Lightning Hasn't Grown Faster

Lightning Network adoption is largely driven by bitcoin's usage as a medium of exchange and transaction fees on the Bitcoin blockchain.

While merchant bitcoin adoption for payments is steadily growing, the total number of locations accepting bitcoin remains low. This is partly due to a limited willingness to use bitcoin for transactions when more convenient alternatives are available.

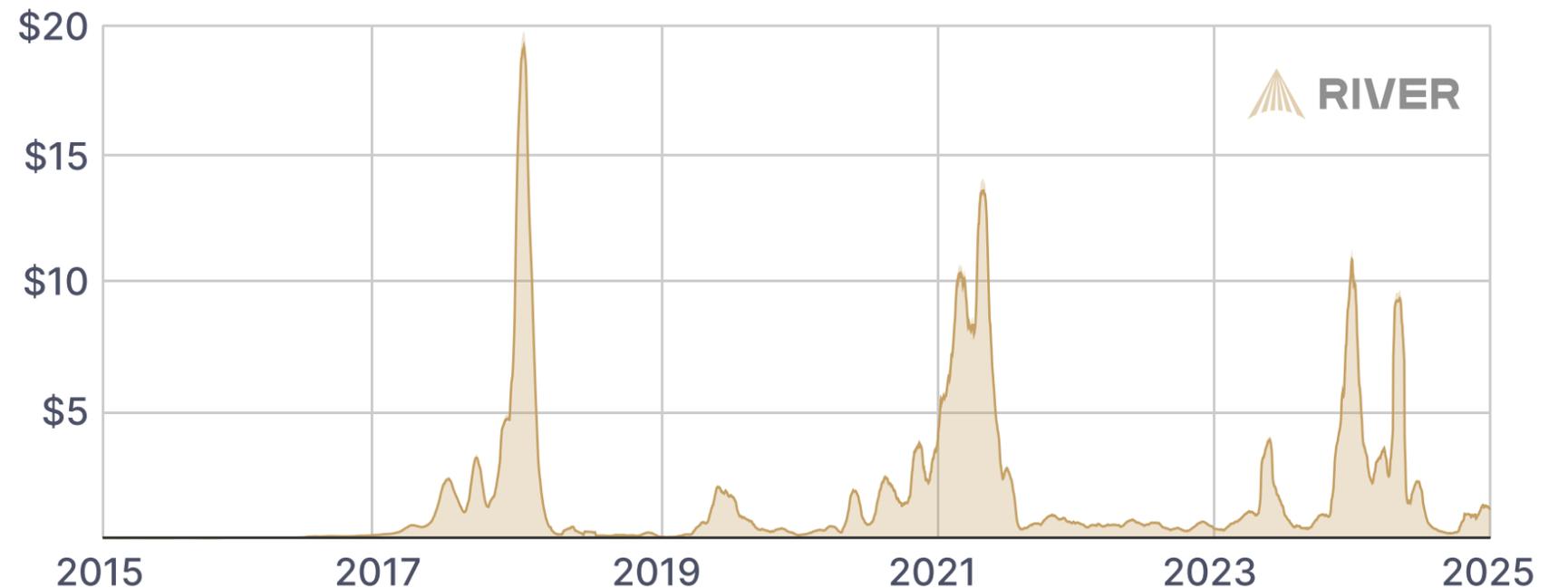
Additionally, Bitcoin transaction fees have not yet reached a level that would drive a significant shift toward the Lightning Network or other scaling solutions.

Number of Merchant Locations Accepting Bitcoin



Data source: BTCMap.org

Average Bitcoin Transaction Fee (30 day average)



Data source: CoinMetrics

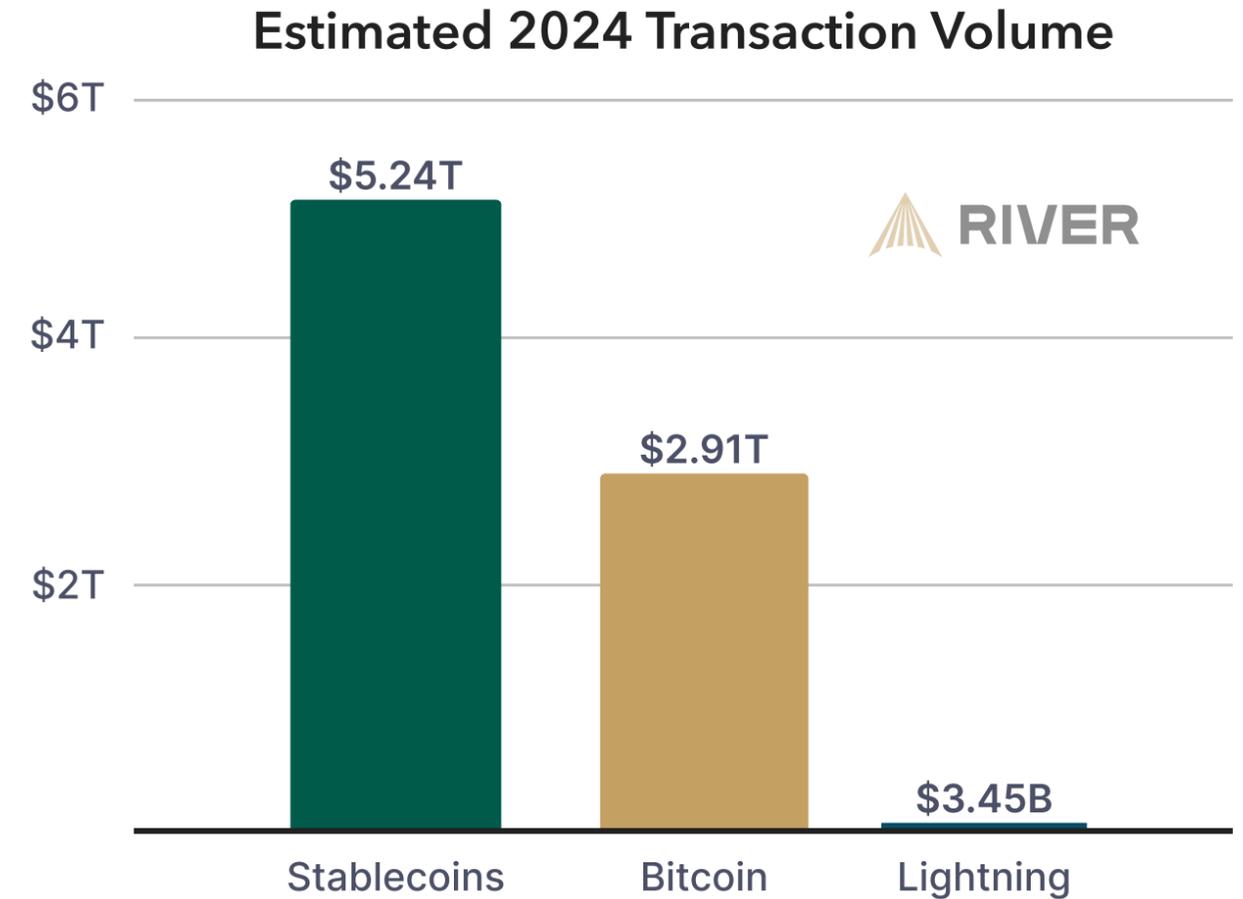
Near-Term Lightning Network Growth Catalysts

Stablecoins

Stablecoins represent the largest demand source for blockchain-based payments in 2025.

