Between Governance and Capital Restrictions: Determinants of Bitcoin Trade Volume in Decentralized Markets

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Abstract: We analyze the determinants of BTC trade volume in decentralized exchanges (DEXs) and test the claim that BTC trades on these platforms are censorship-resistant. The study finds that overall economic freedom, particularly monetary freedom, correlates indirectly with BTC trade volumes, while capital restrictions on residents' transactions abroad correlate in two different directions. Purchase transactions inversely correlate with BTC volume in DEXs, while sales transactions correlate directly. These results suggest that BTC can be used to hedge against poor institutional frameworks, particularly against poor monetary governance, and can be used as a vehicle for institutional hedging against repressive capital controls and institutional failures. The study's originality lies in its use of on-chain panel data on the volume of BTC transactions, which are country-specific and allow for the comparison of the impact of country-specific socio-institutional variables on BTC volumes.

Keywords: bitcoin; crypto-assets; decentralized markets; institutions; trade volume.

JEL Codes: G12; G23; G41; K20; O16.

1. Introduction

The "genesis" block of Bitcoin (BTC) blockchain transactions was mined on Saturday, January 3rd, 2009.[1] On this occasion, the first 50 BTCs were mined into existence. Despite its high volatility, BTC, one of the most elusive features of the internet era, is now the flagbearer of crypto-assets. Nevertheless, BTC's price volatility raises significant challenges for portfolio diversification and institutional investors (Aalborg et al., 2019; Białkowski, 2020; Schilling and Uhlig, 2019). Indeed, whether BTC's historical valuation is a genuine reflection of its monetary soundness as an alternative to national fiat currencies or the indication of a speculative bubble is still under debate (Baur et al., 2018; Cheah & Fry, 2015; Cheung et al., 2015; Corbet et al., 2018a; Selgin, 2015). Furthermore, studies question the nature of BTC as an asset: hedge asset for some (Bouri et al., 2017a, 2017b), a diversification asset for others (Brière et al., 2015; Platanakis and Urquhart, 2020), quasi-synthetic commodity money (Selgin, 2015), or safe-haven asset (Smales, 2019; Urquhart and Zhang, 2019).

Interest in the determinants of BTC price and trade volume resulted in studies showing a diverse set of determinants from sentiments on social networks and searches on the internet (Aalborg et al., 2019; Naeem et al., 2021; Panagiotidis et al., 2018) to market forces (Ciaian et al., 2016). Recently, many articles have related BTC prices and trade volumes to more traditional macroeconomic variables and national uncertainties (Vo et al., 2021; Wu et al., 2021). This latest evolution indicates that BTC is reaching maturity as an investment asset, depending less on pure market features than national characteristics.

For now, the literature has mainly concentrated on transactions of crypto-assets on centralized exchange platforms, which roughly represent 85% of the daily trade volume, the remaining 15% being performed on decentralized exchange platforms.[2] Organized exchanges

[1] On-chain data of the Bitcoin blockchain, such as price, transactions volume, blocks, charts, mining, and network information, can be found on block explorers, such as https://www.blockchain.com/explorer.

[2] See https://www.theblockcrypto.com/data/decentralized-finance/dex-non-custodial/dex-to-cex-spot-trade-volume.

are increasingly falling under the scrutiny of national regulators like the Securities and Exchange Commission (SEC), the Financial Action Task Force (FATF), and the Financial Stability Board (FSB) (Houben and Snyers, 2018; Sauce, 2022; Staff of the Global Legal Research Directorate, 2021). Thus, trading crypto-assets on organized exchanges naturally becomes compliant with regulation and mainstream in its features (Auer and Claessens, 2018).[3]

On the other hand, decentralized finance (DeFi) is less exposed to regulators (Crenshaw, 2021; Zetzsche et al., 2020). DeFi leverages blockchain technology and smart contracts to provide a set of innovative and potentially disruptive financial functionalities and business models (Piñeiro-Chousa et al., 2022). Among the novelties are lending platforms, decentralized exchange platforms (DEX), synthetic assets, and yield farming (Angelis and Ribeiro da Silva, 2019; Chen and Bellavitis, 2020; Kimani et al., 2020). DEXs, contrary to centralized exchanges (or CEXs), do not use order books but are peer-to-peer trading platforms based on smart contracts (Cong and He, 2019).[4] The main advantages of DEXs over CEXs are the more significant number of token pairs that can be swapped, fewer regulatory requirements, and lower transaction costs (Pereira et al., 2019). These features offer users a more comprehensive offer of financial services, such as greater portfolio diversification when including crypto-assets and access to an ampler choice of loans, whatever the regulation of the user's home country. While most DEXs are on the Ethereum protocol, others are exclusively dedicated to BTC trades. BTC DEXs are of particular significance because they allow users access to BTC, whatever their location and the regulatory and institutional frameworks, making bitcoin a "censorship-

[3] However, despite the increasing scrutiny of regulators, misbehavior, mismanagement, and frauds are still frequent in this infant industry. The recent turmoil of the FTX CEX is an illustration of the problem. FTX—and over a hundred affiliates—filed for chapter 11 on November 11th, 2022 because of a massive liquidity crisis. Before its collapse, FTX was the third largest CEX, with over one million users. Its collapse was a major event for the crypto-industry, but also for traditional finance. For instance, the crypto-friendly Silvergate bank declared bankruptcy on March 10th, 2023, after winding down operations and voluntarily liquidating its assets.

[4] Smart contracts are digital contracts stored on a blockchain that self-execute contractual agreements when the terms of the contract are met (Szabo, 1996). The terms of the contract are transparent, immutable, objective (quantified or binary), determined peer-to-peer between the trading partners.

resistant" cryptocurrency. Yet, BTC DEXs are largely absent from the literature dedicated to crypto-assets.

Our study aims to analyze the determinants of BTC trade volume in DEXs and test the claim that BTC trades on these platforms are censorship-resistant (cf. Nabilou, 2021). For this purpose, we analyze the impact of a set of economic governance and capital restrictions variables on the trade volume of BTC in the largest BTC DEXs currently in existence, Localbitcoin and Paxful.[5] Overall economic freedom, particularly monetary freedom, correlates indirectly with BTC trade volumes, while capital restrictions on residents' transactions abroad correlate in two different directions. Purchase transactions inversely correlate with BTC volume in DEXs, while sales transactions correlate directly. These correlations suggest an incentive to trade in DEXs that eludes regulators unless the latter enact outright controls over purchase transactions of non-domestic assets—access to CEXs or DEXs usually necessitates some access via traditional finance networks.

Moreover, controls over sales and issues of domestic assets abroad incentivize residents to look for an alternative asset, BTC. These characteristics of "governance hedging" suggest that BTC can be used to hedge against poor institutional frameworks, particularly against poor monetary governance. More than a medium of exchange or a speculative asset, bitcoin provides traders from countries with poor economic governance a way out for their capital to markets with better governance. Our results thus complement previous results on bitcoin as a portfolio diversification asset (Brière et al., 2015; Damianov and Elsayed, 2020) or as a resource for illegal activities, namely evading capital controls and poor institutional governance (Foley et al., 2019). We consider BTC a vehicle for institutional hedging against repressive capital controls and institutional failures. In the current context of the Russo-Ukrainian crisis, this

[5] Due to unfavorable market conditions, Localbitcoins recently announced its closure on March 2023. However, it has no impact on the reliability of the data used or on the consistency of our results.

alternative use for BTC could prove crucial for citizens trying to leave the conflict zone or a repressive regime while safely moving their capital through BTC DEXs (cf. Cheesman, 2022).

Another originality of our study is that we use on-chain panel data on the volume of BTC transactions on the Localbitcoin and the Paxful DEXs. These platforms' data are country-specific, so we can compare the impact of country-specific socio-institutional variables on BTC volumes. Country-undifferentiated data would preclude such analysis. Previous studies on BTC and its relation to socio-institutional factors use survey-based data on BTC adoption (Alnasaa et al., 2022) or price premia data (Johnson, 2020). Although those data provide relevant information on the penetration of crypto-assets and their volatility, they do not reveal much about the country dynamics of using crypto-assets over time. Moreover, on-chain data are the most reliable, transparent, and auditable data on blockchain-based transactions since they are the only data publicly recorded on the blockchain. We obtain similar results to those previous studies regarding macroeconomic control variables while using more reliable data and identifying overall and monetary freedom, and capital controls as significant explanatory variables of transaction volume in the Localbitcoin and Paxful DEXs. Given the countries where trade volume varies the most, our results suggest that BTC can be used as an instrument of capital mobility between countries, and hence a vehicle of institutional hedging. Consequently, we consider that calls for regulation should be nuanced as to which crypto-users the regulation will be targeting in the first place. Under certain conditions, crypto-assets can prove useful for citizens living in countries with poor institutional frameworks and stringent capital controls, refugees, and citizens emigrating from repressive regimes.

2. Literature review

The most significant part of the literature on crypto-assets focuses on the financial dimension of crypto-assets, such as price dynamics (Ciaian et al., 2016), returns and performance (Bianchi

and Babiak, 2022; Liu et al., 2022), volatility (Hafner, 2020), anomalies (Dong et al., 2022), liquidity risks (Brauneis et al., 2021; Zhang and Li, 2021), and speculation bubbles in cryptocurrency markets (Bariviera and Merediz-Solà, 2021; Fakhfekh and Jeribi, 2020).

