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The role of interpersonal trust in cryptocurrency adoption

Abstract

Despite the impressive adoption of cryptocurrencies since Bitcoin was introduced in 2008, little academic attention has been paid to the role of interpersonal trust in fostering this adoption. In this paper, we quantify the effect of interpersonal trust on the interest in and adoption of the three largest cryptocurrencies by market capitalization – Bitcoin, Ethereum and Litecoin using data from the 7th wave of the World Values Survey, Twitter, and Google Trends. Our results indicate a positive and statistically significant effect of trust on interest in and adoption of cryptocurrencies, confirming the importance of trust in the growth of financial markets.

Key words: cryptocurrency, ethical investment, societal trust, cryptocurrency adoption.

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1. Introduction

Cryptocurrencies are a new investment asset class that are often plagued by accusations of unethical, fraudulent, and illegal activity. Scholarly articles largely agree on the argument that despite their high volatility, cryptocurrency markets continue to attract investors due to the abnormal returns they offer. There is, however, very little agreement on why, and despite all the ethical and environmental concerns, the cryptocurrency market continues to expand with blockchain technology rapidly gaining worldwide attention. The different notions of trust and its role in individuals' decisions have been widely discussed in the business ethics literature but have not yet been employed to assess the interest in cryptocurrency.

Trust plays an important role in situations of risk, uncertainty, and interdependence (McKnight and Chervany, 2001) and is a basic element in almost all interactions between humans (Gambetta, 1988). The Global Financial Crisis of 2008-2009 (GFC) brought the ethical dimensions of financial services under the spotlight, kickstarting a new wave of academic literature on socially responsible and ethical investments. In response to the financial markets' collapse in 2008, some investors demanded better regulation, stricter capital requirements and higher standards of corporate disclosure and transparency, while others found the idea of alternative, unregulated, and fully decentralized financial systems and instruments particularly appealing.

Regarding the latter, a new distributed ledger technology was introduced in 2008, only to become the first successful and widely adopted digital currency of modern times, Bitcoin (Nakamoto, 2008). By 2013, Bitcoin had grown in both popularity and market value, paving the way for other technological developments based on blockchain technology. A significant milestone came with the introduction of Ethereum in 2015 (Dupont, 2019) and since then, the ethics of Bitcoin and other cryptocurrencies have been challenged for their alleged association with a variety of illegal and criminal activities (e.g., Foley, Karlsen, and Putninš, 2019) and their environmental footprint (e.g., Corbet, Lucey, and Yarovaya, 2021). Celebrated economist Paul Krugman went as far as to say that "Bitcoin is evil." (Krugman, 2013). Despite these ethical, environmental, social

and sustainability concerns, the pace of cryptocurrency adoption has been stunning. As of September 2021, there are about 6555 traded cryptocurrencies (source: coinmarketcap.com, September 2021) with a global crypto market cap of $2.01T, with the Bitcoin being the largest and most heavily traded. Today the Bitcoin can be used to pay at Tesla, Microsoft, PayPal, Coca Cola vending machines in New Zealand and Australia and some Starbucks outlets (Conklin and Ceballos, 2021).

In this paper, we attempt to investigate the role of interpersonal trust in society in fostering the degree of interest in and adoption of cryptocurrencies. This study is motivated by the fact that the relationship between interpersonal trust and cryptocurrency use is not *a priori* clear. On the one hand, cryptocurrencies are based on the principle of decentralized control, with participants anonymous except for their e-wallet addresses. On the other hand, the sophistication and fool-proof complexity of the blockchain technology that most cryptocurrencies are built on provides a high level of certainty and transparency (Shin and Hwang, 2020), which may itself mitigate the need for high levels of trust in crypto adoption. The role of trust in the context of digital transactions and social networks has been examined in extant literature. Trust is an essential condition in digital transactions, given the possibility of fraud (Gefen et al., 2003) and given the inherent information asymmetry in online financial platforms (Collier and Hampshire, 2010). While reputation is an important determinant of trust for online vendors (Chen and Dhillon, 2005; Grabner-Kraeuter, 2002), the lack of co-location, identification and regulatory intervention on online platforms may necessitate greater trust. Chen and Dibb (2010) highlight the need for higher trust levels to compensate for higher levels of perceived risk.

The role of trust in cryptocurrency adoption has not been sufficiently explored. Only a few papers have examined cryptocurrencies from an ethical perspective (e.g., Clark et al., 2014; Angel and McCabe, 2015; Dierksmeier and Seele, 2016; Hughes, 2017; Conklin and Ceballos, 2021; Urquhart, 2022), and even fewer have explored the notions of trust in the cryptocurrency context (e.g., Rhue, 2018; Kianieff, 2021). Chellappa and Pavlou (2002) liken cryptocurrencies to the early

internet and along with Greiner et al. (2010), argue for the high need for trust-building given their unregulated nature. We also contribute to the literature on the relationship between *trust* and *ethics* in the context of information asymmetry, individual decision-making, and socially responsible investments (e.g. Castaldo, Premazzi, and Zerbini, 2010; Rhodes and Soobaroyen, 2010; Chen and Chang, 2013; Clouse et al., 2017).

Another stream of literature that we contribute to is that on the role of trust in innovation adoption. The Edelman's Trust Barometer (2016) indicates that at least half of the global population believes that the speed of innovation – technological, social and legal is too fast and attribute this pace to the greed of business owners and creators of this technology. This makes trust an important consideration in innovation adoption (Lazanyi, 2017). Cryptocurrency and blockchain technology are disruptive innovations in the financial service industry and therefore, the main mechanism of trust influencing innovation adoption could very well be applicable here. For example, the positive role of trust in influencing innovation adoption has been documented across various settings such as hospitals (Herting, 2002), e-government services (Carter and Belanger, 2005), digital innovations by start-ups (Konya-Baumabach et al., 2019), online social networks (Grabner-Kräuter, 2009), and SME attitudes to equity financing (Dowling et al., 2019). Trust in technology and technical systems is founded on its perceived functionality and predictability (Luhmann, 1989; Lee and Turban, 2001; Thatcher et al., 2007). Even though the Bitcoin has been hailed as the biggest financial innovation of the fourth industrial revolution (Li et al., 2021), there is no study till date that investigates the effect of trust on the general interest in and adoption of cryptocurrencies.

Our paper fills this gap in literature using a quantitative approach. To measure interest in cryptocurrencies, we use the following metrics – the number of tweets and google trends. These measures have been used as proxies for investment interest and attention (e.g., Urquhart, 2018; Smales, 2022). To measure the degree of cryptocurrency adoption, we use the number of active, sending, receiving, new and total addresses, and market capitalization of Bitcoin, Ethereum, and

Litecoin. Bitcoin and Ethereum have been selected on the basis of their market dominance in the crypto asset landscape. For example, the recent study by Katsiampa et al. (2021) reports that while the Bitcoin dominated the crypto market in the pre-COVID 19 times, the Ethereum blockchain gained power during the pandemic. The recently popular decentralized finance (DeFi) assets and non-fungible tokens (NFTs) have been built predominantly on the Ethereum blockchain, necessitating its inclusion in our cryptocurrency sample. Litecoin is an early Bitcoin spinoff, available since 2011 and we include it in our sample as a proxy for other multiple peer-to-peer cryptocurrencies that are currently in circulation.