With the release of Taproot Assets in December 2023, stablecoin payments can now be facilitated over Lightning.

The largest stablecoin issuer, Tether, announced the integration of its USDT stablecoin into the Lightning Network in January 2025.



Data source: CoinMetrics

Layer 2 Settlement

Since 2021, Layer 2 scaling projects on Bitcoin have increased from 10 to 75, according to Galaxy Research, raising \$447 million in venture capital funding.

We expect the Lightning Network to serve as the settlement layer between various Layer 2 solutions such as rollups, sidechains, ecash mints, and Ark.

6.

Bitcoin Custody is Maturing

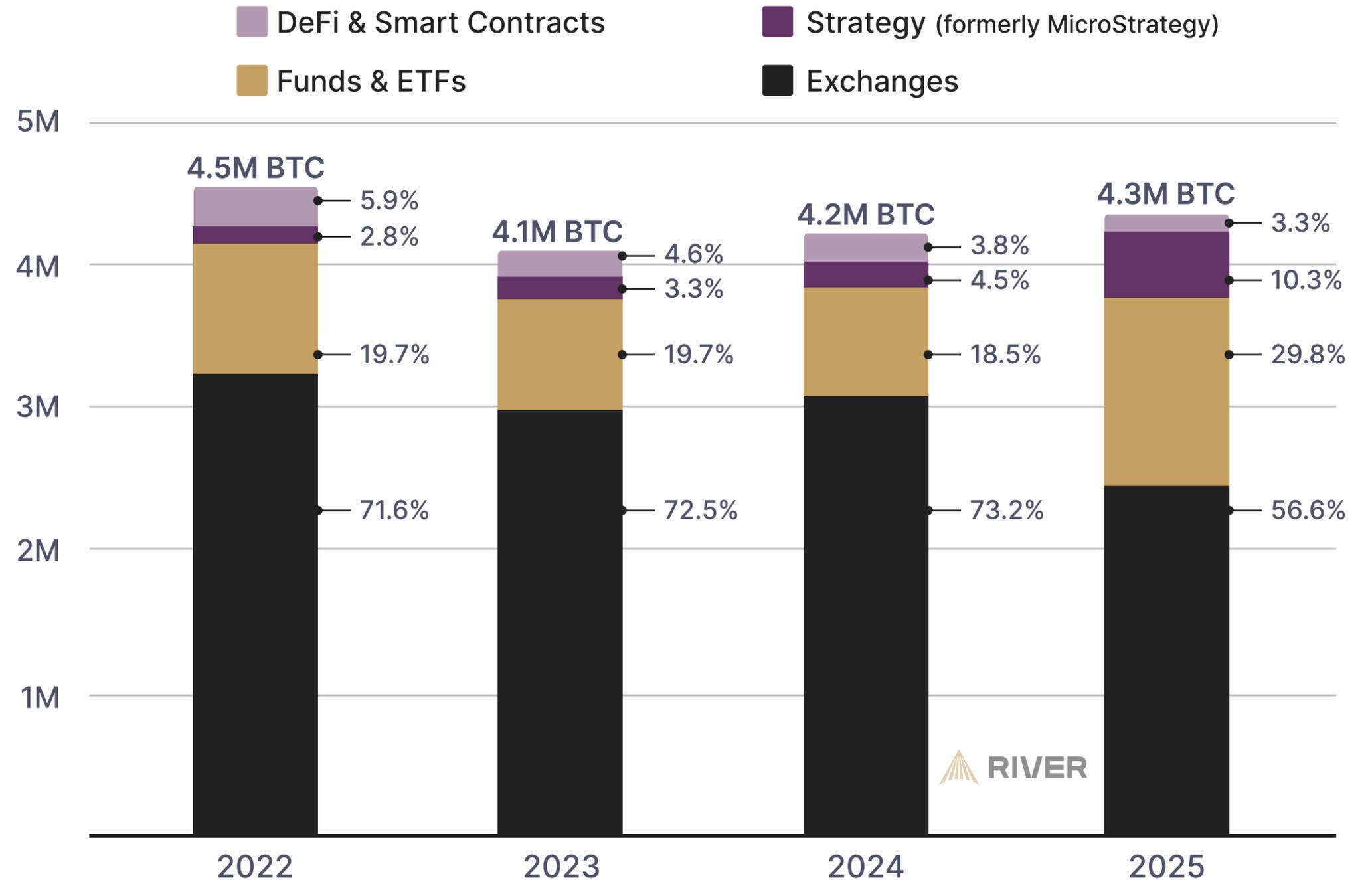


Third-Party Custody Offerings are Evolving

While bitcoin balances held on exchanges have fallen by over 20% since 2022, these coins have remained on third-party custodians rather than flowing to self-custody.

We expect the amount of bitcoin held by known third parties to increase with heightened demand for ETFs and similar products.