The empirical results on the efficiency of cryptomarkets are somewhat mixed; for now, there is no consistent accumulation of knowledge around a set of stylized facts and empirical results (Corbet et al., 2019; Urquhart and Zhang, 2019). Furthermore, it appears that the results heavily depend on the type, origin (off-chain or on-chain data from several CEXs), and period of data used. This can be explained by the fact that crypto-markets are still immature and in the process of organization, with higher levels of liquidity and aggregate market capitalization (from US$18 billion in January 2017 to an all-time high of US$ 3 trillion in November 2021), and the entry of institutional investors.[6]

2.1 Crypto-assets as portfolio diversification assets

Previous studies showed a decoupling and statistical decorrelation between crypto-markets and classical asset classes (Brière et al., 2015; Corbet et al., 2018b). These results suggest that crypto-assets may offer diversification benefits and that crypto-assets and traditional financial assets are owned and managed for different purposes and in different investment horizons. Baur et al. (2018) find that bitcoin is uncorrelated with traditional asset classes (bonds, stocks, and commodities) in normal times and bearish markets and conclude that investors use bitcoin mainly as a speculative investment in a strategy of portfolio diversification rather than as a medium of exchange. Similarly, Giudici & Abu-Hashish (2019) show that bitcoin prices are unrelated to classical financial market prices, confirming that crypto-assets have diversification benefits.

[6] Data from https://www.coingecko.com/fr/global-charts.

2.2 Market efficiency

In their analysis of market efficiency and volatility persistence in twelve cryptocurrencies during pre-and post-crash periods, Yaya et al. (2021) found that markets for bitcoins and other altcoins can be considered efficient though volatile. Following Urquhart (2016), who argued that the BTC market is moving toward informational efficiency, Vidal-Tomas (2022) argues that the BTC market is more efficient over time. Mnif et al. (2020) found that market efficiency increased during the pandemic through their crypto-market performance analysis.

On the other hand, Hu et al. (2022) found evidence of order-based price manipulation during the bitcoin bubble of late 2017. This finding is based on the definition of price manipulation as a violator's intent to pursue a scheme that undermines economic efficiency by making prices less accurate as signals for efficient resource allocation and making markets less liquid for risk transfer (Kyle and Viswanathan, 2008). In the same way, using trading data from 2013 on the now long-time defunct Mt. Gox exchange platform, Gandal et al. (2018) identify the role of suspicious bitcoin trades on price and trading volume.

Focusing on arbitrage and price deviations, Makarov and Shoar (2020) identify several new stylized facts about the price formation across cryptocurrency markets, such as large and recurring deviations in bitcoin prices across exchanges. These differences in BTC valuation are more significant across countries and regions than within the same country, even between countries with liquid crypto-markets, such as the US, Japan, South Korea, and Europe. To explain the deviation from the law of one price, they conjecture that price deviations may reflect tighter capital controls or weaker financial institutions in countries other than the United States and European ones, arguing that controls on capital flows and barriers to arbitrage between regions reduce the efficiency of arbitrage. The rationale is that investors who want to evade strict capital controls are ready to buy cryptocurrencies at a higher price. Chen et al. (2022) extend the literature on the impact of capital control on price discrepancies in crypto-markets

across countries by arguing that investors perceive cryptocurrencies as an alternative hedging investment under uncertainty, specifically during the Covid-19 pandemic and the implementation of strict lockdown regulation.

2.3 Institutions and uncertainty

An emerging trend in the literature focuses on the quality of institutions, economic policy, economic policy uncertainty (EPU), and regulation as determinants of cryptocurrency returns (Gozgor et al., 2019). For instance, Johnson (2020) tests bitcoin premiums across seventeen countries, finding that BTC premium depends on corruption and economic freedom. This suggests that individuals are ready to pay a premium when corruption increases, and economic freedom decreases. This result aligns with the assumption that BTC is a hedge against institutional failures (such as corruption or poor banking and financial systems), a proposition that BTC enthusiasts often put forward to illustrate the "censorship-resistance" property of bitcoin.

Similarly, Alnasaa et al. (2022) explore the correlation between the adoption of crypto-assets and indicators of corruption, capital control, and average consumer price inflation rates. They find that using crypto-assets is significantly and positively associated with a higher perception of corruption and more intensive capital controls, with crypto-assets being used to circumvent capital controls (Graf von Luckner et al., 2021).

Several studies confirm some hedging features of bitcoin relative to economic policy uncertainty (EPU). Demir et al. (2018) find an inverse relationship between EPU and BTC returns under stable periods of uncertainty, while this relationship turns positive at extreme times of uncertainty. Fang et al. (2019) find that EPU levels impact BTC's ability as a hedge differently against equities and bonds. Both Wang et al. (2019) and Wu et al. (2019) confirm BTC as a strong hedge against extreme EPU variations, but not during calmer times. Matkovsky

et al. (2020) and Umar et al. (2021) obtain similar results. Finally, Su et al. (2020) find that BTC is an efficient hedge against EPU and geopolitical shocks.

Instead of focusing solely on EPU, Aysan et al. (2019) focus on geopolitical risks and observe that geopolitical risk has a significant predictive power on returns and volatility of bitcoin. Accordingly, BTC can be considered a hedging tool against global geopolitical risk. Colon et al. (2021) mitigate these results, arguing that the cryptocurrency market can be considered a strong hedge against geopolitical risks in most cases but a weak hedge and safe haven against economic policy uncertainty during a bull market. For their part, Mamun et al. (2020) analyze the impact of geopolitical risk and economic uncertainty policy (EPU) on the correlation between bitcoin and other asset classes and conclude that bitcoin investors can hedge their portfolio only with gold but not with other financial asset classes.

Some studies draw normative and political implications from the relationship between BTC prices and economic policy uncertainty. For instance, considering BTC is an efficient hedge against EPU, and geopolitical risk shocks, Su et al. (2020) argue that governments should show interest in promoting bitcoin and blockchain technology. They further argue that their promotion must be accompanied by more substantial supervision and regulation to promote the healthy development of bitcoin markets.

Contrary to the normative conclusion that tighter regulation is desirable, other studies question the desirability and efficiency of regulation and insist on the detrimental consequences of regulation on crypto markets. Relying on the literature on entrepreneurial activity, Luther (2022) argues that regulatory ambiguity and jurisdictional redundancy prevent the sound development of the crypto-industry. Using data on 120 regulatory events, Shanaev et al. (2020) analyze the implications of regulation on 300 crypto-assets. They find that tighter regulation decreases cryptocurrency prices. The rationale is that consumer utility losses outperform the decrease in risks usually associated with tighter regulation. This argument suggests that crypto

markets efficiently integrate information on regulation and that tighter regulation is undesirable. Sauce (2022) investigates whether applying the latest regulatory guidance of the Financial Action Task Force (FATF) may engender unintended detrimental consequences on the organization and efficiency of cryptomarkets. It is argued that tighter regulation incites some investors to flee to unregulated, riskier, and less liquid DEX platforms. This flight leads to resource misallocation and a two-tier industry. On one side are compliant CEXs, and unregulated DEXs on the other. These unintended consequences are at odds with the initial purpose of regulators to devise a technology-neutral regulation to improve overall market transparency and efficiency.

In this study, we follow Makarov and Schoar (2020), who hypothesize a long-lasting relationship between crypto-markets and the institutional governance framework, and Alnasaa et al. (2022), who analyze the empirical association between crypto-assets, perceived corruption, and capital controls, and works on the impact of economic policy uncertainty and BTC returns. However, while these studies concentrate on CEXs, we analyze the effects of economic governance, capital restrictions, and traditional macroeconomic variables on BTC transactions on DEXs, namely Localbitcoin and Paxful.

3. Methodology and Data

3.1 Dependent variables

For the present study, we use the weekly volumes of BTC transactions of the two largest decentralized exchange platforms of bitcoin (Localbitcoins and Paxful) as endogenous variables. The data are freely available on the coin.dance website. The advantages of this dataset over country-undifferentiated data of BTC transactions are twofold. First, it provides country-specific transaction data for the Localbitcoins (47 countries) and Paxful (14 countries)

platforms[7]. This country-specificity allows us to compare the impact of country-specific economic and socio-economic variables on BTC transactions. This analysis would be impossible if we used country-undifferentiated data. Second, Localbitcoins and Paxful are DEX platforms, meaning that individuals can perform BTC transactions whatever the local regulation, even in countries that strictly prohibit the trade and holding of crypto-assets (such as Iran) and without the Know Your Customer (KYC) and Anti-Money Laundering (AML) requirements of centralized exchange platforms. Furthermore, the platforms provide a wide range of means of payment (credit card, wire transfer, cash, gift cards) that allow even unbanked people to perform BTC transactions, even though the more "exotic" means of payment remain marginal. These features correspond to the initial vision of BTC, a "censorship-resistant" tool to achieve financial inclusion.

