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CRYPTOCURRENCIES, STABLECOINS AND CENTRAL BANK DIGITAL CURRENCIES: THE IMPACT OF TRUST AND PERCEIVED RISK

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Research in Progress

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Abstract

Financial technology is undergoing rapid developments with the arrival of cryptocurrencies, the introduction of stablecoins, and more recently the discussion surrounding central bank digital currencies. The adoption of these technologies has received significant attention, but there has not yet been any research as to how the adoption factors for the three currencies differ, given their inherent similarities. This paper proposes to estimate the effect of trust and perceived risk on the adoption intention of the three aforementioned payment systems by creating three closely-matched questionnaires for each digital currency. This will enable us to estimate the effects of risk and trust in a way that makes it possible to compare the effect sizes for the different technologies, and can help evaluate whether a reduction of perceived market risk is sufficient for cryptocurrency adoption, and whether backing by the central bank may confer more benefits to adoption than the trustlessness touted for cryptocurrencies.

Keywords: technology adoption, adoption intention, cryptocurrencies, central bank digital currencies.

1 Introduction

Over the past decades, financial technology has undergone massive changes, from online-banking enabling users to transfer money without leaving their home (Aladwani, 2001) and mobile banking allowing payments anywhere (Shaikh and Karjaluoto, 2015), to cryptocurrencies allowing transactions without trusted intermediaries (Nakamoto, 2008) and most recently discussions about the introduction of central bank digital currencies (CBDC), which would enable individuals to hold electronic forms of central bank money which were previously limited to commercial banks (Bech and Garratt, 2017). However, unlike electronic and mobile banking, cryptocurrencies have not achieved significant acceptance by individuals for everyday transactions, and are more often used as an investment vehicle (Glaser et al., 2014; Jonker, 2018), with research pointing to the significant price risk as a primary reason (Yermack, 2015). This led to the introduction of stablecoins, which generally function similar to classical cryptocurrencies via blockchains, but aim to have their exchange rate fixed relative to an external unit of account, like the US Dollar (Lyons and Viswanath-Natraj, 2020). This development also accelerated research on the introduction of central bank digital currencies, which would enable ordinary citizens to hold digital forms of central bank money, something that is currently the exclusive privilege of financial institutions (Auer and Böhme, 2020; Auer, Cornelli, and Frost, 2020; Auer, Frost, et al., 2022; Tronnier, Recker, and Hamm, 2020; Ward and Rochemont, 2019). Plans for these currencies usually incorporate distributed ledger technology similar to that used for cryptocurrencies (Bech and Garratt, 2017), but that is no strict requirement, such as in the case of the Chinese e-CNY, which is completely supervised by the People's Bank of China (Laskai, 2022). From the perspective of individuals, both stablecoins and CBDC offer a digital payment option generally without large price volatility, although some stablecoins had

a dramatic collapse in value that broke their stabilization mechanisms (Briola et al., 2022). The main difference between these two then derives from how stablecoins generally build on public peer-to-peer protocols for money creation, while CBDC are universally emitted and backed by central banks (Bech and Garratt, 2017). This is notable, as even though cryptocurrencies are generally touted as "trust-less", usually in a narrow sense indicating that verification by third parties is unnecessary (Chohan, 2019), lack of trust has been identified as one of the main reasons for the lagging acceptance of cryptocurrencies as means of payments (Albayati, S. K. Kim, and Rho, 2020; Sas and Khairuddin, 2017; Voskobojnikov, Abramova, et al., 2021; Voskobojnikov, Obada-Obieh, et al., 2020), as individuals may distrust parts of the wider ecosystem. Thus, the central banks may lend their credibility to a CBDC, which in turn enables these currencies to receive trust that would not be granted to peer-to-peer cryptocurrencies or stablecoins, although trust in central banks should not always be considered as just given (Wälti, 2012). This allows us to differentiate between non-stablecoin cryptocurrencies (which we will refer to as classical cryptocurrencies if necessary to differentiate them from stablecoins), stablecoins and CBDC by how the first two universally rely on peer-to-peer transactions without third-party validation, which means that trust should affect them differently than CBDC. Furthermore, both stablecoins and CBDC should in general exhibit significantly higher price stability than classical cryptocurrencies, which means that price risk and by extension overall perceived risk should affect the former differently than the latter. We intend to use this view and employ technology acceptance theory to evaluate whether perceived risk or trust are necessary or sufficient predictors of currency adoption intention. This question is relevant, as CBDC offer opportunities for the stability of the financial system, and may support financial inclusion especially in developing markets (Auer, Frost, et al., 2022), and to achieve their full potential they have to avoid the issues that stopped cryptocurrencies like Bitcoin as well as stablecoins from finding wide adoption. Thus, our research questions are:

RQ1 How do trust and risk affect the adoption intention for classical cryptocurrencies, stablecoins, and CBDC?

RQ2 Does the effect and interaction between trust and risk differ for these three technologies?

To the best of our knowledge, this is the first paper looking at these three technologies at the same time from the perspective of technology adoption. Bolt, Lubbersen, and Wierts (2022) consider all three currencies from the perspective of monetary policy. Meanwhile, Allen, Gu, and Jagtiani (2022) review these technologies together with fintech with regards to regulatory policy in China.

2 Literature Review

2.1 Theoretical Background

The process of technology adoption has led to a wealth of research, with the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1977), the Theory of Planned Behavior (TPB) (Ajzen, 1991), the Technology Acceptance Model (TAM) (Davis, 1989), and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, et al., 2003) probably being the most influential. The TRA explains the behavior of users as driven by *behavioral intentions*, which in turn are motivated by the individual's *attitudes* and *subjective norms* (Fishbein and Ajzen, 1977), and was later expanded to consider *perceived behavioral control* in the Theory of Planned Behavior (Ajzen, 1991). The TAM incorporates *behavioral intention* as a precedent of actual *usage behavior* from the TRA, and introduces the constructs of *perceived usefulness* and *perceived ease of use* as drivers of *behavioral intention* (Davis, 1989), while the UTAUT extends the TAM by adding *social influence* as a predictor of *behavioral intention*, as well as *facilitating conditions* as a predictor of actual *use behavior* (Venkatesh, Morris, et al., 2003). These models have found widespread success in a variety of applications and domains (Im, Hong, and Kang, 2011; Madden, Ellen, and Ajzen, 1992; Marangunić and Granić, 2015; Venkatesh and Davis, 2000; Williams, Rana, and Dwivedi, 2015).

2.2 Related Work

In the realm of transaction processing and payment services, Pavlou (2003) considered the case of electronic commerce, incorporating the concepts of *perceived risk* and *trust* to the TAM in order to capture the uncertainty of e-commerce transactions that lack the usual face-to-face component customers were used to. In his model, *trust* affects *perceived risk*, the other TAM antecedents, and the *intention to transact* directly. He also finds evidence for *reputation* being an antecedent of both *perceived risk* and *trust*, and *satisfaction with past transaction* being an antecedent of the latter (Pavlou, 2003). Gefen, Karahanna, and Straub (2003) incorporate *trust* in the TAM in an alternative way, positing that *perceived ease of use* affects *trust*, and incorporating *calculative-based beliefs*, *perceptions of structural assurances*, *perception of situational normality*, and *knowledge-based familiarity* as trust antecedents, with the latter two also assumed to affect *perceived ease of use*. The following survey did not find a statistically significant direct effect of *knowledge-based familiarity* on *trust*, although there still was an indirect effect via *perceived ease of use* (Gefen, Karahanna, and Straub, 2003).