Bitcoin Held by Known Third Parties

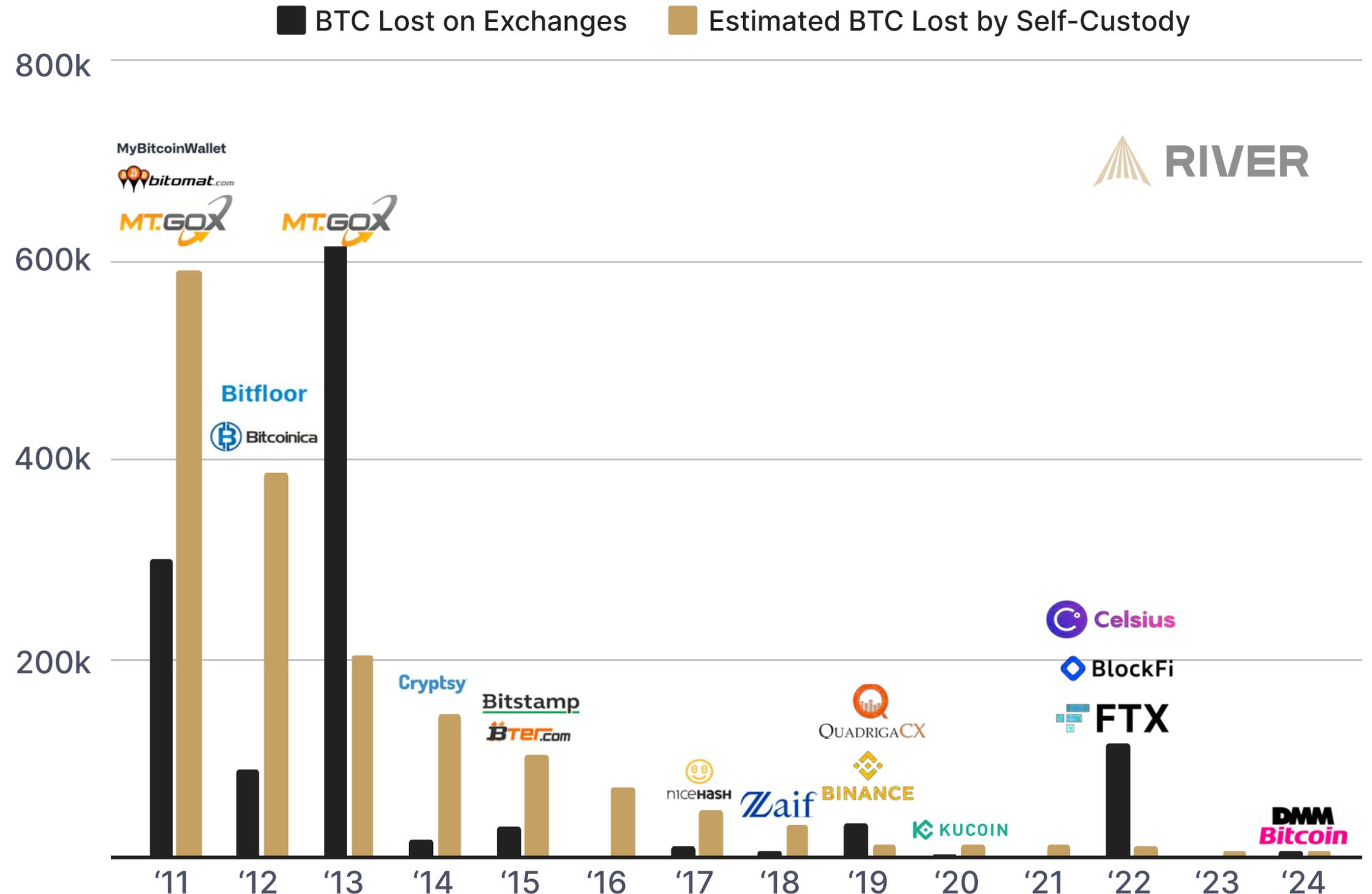


Bitcoin Custody Has Become More Secure

Over 1.3 million bitcoin have been compromised on exchanges through hacks, internal theft, and bankruptcies.

An estimated 1.6 million bitcoin have been lost via self-custody.

Only 10% of losses occurred after 2015.



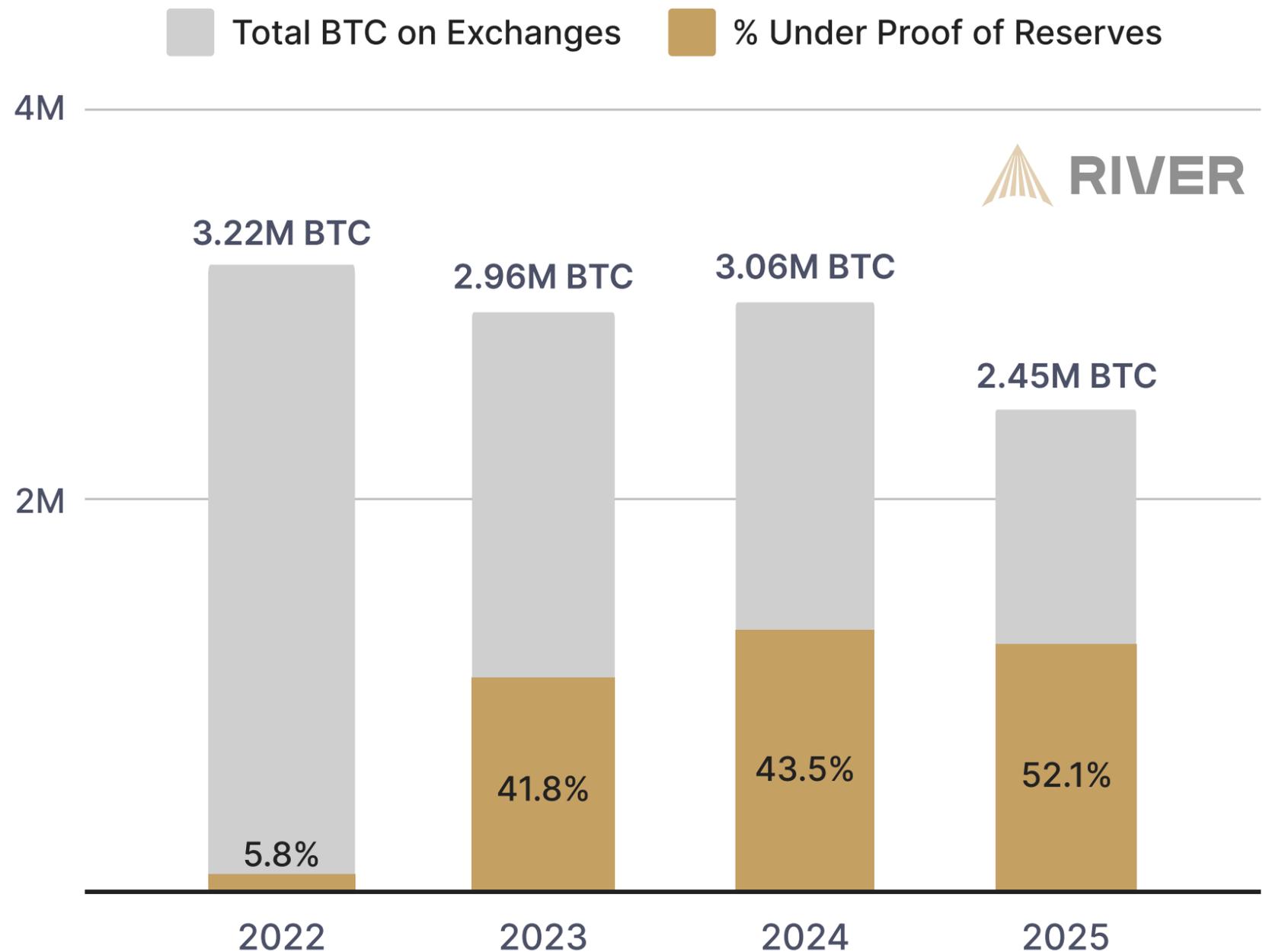
Proof of Reserves is Becoming an Industry Standard

Proof of Reserves, a method for exchanges to validate they hold their clients' bitcoin, has become an industry standard, accounting for over half of all exchange holdings.

This shift occurred in the aftermath of FTX's November 2022 collapse, which cost users over 20,000 BTC.