We manually collected the total number of BTCs traded weekly against 47 currencies over the 2013-2019 period on the Localbitcoins and Paxful platforms.[8] Our first dependent variable is the total volume by year and by currency. We use the following notation: subindex *i* for the currency, *j* for the year, and *k* for the week, with $i = 1, \dots, 47$ and $j = 2013, \dots, 2019$ and $k = 1, \dots, 52$. Then, our first dependent variable is:

$$Y1_{i,j} = \sum_{k=1}^{52} VOLUME_{i,j,k}^{LBC}$$

[7] For the Localbitcoins platform: Argentina, Australia, Brazil, Canada, Chile, Chine, Colombia, Croatia, Czech Republic, Denmark, Dominican Republic, Egypt, Europe, Hong Kong, Hungary, India, Indonesia, Iran, Japan, Kazakhstan, Kenya, Malaysia, Mexico, Morocco, New Zealand, Nigeria, Norway, Pakistan, Peru, Philippines, Poland, Romania, Russia, Saudi Arabia, Singapore, South Africa, South Korea, Sweden, Switzerland, Tanzania, Thailand, Turkey, Ukraine, United Arab Emirates, United Kingdom, USA, Venezuela and Vietnam. For the Paxful platform: Argentina, Australia, Canada, China, Europe, Hong Kong, India, Japan, Kenya, Malaysia, New Zealand, Philippines, Sweden, United Arab Emirates, United Kingdom and USA.

[8] See https://coin.dance/volume/localbitcoins for Localbitcoins and https://coin.dance/volume/paxful for Paxful.

where $VOLUME_{i,j,k}^{LBC}$ is the volume recorded on the DEX Localbitcoins for currency *i*, year *j*, and week *k*. We thus obtain 329 currency-year observations. Our second dependent variable combines the BTC volume from Localbitcoin and Paxful for the same currency *i*, year *j*, and week *k*.

$$Y2_{i,j} = \sum_{k=1}^{52} \left(VOLUME_{i,j,k}^{LBC} + VOLUME_{i,j,k}^{PXL} \right)$$

For robustness checking, we create two other dependent variables. Since the BTC outstanding amount tends to progressively increase due to mining activities, we propose a third dependent variable where annual volumes are scaled by $OUSTANDING\_BTC_j$, the average number of BTC mined in the year *j*. Formally,

$$Y3_{i,j} = \frac{\sum_{k=1}^{52} VOLUME_{i,j,k}^{LBC}}{\frac{1}{52} \sum_{k=1}^{k=52} OUSTANDING\_BTC_{k,j}}$$

Our fourth dependent variable scales the previously combined volumes by $OUSTANDING\_BTC_j$:

$$Y4_{i,j} = \frac{\sum_{k=1}^{52} \left(VOLUME_{i,j,k}^{LBC} + VOLUME_{i,j,k}^{PXL} \right)}{\frac{1}{52} \sum_{k=1}^{k=52} OUSTANDING\_BTC_{k,j}}$$

Descriptive Statistics on the dependent variables are reported in Table 1.

INSERT TABLE 1 HERE

3.2 Independent variables

Our main explanatory variables consist of economic governance and capital restrictions. Given their notoriety in State governance studies, we use the Heritage Foundation's economic freedom indexes as a proxy for economic governance.[9] In this manner, we regress BTC volumes on the thirteen freedom indexes, including the overall freedom index and the specific twelve freedom indexes. The Heritage indexes are scored from 0 to 100; the higher the score, the greater the freedom on four weights: Rule of Law, government size, regulatory efficiency, and open markets. Table 2 reports the average scores by country.

INSERT TABLE 2 HERE

We resorted to the International Monetary Fund's capital restriction indexes concerning capital restrictions. We use a dataset, available at http://www.columbia.edu/~mu2166/fkrsu/, containing 57 different capital restrictions indexes by country by year for 1995-2019. These indexes are presented in Fernández, Klein, Rebucci, Schindler, and Uribe (2016). For a given country, a restriction index is reported for each asset category (i.e., equity, bond, money market instructions, collective investments, derivatives, and real estate) and each type of capital movement ("Purchase locally by nonresidents," "Sale or issue locally by nonresidents," "Purchase abroad by residents," and "Sale or issue abroad by residents"). For each country, we

[9] The datasets are openly available here: https://www.heritage.org/index/explore.

compute the average index across asset categories for each type of capital movement. Our average indexes by country are reported in Table 3.

INSERT TABLE 3 HERE

We also use traditional macroeconomic aggregates as control and main explanatory variables. Therefore, we include GDP per capita, GDP growth, inflation, broad money growth (i.e., M2 stock), unemployment rate, and exchange rate change. All those variables are sourced from the World Bank. In addition to the traditional macroeconomic variables, we included two macroeconomic uncertainty proxies: the World Uncertainty Index (WUI) and the country risk premium. The WUI is an index that tracks uncertainty in the world using text mining.[10] The country risk premium per country is from Aswath Damodaran's website (https://pages.stern.nyu.edu/~adamodar/, Archives Data). It is defined as the country's default spread, based on agency ratings, times a multiplier that reflects the relative equity market volatility over the bond market's volatility. Descriptive statistics for these variables are presented in Table 4.

INSERT TABLE 4 HERE

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4. Results

[10] For more details, see https://worlduncertaintyindex.com/data/.

Given our four dependent variables, we run four different regressions. First, we regress economic governance, capital restrictions, and macroeconomic control variables on the sum of weekly BTC volume in the Localbitcoin DEX, as seen in Table 5. Of all economic governance indexes, only the overall economic and monetary freedom indexes are significant at the 1% level. The tax burden index is significant at the 5% level, while the judicial effectiveness, trade, investment, and financial freedom indexes are significant at the 10% level. All significant economic freedom indexes negatively correlate with BTC volumes in Localbitcoins, except for judicial effectiveness, which correlates positively. When controlling for all economic freedom indexes, the average restrictions on assets purchased abroad by residents and the average restrictions on assets sold and issued abroad by residents are significant most of the time at the 1% level and sometimes at the 10% level (see Table 5).

INSERT TABLE 5 HERE

The corruption perception index is negatively correlated with BTC volume when controlling for some governance proxies—judicial effectiveness, government spending, fiscal health, labor freedom at the 10% level, and tax burden at the 1% level. Indeed, less corrupt countries (highly scoring indexes) would result in less incentive for users to resort to a BTC DEX.

GDP per capita is the only macroeconomic control variable statistically significant when controlling for all economic governance proxies but at varying significance levels. It correlates positively with BTC volume, consistent with greater GDP per capita underlying market potential for trading assets. Other significant macroeconomic variables are broad money growth (when controlling for monetary freedom), unemployment rate (when controlling for investment

freedom), and country risk premium (when controlling for fiscal health and monetary freedom). Except for country risk premium when controlling for monetary freedom, all the others are significant only at the 10% level. Country risk premium is significant at the 1% level when controlling for monetary freedom, which is coherent with the fact that countries with more monetary freedom are also risk-safer.

Since Paxful data only begins in 2015, we run a second model like the first. However, we consolidate BTC transaction volume data from Localbitcoins and Paxful with results in Table 6. Including Paxful data makes specific governance proxies insignificant, while the other previously significant proxies remain significant and retain their correlation sign. The now insignificant governance proxies are judicial effectiveness and investment freedom. Concerning the corruption perceptions index, it becomes positively significant at the 10% level when controlling for business and trade freedoms. Meanwhile, the results do not change the significance levels and signs of capital restriction variables. Similarly, GDP per capita, broad money growth, and country risk premium face little change when including the Paxful data in the regression. The unemployment rate becomes overall insignificant now when controlling for all governance proxies.

INSERT TABLE 6 HERE

For robustness, we run two additional regressions, using the sum of weekly transactions divided by the average weekly outstanding BTC, thus leveling the data relative to the outstanding BTC stock in circulation in both DEXs and CEXs (and also outside exchanges). The first additional regression (see Table 7) includes only Localbitcoin transaction volumes. The significance and

sign orientation of governance proxies are the same, except for investment freedom, which is statistically insignificant. Regarding significance and signs, the results for capital restrictions are much the same as before. Still, the average of sold and issued assets abroad by residents is not insignificant. The corruption perceptions index sees its significance reduced to only three regressions (judicial effectiveness, tax burden, and fiscal health), with no change in signs. Concerning macroeconomic variables, the unemployment rate is positively significant at the 10% level when controlling for investment and financial freedoms. Country risk premium remains negatively significant for fiscal health and monetary freedom.

INSERT TABLE 7 HERE

Finally, the second additional model includes the Paxful database and corroborates much of the results above (see Table 8). In this manner, our most significant results for governance proxies, capital restrictions, corruption, GDP per capita, and country risk premium do not change signs. They remain strongly significant in all models tested.

INSERT TABLE 8 HERE

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5. Discussion

Our results indicate that BTC users resort to DEXs when concerned with threats to overall economic freedoms, monetary governance, and tax burden. This is expected since resorting to unregulated platforms would be incentivized by heavy tax burdens and loose monetary governance. Indeed, one of BTC's promises is to escape the supposedly mismanaged fiat currency monetary system and government scrutiny of one's financial transaction, primarily observed in unregulated DEXs relative to more regulated CEXs.