Finally, we measure interpersonal trust using the 7th wave of the World Value Survey (hereafter, WVS) that covers 48 countries over 2017-2020 (Inglehart et al., 2020). Specifically, we focus on the latest survey wave due to the following reasons. First, during this time, Bitcoin has witnessed its most significant price increases, i.e., Bitcoin price bubbles (Corbet, 2018). This phenomenon was partially influenced by the introduction of Bitcoin futures in 2017 (Jalan et al., 2021). Second, this astonishing price growth attracted attention in both cryptocurrencies in general, as well as the ethical issues associated with this new class of assets. According to the Index of Cryptocurrency Environmental Attention, this period represents the first time in cryptocurrency history when attention to environmental concerns of cryptocurrency energy consumption and e-waste problem has started actively growing (Wang et al., 2021a). Finally, this period marks the DeFi boom[1], as systems and technologies built on the Ethereum blockchain boomeranged, significantly changing the role of Ethereum in the interconnected system of digital assets (Katsiampa et al., 2021).

The WVS provides us with unobservable characteristics of people worldwide through comprehensive surveys in over 100 countries. Widely used in literature, its trust measure captures expectations about others' trustworthiness (Banerjee, 2018). Glaeser et al. (2000) and Johnson and Mislin (2012) document that the WVS trust measure is positively correlated with experimentally

[1] Please see timeline of the key events in cryptocurrency area in Lucey et al. (2021).

measured trust and trustworthiness while Sapienza et al. (2013) argue that trust may be belief and preference-driven and the WVS measure captures mostly the belief-based component.

Dou et al. (2016, p. 851) indicate the need to include cultural dimensions '…in cross-country research to account for innate differences among international investors.' Hoehle, Zhang, and Venkatesh (2015), Srite and Karahanna (2006) highlight the importance of using cultural measures in the context of how individuals react to a novel technology. Therefore, to account for cultural differences in trust, we use the Uncertainty Avoidance Index (UAI) and long term versus short term normative orientation, LTO (Hofstede's 1980; 2001). UAI captures the attitude of a society towards risk and uncertainty. A high score on uncertainty avoidance indicates general discomfort with uncertain and ambiguous situations, while a low score shows flexibility in attitude and higher likelihood of engaging in risky behavior (Hofstede, 2001). Consequently, it can be used as a proxy to measure people's trust in the future and to what extent they can deal with the fact that the future is uncertain. LTO on the other hand, refers to the degree to which a society demonstrates pragmatism and a future-oriented perspective with emphasis on the future, thrift and persistence. Higher scores indicate a pragmatic, future-oriented approach.

By estimating point-biserial correlations and GLMs, we document a positive and statistically significant relationship between societal trust and interest in and adoption of the selected cryptocurrencies. Our results offer interesting insights into the pervasiveness of societal trust in influencing the adoption of the century's unique financial innovation – cryptocurrencies, that are anonymous. The findings confirm the hypothesis of Kong et al. (2021) that trust plays an important role in promoting innovation when formal institutions are lacking. Our results are consistent with the findings of Abrhám and Lžičař (2018) and Rojek (2019) who stress the importance of interpersonal trust in modern societies characterized by high uncertainty-social interactions. Our results also contribute to literature that documents the positive role of interpersonal trust on financial development (Guiso et al., 2004; Guiso, Sapienza and Zingales, 2008).

Effects of Uncertainty Avoidance are positive, implying that higher uncertainty and ambiguity about the future tend to increase interest in cryptocurrencies and their adoption. Interestingly, our LTO estimates remain negative and statistically significant in all models, potentially indicating that both interest in and adoption of cryptocurrencies are considered with a short-term perspective[2] rather than a long and futuristic one. Given our results, we can assume that trust in society, Uncertainty Avoidance and the Long-term orientation versus short term normative orientation index are robust society-level predictors of interest in and adoption of cryptocurrencies.

Our findings, along with the rising ethical and sustainability concerns associated with cryptocurrencies in current times, seem to highlight interpersonal trust as one of the various potential channels through which ethical concerns related to the asset class seem to be mitigated.

We contribute to an understanding of the determinants of innovation adoption in general and cryptocurrency adoption in particular. Our results are useful for regulators as to the need to foster interpersonal trust in society to enable the healthy growth of financial markets. This becomes even more relevant as central banks worldwide contemplate to introduce their own digital currencies (Wang et al., 2021b).

The rest of our paper is organized as follows. Section 2 presents the literature review and hypotheses, Section 3 provides the data and methodology while Section 4 presents the empirical results. Section 5 concludes. Appendix contains supplementary tables.

2. Literature review and hypothesis development

2.1. Trust

There is no universally accepted scholarly definition of trust and each definition is rooted in some theoretical framework (Hartmann and Offe, 2001). In general, trust can be considered as a social construct, based on generalized relationships (Inglehart and Baker, 2000). Trust or distrust

[2] As a robustness check, we also used individualism/collectivism as a proxy for cultural dimensions in affecting the adoption of and interest in cryptocurrencies. We do not find any significant or robust effect. Results can be provided upon request.

is a certain level of subjective probability assessment that an agent uses with another agent, or group of agents, in the context of performing a specific action (Gambetta, 1988). Thus, trust can be considered as a belief. In a similar spirit, Nakata and Sivakumar (2001, p. 712) highlight vulnerability and willingness in the context of an agent's action, defining trust as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control the other party". Trust is also analyzed in the context of inter and intra-group interaction dynamics, within and between social contacts at all levels (Hardin, 2002).

Prior studies highlight the importance of trust in understanding generalized behavior and economic exchanges. For instance, Arrow (1972) points out the role of trust and loyalty in facilitating exchange in an economy. Fukuyama (1995) defines interpersonal trust as shared values and the ability to trust people with unspecified identities, outside of the immediate family. He calls this 'social capital' and argues for its importance in the growth of financial markets and economic activity through the reduction of transaction costs and greater cooperation. Generally speaking, interpersonal trust has been shown to affect economic outcomes positively. Trust fosters economic growth (Knack and Keefer, 1997; Zak and Knack, 2001, Algan and Cahuc, 2014), financial development (Guiso et al., 2004; Guiso, Sapienza and Zingales, 2008) and financial inclusion (Xu, 2020).

The financial crisis of 2008 paved way for a bigger trust crisis in financial systems across the globe. By 2012, on average only four out of ten people in OECD countries expressed confidence in their government, much lower than pre-crisis trust levels (OECD, 2013). In the context of excessive risk-taking and opportunistic culture of modern banks, Mrs. Christine Lagarde, the Managing Director of the International Monetary Fund remarked "In this age of diminished trust, it is the financial sector that takes last place in opinion surveys." (Mele et al., 2017).

This is evident also in the success of the Bitcoin, launched in January 2009 during the depths of the Global Financial Crisis. Its success since has been attributed to the general interest in

alternative technologies as public faith in central banks and traditional currencies crashed. In fact, this forms one of the major objectives of the Bitcoin, as can be gauged from its whitepaper which states Bitcoin as "a purely peer to peer version of electronic cash [that] would allow online payments to be sent directly from one party to another without going through a financial institution" (Nakamoto, 2008).

Trust depends on many factors such as educational background (Guiso, Sapienza, and Zingales, 2004) and religious philosophy (Guiso, Sapienza, and Zingales, 2003). You (2012) argues that trust can be explained by fairness: fair procedural rules (democracy), fair administration of rules (freedom from corruption), and fair income distribution. In terms of its impact on the functioning of the economy, trust can be considered a fundamental condition for economic transactions (Preda, 2007). The literature examining the effect of trust on the functioning of financial markets and the economy, is divided into two strands – the effect on (i), corporates and the stock market, and (ii) household behavior.