Exchanges Using Proof of Reserves

580% Increase in Proof of Reserves Since 2022



Bitcoin Supply Distribution by Custody Setup (Dec 31, 2024)



21 million bitcoin



Coinbase holds an estimated 2.37M BTC (11.3% of supply) between exchange and institutional businesses

Exchanges: 2.45M BTC (11.7% of supply)

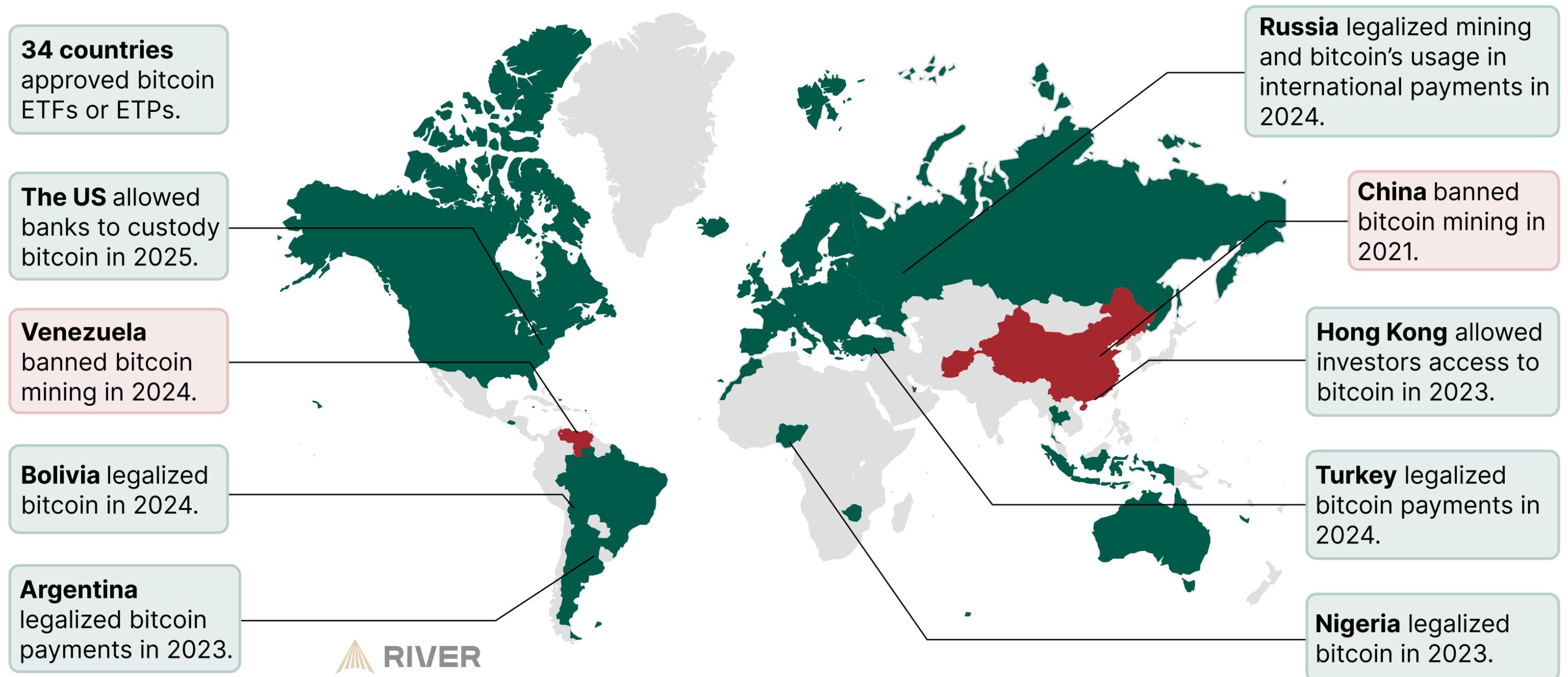
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The Dramatic Shift in Nation State Adoption



Regulatory Changes to Bitcoin Since 2020

■ More Access (47 countries) ■ Less Access (4 countries)



Only 9 Countries Still Outlaw Bitcoin

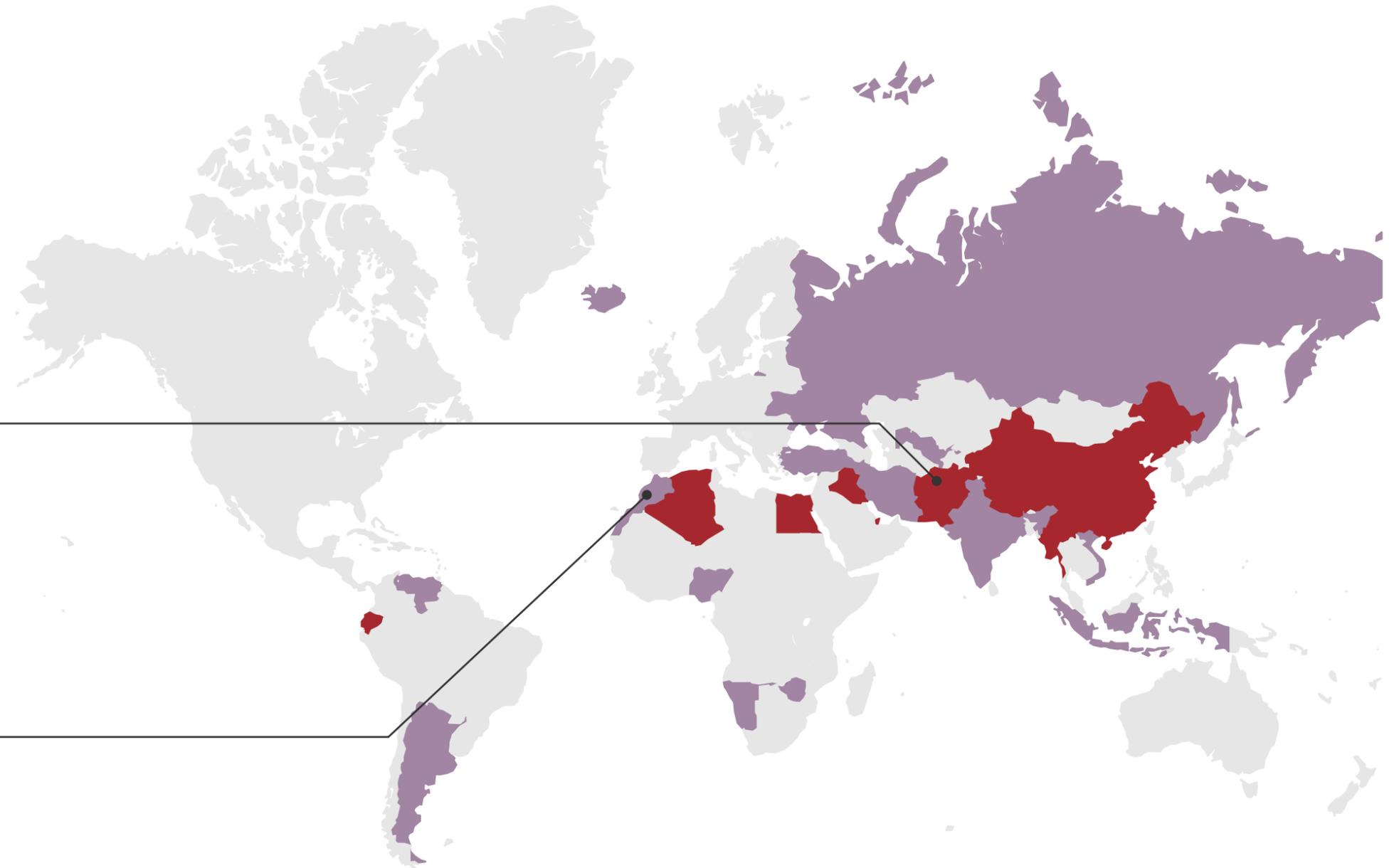
More than half of all countries that have outlawed Bitcoin have since lifted these restrictions, with 5 countries unbanning or officially legalizing Bitcoin since 2022. It is unlikely that Bitcoin will be widely banned by governments in the future.