For cryptocurrencies, Abramova and Böhme (2016) applied the TAM to the adoption of Bitcoin, replacing *perceived usefulness* with the related *perceived benefit*, and adding *perceived risk* as another construct affecting usage behavior, where the former is influenced by *transaction processing*, *security* and *control*, as well as *decentralization*, while the latter is represented by *financial losses*, *legal risk*, *operational risk*, and *adoption risk*. They found that the overall effect of *perceived risk* both had a strong effect size as well as a high statistical significance, while *perceived benefit* has a comparably smaller (albeit still statistically significant) effect (Abramova and Böhme, 2016). Albayati, S. K. Kim, and Rho (2020) adapt the TAM in a different way, adding *trust* as a predictor to *perceived ease of use* and *attitude*, with *trust*, perceived *ease of use*, and *perceived usefulness* all affecting *attitude*, which in turn predicts *adoption intention*. The exogenous variables are *social influence* affecting *perceived usefulness* and *trust*, *design* affecting *perceived ease of use*, and *regulatory support* as well as *experience* affecting *trust*. They found all of their hypotheses supported (Albayati, S. K. Kim, and Rho, 2020). Arias-Oliva, Pelegrín-Borondo, and Matías-Clavero (2019) employ the influencing factors from the UTAUT model and add *perceived risk* and *financial literacy* as additional constructs influencing the *intention to use* cryptocurrencies. They found that neither *perceived risk* nor *financial literacy* are significant factors for *adoption intention*, and neither is *social influence*. The strongest predictor was *performance expectancy*, followed by *facilitating conditions*, with both being statistically highly significant. *Effort expectancy* had an overall smaller effect and exhibited smaller statistical significance.

More recently, non-users of cryptocurrencies have received more attention. Initially only considered by Gao, Clark, and Lindqvist (2016), who conducted a small-scale interview study and found lack of self-efficacy, i.e. a belief on the part of the respondents that they are not capable of using Bitcoin, as the core obstacle. Voskobojnikov, Obada-Obieh, et al. (2020) conducted another interview study finding skewed risk perception as well as usability concerns to be significant inhibitors of cryptocurrency adoption. Finally, Voskobojnikov, Abramova, et al. (2021) conduct a quantitative study comparing users and non-users, and find that while *trust* significantly affects *adoption intention*, actual behavior is essentially all driven by *self-efficacy*.

While the adoption decision of stablecoins has to the best of our knowledge not been researched, there has been some work looking at CBDC. Söilen and Benhayoun (2021) conduct a survey to evaluate household acceptance of cryptocurrencies employing the UTAUT model extended by *trust* as a mediating variable connecting *effort expectancy* and *use behavior*. Bijlsma et al. (2021) look at the *intention to adopt* CBDC as a current or as a savings account. Using a probit model, they find *trust*, *high privacy preference* as well as interest rate differences to be statistically significant predictors of adoption intention.

There has been no paper looking at the adoption intention for classical cryptocurrencies, stablecoins, and CBDC in a model that allows direct comparisons between the effects of all three technologies, which is a

research gap we aim to close.

3 Research Model

This chapter describes the research model that was developed to measure the effect of *trust* and *perceived risk* on adoption intention. The main focus is to create a model that is equally applicable to each of the three technologies, such that any difference between estimated effects can be traced to differences in the perceptions towards these technologies, rather than differences in the specific wording of the questions. With this in mind, the model predicts adoption intention rather than adoption behavior, as CBDC are generally not beyond the pilot-phase and not even beyond the initial research phase in the Eurozone and the United States as of November 2022 (CBDCTracker, 2022). We define adoption intention as the belief that the respondent will use the currency if given the possibility (Fishbein and Ajzen, 1977, p. 12). The model and the hypotheses are very similar to the work by Voskobojnikov, Abramova, et al. (2021), albeit without including self-efficacy and security cost, as self-efficacy would be very hard to measure for CBDC due to the final form of the technology not yet being clear for many potential users. This is also why we do not consider *security cost*, which also features in their model. Our model is shown in Figure 1.