In the first group, Engelhardt et al. (2021) document that not only does trust significantly impact uncertainty in financial markets during the COVID-19 pandemic, volatility in stock markets is significantly lower in high-trust countries. Peirò-Palomino and Tortosa-Ausina, (2013) show that positive changes in trust levels are associated with higher income, while Georgarakos and Furth (2015) document lower likelihood of loan arrears due to increase in trust. Sangnier (2013) show that increase in trust can result in higher macroeconomic stability. Guiso et al., (2009) and Yu et al. (2015) find that positive changes in trust levels can stimulate international trade and investment. Bottazzi et al. (2011) show that trust significantly facilitates financial investment decisions. Xu (2020) shows that social trust remains a significant and positive determinant for various aspects of financial inclusion. Similar results are documented by Ghosh (2021). Guiso et al. (2004, 2008) argue that changes in trust levels can affect levels of financial development. Guiso et al. (2008) show that less trusting individuals are less likely to invest in stocks. Pevzner et al. (2015) show that social trust has a positive effect on trading volume in financial markets. Blau (2017) document that American

Depository Receipts of the most corrupt home countries trade less frequently. Kim (2021) shows that the relationship between trust and trading volume is not monotonic.

Even in terms of the corporate sector, there exists rich literature on the effects of trust. For instance, Gallemore and Labro (2013) suggest that trust may play a more important role in more decentralized firms. Goergen et al. (2013) document the relationship between firm-level trust and firm performance while Graham, Harvey, and Rajgopal (2005) study the effects of trust on establishing credibility with capital markets. A number of studies document the negative consequences of low levels of trust in corporations, in the form of inhibiting open communication and sharing of knowledge among and between peers, subordinates, and superiors (McGregor 1967, p. 163; Beer 1987; Ouchi 1981; Zand 1981; McEvily, Perrone, and Zaheer, 2003; Chowdhury 2005; etc). Trust reduces the fear of criticism and the worry that shared knowledge will be used wrongly (Ardichvili, Page, and Wentling, 2003; McEvily, Perrone, and Zaheer, 2003; etc.).

Trust affects household decisions as well. For instance, Delis and Mylonidis (2015) show that higher levels of trust affect risky investment behavior of households. Iyer and Puri (2012) demonstrate that trust discourages depositors from withdrawing deposits from financial institutions during crises. Cole et al. (2013) and Baidoo and Akoto (2019) demonstrate that trust affects borrowings and long-term savings behavior. Alvarez-Botas and Gonzalez (2021) find evidence that bank loan spreads are typically lower in countries where trust in the financial system is high. In fact, increased interpersonal trust can potentially reduce transaction costs (Fafchamps, 2006).

Trust also affects anonymous transactional relationships. For instance, Kim and Peterson (2017) show that trust, particularly online trust, is an important aspect of e-commerce. Ter Huurne, Ronteltap, Corten, and Buskens (2017), in their study of antecedents of trust in the sharing economy, highlight that trust is a key factor in overcoming uncertainty and mitigating risk. Kowalski et al (2021) show that the blockchain technology enhances trust relationships. Though, in the context of our study, identity as a vital component of any economic exchange (Berg et al.,

2017, 2018) is important. In the case of cryptocurrency, all one can observe is the e-wallet address without any supporting identity information. This makes the crypto-trust nexus nuanced and interesting to study.

2.2. Cryptocurrency adoption – a global view

Cryptocurrencies are a financial asset class that has attracted massive attention from public and academia since their inception. Digital currency research originated from an anonymous and untraceable electronic currency system developed by Chaum (1983). Bitcoin (Nakamoto 2008), as the first successful experiment, is considered as one of the most interesting recent developments in modern monetary economies (Hendrickson et al., 2016). However the debate surrounding the merits and pitfalls of cryptocurrencies remain unabated.

Proponents argue that cryptocurrency is the most effective means to transfer assets across long distances without the need for a third party (Chohan, 2019; Eichengreen, 2019; Meera, 2018; Bech and Garratt, 2018), while detractors argue that cryptocurrencies possess no real value (Bouoiyour, Selmi and Wohar, 2019; Asplund and Ivarsson, 2018; Vries 2018 etc.) and that they facilitate illegal activities such as asset transfers on the dark-web (Whitford and Anderson, 2020). The latter may necessitate tighter regulation, which could have a strong impact on cryptocurrency markets (Auer and Claessens, 2018; Borri and Shakhnov, 2020b) and may in some way defeat the purpose of their creation.

Even the stand of governments on the use of cryptocurrencies remains extremely divided. For instance, while the Canary Islands recently sold its Bitcoin holdings citing 'ethical reasons' while El Salvador mandated the acceptance of the Bitcoin by its businesses in 2021 citing the beneficial impact it had on its poor population. Most rich and developed nations argue that the growth of cryptocurrencies poses a threat to the healthy functioning of their Central banking systems, third-world countries with weak governance systems find desperate relief in the Bitcoin and alternative currencies. Kianieff (2021) argues that a successful change in consumer behaviour

from traditional fiat currencies to cryptocurrencies will require effective persuasion and demonstration that risks inherent in private currencies can be mitigated by the technology on which these new currencies are built.

The cryptocurrency market was initially shown to have low liquidity, that has improved over time (Brauneis and Mestel, 2019; Choi, 2020; Ghabri et al., 2020; Jalan et.al, 2021). There are studies that highlight portfolio diversification benefits and hedging characteristics of cryptocurrencies (Briere et al., 2015; Hu et al., 2019; Platanakis and Urquhart, 2019; Charfeddine et al., 2020; Matkovskyy and Jalan, 2021).

In terms of market efficiency, Urquhart (2016) provides evidence of large-scale inefficiency of the cryptocurrency (bitcoin) market. Jalan et al. (2021) document an improvement in market efficiency, following the launch of bitcoin futures in 2017. One group of researchers document predictability in cryptocurrency returns (see, e.g., Panagiotidis et al., 2018, Adcock and Gradojevic, 2019, etc.), while the other group of scholars show that crypto returns exhibit clustering, long memory and jumps (see, e.g., Dyhrberg, 2016, Katsiampa, 2017, Klein et al., 2018, Ardia et al., 2019, Gronwald, 2019, Hafner, 2020, and Segnon and Bekiros, 2020; Scaillet et al., 2020). Tucker (2013) argues that one of the major reasons for high cryptocurrency volatility is the 'pump and dump' strategy, where false-positive statements are used to inflate cryptocurrency prices.

2.3. Cryptocurrencies as Corporate Treasury Investments

The year 2020 marked an important period with regard to the institutional adoption of cryptocurrencies in general and the Bitcoin in particular. This year marked wide interest from large institutions such as investment banks and asset funds who are believed to be willing to buy more Bitcoin that can be mined on a daily basis. According to recent data, more than 4% of all Bitcoin in supply is currently held by institutions.[3] A welcome change came in the form of OCC[4] (the

[3] https://academy.ivanontech.com/blog/institutional-investment-in-crypto-7-publicly-traded-companies-invested-in-cryptocurrency
[4] https://www.occ.gov/news-issuances/news-releases/2020/nr-occ-2020-125.html

Office of the Comptroller of the Currency) on September 21, 2020, which allowed national banks and federal savings institutions to hold certain types of crypto assets for the first time. This has resulted in higher regulatory certainty and a signal of legitimization for institutional investors in the crypto markets. Steve Ehrlich, the CEO of Voyager Digital, a U.S. based digital exchange that facilitates buying and selling of cryptos sums it up as "This is the beginning of the adoption phase as regulation legitimizes crypto assets, and yields remain ahead of traditional investment products."[5]

A recent trend closely associated with this phenomenon is the corporate interest in cryptocurrency. Increasingly, public companies are showing interest in investing in the Bitcoin as part of their Treasury operations, to take advantage of its unbelievably high returns and particularly in a pandemic-struck environment where other opportunities for investment seem to have either dried out or dulled in comparison to normal times. One of the key indicators of this trend came with Elon Musk's announcement of Tesla having invested in $1.5 billion in the Bitcoin as part of its Treasury (February 8, 2021). After Musk's announcement, the wave of optimism in cryptocurrencies drove the price of Bitcoin from about $39,400 to over $48,000 in less than 24 hours.[6] In fact, Tesla began to accept payments in the Dogecoin for some of its merchandise starting January 2022, driving up the Dogecoin by about 15% within a day.[7]