Afghanistan is the most recent country to ban Bitcoin. In August 2022, the Taliban authorities prohibited all bitcoin trading within the country.

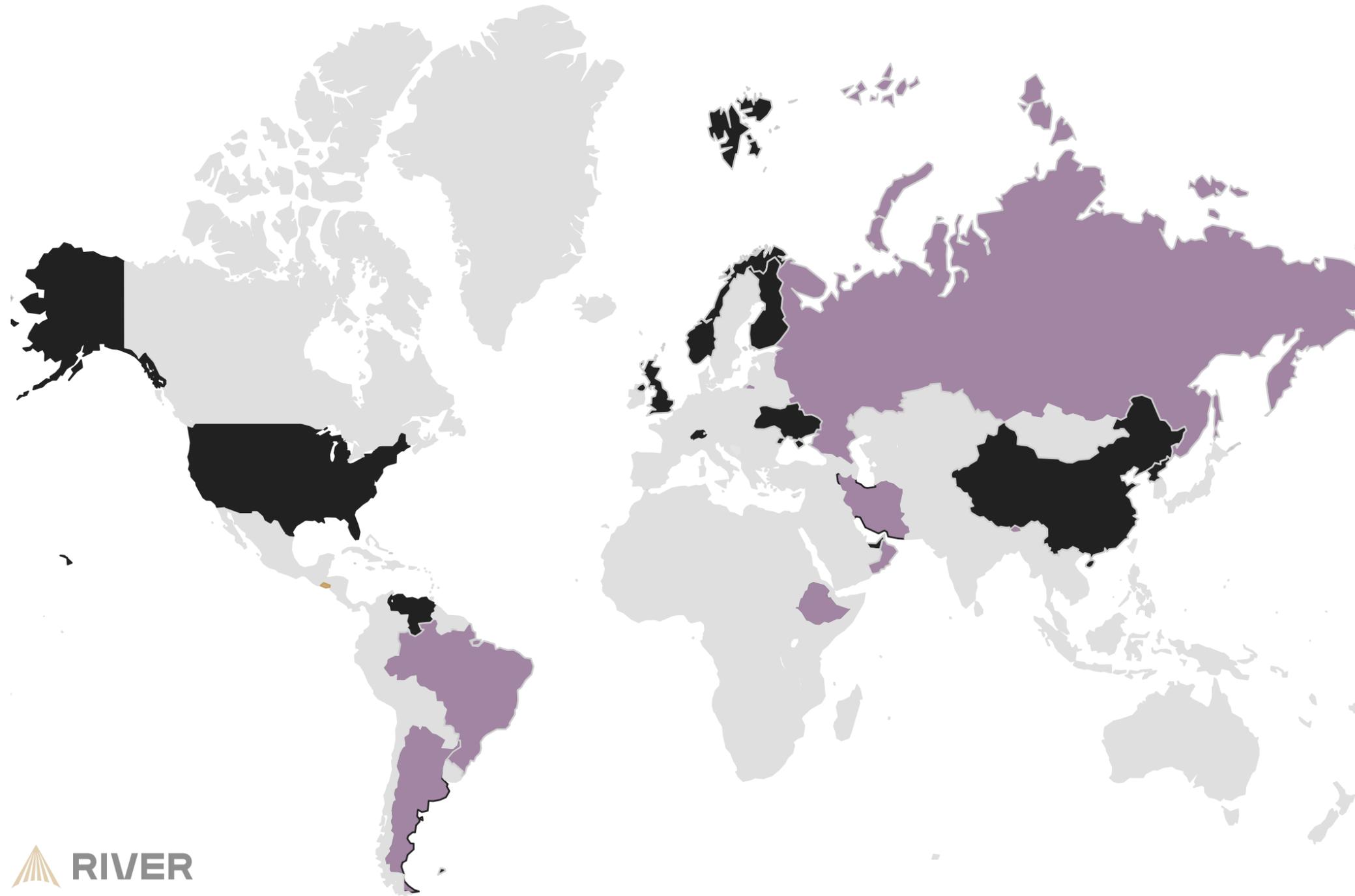
Morocco is the most recent country to lift its ban on Bitcoin in 2024, ending restrictions that had been in place since 2017.

■ Previously Banned (16 countries)

■ Currently Banned (9 countries)



18 Nation-States Estimated to Own Bitcoin



Direct Purchases:

- El Salvador: 6K BTC

State-Backed Mining:

- Bhutan: 11.7K BTC
- Argentina
- Brazil
- Ethiopia
- Iran
- Oman
- Russia

Seizures:

- United States: 198K BTC
- United Kingdom: 61K BTC
- China: 15K BTC
- Venezuela: 240 BTC
- Finland: 60 BTC

Indirect Exposure via Government Investment:

- UAE: 4.7K BTC
- Norway: 3.8K BTC
- Switzerland: 1.1K BTC

Hacking/Theft:

- N. Korea: 778 BTC

Donations:

- Ukraine

Medium-Term (1-4 Years) Global Bitcoin Policy Catalysts

Policy Catalyst	Current Situation	What Could Change	Impact on Bitcoin Adoption	Likelihood
G20 Nation(s) Announces a Strategic Bitcoin Reserve	While three G20 nations own bitcoin directly, none have acquired bitcoin for strategic purposes.	With heightened geopolitical uncertainty and a global shift away from US treasuries as reserve assets, there is a moderate likelihood of at least one G20 nation to announce holding bitcoin for strategic purposes in the next four years.	Very High	Medium
Increased Use of Bitcoin in International Trade	While the dollar is still the undisputed global reserve currency, used in 88% of foreign exchange transactions, countries such as Russia have begun using alternative currencies, including bitcoin, for international trade.	Bitcoin stands to gain market share as a neutral settlement asset during periods of heightened geopolitical tension and loss of trust in the US dollar. This would significantly enhance its reputation, liquidity, and global accessibility.	High	Medium
G7 Central Bank(s) Announces a Strategic Bitcoin Reserve	G7 currencies, including the US dollar and euro, account for 92-94% of global central bank reserves. No G7 central banks are known to hold bitcoin, and several have publicly opposed adding it to their reserves.	Given the strength of G7 currencies and the conservative stance of their central banks, bitcoin is unlikely to be added to G7 reserves in the next four years. However, if it were, it would signal bitcoin recognition as a global reserve asset.	Very High	Low