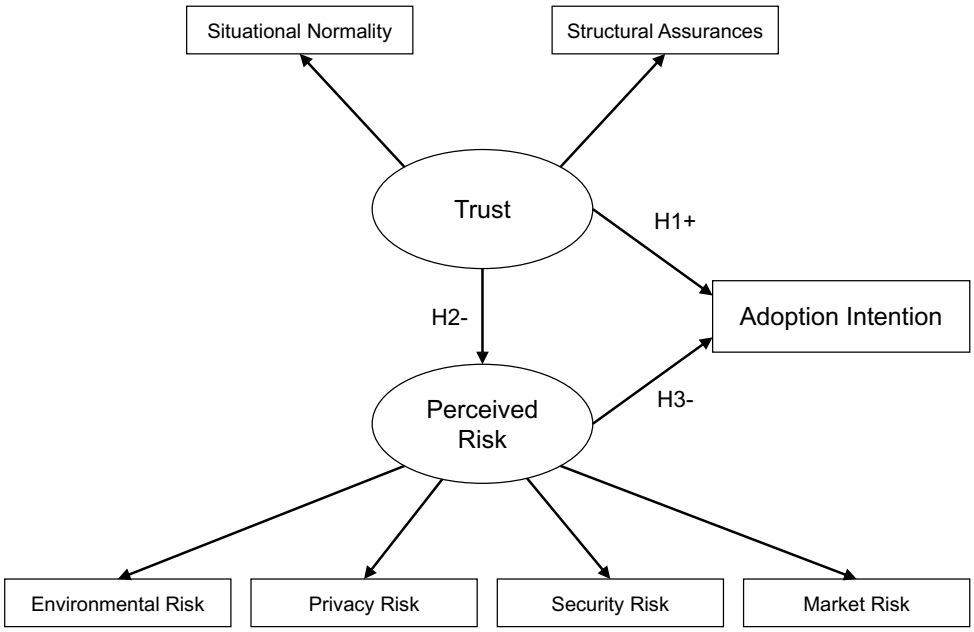

Figure 1. Research model

3.1 Trust

Trust has been consistently identified as an important factor in the adoption of cryptocurrencies (Albayati, S. K. Kim, and Rho, 2020; Mendoza-Tello et al., 2019; Ooi et al., 2021; Sas and Khairuddin, 2017; Shahzad et al., 2018; Voskobojnikov, Abramova, et al., 2021; Voskobojnikov, Obada-Obieh, et al., 2020) as well as CBDC (Bijlsma et al., 2021; Söilen and Benhayoun, 2021; Tronnier, Harborth, and Hamm, 2022). McKnight, Choudhury, and Kacmar (2002) model trust using personal *disposition to trust* and *institution-based trust* as antecedents of *trusting beliefs*, which together with the two aforementioned constructs affect *trusting intentions* and in turn behavior. Institutional trust is defined as having two dimensions: *structural assurances*, defining a belief in structures like regulations, guarantees or legal recourse to ensure success (McKnight, Choudhury, and Kacmar, 2002; McKnight, Cummings, and Chervany, 1998; Shapiro, 1987),

and *situational normality*, which defines a belief that belief that everything is in "proper order", such that a successful transaction is likely (McKnight, Choudhury, and Kacmar, 2002; McKnight, Cummings, and Chervany, 1998). Gefen, Karahanna, and Straub (2003) showed that the institutional-based constructs, together with calculative and familiarity-based trust positively affect perceived usefulness and intention to use in a TAM model examining online purchasing intentions, and Yousafzai, Pallister, and Foxall (2005) showed that these constructs are highly relevant for trust in electronic banking.