Tesla may have been one of the first public companies to have initiated this move, but others have tried to catch up with this new Treasury trend. Soon after Musk's announcement, Ned Segal, the Finance Director of Twitter also signaled similar intentions. According to bitcointreasuries.org, a website that compiles data on corporate treasury investments, 26 publicly traded, 5 private and 17 ETF-type firms hold Bitcoin investments on their Balance Sheet.[8] Of these 26 publicly traded firms, 23 represent Bitcoin-trading firms for which these Bitcoin holdings

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[5] https://www.pymnts.com/news/b2b-payments/2020/crypto-gets-a-second-look-from-corporate-investors-seeking-yield-and-hedge/

[6] https://www.wsj.com/articles/tesla-buys-1-5-billion-in-bitcoin-11612791688; https://theconversation.com/bitcoin-why-a-wave-of-huge-companies-like-tesla-rushing-to-invest-could-derail-the-stock-market-154966

[7] https://www.cnbc.com/2022/01/14/dogecoin-jumps-after-elon-musk-says-its-can-be-used-buy-tesla-merch.html

[8] As on March 25, 2021, when the site was accessed.

represent inventory held and not really an investment. However, the remaining 3 – Tesla, Microstrategy and Square Inc. represent those that have bought the Bitcoin purely for investment purposes. Microstrategy Incorporated provides enterprise software platforms around the world. In September 2020 MicroStrategy Announced about $1B in total bitcoin purchases[9], that makes this company one of the biggest institutional investors in Bitcoin. Square Inc. is a commerce ecosystem, enabling its sellers to start, run and grow their businesses. It provides software and hardware to enable sellers to turn mobile devices and computing devices into payments and point-of-sale solutions and P2P payment. It has also developed a software to buy and sell bitcoin. On October 7, 2020, Square, Inc. purchased approximately 4,709 bitcoins at an aggregate purchase price of $50 million.

We see this increasing demand for cryptocurrencies by public companies as a subtle signal of greater integration and adoption of this asset class into the 'traditional' financial system. This we expect shall enhance trust in the asset class, so far viewed with high degrees of skepticism. This further strengthens our motivation to investigate the trust-crypto adoption relationship. Despite the "alternative" nature of cryptocurrencies, we expect that trust should positively affect interest in cryptocurrencies and its adoption, due to an integration of this financial innovation into traditional financial system. This is rooted in the cryptocurrency literature that documents that the value of cryptocurrencies rises as traditional financial/macro-economic condition worsen, e.g., Matkovskyy and Jalan, 2020; Matkovskyy, Jalan and Dowling, 2020; Demir et al. 2018; Bouri et al. 2017; Bouri et al. 2018 etc.)

Therefore, we expect that trust will have a positive relationship with the interest in cryptocurrencies:

H1: Trust will have a positive relationship with cryptocurrency interest.

[9] https://www.microstrategy.com/en/company/company-videos/microstrategy-announces-over-1b-in-total-bitcoin-purchases-in-2020

Further, we expect that trust will have a positive impact on the adoption and use of cryptocurrencies, specifically:

H2: Trust will have a positive relationship with cryptocurrency use and adoption.

3. Data and methodology

Trust data has been collected from the WVS wave 7, covering the period 2017-2020. In this survey, the main trust-related question useful for our paper is "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?". There are 5 possible answers: 1: Most people can be trusted, 2: Need to be very careful, -1: Don´t know, -2: No answer, -4: Not asked. Our sample comprises 70,867 observations.

For our dependent/ continuous variables to measure interest in and degree of cryptocurrency adoption, we use the following metrics – the number of tweets and google trends, the number of active, sending, receiving, new and total addresses, and market capitalization of Bitcoin, Ethereum, and Litecoin, the three dominant players by market capitalization.

We measure interest in and adoption of cryptocurrencies separately. While interest is measured using the numbers of cryptocurrency-related tweets and Google trends[10], adoption is measured using the number of active, sending, receiving, new and total addresses, and market capitalization of Bitcoin, Ethereum and Litecoin[11]. In each case, we use growth-transformed dependent variables (see appendix for details).

For our empirical tests, we use the generalized linear model (GLM). To get a first impression of the data, , we estimate correlation $\varrho_{pb}(X,Y)$ between continuous and dichotomous

[10] The number of tweets and google trends of Bitcoin, Ethereum, and Litecoin were obtained from the Blockchain research center, Humboldt university. We also considered the problem of noisy estimates. Following an analysis report from Twitter, it estimates that spam and fake accounts comprise less than 5% of total. We believe that this should present by and large capture what we intend to, using Twitter data. (https://www.reuters.com/technology/twitter-estimates-spam-fake-accounts-represent-less-than-5-users-filing-2022-05-02/)

[11] The number of active, sending, receiving, new and total addresses, and market capitalization of Bitcoin, Ethereum, and Litecoin were downloaded from Glassnode.

variables by means of a Point-Biserial Correlation (a Population Product-Moment Correlation), which is defined as:

$$\varrho_{pb}(X,Y)=E[(X-\mu X)(Y-\mu Y)]/\sigma X\sigma Y \quad (1)$$

Given that $\mu Y=P(Y=1) = p$ and $\sigma Y=\sqrt{p(1-p)}p$, the point-biserial correlation is:

$$\varrho_{pb}\ (X,Y)=E[(X-\mu X)(Y-p)]/\sigma X p\sqrt{p(1-p)} \quad (2)$$

where X and Y are the selected continuous and dichotomous variables, respectively, μ is a sample mean, σ is the sample standard deviation of X, and p is the sample proportion for Y = 1.

For generalized linear modeling, we control for standard personal characteristics of responders, namely, "Sex", "Age", "Marital status", "Education level"[12], "Employment status", and "Scale of incomes"[13] . We also control for confidence in government, parliament, political parties, and banks as well economic freedom (Index of Economic Freedom, 2022). The motivation to include these variables comes from literature. For instance, van den Akker et al. (2020) document that men and women differ in their trust behavior. Greiner and Zednik (2019) observe that females are more trustworthy than males. Also, they find that older adults are more trusting and more trustworthy than younger participants. Lindström (2012) provides evidence of lower trust in unmarried men and women and divorced men. Galiani et al. (2020) show that trust levels increase as a consequence to a financial education outreach exercise. Friehe and Marcus (2021) document that job loss decreases trust by about 9 percent of standard deviation. On the other hand, Ananyev and Guriev (2019) and Alexeev (2020) provide conflicting results on the effects of income on trust. We acknowledge that in the context of interpersonal trust, it is reasonable to include controls such as integrity, honesty and ability. However, given the non-availability of this data at an inter-country level as is required in this study, we are unable to include these variables.

[12] Galiani et al. (2020) show that trust level increases as consequence to a financial education outreach exercise.
[13] Please refer to Table 1 in online Appendix

Hofstede(2011) defines culture as "the collective programming of the mind that distinguishes the members of one group or category of people from others". This implies that culture can be used as a proxy for the behavioral characteristics that prevail within a country. Prior studies have shown that culture influences business activities such as risk taking (Kanagaretnam et al., 2014), asset managers' behavior (Beckmann et al., 2008), and central banks' transparency (Makrychoriti and Pasiouras, 2021) etc. To account for more cultural differences in addition to societal trust, we incorporate the Uncertainty Avoidance (UA) and long/short term orientation indices in our dataset.

The Uncertainty avoidance index (UAI; Hofstede's 1980; 2001) refers to the degree to which individuals in a society accept risk and uncertainty. A high score indicates that individuals are uncomfortable with uncertain and ambiguous situations. A low score shows that people have flexible attitudes and behaviors and are more likely to engage in risky behavior (Hofstede, 2001). Therefore, it attempts to capture the general degree of trust in the future and to what extent people can deal with the fact that the future is uncertain.