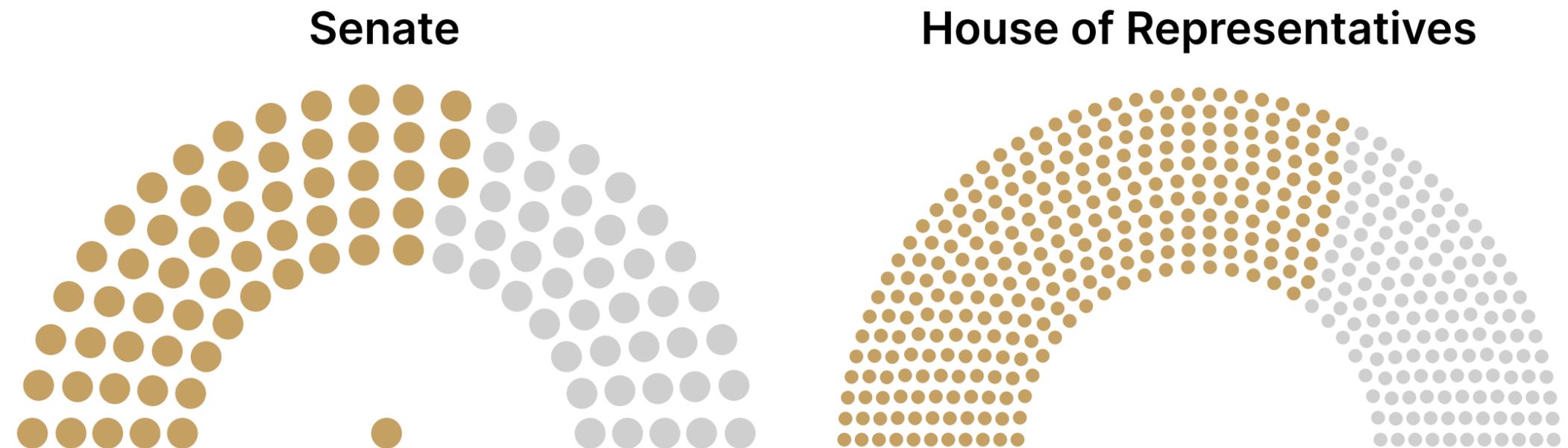
US Congress Is Pro-Bitcoin, Gaining 15 Seats in the 2024 Election

After the November 2024 election, the majority of both the House and Senate are now pro-Bitcoin, based on public statements and political activity, as defined by advocacy group Stand With Crypto.

<u>Pro-Bitcoin Members</u>	2024	2025	Change
Senate	57	59	+2
House of Representatives	276	289	+13

In January 2025, a Senate panel on digital assets was established with two focus areas:

1. Pass legislation for responsible innovation and consumer protection, covering market structure, stablecoins, and a strategic bitcoin reserve.
2. Regulatory oversight to prevent overreach such as Operation Chokepoint 2.0.



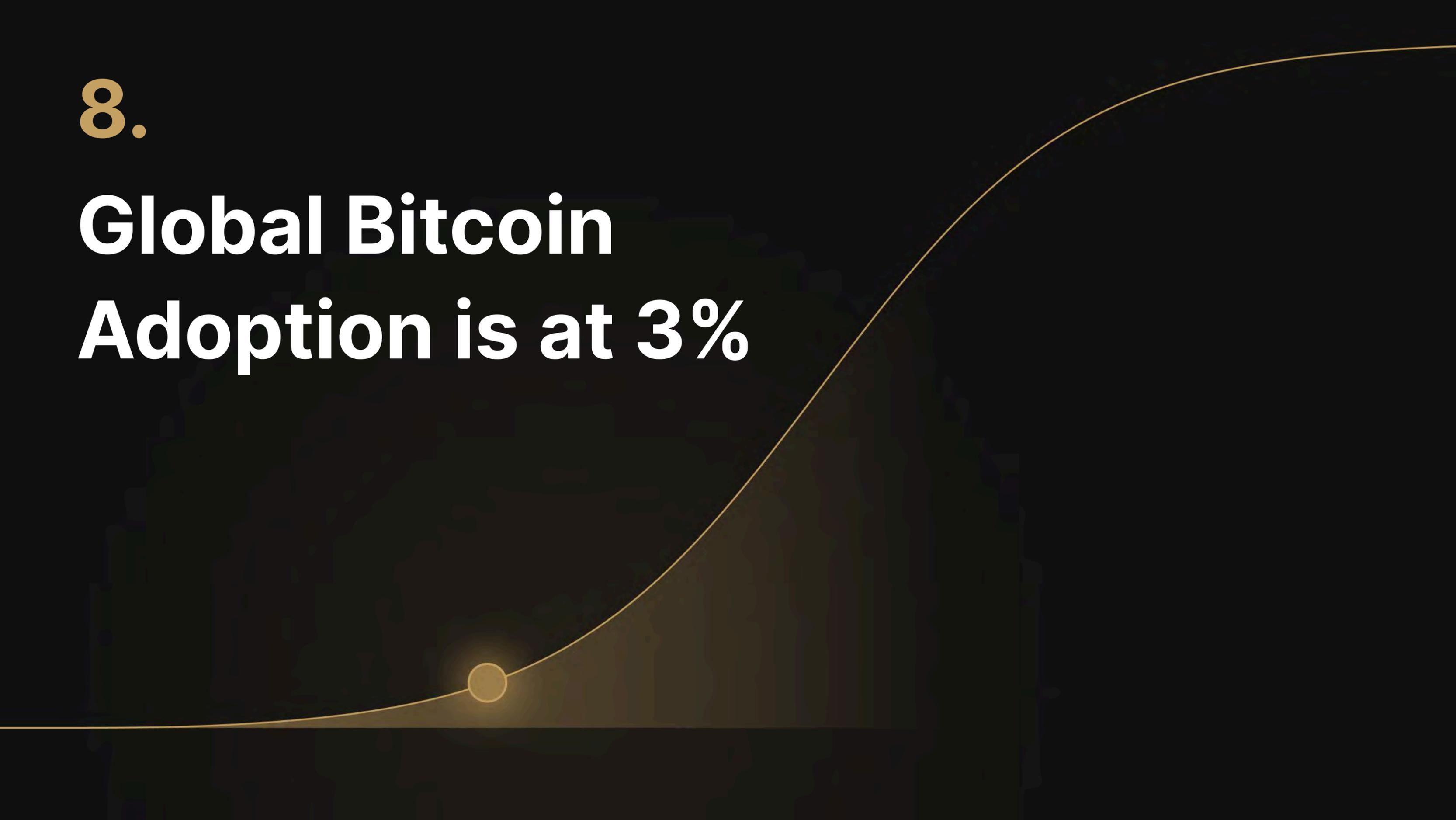
Data Source: Stand With Crypto

US Bitcoin Policy Catalysts Over the Next Four Years

Policy Catalyst	Description	Impact on Bitcoin Adoption	Likelihood
Repealing SAB 121	US banks can now custody bitcoin, and some will incrementally do so over the coming years. They will likely focus on institutional clients first before investing in wide-scale services for individuals.	High	Completed (Jan 2025)
Halting of Operation Choke Point 2.0	This was a widespread effort by US regulators and government agencies to limit access to financial services for cryptocurrency businesses. The officials who spearheaded this effort have been replaced by less hostile ones, which may result in a fairer treatment for Bitcoin companies.	Medium	Underway
Strategic Bitcoin Reserve	Limited Scope refers to one established either through a presidential executive order or by prohibiting the future sale of bitcoin held by the US government. These measures are temporary and easily reversible, limiting their effectiveness.	Medium	Medium
	Full Scope refers to a reserve created through congressional legislation, defining a federal bitcoin acquisition strategy, such as the 2024 BITCOIN Act proposed by Senator Lummis.	Very High	Low
Tax Exemption on Small Bitcoin Payments	The 2022 Lummis-Gillibrand Responsible Financial Innovation Act first proposed exempting small bitcoin transactions (under \$200) from capital gains tax to encourage everyday use. With Senator Lummis now chairing the Senate Panel on digital assets, the chances of enactment are significant. A tax exemption for bitcoin payments is the most practical and impactful policy for its adoption as a medium of exchange, as a full capital gains tax repeal remains unlikely.	Very High	Medium

8.