For cryptocurrencies, Albayati, S. K. Kim, and Rho (2020) demonstrate a positive relationship between *trust* and *perceived ease of use* as well as on *attitude towards adopting* blockchain-based cryptocurrency transactions, where they define *trust* as "the level of comfort, confidence, and security that consumers have when using technologies". Mendoza-Tello et al. (2019) incorporate *perceived trust* in a TAM-based model and show a positive effect of trust on the *intention to use* cryptocurrencies for monetary C2C transactions in e-commerce, as well as on *perceived usefulness*. They further show a negative effect of *perceived trust* on *perceived risk*, and employ *perceived ease of use* as an antecedent (Mendoza-Tello et al., 2019). Voskobojnikov, Abramova, et al. (2021) compare users and non-users of crypto-assets, and find that for non-users, *trust* significantly affects *perceived risk* and the *adoption intention*, while being positively influenced by *self-efficacy*. For a combined sample of users as well as non-users however, both effects of *trust* lose statistical significance, and *self-efficacy* becomes the only significant predictor of *behavioral intention* (Voskobojnikov, Abramova, et al., 2021).

As for CBDC, Bijlsma et al. (2021) research the effect of *narrow-scope trust in banks*, *broad-scope trust in banks* (where narrow-scope designates trust in the specific bank the respondents were clients of, while broad-scope meant trust in general), *trust in the central bank*, as well as *generalized trust*, which means trust in other people, on the intention to use CBDC for either current or savings accounts, finding that the adoption intention is positively influenced by trust in banks as well as the central bank. This fits in with research by Lockl and Stoetzer (2021), who have shown that *distrust in banks* does not have a significant effect on the behavioral intention to use decentralized finance, showing that trust in institutions and trust in these kinds of technologies is not interchangeable. Söilen and Benhayoun (2021) use the UTAUT model and employ trust as a mediator variable, being affected by *effort expectancy* and in turn affecting *usage behavior* positively. Finally, Tronnier, Harborth, and Hamm (2022) employ the APCO model (Smith, Dinev, and Xu, 2011) to show the influence of *trust* as well as *privacy concerns* on the *willingness to use* a Digital Euro, with both hard trust factors (liquidity, fungibility, and stability) as well as soft ones (credibility, image, and security) having a positive and statistically significant effect on *the willingness to use* the Digital Euro, with the soft factors also having a negative statistically significant effect on *privacy concerns*.

As we have shown, trust has been found to have a positive effect on adoption intention and a negative connection to perceived risk. Thus we hypothesize that:

H1 Trust will positively affect the intention to adopt classical cryptocurrencies, stablecoins, or CBDC.

H2 Trust will negatively affect the perceived risk of classical cryptocurrencies, stablecoins, or CBDC.

3.2 Perceived Risk

Perceived risk is one of the key factors differentiating e-commerce from more classical brick-and-mortar business (Y. H. Kim and D. J. Kim, 2005; K. S. Lee, H. S. Lee, and S. Y. Kim, 2007), and has been shown to be relevant for the adoption of cryptocurrencies (Abramova and Böhme, 2016; Mendoza-Tello et al., 2019; Voskobojnikov, Abramova, et al., 2021), although it has received less attention for CBDC, where it has essentially been limited to financial and privacy-risks related to cyberattacks (D. K. C. Lee, Yan, and Wang, 2021).

The first detailed study of how risk perceptions of cryptocurrencies affect adoption behavior was conducted for the case of Bitcoin by Abramova and Böhme (2016), who divided *perceived risk* into the categories *financial losses*, *legal risk*, *operational risk*, and *adoption risk*, and demonstrated that overall *perceived risk*

has a has a statistically significant negative effect on *usage behavior* in a TAM-based model. Mendoza-Tello et al. (2019) considered the use of cryptocurrencies in C2C transactions, and found *perceived risk* to be negatively affected by *trust*, and to itself have a negative effect on both *perceived usefulness* and *intention to use* in a TAM-model. In the work comparing users and non-users of crypto-assets by Voskobojnikov, Abramova, et al. (2021), *perceived risk* negatively affects *adoption intention* and *adoption behavior*, and is itself negatively affected by *self-efficacy* and *trust*, and positively by *security cost*. However, it should be noted that *perceived risk* did not have a statistically significant effect on *adoption*, which the authors explain through the similar risk perception of users and non-users (Voskobojnikov, Abramova, et al., 2021). This is consistent with Sarker, Hughes, and Dwivedi (2020), who conduct a meta-study of social commerce applications using UTAUT and identify that while *trust* is generally positively connected to social commerce use, *perceived risk* is found to have a statistically significant negative impact in half of the papers surveyed, with further work needed.
For this study, we employ the definition of Abramova and Böhme (2016), who define *perceived risk* as the perception of the uncertainty and negative consequences associated with using a digital currency. As the theoretical justification of considering *perceived risk* is overall sound and the empirical results not unambiguously negative, we hypothesize that:

H3 Perceived risk will negatively affect the intention to adopt classical cryptocurrencies, stablecoins, or CBDC.

4 Research Methodology and Pre-Test

4.1 Instrument Development

As our stated goal is to compare the effect of trust and perceived risk on the adoption of different technologies using the same model, we need to ensure that for each of the three digital currencies, each item is as close as possible to their equivalents for the other two technologies. Most of the items are based on the work by Voskobojnikov, Abramova, et al. (2021), including their risk model which considers *environmental risk*, *privacy risk*, *market risk*, and *security risk*. Although we expect most of the difference between the classical cryptocurrencies and the other to be driven by *market risk* first and foremost, we include all factors. We based our risk-related questions closely on theirs with the exception of *security risk*, as we did not find their items related to concerns on "the theft of private keys", "security vulnerabilities of wallets" and "security vulnerabilities of exchanges" to have obvious and clear equivalents for CBDC, due to these currencies not having exchanges as of yet, and the form of wallets not yet being defined in many cases (Morales-Resendiz et al., 2021). Thus, we replaced this with one item indicating concern about "theft of my funds due to security breaches". We employed a similar approach to the questions related to *trust*, including *situational normality* and *structural assurances*. The main changes here concerned the replacement of references to exchanges, which are the main marketplace for crypto-assets, but may not play such a role for CBDC. Specifically, we changed "I feel that existing safeguards adequately protect me when using crypto-asset exchanges" to "I feel that existing safeguards adequately protect me when acquiring classical cryptocurrencies.", and "I feel that most crypto-asset exchanges act in their customers' best interest" to "I feel that the developers of classical cryptocurrencies generally act in their users' best interest". The latter is to some extent a departure in meaning as exchanges are not "developers", but developers are the one group that exists and fulfills a similar role for each of the three currencies in question. Finally, for *adoption intention*, we employ items based on those employed by Albayati, S. K. Kim, and Rho (2020) for *behavioral intention*, as their wording considers that the respondents may not have access to the digital currency in question yet, which can be the case for CBDC. After finishing the initial set of questions, two researchers who were not involved in the creation of the questionnaire independently verified that for each item, the questions for each currency are equivalent. The completed questions are listed in Table 1, with classical cryptocurrencies shortened to CC and stablecoins shortened to SC, unlike in the version that respondents see.