Long term orientation versus short term normative orientation (LTO) refers to the degree to which a society demonstrates a pragmatic and future-oriented perspective and places greater emphasis on the future, thrift and persistence (Hofstede, 2010). A long-term-oriented society tends to have a long-term future plan and a strong commitment to achieving their future goals. On the other hand, individuals in a short-term-oriented culture seem to focus heavily on instant results, life satisfaction and happiness at the present moment. Thus, higher scores on this index indicate a thoughtful, pragmatic approach, while low scores show normative, short-term vision. While Fang (2003) questions the validity of this cultural dimension, Hofstede et al., (2010) highlights its importance in understanding the cultural differences between the East and the West, for instance.

The Uncertainty Avoidance and Long – short term orientation indices[14] are available for the following 41 countries (within our sample defined by the trust variable): Argentina, Australia,

[14] Data Source: https://hi.hofstede-insights.com/national-culture

Bangladesh, Bolivia, Brazil, Chile, China, Colombia, Ecuador, Egypt, Arab Rep., Ethiopia, Germany, Greece, Guatemala, Hong Kong, India, Iran, Iraq, Japan, Jordan, Kazakhstan, Lebanon, Malaysia, Mexico, New Zealand, Nigeria, Pakistan, Peru, Philippines, Puerto Rico, Romania, Russian Federation, Serbia, Korea, Taiwan, Thailand, Tunisia, Turkey, USA, Vietnam.

Economic freedom is associated with economic activity that is based on "personal choice, voluntary exchange, open markets, and clearly defined and enforced property rights" (Gwartney, Lawson, and Hall 2017, p. 1). Economic freedom has a major effect on cross-country differences in both per capita income and economic growth (Van den Berg 2017; Azman-Saini et al., 2010; Compton et al., 2011; among others). To account for economic freedom, the Index of economic freedom (World Bank) is used. It covers four main aspects of the economic and entrepreneurial environment i.e., rule of law, government size, regulatory efficiency, and market openness (2022 Index of Economic Freedom). This Index measures the following components: Property Rights, Government Integrity, Tax Burden, Government Spending, Fiscal Health, Business Freedom, Labor Freedom, Trade Freedom, Investment Freedom, Financial Freedom. They are calculated from a number of sub-variables, are equally weighted and averaged to derive overall economic freedom score for each economy. The ready scores are provided by the World Bank.

To account for financial development of the countries, the Index of financial development is used (IMF). It includes the aggregated counterparts related to development of financial institutions and financial markets (e.g., their depth, access, efficiency). Our final sample comprises 70,867 observations, 39 variables, combining data from 4 main sources, i.e., the most recent 7th wave of the World Values Survey, cultural differences (Uncertainty Avoidance Index (UAI) and long term versus short term normative orientation, LTO (Hofstede's 1980; 2001), Index of economic freedom (World bank) and index of financial development (IMF). In its simplest form, the GLM can be specified as follows:

$$Y = a_0 + a_1 Trust + a_2 Sex + a_3 Age + a_4 Marital_{status} + a_5 Education_{level} + a_6 Employment_{status} + a_7 Scale_{of_{incomes}} + a_8 UA + a_9 LTO + a_{10} EconomicFreedom + a_{11} Financial\ Development + \varepsilon \quad (3)$$

Here, Y is the dependent variable, i.e., the growth-transformed number of tweets, Google trends, number of addresses and market capitalization of the respective cryptocurrencies. We construct our database by pooling all data, based on Dearmon and Grier (2009). Date stamps on dependent variables are the same as the interview dates from WVS.

We estimate pooled GLMs by applying both Bayesian and Frequentist approaches. Also, we estimated panel GLM and traditional panels with/without fixed/random effects.

4. Empirical results and discussion

We first examine the correlation between the trust variable and selected dependent variables to measure interest in and adoption of cryptos. The Point-Biserial Correlation results indicate the presence of a negative correlation between mistrust[15] on both interest in and adoption of cryptocurrencies, implying the conducive role of trust in crypto adoption (see Table 1).

[Table 1 here]

We verify the robustness of our results by estimating 3 GLM specifications: Model 1 is a multivariate GLM model that contains control variables in terms of individual characteristics, i.e., "Sex", "Age", "Marital status", "Education level", "Employment status", "Scale of incomes", confidence in government, parliament, political parties and banks. Model 2 includes all individual characteristics control variables plus the Uncertainty Avoidance Index and the Long/Short Term

[15] We use the term 'mistrust' to capture the antithesis of trust. It is based on the response 'Need to be very careful' to the WVS trust question.

Orientation Index. Finally, Model 3 includes all individual characteristic controls plus both cultural differences control variables – the UAI and the LTO, the economic freedom index and the financial development index, as shown in Tables 2 and 3.

Results presented in Table 2 indicate a negative and statistically significant effect of mistrust on the number of tweets and Google trends for the three cryptocurrencies in both univariate and multivariate setups. This suggests that societal trust is positively related to the number of tweets and the attention cryptocurrencies are receiving. This is surprising given the anonymity and the consequent perceived risk of cryptocurrencies. These results seem consistent with the findings of Dirks and Ferrin (2001), who postulate that in low rule-based environments, a new and higher form of trust is likely to emerge. This is evident in the perceived trust in cryptocurrencies for the selected sample despite their unregulated nature.

[Table 2 here]

Similarly, using cryptocurrency addresses (active addresses, sending addresses, receiving addresses, new addresses and total addresses) we find a negative and statistically significant effect of mistrust on cryptocurrency adoption in Table 3 indicating that lower mistrust leads to more users and higher adoption of cryptocurrencies, which is consistent with our previously stated hypotheses.

[Table 3 here]

Uncertainty avoidance has a statistically significant and positive effect on interest in cryptocurrency and its adoption. A high score on uncertainty avoidance indicates that individuals are uncomfortable with uncertain and ambiguous situations (Hofstede et al., 2010; Yoo et al., 2011).

Our results show a positive and statistically significant relationship between UAI and interest in cryptocurrencies and their adoption indicating that discomfort with uncertainty and ambiguity in the future propels individuals closer to the new and risky asset class - cryptocurrencies (Luo et al., 2021). Interestingly, for the relationship between UAI and market cap of Bitcoin and Ethereum, variable, we observe coefficient values close to zero. We interpret these results to suggest that contrary to expectations, the Uncertainty Avoidance Index (UAI) and Long/Short Term Orientation Index (LTO) do not affect market capitalization of cryptocurrencies. This points to the speculative nature of the cryptocurrency market.

We observe interesting results with LTO estimates. Higher scores indicate a pragmatic approach in life, while lower scores show a normative, short-term vision. We find that estimates are negative and statistically significant in all models for both interest in and adoption of cryptocurrencies. That might then indicate that both interest in and adoption of cryptocurrencies are considered with a short-term perspective, rather than a well-planned, futuristic one. This might indicate a general trend of impulsive investing in crypto assets, which is logical given the high volatility and risk inherent in this asset class. These findings can be explained by the results reported by Rhue (2018) who examines the relationship between trust and risk for 5,000 Ethereum tokens. The results show that transaction history, information, reputation and third-party alliances are important determinants of the tokens' predictive risk and perceived trust. Furthermore, while overall perceived trust was generally lower for riskier tokens, tokens under SEC investigation continued to have relatively high scores of perceived trust. This highlights the role of market information and trading activity in influencing the investors' perception of risk associated with digital asset. Besides, the reputation and trading volume of large and well-known cryptocurrencies like Bitcoin, Ethereum and Litecoin would make these cryptocurrencies more trustworthy than other digital tokens, especially in the short-term, and may end up mitigating the negative impact of concerns expressed. Thus, investors from countries with higher levels of societal trust can be

expected to invest more in this asset class, ignoring the existing ethical and environmental concerns surrounding their generation.