**Global Bitcoin
Adoption is at 3%**



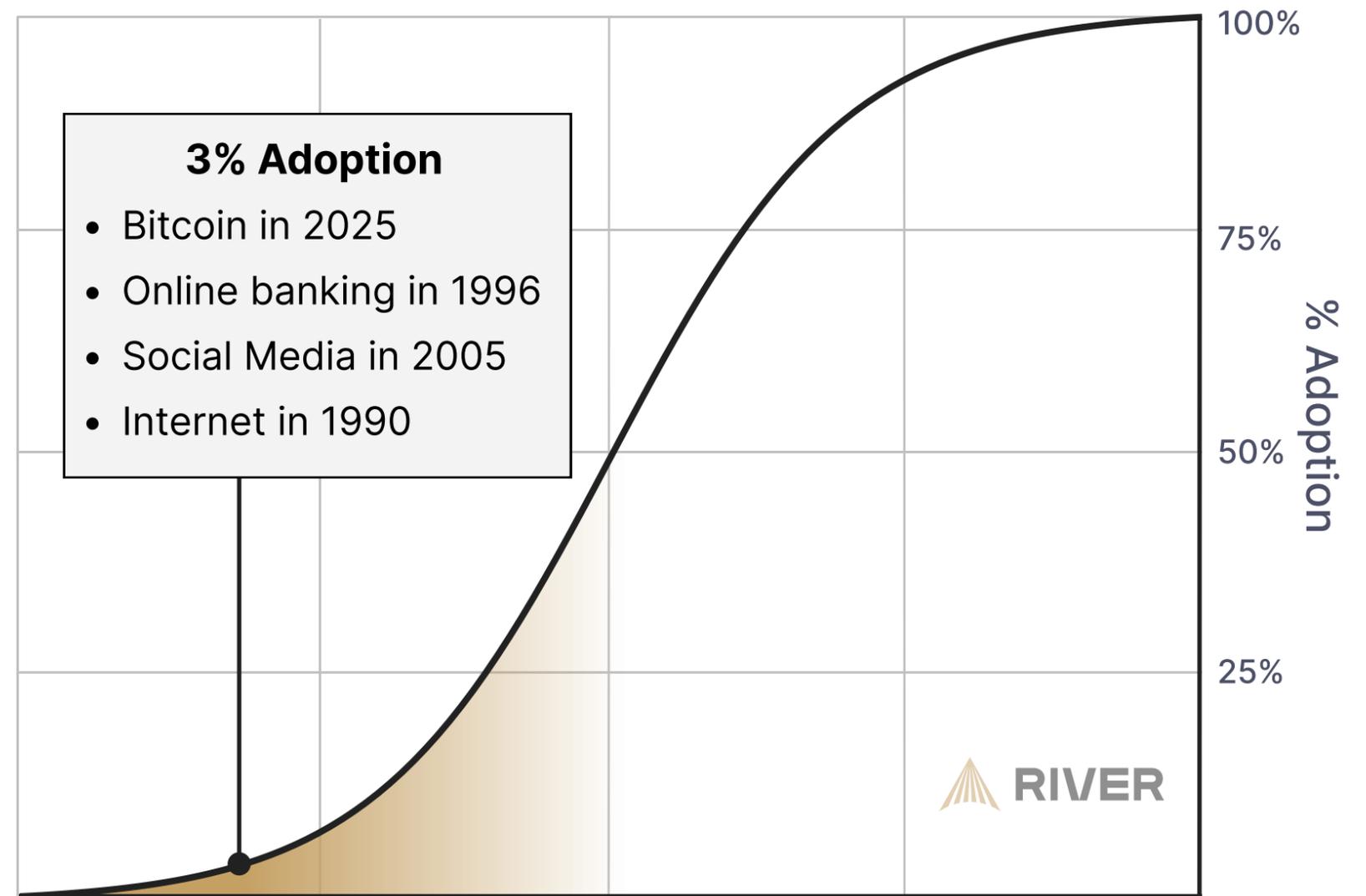
Bitcoin Adoption is Just Beginning

Bitcoin adoption in 2025 is at roughly 3% of its full potential.

The term "adoption" encompasses more than just bitcoin's price or ownership levels—it reflects a combination of factors. This 3% estimate is derived from a blend of key metrics, which are examined in this section:

- **Total Addressable Market (TAM):** Bitcoin's market value remains below 1% of its estimated TAM.
- **Institutional Underallocation:** US-based investment advisors collectively allocate just 0.006% of their portfolios to bitcoin.
- **Global Ownership:** While 14% of Americans own some bitcoin, global ownership remains under 4%.*

Bitcoin's Adoption Path



Source: Our World in Data

Source: The Nakamoto Project, River

Bitcoin Is at <1% of Its Total Addressable Market

Bitcoin accounts for **0.2%** of total global wealth.



Bitcoin's total addressable market is **\$225 trillion**, assuming a 50% market-share of store-of-value assets.

Total Global Wealth: \$900T



Source: Jesse Myers

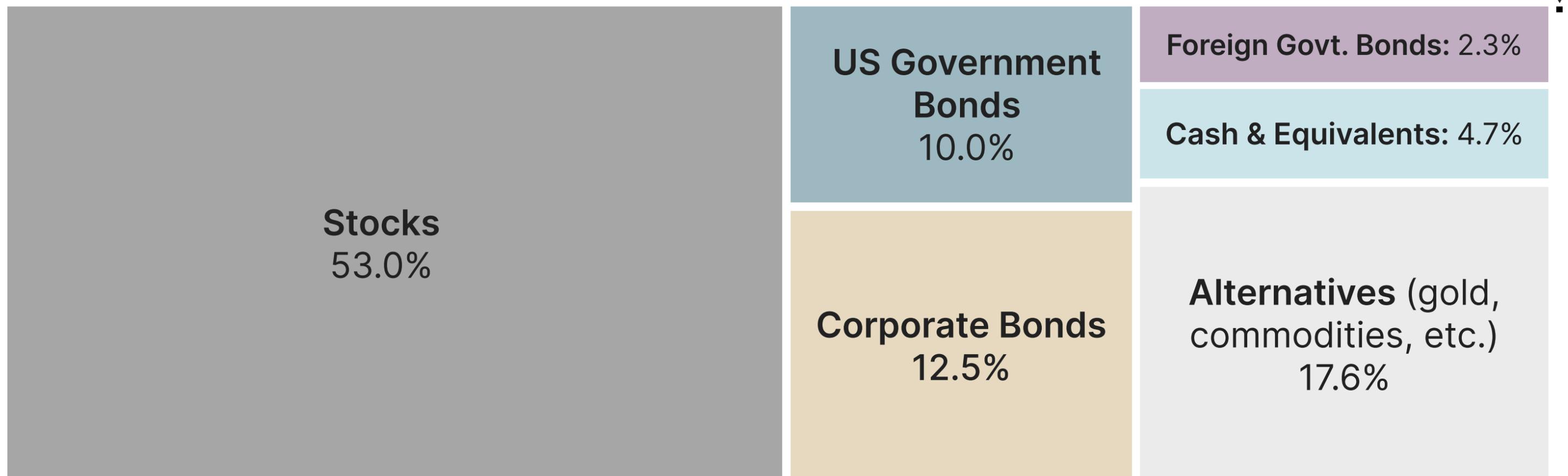
Institutions Are Significantly Underinvested in Bitcoin

US investment advisors currently have a net bitcoin allocation of just **0.006%**.