The results of capital restrictions show two different movements in DEXs' transaction volumes. The average of purchased assets abroad by residents negatively correlates with BTC transaction volumes. One would think that unregulated BTC trades would correlate positively with greater restrictions. However, acquisitions of foreign assets mainly necessitate access to officially-sanctioned banking networks. The same remains true for BTC networks despite the promise of independence from fiat monetary systems. Although some DEXs transactions can involve exotic exchange media such as collectibles, and Amazon® coupons, these remain marginal. Most transactions in DEXs remain anchored to fiat currencies. As long as access to the fiat monetary system is necessary, it is easy for a restrictive State to control capital flows to foreign asset networks, among which BTC. Consequently, the tighter the restrictions on asset purchases abroad, the lower the BTC transaction volumes in DEXs. This result is consistent with our data showing the greatest transaction volumes in developed countries where capital restrictions are mostly weak.

The restrictions on sales and issues of assets abroad by residents vary directly with BTC transaction volumes in DEXs. This is consistent with the fact that restricting sales and issues of domestic assets only reduces their marketability while increasing that of international assets. If domestic investors cannot resort to foreign markets, only BTC remains a tradable asset despite purchase restrictions. Indeed, it might not be easy for residents to buy BTC abroad, but networks can form where BTC is tradable internally. Once BTC is acquired, it becomes tradable in DEXs,

CEXs, and even physically (on hardware storage). Moreover, domestic controls can be bypassed once BTC is in hand via VPNs (Virtual Private Networks).

The more isolated results concerning country risk premium—primarily significant when controlling for monetary freedom—indicate a weakness of the domestic currency. As risk premium increases, BTC transaction volumes fall in DEXs because the domestic currency tends to depreciate under that circumstance. Risk premium would be mostly a problem concerning monetarily free countries, where trading on foreign exchange is largely unregulated.

In sum, our results show that BTC transactions in DEXs are resorted to as an alternative to weak monetary governance and a restrictive financial system.

6. Practical Implications and Conclusion

Our findings highlight the relationship between economic governance, capital restrictions, and macroeconomic control variables with BTC transaction volumes in DEXs. Although our results are comparable to those of Alnasaa et al. (2022), our conclusions differ. Indeed, since we had access to a country-specific dataset on transaction volumes, we did not need to resort to qualitative survey-based data. Therefore, our results suggest that users are more likely to turn to DEXs when facing threats to overall economic freedoms, poor monetary governance, and heavy tax burdens. Additionally, capital restrictions influence the transaction volumes in DEXs differently depending on whether they are related to purchasing or selling assets abroad.

Consequently, our findings imply some recommendations for practitioners and regulators. Private investors should be aware that increased restrictions on sales and issues of domestic assets can lead to higher demand for alternative assets like BTC, which may impact market dynamics and investment opportunities. Moreover, investors should monitor and consider the impact of economic governance and capital restrictions on crypto-asset markets

when making investment decisions. These factors may affect the potential returns and risks associated with such investments.

Institutional investors like banks and investment funds should acknowledge the growing interest in DEX platforms and crypto-assets, as these may provide opportunities for portfolio diversification and risk management. Traditional financial institutions may face increased competition from DEXs and other blockchain-based financial services, which could challenge their market dominance and revenue streams. Crypto-asset transactions on DEXs can be difficult to trace, posing potential challenges for banks and investment funds in complying with AML and KYC regulations. Therefore, institutional investors should consider exploring opportunities in the blockchain and cryptocurrency space, including offering cryptocurrency-related products and services to their clients, such as crypto custody, trading, and investment solutions, alongside their more traditional financial products. Moreover, collaboration with regulators and other stakeholders is crucial for banks and investment funds to establish industry standards and best practices for dealing with the risks associated with DEXs and crypto-assets, such as fraud, market manipulation, and cyber threats.

Concerning regulators, these agents should carefully consider the potential consequences of implementing heavy tax burdens and loose monetary governance, as they may incentivize users to turn to unregulated platforms like DEXs. To maintain stability in the cryptocurrency markets and protect investors, regulators should monitor the relationship between economic governance, capital restrictions, and the use of DEXs. Striking a balance between promoting economic freedom and ensuring proper oversight is crucial. In this manner, regulators in institutionally strong countries may significantly influence the global regulatory landscape for crypto-assets, setting examples and guidelines for other nations to follow. Indeed, they typically have more resources and expertise available to address challenges related to crypto-asset regulation, allowing them to develop more comprehensive and effective policies.

Regulators from institutionally strong countries can thus encourage collaboration with regulators from institutionally weak countries to share best practices, resources, and knowledge, fostering a more consistent and coordinated global approach to cryptocurrency regulation. These measures can help strike a balance between protecting investors, preventing illicit activities, and fostering a competitive environment that promotes innovation in the crypto-asset and blockchain sectors.

Concomitantly, regulators in institutionally weak countries may face more significant challenges in developing and enforcing crypto-asset regulations, including limited resources, expertise, and a potentially weaker legal framework. The potential for higher corruption levels and weaker governance in institutionally weak countries may lead to increased use of DEXs and crypto-assets for illicit activities, making regulation even more critical. Therefore, regulators in institutionally weak countries should prioritize building capacity and expertise in the crypto-asset and blockchain sectors. They could thus seek partnerships and collaborations with regulators from institutionally strong countries, international organizations, and industry stakeholders to access resources, expertise, and support in developing and implementing effective regulatory frameworks.

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Table 1: Summary statistics on the dependent variables by country

Countries	Y1	Y2	Y3	Y4
Argentina	2.570	2.573	0.172	0.172
Australia	37.018	37.764	2.594	2.638
Brazil	3.013	3.013	0.192	0.192
Canada	10.713	12.531	0.727	0.836
Chile	1.157	1.157	0.072	0.072
China	36.212	37.703	2.206	2.292
Colombia	7.091	7.091	0.419	0.419
Croatia	0.611	0.611	0.041	0.041
Czech Republic	0.799	0.799	0.056	0.056
Denmark	0.330	0.330	0.021	0.021
Dominican Republic	0.373	0.373	0.022	0.022
Egypt	0.074	0.074	0.004	0.004
Hong Kong	3.839	3.839	0.251	0.251
Hungary	0.189	0.189	0.013	0.013
India	8.429	8.827	0.532	0.555
Indonesia	0.241	0.241	0.014	0.014
Iran	0.778	0.778	0.048	0.048
Japan	0.223	0.344	0.015	0.022
Kazakhstan	0.285	0.285	0.017	0.017
Kenya	2.276	2.472	0.139	0.150
Malaysia	5.472	5.494	0.347	0.348
Mexico	3.595	3.595	0.239	0.239
Morocco	0.458	0.458	0.027	0.027
New Zealand	3.762	3.871	0.248	0.254
Nigeria	16.366	16.366	0.972	0.972
Norway	3.579	3.579	0.237	0.237
Pakistan	2.443	2.443	0.149	0.149
Peru	2.572	2.572	0.151	0.151
Philippines	1.911	1.918	0.128	0.128
Poland	1.357	1.357	0.091	0.091
Romania	3.084	3.084	0.203	0.203
Russia	108.619	108.619	6.760	6.760
Saudi Arabia	1.182	1.182	0.070	0.070
Singapore	1.617	1.617	0.104	0.104
South Africa	16.547	16.547	1.082	1.082
South Korea	0.232	0.232	0.015	0.015
Sweden	10.139	10.154	0.669	0.670
Switzerland	1.908	1.908	0.134	0.134
Tanzania	0.223	0.223	0.013	0.013
Thailand	8.714	8.714	0.589	0.589
Turkey	0.855	0.855	0.053	0.053
US	299.221	363.284	20.591	24.436
Ukraine	2.441	2.441	0.146	0.146
United Arab Emirates	1.976	1.980	0.123	0.123
United Kingdom	113.507	114.530	8.001	8.060
Venezuela	16.836	16.836	0.986	0.986
Vietnam	0.266	0.266	0.016	0.016

This table reports the average values of the four dependent variables by country. Y1 and Y3 are in thousands of BTC. Y2 and Y4 are multiplied by one thousand.