Overall, our results provide evidence in support of the argument that interpersonal trust has a positive impact on innovation adoption (e.g., Pavlou, 2003; Pavlou and Gefen, 2004; Kirs and Bagchi, 2012; Alalwan et al. 2018; etc.), financial market development (Guiso et al., 2004; Guiso, Sapienza and Zingales, 2008) and financial inclusion (Xu, 2020).

The potential link between trust and crypto adoption can emerge from the following potential sources. First, following Kong at al. (2021) who document that trust plays a more important role in promoting innovation when formal institutions are lacking, and given that the crypto market lacks formal institutions and regulation, trust can play a crucial role in further adoption of these contemporary financial assets.

Second, Guiso et al. (2008) provide evidence that less trusting individuals are less likely to participate in financial markets, showing that lack of trust is an essential factor in explaining the limited participation puzzle. Existing studies show that it is optimal for individuals to hold at least some stocks in their portfolio (Andersen & Nielson, 2011). Households, however, do not often follow the portfolio theory and tend to avoid risky financial assets. This leads to welfare loss resulting from nonparticipation in the stock market (Cocco et al., 2005). An increase of stock market participation could have a positive effect on social welfare and personal lifetime income and consumption (Campbell, 2006). Ampudia & Ehrmann (2017) estimate that stock market participation, particularly in Europe, can plummet even further. A potential reason cited is the high cost of stock market participation, estimated between 4% and 6% of labor income on average (Khorunzhina, 2013). Since stock market participation costs are higher for first-time investors, a low (and decreasing) participation rate of can potentially have a negative effect in the future. This might open up the possibility to consider participation for individuals in the crypto asset market, that does not entail high costs of participation.

Third, when an education level is lower, less educated people rely more on trust in making their economic decisions (Pevzner et al. 2015). Given that crypt literacy is low[16], a role of trust becomes dominating. Promoting financial literacy, especially related to highly speculative crypto assets potentially encourages more diversified portfolios.

5. Conclusion

Even as cryptocurrency markets continue to attract investor interest at a global scale, research on their eco-print and ethical dimension has only just begun (e.g., Angel and Mc Cabe, 2015). In this paper, we investigate the role of interpersonal trust on interest in and adoption of three cryptocurrencies that have played an important role in development and shaping the digital asset ecosystem- Bitcoin, Ethereum, and Litecoin. This question remains relevant for two primary reasons: (1) the unique risk-return combination that cryptos offer – a rather robust and foolproof blockchain technology coupled with high degrees of anonymity and personal non-identification. (2) the high environmental footprint of the Bitcoin which raises serious ethical and environment concerns about the asset. Chen et al. (2010) document higher consumer awareness about environmental concerns amidst rising concerns about global warming. This makes our study a timely one.

Using Point-Biserial correlation and GLMs, we find that societal trust and cultural values affect interest in cryptocurrencies and their adoption. Specifically, our results indicate a negative and statistically significant effect of mistrust on interest in the three cryptocurrencies using the number of tweets and Google trends in both univariate and multivariate setups. Similarly, we find a negative and statistically significant effect of mistrust on cryptocurrency adoption using cryptocurrency addresses and market capitalization as proxies. In terms of cultural dimensions,

[16] For instance, 96% in the U.S. and 99% in Mexico and Brazil failed the crypto literacy assessment (source: cryptoliteracy.org)

uncertainty avoidance has a positive and statistically significant effect on interest in cryptocurrency and its adoption, indicating that contrary to popular belief about investor rationality and risk aversion, uncertainty and ambiguity increase the interest in cryptocurrencies and their adoption. On the other hand, the Long-term orientation versus short term normative orientation index estimates remain negative and statistically significant across all models, indicating the role of 'impulse' and myopic vision in cryptocurrency investing. We acknowledge that in the context of interpersonal trust, it is reasonable to include controls such as integrity, honesty and ability. However, given the non-availability of this data at an inter-country level as is required in this study, we are unable to include these variables.

These results are important for various audiences - cryptocurrency market participants, developers, market regulators and Governments. For cryptocurrency investors, it is enlightening to understand the role of impulse of a small investor group in cryptos, which end up protecting short-term investment returns for all the rest. For cryptocurrency developers, it will be important to acknowledge that in countries with higher degree of uncertainty avoidance, cryptocurrencies will eventually have to face higher levels of scrutiny with respect to their ethical, social, and environmental footprint. This highlights the need for greater trust building in a phased and planned manner, to ensure the continuity of the asset class in the long term in these geographies. For market regulators, our results are rather alarming given that in high interpersonal trust countries, ethical or environmental concerns around cryptocurrencies do not in fact stop investors from pursuing high profits, highlighting the mitigating role of interpersonal trust in ethical considerations. Here it must be noted that in the context of rising ethical and sustainability concerns associated with cryptocurrencies, our results seem to highlight interpersonal trust as only one of the various potential channels through which ethical concerns related to the asset class seem to be mitigated.

This may necessitate the creation and enforcement of well-designed and uniformly applied rules, to mitigate the potential threat to financial stability. Our results are useful for governments around the world, who continue to be differed in their opinions regarding the use and regulation

of cryptocurrencies. The Edelman Trust Barometer (2022) finds that trust in the government fell for 17 out of 27 countries surveyed, a phenomenon made worse by the ongoing COVID-19 crisis with all its socio-economic implications. In fact, in 23 of the 28 markets studied, people demonstrated greater trust in businesses than their government. These alarming statistics in addition to our results highlight the compelling need for governments round the world to undertake measures to restore institutional trust and foster interpersonal trust, given that macroeconomic, financial and political stability require sufficient levels of both institutional and interpersonal trust (Buriak et al., 2019).

In summary, this research offers a step towards an overall understanding of the role of trust in cryptocurrency adoption. Our results contribute to literature that documents the positive role of interpersonal trust on financial development (Guiso et al., 2004; Guiso, Sapienza and Zingales, 2008). The findings also confirm the hypothesis of Kong at al. (2021) that trust plays an important role in promoting innovation when formal institutions are lacking. The paper also provides supporting evidence to research on the role of personal and societal values in investment decision-making (Pasewark and Riley, 2009).

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Tables and Figures

Table 1. Point-Biserial Correlation with "Need to be very careful"

Variables (growth)	Biserial correlation
Bitcoin Tweets	-0.02025
Ethereum Tweets	-0.01051
Litecoin Tweets	-0.01108
Bitcoin Google Trends	-0.00967
Ethereum Google Trends	-0.01381
Litecoin Google Trends	-0.00815
BTC Active Adresses	-0.01418
BTC Sending Adresses	-0.013
BTC Receiving Adresses	-0.01616
BTC New adresses	-0.01784
BTC Total Adresses	-0.01674
ETH Active Adresses	-0.01023
ETH Sending Adresses	-0.01894
ETH Receiving Adresses	-0.01053
ETH New adresses	-0.00893
ETH Total Adresses	-0.01311
LTC Active Adresses	-0.01053
LTC Sending Adresses	-0.00932
LTC Receiving Adresses	-0.01094
LTC New adresses	-0.00983
LTC Total Adresses	-0.00429
BTC Market Cap	-0.00865
ETH Market Cap	-0.00823
LTC Market Cap	-0.00434

Note: Statistics is significant at 5% level.