Item	Currency	Question	Rererence
Please indicate to what extent do you agree or disagree with the following statements.			
SA1	CC	I feel confident that the technological features of CC make it safe for me to use them.	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	I feel confident that the technological features of SC make it safe for me to use them.	
	CBDC	I feel confident that the technological features of CBDC make it safe for me to use them.	
SA2	CC	I feel that existing safeguards adequately protect me when acquiring CC.	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	I feel that existing safeguards adequately protect me when acquiring SC.	
	CBDC	I feel that existing safeguards adequately protect me when acquiring CBDC.	
SA3	CC	In general, the environment in which I can use CC is robust and safe.	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	In general, the environment in which I can use SC is robust and safe.	
	CBDC	In general, the environment in which I can use CBDC is robust and safe.	
SN1	CC	I feel that the developers of CC generally act in their customers' best interest.	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	I feel that the developers of SC generally act in their customers' best interest.	
	CBDC	I feel that the developers of the CBDC generally act in their customers' best interest.	
SN2	CC	I feel that most merchants who accept CC act in their customers' best interest.	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	I feel that most merchants who accept SC act in their customers' best interest.	
	CBDC	I feel that most merchants who accept CBDC act in their customers' best interest.	
I am concerned about:			
ER1	CC	the legal uncertainty for the users of CC and possible prosecution	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	the legal uncertainty for the users of SC and possible prosecution	
	CBDC	the legal uncertainty for the users of CBDC and possible prosecution	
ER2	CC	the restricted CC usage because of regulatory involvement	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	the restricted SC usage because of regulatory involvement	
	CBDC	the restricted CBDC usage because of regulatory involvement	
ER3	CC	the lack of wide adoption of CC	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	the lack of wide adoption of SC	
	CBDC	the lack of wide adoption of CBDC	
ER4	CC	the lack of interoperability of CC with other services	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	the lack of interoperability of SC with other services	
	CBDC	the lack of interoperability of CBDC with other services	
PR1	CC	the traceability of transactions by governments	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	the traceability of transactions by governments	
	CBDC	the traceability of transactions by governments	
PR2	CC	the traceability of transactions by firms/private sector	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	the traceability of transactions by firms/private sector	
	CBDC	the traceability of transactions by firms/private sector	
PR3	CC	the traceability of transactions by individuals	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	the traceability of transactions by individuals	
	CBDC	the traceability of transactions by individuals	
SR	CC	theft of my funds due to security breaches	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	theft of my funds due to security breaches	
	CBDC	theft of my funds due to security breaches	
MR1	CC	the volatility of the market price	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	the volatility of the market price	
	CBDC	the volatility of the market price	
Please indicate to what extent do you agree with the following statements			
MR2	CC	I agree that the users of CC are risk-takers.	Adapted from Voskobojnikov, Abramova, et al., 2021
	SC	I agree that the users of SC are risk-takers.	
	CBDC	I agree that the users of CBDC are risk-takers.	
Please indicate to what extent do you agree with the following statements			
AI1	CC	If I have access to CC, I intend to use them.	Adapted from Albayati, S. K. Kim, and Rho, 2020
	SC	If I have access to SC, I intend to use them.	
	CBDC	If I have access to CBDC, I intend to use it	
AI2	CC	If I have access to CC, I would use them.	Adapted from Albayati, S. K. Kim, and Rho, 2020
	SC	If I have access to SC, I would use them.	
	CBDC	If I have access to CBDC, I would use it.	
AI3	CC	I plan to use CC within the next 12 months if possible.	Adapted from Albayati, S. K. Kim, and Rho, 2020
	SC	I plan to use SC within the next 12 months if possible.	
	CBDC	I plan to use CBDC within the next 12 months if possible.	

CC: Classical cryptocurrencies SC: Stablecoins

Table 1. Questionnaire

4.2 Pre-Test

To evaluate the understandability of the questions, we conducted a pre-test with Master's students at a large European university. Each question used a 5-point Likert scale from "strongly disagree" to "strongly agree". Each participant was randomly placed in a group corresponding to either classical cryptocurrencies, stablecoins, or CBDC, and only shown questions for the one digital currency they were assigned to. Before seeing the questions, the participants were shown a short introductory text on their assigned currency, with both classical cryptocurrencies and stablecoins being described as technologies that enable safe financial transactions without central counterparties, with the former being told that the unit of account does not have a fixed value, while the latter is informed that their digital currency is generally pegged to currencies such as the US Dollar or the Euro. The respondents receiving questions on CBDC were told

that central banks are discussing the introduction of this currency, which would enable private households to hold digital central bank money. It was further stated that the central bank would create and manage this currency, and that it would be introduced as an addition rather than a replacement for cash. For all three groups, the further text told the respondents to assume that they would be able to use the digital currency similarly to other payment solutions like PayPal, and it was clarified that we are interested in their perceptions concerning the technologies. At the end of the questionnaire, the respondents were asked for feedback on readability and clarity of the questions. We received 13 completed question questionnaires, which were universally completed in 5 minutes, with the general feedback being that all questions are easy to understand even for non-experts, although one student who was assigned to stablecoins asked for a more detailed introduction into the digital currency to be shown.