Increasing this to bitcoin's current percentage of global wealth (0.2%) would require a **36X** rise in exposure, equating to **\$249 billion** in investment.

How \$128 Trillion of US Investment Advisor Money is Allocated



Source: SEC, AUM and allocations (ex-bitcoin) as of 2023

Less Than 4% of People Own Bitcoin

Bitcoin ownership by individuals is estimated at 14% within the United States, and less than 4% worldwide.

This indicates there is still significant room for adoption by individuals, who may lack sufficient knowledge about Bitcoin's value proposition, or access to trustworthy bitcoin on-ramps and custodians.

Estimated Bitcoin Ownership by Country

(<4% Worldwide)



Estimates combine crypto ownership data from Triple A with bitcoin data from Crypto.com and the Nakamoto Project.



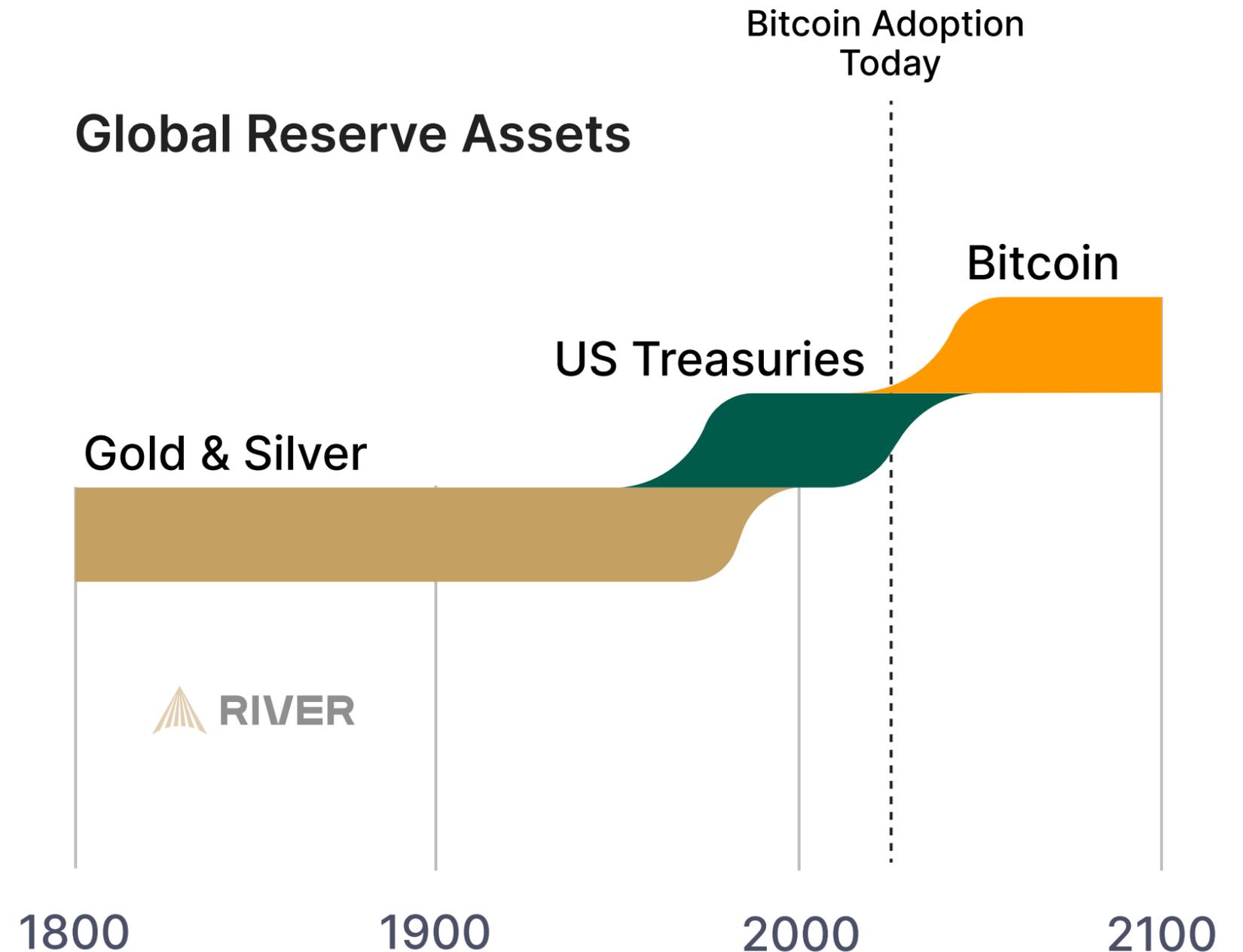
We Expect Bitcoin Adoption to Accelerate

Individual adoption will steadily grow as access to and education about Bitcoin expand.

Institutions are expected to significantly increase their bitcoin exposure with growing ETF adoption and emerging banking services.

Business bitcoin adoption will go mainstream in the medium term as legal and accounting hurdles fade and successful corporate precedents grow.

Nation-states will be a large driver of Bitcoin adoption in the medium-long term, fueled by legal accessibility, industry competition, and strategic reserve incentives.



Credits

Report created by: Sam Baker

Review by: Sam Wouters, Harsh Jhaveri, Alexander Leishman, Julia Duzon, Alex Sharp, Philip Serrano

Cover designs by: Jason Benjamin

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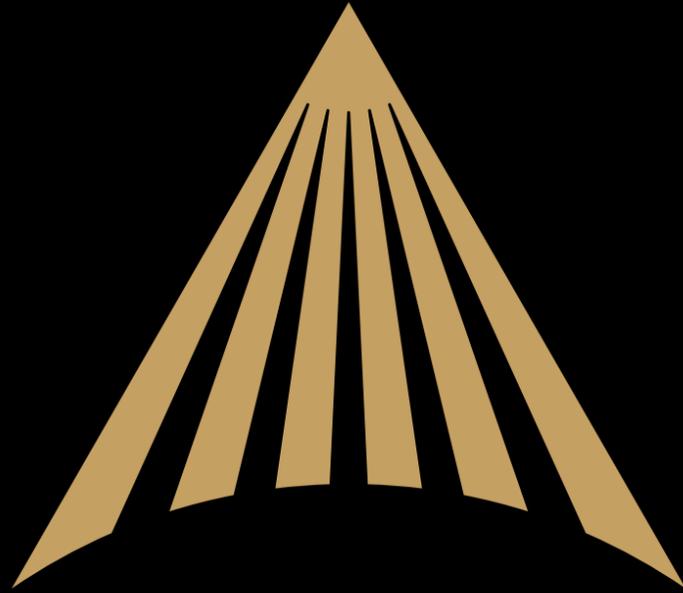
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