Table 2. GLM estimates of effects of trust on interest in the cryptocurrencies

Dependent variable (in growth)	Model 1: Only individual characteristics	Model 2: Individual and cultural characteristics			Model 3. Individual, cultural, economic freedom and financial development characteristics				
	Lack of trust	Lack of trust	UAI	LTO	Lack of trust	UAI	LTO	Economic Freedom	Financial development
1. Number of tweets									
Bitcoin	-0.00076 ***	-0.00087 ***	0.00002 ***	-0.00003 ***	-0.00093 ***	0.00002 ***	-0.00003 ***	-0.00004 ***	0.00101 ***
Ethereum	-0.00048 ***	-0.00075 ***	0.00003 ***	-0.00001 ***	-0.0009 ***	0.00001 ***	-0.00001 ***	-0.00003 ***	-0.00028 ***
Litecoin	-0.00074 *	-0.00129 ***	0.00003 ***	-0.00005 ***	-0.00126 ***	0.00003 ***	-0.00006 ***	-0.00006 ***	0.00281 ***
2. Google Trends									
Bitcoin	-0.00053 ***	-0.00103 ***	0.00007 ***	-0.00006 ***	-0.0014 ***	0.00005 ***	-0.00006 ***	-0.00016 ***	0.0002 ***
Ethereum	-0.00175 ***	-0.00403 ***	0.00023 ***	-0.00021 ***	-0.00513 ***	0.00016 ***	-0.00021 ***	-0.0005 ***	0.00184
Litecoin	-0.00060 *	-0.00218 ***	0.00018 ***	-0.00016 ***	-0.00296 ***	0.00013 ***	-0.00016 ***	-0.00039 ***	0.00159

Note: i) We report coefficients related only to the variables of interest; ii) First difference transformation is applied to the dependent variables. iii) Model 1 contains control variables in terms of individual characteristics, i.e., "Sex", "Age", "Marital status", "Education level", "Employment status", and "Scale of incomes", "Confidences". Model 2 includes all individual characteristic as Model 1 plus the Uncertainty Avoidance Index, the Long term orientation versus short term normative orientation. Model 3 includes all the characteristics as Model 2 plus the Index of Economic Freedom and Index of financial development. iv) Significance codes: 0 '***', 0.001 '**', 0.01 '*', 0.05 '.', 0.1 ' '.

Table 3. GLM estimates of effects of trust on adoption of the cryptocurrencies

Dependent variable (in growth)	Model 1: Only individual characteristics	Model 2: Individual and cultural characteristics			Model 3. Individual, cultural, economic freedom and financial development characteristics				
	Lack of trust	Lack of trust	UAI	LTO	Lack of trust	UAI	LTO	Economic freedom	Financial development
1. Number of Active Addresses									
Bitcoin	-0.00104 ***	-0.00226 ***	0.0001 ***	-0.00009 ***	-0.00274 ***	0.00007 ***	-0.00009 ***	-0.00021 ***	0.00101
Ethereum	-0.00048 ***	-0.00068 ***	0.00001	-0.00001 ***	-0.00078 ***	0.00001 ***	-0.00001 ***	-0.00003 ***	0.00023
Litecoin	-0.00038 ***	-0.00076 ***	0.00003 ***	-0.00003 ***	-0.00093 ***	0.00002 ***	-0.00003 ***	-0.00007 ***	0.00018
2. Number of Sending Addresses									
Bitcoin	-0.00110 ***	-0.00263 ***	0.00012 ***	-0.00011 ***	-0.0032 ***	0.00008 ***	-0.00011 ***	-0.00026 ***	0.00137
Ethereum	-0.00137 ***	-0.00226 ***	0.00009 ***	-0.00008 ***	-0.00267 ***	0.00006 ***	-0.00009 ***	-0.00019 ***	0.00134
Litecoin	-0.00048 ***	-0.00108 ***	0.00005 ***	-0.00005 ***	-0.00133 ***	0.00003 ***	-0.00005 ***	-0.00011 ***	0.00055
3. Number of Receiving Addresses									
Bitcoin	-0.00106 ***	-0.00192 ***	0.00007 ***	-0.00007 ***	-0.00231 ***	0.00005 ***	-0.00007 ***	-0.00016 ***	0.00063
Ethereum	-0.00046 ***	-0.00055 ***	0.00002 ***	-0.00002 ***	-0.00067 ***	0.00001 ***	-0.00002 ***	-0.00004 ***	-0.00005
Litecoin	-0.00038 ***	-0.00053 ***	0.00001 ***	-0.00001 ***	-0.00063 ***	0.00001 ***	-0.00001 ***	-0.00003 ***	0.00006
4. Number of new addresses									
Bitcoin	-0.00074 ***	-0.0013 ***	0.00005 ***	-0.00005 ***	-0.00157 ***	0.00004 ***	-0.00005 ***	-0.00011 ***	0.00037
Ethereum	-0.00025 ***	-0.00022	0.00001	-0.00001	-0.0003	0.00001	0.0000001	-0.00002	-0.0002

		***	***	***	**	***	**	***	
Litecoin	-0.00028 ***	-0.00041 ***	0.00001 ***	-0.00001 ***	-0.00049 ***	0.00001 ***	-0.00001 ***	-0.00002 ***	-0.00006
5. Number of total addresses									
Bitcoin	-0.00073 ***	-0.0014 ***	0.00006 ***	-0.00006 ***	-0.00177 ***	0.00005 ***	-0.00005 ***	-0.00014 ***	0.00000001
Ethereum	-0.00064 ***	-0.00161 ***	0.0001 ***	-0.00009 ***	-0.00209 ***	0.00007 ***	-0.00009 ***	-0.00021 ***	0.00054
Litecoin	-0.00044 ***	-0.00214 ***	0.00016 ***	-0.00012 ***	-0.00313 ***	0.00011 ***	-0.00011 ***	-0.00035 ***	-0.00168 ***
6. Market cap									
Bitcoin	-0.00003	-0.00009	0.0000001	-0.0000001	-0.00008	0.00000001	-0.0000001 **	0.0000001	0.00010
Ethereum	-0.00005	-0.00012	0.0000001	-0.0000001 ***	-0.00008	-0.000000001	-0.0000001	0.00001 ***	0.00032
Litecoin	-0.00002	-0.00015 ***	0.0000001 ***	-0.0000001	-0.00015 **	0.0000001 ***	-0.0000001 ***	-0.00001	0.00016

Note: i) We report coefficients related only to the variables of interest; ii) First difference transformation is applied to the dependent variables. iii) Model 1 contains control variables in terms of individual characteristics, i.e., "Sex", "Age", "Marital status", "Education level", "Employment status", and "Scale of incomes", "Confidences". Model 2 includes all individual characteristic as Model 1 plus the Uncertainty Avoidance Index, the Long term orientation versus short term normative orientation. Model 3 includes all the characteristics as Model 2 plus the Index of Economic Freedom and Index of financial development. iv) Significance codes: 0 '***', 0.001 '**', 0.01 '*', 0.05 '.', 0.1 ' '.