Table 2: Summary statistics on institutional scores and indices by countries

Countries	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Argentina	47.729	25.857	33.114	42.867	65.471	50.600	47.333	56.100	45.114	55.200	68.529	41.429	41.429
Australia	81.300	85.643	81.257	90.933	63.786	61.357	85.033	91.471	81.343	85.029	86.486	80.714	90.000
Brazil	54.843	51.871	36.257	52.300	69.771	53.429	12.133	57.086	51.800	70.257	69.271	51.429	54.286
Canada	78.657	88.971	83.029	75.767	78.614	49.529	81.533	85.343	76.029	76.971	87.886	79.286	80.000
Chile	77.286	79.971	68.900	61.133	76.900	82.629	92.267	71.786	66.357	83.757	85.186	86.429	70.000
China	54.671	32.129	40.714	67.100	70.043	76.671	84.800	52.714	62.643	72.114	72.600	25.714	25.714
Colombia	69.814	54.814	35.243	31.967	78.829	74.871	83.733	80.314	78.671	77.671	78.914	77.857	70.000
Croatia	60.586	50.343	42.800	52.067	69.957	38.843	65.767	59.757	42.471	79.557	87.186	76.429	60.000
Czech Republic	72.857	72.586	49.629	53.800	82.300	45.886	95.267	68.971	80.386	82.700	87.214	78.571	80.000
Denmark	76.029	89.671	89.357	76.633	39.829	5.886	96.267	95.200	87.914	84.000	87.214	89.286	82.857
Dominican Republic	61.467	40.567	28.100	22.167	84.350	90.117	90.167	54.017	56.217	76.383	76.333	74.167	40.000
Egypt	53.914	28.586	31.529	52.367	85.443	67.014	1.933	66.271	49.771	64.800	71.243	53.571	42.857
Hong Kong	89.686	91.357	80.314	81.200	92.986	89.929	100.000	97.500	90.614	83.086	90.714	90.000	90.000
Hungary	66.371	57.657	45.114	51.367	79.243	27.929	82.233	70.057	65.629	83.614	87.214	76.429	70.000
India	54.857	54.014	39.400	53.433	78.600	77.786	12.967	47.457	52.757	70.314	68.886	37.143	40.000
Indonesia	60.686	38.543	35.857	46.000	83.500	89.757	89.200	54.857	49.300	76.300	77.971	39.286	58.571
Iran	46.350	21.400	28.767	37.533	81.000	90.950	92.033	61.650	50.900	53.667	50.167	0.833	10.000
Japan	72.086	82.786	78.729	71.833	68.529	49.543	38.167	81.771	81.414	85.757	82.043	68.571	55.714
Kazakhstan	65.683	42.733	33.933	56.900	93.067	85.400	75.733	73.850	85.317	72.667	78.117	43.333	50.000
Kenya	55.629	38.114	25.614	44.533	78.486	76.314	14.100	53.086	62.257	73.643	66.643	53.571	50.000
Malaysia	71.471	67.600	50.186	66.900	85.086	77.229	79.867	87.000	74.471	82.229	80.771	56.429	54.286
Mexico	65.500	53.686	30.271	37.533	77.300	77.957	73.267	72.343	58.914	77.714	82.914	71.429	60.000
Morocco	60.800	46.571	37.271	44.433	71.357	66.800	60.833	70.771	33.171	81.643	75.771	68.571	64.286
New Zealand	82.657	95.171	93.329	86.800	70.914	42.986	98.233	93.886	87.757	87.557	87.829	80.000	80.000
Nigeria	56.486	32.829	20.829	35.700	84.643	86.829	78.767	50.014	74.700	70.214	63.786	41.429	40.000
Norway	72.186	88.457	89.186	83.500	53.757	37.300	97.833	90.643	49.014	76.943	87.771	74.286	60.000
Pakistan	54.817	33.983	28.017	36.100	79.200	87.283	44.667	61.467	41.950	72.717	65.550	51.667	40.000
Peru	67.983	48.550	36.200	31.900	79.617	86.750	93.867	68.750	62.733	83.533	86.933	72.500	60.000
Philippines	62.571	37.557	32.871	37.233	78.757	89.829	97.333	59.686	55.529	76.800	76.871	58.571	57.143
Poland	67.929	61.414	55.286	52.867	76.643	46.186	81.333	67.214	61.571	81.971	87.214	72.857	70.000
Romania	67.214	49.514	40.771	56.700	87.671	64.357	90.433	67.357	65.171	79.900	87.214	76.429	50.000
Russia	54.271	34.100	30.571	45.500	85.400	59.457	89.233	73.986	54.314	63.729	75.971	27.143	30.000
Saudi Arabia	61.850	48.350	47.383	62.633	99.717	57.633	34.933	70.517	68.933	71.383	76.767	40.833	50.000
Singapore	88.771	93.271	89.729	91.600	90.857	91.114	80.233	94.657	92.843	83.400	90.686	83.571	80.000
South Africa	61.771	56.300	43.043	54.967	67.657	68.643	69.067	69.043	58.343	75.171	75.843	47.143	55.714
South Korea	72.157	74.500	55.100	60.367	71.871	69.900	97.067	91.400	53.043	81.657	76.100	69.286	74.286
Sweden	73.871	90.100	89.943	84.800	43.057	21.157	95.367	90.000	53.543	84.043	87.214	87.143	80.000
Switzerland	81.314	88.057	85.457	80.567	70.014	65.514	96.000	77.057	77.329	85.757	89.629	84.286	84.286
Tanzania	58.940	32.440	31.640	34.967	79.940	87.460	80.267	47.840	63.680	69.540	72.180	57.000	50.000
Thailand	65.043	46.229	36.057	44.300	80.686	83.929	96.400	74.714	64.257	71.614	78.871	48.571	62.857
Turkey	64.043	50.971	43.557	52.267	76.057	61.786	93.833	65.114	49.557	71.929	82.329	72.143	60.000
US	75.814	80.700	73.914	76.867	67.486	53.129	53.733	86.300	93.486	77.043	86.800	75.714	72.857
Ukraine	48.800	33.043	26.243	27.867	79.314	36.514	75.467	59.200	49.157	65.900	83.457	24.286	30.000
United Arab Emirates	74.229	64.971	71.957	85.167	98.286	76.743	95.700	77.657	81.157	81.871	83.214	39.286	55.714
United Kingdom	76.457	91.186	78.500	90.900	62.343	37.286	54.167	91.014	73.257	78.300	87.214	90.000	80.000
Venezuela	31.214	5.657	14.500	12.400	74.357	54.000	17.067	40.700	28.943	27.200	60.986	1.429	14.286
Vietnam	52.883	31.817	29.650	36.200	79.067	74.383	29.700	61.617	63.200	70.217	80.217	22.500	36.667

This table reports average Heritage indexes by country. High (low) scores mean an important (poor) entrenchment of the institutional factor. (1): Overall Score. (2): Property Rights. (3): Government Integrity. (4): Judicial Effectiveness. (5): Tax Burden. (6): Government Spending. (7): Fiscal Health. (8): Business Freedom. (9): Labor Freedom. (10): Monetary Freedom. (11): Trade Freedom. (12): Investment Freedom. (13): Financial Freedom. Source: www.heritage.org

Table 3: IMF restriction indexes by countries

Countries	Restriction 1 Purchase Abroad by Residents	Restriction 2 Sale or Issue Abroad by Residents	Restriction 3 Purchase Locally by Nonresidents	Restriction 4 Sale or Issue Locally by Nonresidents
Argentina	0.571	0.571	0.595	0.786
Australia	0.000	0.000	0.500	0.238
Brazil	0.833	0.400	0.500	0.833
Canada	0.000	0.000	0.071	0.000
Chile	0.833	0.000	0.000	0.000
China	1.000	1.000	1.000	1.000
Colombia	0.833	0.800	0.167	0.833
Croatia	N/A	N/A	N/A	N/A
Czech Republic	1.000	0.200	0.167	0.500
Denmark	0.000	0.000	0.167	0.000
Dominican Republic	0.000	0.433	0.000	0.306
Egypt	0.833	0.200	0.167	0.476
Hong Kong	0.000	0.000	0.143	0.000
Hungary	0.167	0.000	0.167	0.000
India	1.000	0.800	0.833	1.000
Indonesia	0.667	0.800	0.667	0.381
Iran	0.000	0.000	0.333	0.833
Japan	0.000	0.000	0.000	0.000
Kazakhstan	0.556	0.500	0.000	0.583
Kenya	0.024	0.771	0.333	0.833
Malaysia	1.000	1.000	0.333	0.833
Mexico	1.000	0.200	0.810	0.667
Morocco	1.000	1.000	0.333	0.833
New Zealand	0.000	0.000	0.167	0.000
Nigeria	0.405	0.000	0.190	0.000
Norway	0.167	0.000	0.167	0.000
Pakistan	1.000	1.000	0.361	0.833
Peru	0.000	0.000	0.000	0.000
Philippines	0.976	1.000	0.643	1.000
Poland	1.000	0.800	0.381	0.500
Romania	0.000	0.000	0.167	0.000
Russia	0.095	0.800	0.548	0.667
Saudi Arabia	0.722	0.800	0.667	0.833
Singapore	0.000	0.000	0.167	0.167
South Africa	1.000	1.000	0.071	0.833
South Korea	0.167	0.114	0.167	0.000
Sweden	0.571	0.000	0.000	0.000
Switzerland	1.000	0.143	0.167	0.167
Tanzania	1.000	1.000	0.867	0.867
Thailand	1.000	0.800	0.833	0.833
Turkey	1.000	0.600	0.476	0.833
US	0.000	0.000	0.167	0.548
Ukraine	1.000	1.000	0.667	0.833
United Arab Emirates	0.000	0.000	0.500	0.500
United Kingdom	0.143	0.000	0.000	0.000
Venezuela	0.119	1.000	0.667	0.833
Vietnam	0.833	1.000	0.833	0.833

This table reports average indices by country for four categories of capital control (i.e., restrictions on capital movements). Large (low) values mean important (limited) capital control. The indices are presented in Fernández, Klein, Rebucci, Schindler, and Uribe (2016). The reported averages are calculated with the indices of six asset categories: equity, bond, money market instruments, collective investments, derivatives, and real estate. Data source: IMF.