Appendix

Table A1. Categorical variables used in the study

Title	Question text	Categories	WVS wave 7 (2017-2021) variable
Most people can be trusted	Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?	1 Most people can be trusted 2 Need to be very careful -1 Don´t know -2 No answer -4 Not asked	Q57
Sex	Sex	1 Male 2 Female -1 Don´t know -2 No answer -4 Not asked -5 Missing; Unknown	Q260
Age		-5 Missing; Unknown -4 Not asked in survey -3 Not applicable -2 No answer -1 Don't know	Q262
Marital status	Are you currently	1 Married 2 Living together as married 3 Divorced 4 Separated 5 Widowed 6 Single/Never married -2 No answer -4 Not asked	Q273
Education level (recoded)		1 Lower 2 Middle 3 Upper -5 Missing; Unknown -4 Not asked in survey -3 Not applicable	Q275R

		-2 No answer -1 Don´t know	
Employment status	Are you employed now or not? IF YES: About how many hours a week?	1 Full time 2 Part time 3 Self-employed 4 Retired 5 Housewife 6 Students 7 Unemployed 8 Other -2 No answer -5 Missing; Unknown	Q279
Scale of incomes	On this card is an income scale, where 1 indicates the lowest, and 10, the highest income group in your country. We would like to know in what group your household is. Please, specify the appropriate number, counting all wages, salaries, pensions and other incomes that come in.	1 Lower step 2 second step 3 Third step 4 Fourth step 5 Fifth step 6 Sixth step 7 Seventh step 8 Eighth step 9 Nineth step 10 Higher step -5 Missing; Unknown -4 Not asked in survey -3 Not applicable -2 No answer -1 Don´t know	Q288

Confidence: The Government	I am going to name a number of organizations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all? The government (in your nation's capital)	1.- A great deal 2.- Quite a lot 3.- Not very much 4.- None at all -1-.- Don´t know -2-.- No answer -4-.- Not asked -5-.- Missing;Not available	Q71
Confidence: Parliament	I am going to name a number of organizations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all?	1.- A great deal 2.- Quite a lot 3.- Not very much 4.- None at all -1-.- Don´t know -2-.- No answer -4-.- Not asked -5-.- Missing; Not available	Q73

Confidence: The Political Parties	I am going to name a number of organizations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all?	1.- A great deal 2.- Quite a lot 3.- Not very much 4.- None at all -1-.- Don´t know -2-.- No answer -4-.- Not asked -5-.- Missing; Not available	Q72
Confidence: Banks	I am going to name a number of organizations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all?	1.- A great deal 2.- Quite a lot 3.- Not very much 4.- None at all -1-.- Don´t know -2-.- No answer -4-.- Not asked -5-.- Missing; Unknown	Q78

Source: World Values Survey (WVS); 7th wave.

Table A2. General statistics - categorical variables

variables	levels	N	freq	%	rank
Q57	2	70867	54838	77.38157	1
Q57	1	70867	15102	21.31034	2
Q57	NA	70867	927	1.308084	3
Q260	2	70867	37243	52.55337	1
Q260	1	70867	33573	47.37466	2
Q260	NA	70867	51	0.071966	3
Q262	30	70867	1958	2.762922	1
Q262	35	70867	1863	2.628868	2
Q262	40	70867	1772	2.500459	3
Q262	25	70867	1753	2.473648	4
Q262	45	70867	1708	2.410149	5
Q262	28	70867	1636	2.30855	6
Q262	20	70867	1576	2.223884	7
Q262	24	70867	1572	2.21824	8
Q262	38	70867	1569	2.214007	9
Q262	32	70867	1565	2.208362	10
Q273	1	70867	40927	57.75185	1
Q273	6	70867	16366	23.09396	2
Q273	2	70867	4829	6.814173	3
Q273	5	70867	4008	5.655665	4
Q273	3	70867	2818	3.976463	5
Q273	4	70867	1580	2.229529	6
Q273	NA	70867	339	0.478361	7
Q275R	2	70867	24756	34.93304	1
Q275R	1	70867	24093	33.99749	2
Q275R	3	70867	21424	30.23128	3
Q275R	NA	70867	594	0.83819	4
Q279	1	70867	24857	35.07556	1
Q279	3	70867	10853	15.3146	2
Q279	5	70867	10655	15.03521	3
Q279	4	70867	7818	11.03193	4
Q279	2	70867	5738	8.096857	5
Q279	7	70867	5412	7.636841	6
Q279	6	70867	3918	5.528666	7
Q279	NA	70867	846	1.193786	8
Q279	8	70867	770	1.086542	9
Q288	5	70867	16977	23.95614	1
Q288	6	70867	10116	14.27463	2
Q288	4	70867	9845	13.89222	3
Q288	3	70867	8039	11.34378	4
Q288	7	70867	7541	10.64106	5
Q288	1	70867	6156	8.686695	6

Q288	2	70867	4390	6.194703	7
Q288	8	70867	3776	5.328291	8
Q288	NA	70867	1722	2.429904	9
Q288	10	70867	1254	1.769512	10
Q71	2	70867	21523	30.37097	1
Q71	3	70867	20655	29.14614	2
Q71	4	70867	15419	21.75765	3
Q71	1	70867	10631	15.00134	4
Q71	NA	70867	2639	3.723877	5
Q72	3	70867	25998	36.68562	1
Q72	4	70867	22098	31.18236	2
Q72	2	70867	15427	21.76895	3
Q72	1	70867	4863	6.86215	4
Q72	NA	70867	2481	3.500924	5
Q73	3	70867	23805	33.59109	1
Q73	4	70867	19021	26.84042	2
Q73	2	70867	18744	26.44955	3
Q73	1	70867	6764	9.54464	4
Q73	NA	70867	2533	3.574301	5
Q78	2	70867	27050	38.17009	1
Q78	3	70867	20100	28.36299	2
Q78	1	70867	11117	15.68713	3
Q78	4	70867	10408	14.68667	4

Table A3. General statistics - continuous variables (growth transformed)

variables	min	Q1	mean	median	Q3	max
Bitcoin Tweets	-0.22051	-0.06917	-0.06737	-0.06917	-0.06917	0.286717
Ethereum Tweets	-0.31626	0.030754	0.030907	0.030754	0.030754	0.470436
Litecoin Tweets	-0.61174	-0.16768	-0.1638	-0.16768	-0.16768	3.474929
Bitcoin Google Trend	-0.26045	-0.0597	-0.05735	-0.0597	-0.0597	0.377595
Ethereum Google Trend	-0.36047	-0.20786	-0.20039	-0.20786	-0.20786	0.836737
Litecoin Google Trend	-0.30028	-0.21775	-0.21096	-0.21775	-0.21775	0.500349
BTC Active Addresses	-0.37017	-0.07543	-0.0721	-0.07543	-0.07543	0.552267
BTC Sending Addreses	-0.43853	-0.09914	-0.09491	-0.09914	-0.09914	0.79343
BTC Receiving Addresses	-0.32434	-0.04548	-0.04305	-0.04548	-0.04548	0.452296
BTC New addresses	-0.14863	-0.03498	-0.03325	-0.03498	-0.03498	0.245179
BTC Total Addresses	0.430622	0.627535	0.629283	0.627535	0.627535	0.910463
ETH Active Addresses	-0.39384	-0.00932	-0.00882	-0.00932	-0.00932	0.654909
ETH Sending Addreses	-0.55991	-0.0929	-0.08971	-0.0929	-0.0929	1.466967
ETH Receiving Addresses	-0.20924	-0.01187	-0.01124	-0.01187	-0.01187	0.392318
ETH New addresses	-0.15215	-0.00072	-0.00055	-0.00072	-0.00072	0.233283
ETH Total Addresses	0.167819	0.213393	0.216404	0.213393	0.213393	0.470831
LTC Active Addresses	-0.33167	-0.01683	-0.01597	-0.01683	-0.01683	0.527884

LTC Sending Addreses	-0.42372	-0.03371	-0.03211	-0.03371	-0.03371	0.984131
LTC Receiving Addresses	-0.13806	-0.00513	-0.00474	-0.00513	-0.00513	0.205555
LTC New addresses	-0.11772	-0.00249	-0.00224	-0.00249	-0.00249	0.134943
LTC Total Addresses	0.318493	0.400448	0.403289	0.400448	0.400448	0.687846
Bitcoin Market Cap	-0.09828	-0.00327	-0.00316	-0.00327	-0.00327	0.104732
Ethereum Market Cap	-0.15112	-0.01085	-0.01078	-0.01085	-0.01085	0.171665
Litecoin Market Cap	-0.12896	-0.01355	-0.01333	-0.01355	-0.01355	0.12618