Table 4: Summary statistics on macroeconomic data

Countries	Real GDP per capita	GDP growth	Inflation	Money Growth	Unemp-loyment rate	Country risk premium
Argentina	9.507	-0.183	N/A	33.623	8.202	9.045
Australia	10.956	2.480	1.885	6.769	5.650	0.000
Brazil	9.079	0.145	5.878	9.347	10.107	3.612
Canada	10.692	2.079	1.602	N/A	6.531	0.000
Chile	9.515	2.161	3.117	7.348	6.800	0.854
China	9.048	6.961	2.078	10.466	4.514	0.870
Colombia	8.727	3.112	4.071	8.897	8.936	2.650
Croatia	9.437	2.164	0.545	3.533	12.869	3.869
Czech Republic	9.817	3.077	1.460	7.034	4.171	0.941
Denmark	10.906	2.152	0.682	2.844	6.080	0.000
Dominican Republic	8.911	6.223	2.351	9.858	6.610	5.486
Egypt	8.206	4.125	13.826	19.972	11.587	9.129
Hong Kong	10.672	2.199	2.992	7.688	3.183	0.592
Hungary	9.488	3.730	1.482	7.283	5.874	3.188
India	7.435	6.719	5.362	10.614	5.382	2.843
Indonesia	8.150	5.105	4.676	9.256	4.157	2.892
Iran	8.598	1.923	17.051	29.142	11.605	N/A
Japan	10.471	0.948	0.815	3.018	3.100	0.934
Kazakhstan	9.286	3.200	7.770	11.242	4.917	2.867
Kenya	7.308	4.657	6.201	12.416	3.416	6.461
Malaysia	9.239	5.048	2.123	4.936	3.221	1.633
Mexico	9.176	2.036	3.992	9.350	4.010	1.718
Morocco	7.971	3.259	1.197	4.728	9.354	3.398
New Zealand	10.574	3.308	1.196	7.110	5.001	0.000
Nigeria	7.857	2.708	11.605	10.334	6.429	6.240
Norway	11.222	1.461	2.384	4.859	3.933	0.000
Pakistan	7.256	4.669	5.538	11.463	3.453	8.941
Peru	8.762	3.053	2.854	7.582	3.463	1.605
Philippines	8.061	6.570	2.666	13.508	2.857	2.650
Poland	9.482	3.830	0.803	7.876	6.429	1.154
Romania	9.169	4.431	1.815	9.639	5.663	2.993
Russia	9.165	1.078	6.884	10.641	5.187	3.035
Saudi Arabia	9.914	1.923	0.840	3.857	5.760	0.915
Singapore	10.959	3.530	0.558	4.181	3.773	0.000
South Africa	8.736	1.235	5.264	6.819	26.223	2.672
South Korea	10.292	2.919	1.151	6.831	3.464	0.720
Sweden	10.852	2.416	0.892	6.347	7.190	0.000
Switzerland	11.359	1.955	0.003	3.008	4.743	0.000
Tanzania	6.920	6.212	4.608	8.883	2.181	5.344
Thailand	8.711	2.970	0.829	4.849	0.634	2.173
Turkey	9.327	4.886	10.635	18.322	10.724	3.704
US	10.960	2.281	1.550	4.842	5.089	0.000
Ukraine	7.741	-1.188	15.389	9.363	8.774	12.047
United Arab Emirates	10.561	3.498	1.748	7.720	2.058	0.677
United Kingdom	10.734	2.175	1.673	3.213	5.116	0.592
Venezuela	N/A	-1.276	119.874	58.843	5.853	14.823
Vietnam	7.941	6.898	2.873	15.517	1.672	5.659

This table reports the average values of macroeconomics indicators by country for the period 2013-2019. The numbers of columns 3 to 7 are in percentage. Data Source: World Bank.

Table 5: Annual Localbitcoins data regression

Dependent variable: Y1

Overall Score	-1.627***												
	(0.539)												
Property Rights		-0.272											
		(0.318)											
Government Integrity			-1.376										
			(0.942)										
Judicial Effectiveness				0.577*									
				(0.247)									
Tax Burden					-0.772**								
					(0.276)								
Government Spending						-0.208							
						(0.123)							
Fiscal Health							-0.174						
							(0.120)						
Business Freedom								-0.174					
								(0.256)					
Labor Freedom									0.617				
									(0.453)				
Monetary Freedom										-3.704***			
										(0.951)			
Trade Freedom											-0.672*		
											(0.303)		
Investment Freedom												-0.480*	
												(0.242)	
Financial Freedom													-0.593*
													(0.255)
Corruption Index (CPI)	-0.158	-0.309	0.879	-0.892*	-0.846***	-0.600*	-0.536*	-0.477	-0.548*	0.125	-0.464	-0.328	-0.260
	(0.228)	(0.262)	(0.952)	(0.354)	(0.296)	(0.261)	(0.264)	(0.249)	(0.272)	(0.224)	(0.245)	(0.216)	(0.213)
Average Restrictions PABR	-32.890***	-32.649***	-35.084***	-19.407*	-34.667***	-33.610***	-19.551*	-33.827***	-29.220***	-32.153***	-32.039***	-30.718***	-30.163***
	(8.924)	(8.755)	(10.095)	(9.293)	(9.507)	(9.192)	(9.562)	(9.534)	(8.255)	(8.101)	(8.973)	(8.327)	(8.430)
Average Restrictions SIAR	21.392***	25.747***	29.904***	30.281*	26.630***	26.415***	33.679*	27.969***	28.542***	14.224*	26.417***	15.980*	20.955***
	(7.452)	(8.024)	(9.502)	(12.903)	(8.497)	(8.544)	(13.838)	(9.130)	(8.926)	(6.870)	(8.329)	(7.646)	(7.181)
GDP per Capita	19.949***	18.041**	19.548**	6.900	20.588***	16.627*	11.257*	19.250*	16.068**	9.842*	20.390***	16.987**	16.410**
	(6.981)	(6.758)	(7.527)	(4.740)	(7.285)	(6.756)	(5.448)	(7.665)	(5.941)	(4.760)	(7.228)	(6.144)	(6.137)
GDP Growth	-0.796	-0.953	-0.936	-3.512	-0.387	-0.562	-2.861	-0.925	-0.859	-1.183	-0.963	-0.533	-1.268
	(1.067)	(1.114)	(1.093)	(2.301)	(1.090)	(1.069)	(2.319)	(1.098)	(1.098)	(1.102)	(1.079)	(1.065)	(1.103)
Inflation	0.780	0.925	1.032	1.779	1.071	0.993	2.501	0.845	0.598	-0.697	0.718	0.384	0.606
	(0.602)	(0.658)	(0.636)	(1.527)	(0.638)	(0.651)	(1.554)	(0.632)	(0.664)	(0.787)	(0.582)	(0.622)	(0.601)
Broad Money Growth	-0.928	-0.977	-0.924	0.728	-0.818	-0.832	0.578	-0.900	-0.800	-1.143*	-0.901	-0.906	-0.881
	(0.525)	(0.581)	(0.535)	(0.929)	(0.522)	(0.518)	(0.906)	(0.523)	(0.506)	(0.542)	(0.510)	(0.519)	(0.507)
Unemployment Rate	0.522	0.840	0.706	-0.775	0.299	0.642	-0.836	0.791	1.046	0.278	0.726	1.022*	0.856
	(0.419)	(0.438)	(0.402)	(0.502)	(0.406)	(0.429)	(0.476)	(0.438)	(0.561)	(0.362)	(0.433)	(0.500)	(0.456)
World Uncertainty Index	-0.226	-0.176	-0.145	-0.499	-0.264	-0.249	-0.518	-0.265	-0.225	-0.342	-0.250	-0.183	-0.301
	(0.262)	(0.269)	(0.272)	(0.326)	(0.267)	(0.261)	(0.339)	(0.264)	(0.265)	(0.256)	(0.262)	(0.261)	(0.267)
Country Risk Premium	-1.929	-1.092	-1.058	-3.007	-0.541	-1.350	-4.184*	-0.676	-0.044	-3.308***	-0.560	-0.851	-1.721
	(1.002)	(1.019)	(0.932)	(1.796)	(1.009)	(1.072)	(2.031)	(0.994)	(1.273)	(1.003)	(0.942)	(0.922)	(1.026)
Exchange Rate Change	-0.207	-0.240	-0.205	-0.536	-0.248	-0.227	-0.643	-0.197	-0.183	0.342	-0.174	-0.133	-0.181
	(0.268)	(0.279)	(0.268)	(0.443)	(0.273)	(0.264)	(0.463)	(0.266)	(0.274)	(0.250)	(0.263)	(0.260)	(0.266)
Intercept	-26.399	-100.341*	-122.907*	-14.909	-52.601	-73.659	-28.943	-106.026*	-132.831*	247.100***	-76.123	-74.443	-61.807
	(41.650)	(47.248)	(58.300)	(38.660)	(43.849)	(54.094)	(42.094)	(49.794)	(64.320)	(65.693)	(46.740)	(38.814)	(41.994)
Number of observations	272	272	272	118	272	272	118	272	272	272	272	272	272
Adjusted R-square	4.6	3.5	4.1	7.5	4.6	3.6	6.7	3.4	4.5	10.4	3.6	4.2	4.2

This table reports regression results where the dependent variable Y1 is regressed on Heritage indexes and a set of control variables. Y1 is the annual volume of BTC traded on Localbitcoins, scaled by one thousand. See subsection 3.1.1 for more details. Standard errors, in parentheses, follow coefficient estimates. Standard errors are corrected for heteroscedasticity following White (1980). ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Table 6: Annual Localbitcoins and Paxful data regression

Dependent Variable: Y2

Overall Score	-1.749***												
	(0.579)												
Property Rights		-0.326											
		(0.330)											
Government Integrity			-1.312										
			(0.973)										
Judicial Effectiveness				0.577									
				(0.299)									
Tax Burden					-0.869***								
					(0.308)								
Government Spending						-0.204							
						(0.133)							
Fiscal Health							-0.363						
							(0.192)						
Business Freedom								-0.299					
								(0.292)					
Labor Freedom									0.748				
									(0.474)				
Monetary Freedom										-3.905***			
										(0.987)			
Trade Freedom											-0.714*		
											(0.323)		
Investment Freedom												-0.446	
												(0.256)	
Financial Freedom													-0.550*
													(0.271)
Corruption Index	-0.204	-0.342	0.741	-0.955*	-0.960***	-0.671*	-0.652*	-0.524*	-0.628*	0.087	-0.533*	-0.414	-0.351
	(0.244)	(0.276)	(0.978)	(0.390)	(0.315)	(0.273)	(0.294)	(0.257)	(0.288)	(0.235)	(0.257)	(0.234)	(0.236)
Average Restrictions PABR	-35.492***	-35.164***	-37.623***	-24.584*	-37.476***	-36.230***	-24.311*	-36.890***	-30.997***	-34.722***	-34.591***	-33.522***	-33.010***
	(9.377)	(9.175)	(10.555)	(10.402)	(10.005)	(9.630)	(10.711)	(10.149)	(8.536)	(8.544)	(9.421)	(8.813)	(8.924)
Average Restrictions SIAR	22.807***	27.329***	31.609***	33.792*	28.417***	28.267***	39.977**	30.461***	30.699***	15.369*	28.217***	18.610*	23.236***
	(7.692)	(8.229)	(9.774)	(13.140)	(8.730)	(8.801)	(14.874)	(9.572)	(9.240)	(7.141)	(8.553)	(8.200)	(7.555)
GDP per Capita	23.644***	21.595***	23.025***	11.539	24.461***	20.201**	18.284*	23.678**	19.203***	12.949*	24.089***	20.611***	20.076***
	(7.637)	(7.413)	(8.165)	(6.190)	(7.992)	(7.454)	(7.716)	(8.593)	(6.509)	(5.315)	(7.894)	(6.864)	(6.879)
GDP Growth	-0.747	-0.933	-0.881	-3.080	-0.285	-0.518	-2.480	-0.959	-0.821	-1.155	-0.924	-0.504	-1.186
	(1.131)	(1.184)	(1.158)	(2.377)	(1.148)	(1.137)	(2.474)	(1.179)	(1.169)	(1.189)	(1.144)	(1.121)	(1.172)
Inflation	1.028	1.190	1.279	2.512	1.351	1.245	3.447	1.083	0.795	-0.528	0.964	0.673	0.880
	(0.651)	(0.713)	(0.687)	(1.747)	(0.695)	(0.699)	(1.855)	(0.683)	(0.700)	(0.834)	(0.634)	(0.680)	(0.655)
Broad Money Growth	-0.928	-0.993	-0.917	0.691	-0.806	-0.829	0.604	-0.910	-0.779	-1.154*	-0.899	-0.900	-0.877
	(0.545)	(0.599)	(0.555)	(1.043)	(0.544)	(0.538)	(1.028)	(0.544)	(0.530)	(0.564)	(0.530)	(0.539)	(0.527)
Unemployment Rate	0.473	0.819	0.682	-0.813	0.207	0.617	-1.070	0.755	1.069	0.221	0.693	0.978	0.824
	(0.433)	(0.447)	(0.412)	(0.521)	(0.425)	(0.439)	(0.549)	(0.451)	(0.575)	(0.376)	(0.443)	(0.508)	(0.465)
World Uncertainty Index	-0.067	-0.003	0.006	-0.381	-0.108	-0.093	-0.415	-0.114	-0.061	-0.190	-0.093	-0.032	-0.141
	(0.321)	(0.330)	(0.331)	(0.435)	(0.326)	(0.320)	(0.444)	(0.323)	(0.322)	(0.308)	(0.321)	(0.320)	(0.329)
Country Risk Premium	-1.906	-1.052	-0.929	-3.463	-0.405	-1.225	-5.276*	-0.534	0.213	-3.335***	-0.436	-0.727	-1.535
	(1.079)	(1.084)	(1.001)	(2.128)	(1.079)	(1.150)	(2.540)	(1.071)	(1.338)	(1.090)	(1.007)	(0.981)	(1.104)
Exchange Rate Change	-0.312	-0.352	-0.309	-0.718	-0.358	-0.331	-0.919	-0.300	-0.284	0.267	-0.277	-0.242	-0.287
	(0.285)	(0.298)	(0.284)	(0.470)	(0.291)	(0.280)	(0.531)	(0.282)	(0.290)	(0.262)	(0.279)	(0.276)	(0.282)
Intercept	-52.088	-130.881*	-153.782*	-56.454	-77.561	-105.916	-75.096	-137.668*	-170.196*	234.572***	-105.907*	-108.369*	-96.682
	(47.593)	(53.385)	(64.277)	(53.720)	(49.636)	(61.244)	(59.257)	(56.163)	(71.020)	(67.942)	(52.882)	(47.243)	(50.614)
Number of observations	272	272	272	118	272	272	118	272	272	272	272	272	272
Adjusted R-square	5.2	4.1	4.5	4.4	5.3	4.1	7.5	4.0	5.4	10.6	4.2	4.5	4.5

This table reports regression results where the dependent variable Y2 is regressed on Heritage indexes and a set of control variables. Y2 is the annual volume of BTC traded on Localbitcoins and Paxful, scaled by one thousand. See subsection 3.1.1 for more details. Standard errors, in parentheses, follow coefficient estimates. Standard errors are corrected for heteroscedasticity following White (1980). ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Table 7: Annual levelled Localbitcoins data regression

Dependent Variable: Y3

Overall Score	-0.107***												
	(0.036)												
Property Rights		-0.017											
		(0.021)											
Government Integrity			-0.102										
			(0.064)										
Judicial Effectiveness				0.034*									
				(0.015)									
Tax Burden					-0.053**								
					(0.019)								
Government Spending						-0.015							
						(0.009)							
Fiscal Health							-0.010						
							(0.007)						
Business Freedom								-0.009					
								(0.017)					
Labor Freedom									0.044				
									(0.031)				
Monetary Freedom										-0.253***			
										(0.065)			
Trade Freedom											-0.043*		
											(0.020)		
Investment Freedom												-0.030	
												(0.016)	
Financial Freedom													-0.036*
													(0.017)
Corruption Index	-0.008	-0.018	0.072	-0.052*	-0.054***	-0.037*	-0.031*	-0.029	-0.034	0.012	-0.028	-0.020	-0.016
	(0.015)	(0.017)	(0.064)	(0.021)	(0.019)	(0.017)	(0.016)	(0.016)	(0.018)	(0.015)	(0.016)	(0.014)	(0.014)
Average Restrictions PABR	-2.225***	-2.210***	-2.385***	-1.157*	-2.346***	-2.274***	-1.165*	-2.278***	-1.961***	-2.174***	-2.172***	-2.088***	-2.062***
	(0.594)	(0.583)	(0.677)	(0.558)	(0.634)	(0.612)	(0.573)	(0.632)	(0.539)	(0.539)	(0.598)	(0.555)	(0.563)
Average Restrictions SIAR	1.369***	1.658***	1.952***	1.806*	1.712***	1.696***	2.009*	1.789***	1.848***	0.864	1.701***	1.040*	1.372***
	(0.474)	(0.508)	(0.618)	(0.774)	(0.540)	(0.545)	(0.830)	(0.581)	(0.573)	(0.447)	(0.530)	(0.497)	(0.462)
GDP per Capita	1.301**	1.176**	1.287*	0.403	1.350**	1.076*	0.661*	1.238*	1.035**	0.615	1.325**	1.109**	1.077**
	(0.465)	(0.450)	(0.506)	(0.282)	(0.486)	(0.451)	(0.325)	(0.507)	(0.390)	(0.317)	(0.481)	(0.410)	(0.412)
GDP Growth	-0.050	-0.060	-0.060	-0.209	-0.022	-0.033	-0.171	-0.057	-0.054	-0.076	-0.060	-0.033	-0.078
	(0.070)	(0.073)	(0.072)	(0.138)	(0.072)	(0.070)	(0.140)	(0.072)	(0.072)	(0.073)	(0.071)	(0.070)	(0.072)
Inflation	0.049	0.058	0.067	0.107	0.068	0.063	0.150	0.053	0.035	-0.053	0.045	0.024	0.039
	(0.040)	(0.043)	(0.042)	(0.091)	(0.042)	(0.043)	(0.093)	(0.042)	(0.044)	(0.054)	(0.039)	(0.042)	(0.040)
Broad Money Growth	-0.064	-0.067	-0.064	0.044	-0.057	-0.057	0.036	-0.062	-0.055	-0.079*	-0.062	-0.063	-0.061
	(0.036)	(0.039)	(0.036)	(0.055)	(0.035)	(0.035)	(0.054)	(0.035)	(0.034)	(0.037)	(0.035)	(0.035)	(0.034)
Unemployment Rate	0.041	0.062*	0.052	-0.046	0.025	0.048	-0.050	0.059	0.077	0.023	0.055	0.073*	0.063*
	(0.029)	(0.031)	(0.028)	(0.030)	(0.028)	(0.030)	(0.029)	(0.031)	(0.039)	(0.025)	(0.030)	(0.035)	(0.032)
World Uncertainty Index	-0.024	-0.020	-0.017	-0.032	-0.026	-0.025	-0.033	-0.026	-0.023	-0.031	-0.025	-0.021	-0.028
	(0.018)	(0.019)	(0.019)	(0.019)	(0.019)	(0.018)	(0.020)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.019)
Country Risk Premium	-0.127	-0.072	-0.073	-0.182	-0.036	-0.092	-0.251*	-0.046	0.000	-0.225***	-0.038	-0.056	-0.108
	(0.068)	(0.069)	(0.064)	(0.107)	(0.069)	(0.073)	(0.122)	(0.068)	(0.087)	(0.068)	(0.065)	(0.063)	(0.069)
Exchange Rate Change	-0.012	-0.014	-0.012	-0.032	-0.015	-0.013	-0.039	-0.011	-0.010	0.026	-0.010	-0.007	-0.010
	(0.018)	(0.018)	(0.018)	(0.027)	(0.018)	(0.018)	(0.028)	(0.018)	(0.018)	(0.017)	(0.017)	(0.017)	(0.018)
Intercept	-1.501	-6.372*	-7.982*	-0.777	-3.078	-4.455	-1.605	-6.735*	-8.648*	17.408***	-4.837	-4.735	-4.060
	(2.796)	(3.140)	(3.940)	(2.306)	(2.939)	(3.649)	(2.510)	(3.319)	(4.359)	(4.537)	(3.117)	(2.589)	(2.826)
Number of observations	272	272	272	118	272	272	118	272	272	272	272	272	272
Adjusted R-square	4.6	3.5	4.4	7.2	4.7	3.7	6.5	3.5	4.7	10.5	3.7	4.1	4.1

This table reports regression results where the dependent variable Y3 is regressed on Heritage indexes and a set of control variables. Y3 is the annual volume of BTC traded on Localbitcoins, scaled by the annual average of outstanding BTC. See subsection 3.1.1 for more details. Standard errors, in parentheses, follow coefficient estimates. Standard errors are corrected for heteroscedasticity following White (1980). ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Table 8: Annual levelled Localbitcoins and Paxful data regression

Dependent Variable: Y4													
Overall Score	-0.114***												
	(0.038)												
Property Rights		-0.021											
		(0.022)											
Government Integrity			-0.099										
			(0.066)										
Judicial Effectiveness				0.034									
				(0.018)									
Tax Burden					-0.059***								
					(0.021)								
Government Spending						-0.014							
						(0.009)							
Fiscal Health							-0.021						
							(0.011)						
Business Freedom								-0.016					
								(0.019)					
Labor Freedom									0.052				
									(0.033)				
Monetary Freedom										-0.265***			
										(0.067)			
Trade Freedom											-0.045*		
											(0.021)		
Investment Freedom												-0.029	
												(0.017)	
Financial Freedom													-0.034
													(0.018)
Corruption Index	-0.011	-0.020	0.064	-0.055*	-0.061***	-0.042*	-0.038*	-0.032	-0.039*	0.010	-0.032	-0.025	-0.021
	(0.016)	(0.018)	(0.065)	(0.023)	(0.020)	(0.017)	(0.017)	(0.016)	(0.019)	(0.016)	(0.017)	(0.015)	(0.015)
Average Restrictions PABR	-2.382***	-2.362***	-2.539***	-1.462*	-2.515***	-2.432***	-1.445*	-2.463***	-2.068***	-2.329***	-2.326***	-2.256***	-2.232***
	(0.621)	(0.608)	(0.704)	(0.625)	(0.663)	(0.638)	(0.642)	(0.669)	(0.556)	(0.566)	(0.624)	(0.583)	(0.592)
Average Restrictions SIAR	1.453***	1.752***	2.055***	2.013*	1.819***	1.807***	2.377**	1.937***	1.976***	0.932*	1.808***	1.193*	1.506***
	(0.489)	(0.521)	(0.635)	(0.789)	(0.555)	(0.560)	(0.892)	(0.608)	(0.593)	(0.464)	(0.544)	(0.528)	(0.484)
GDP per Capita	1.520***	1.386***	1.493**	0.670	1.579***	1.287**	1.067*	1.500**	1.220***	0.798*	1.543***	1.323***	1.293***
	(0.502)	(0.487)	(0.543)	(0.364)	(0.526)	(0.490)	(0.453)	(0.560)	(0.422)	(0.347)	(0.518)	(0.450)	(0.452)
GDP Growth	-0.047	-0.059	-0.057	-0.184	-0.016	-0.031	-0.150	-0.059	-0.052	-0.075	-0.058	-0.032	-0.074
	(0.074)	(0.077)	(0.076)	(0.143)	(0.075)	(0.074)	(0.148)	(0.077)	(0.077)	(0.078)	(0.075)	(0.074)	(0.077)
Inflation	0.063	0.074	0.081	0.150	0.085	0.078	0.205	0.067	0.047	-0.043	0.060	0.041	0.055
	(0.043)	(0.046)	(0.045)	(0.104)	(0.045)	(0.046)	(0.110)	(0.045)	(0.046)	(0.057)	(0.042)	(0.045)	(0.043)
Broad Money Growth	-0.064	-0.068	-0.064	0.042	-0.056	-0.058	0.037	-0.063	-0.054	-0.080*	-0.062	-0.062	-0.061
	(0.037)	(0.040)	(0.037)	(0.062)	(0.037)	(0.036)	(0.061)	(0.037)	(0.036)	(0.038)	(0.036)	(0.036)	(0.036)
Unemployment Rate	0.038	0.061	0.051	-0.048	0.019	0.047	-0.064	0.057	0.078	0.020	0.053	0.071*	0.061
	(0.030)	(0.031)	(0.029)	(0.031)	(0.029)	(0.030)	(0.033)	(0.031)	(0.040)	(0.026)	(0.031)	(0.035)	(0.032)
World Uncertainty Index	-0.015	-0.011	-0.009	-0.026	-0.017	-0.016	-0.028	-0.018	-0.014	-0.023	-0.016	-0.013	-0.019
	(0.021)	(0.022)	(0.021)	(0.025)	(0.021)	(0.021)	(0.026)	(0.021)	(0.021)	(0.020)	(0.021)	(0.021)	(0.021)
Country Risk Premium	-0.126	-0.070	-0.066	-0.209	-0.028	-0.085	-0.316*	-0.037	0.016	-0.227***	-0.031	-0.049	-0.098
	(0.072)	(0.072)	(0.068)	(0.127)	(0.073)	(0.078)	(0.152)	(0.072)	(0.091)	(0.073)	(0.068)	(0.066)	(0.073)
Exchange Rate Change	-0.018	-0.021	-0.018	-0.043	-0.021	-0.019	-0.055	-0.017	-0.016	0.021	-0.016	-0.014	-0.016
	(0.019)	(0.019)	(0.019)	(0.028)	(0.019)	(0.018)	(0.032)	(0.019)	(0.019)	(0.018)	(0.018)	(0.018)	(0.019)
Intercept	-2.985	-8.154*	-9.794*	-3.146	-4.522	-6.345	-4.238	-8.584*	-10.842*	16.718***	-6.576	-6.708*	-6.083
	(3.107)	(3.469)	(4.268)	(3.132)	(3.246)	(4.038)	(3.461)	(3.662)	(4.719)	(4.651)	(3.446)	(3.029)	(3.269)
Number of observations	272	272	272	118	272	272	118	272	272	272	272	272	272
Adjusted R-square	5.1	4.1	4.7	4.2	5.4	4.2	7.3	4.0	5.5	10.7	4.2	4.5	4.4

This table reports regression results where the dependent variable Y4 is regressed on Heritage indexes and a set of control variables. Y4 is the annual volume of BTC traded on Localbitcoins and Paxful, scaled by the annual average of outstanding BTC. See subsection 3.1.1 for more details. Standard errors, in parentheses, follow coefficient estimates. Standard errors are corrected for heteroscedasticity following White (1980). ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.