4.3 Lessons Learned

The pre-test confirmed that the questions were clear and generally understandable. The students also completed the questionnaire quickly, taking barely more than three minutes for the questions on average, not counting any demographic questions, welcome text or feedback questions. Even though Master's students in business administration may be quicker and somewhat more familiar with the subject matter, we do not expect respondents drawn from a more representative sample to deviate massively from that. This enables us to ask each respondent about each digital currency without worrying about respondent fatigue due to survey length (Peytchev and Peytcheva, 2017) in the final survey. This is desirable as we need to avoid significantly different populations in all three groups to answer **RQ2**, as otherwise it would not be possible to differentiate whether any differing loadings or path coefficients would be caused by a difference in the general perception of the currency or simply reflect differences in the underlying sample. We will also slightly expand the introductory texts for each digital currency before the corresponding question block.

5 Limitations and Outlook on Future Work

In this research-in-progress paper, we propose a way to measure the effect of trust and perceived risk on the adoption intention of classical cryptocurrencies, stablecoins, and CBDC, and to estimate whether these factors affect the adoption intention differently for each technology. In order to be able to interpret differences in estimates as differences in the perception of the underlying technology, we developed three questionnaires with essentially equivalent wording for each technology, and verified the understandability of the questions via a pre-test. This approach may illuminate whether price stability is a necessary or sufficient condition for the adoption of classical cryptocurrencies, should the estimates for the classical cryptocurrency and the stablecoin-model differ. Furthermore, significant differences in results between stablecoins and CBDC could signify whether individuals may actually wish for the central bank to operate their preferred payment method, rather than having a broad base of unknown users work to ensure the correct functioning of the currency.

However, the approach demanding close equivalence between questions led to the exclusion of factors that may play a role in explaining adoption intention. Notably, the model is mostly based on the one employed by Voskobojnikov, Abramova, et al. (2021), but it excludes self-efficacy, which the aforementioned authors found to have at least an indirect effect for the adoption intention of non-users. That is because the final specification, implementation and features of most CBDC is still not decided, and comparing self-efficacy between existing and upcoming technologies may not be straightforward for respondents. We intend to add this construct to the questionnaire once a large CBDC like the digital euro (ECB, 2022) or a United States central bank digital currency (Marda, 2022) materializes.

We intend to employ a large-scale survey to evaluate the model(s), and compare the estimation results for statistically significant differences to answer the proposed research questions in our future work.

References

Abramova, S. and R. Böhme (2016). "Perceived benefit and risk as multidimensional determinants of bitcoin use: A quantitative exploratory study."

Ajzen, I. (1991). "The theory of planned behavior." *Organizational behavior and human decision processes* 50 (2), 179–211.

Aladwani, A. M. (2001). "Online banking: a field study of drivers, development challenges, and expectations." *International journal of information management* 21 (3), 213–225.

Albayati, H., S. K. Kim, and J. J. Rho (2020). "Accepting financial transactions using blockchain technology and cryptocurrency: A customer perspective approach." *Technology in Society* 62, 101320.

Allen, F., X. Gu, and J. Jagtiani (2022). "Fintech, cryptocurrencies, and CBDC: Financial structural transformation in China." *Journal of International Money and Finance* 124, 102625.

Arias-Oliva, M., J. Pelegrín-Borondo, and G. Matías-Clavero (2019). "Variables influencing cryptocurrency use: a technology acceptance model in Spain." *Frontiers in Psychology* 10, 475.

Auer, R. and R. Böhme (2020). "The technology of retail central bank digital currency." *BIS Quarterly Review, March*.

Auer, R., G. Cornelli, and J. Frost (2020). "Rise of the central bank digital currencies: drivers, approaches and technologies."

Auer, R., J. Frost, L. Gambacorta, C. Monnet, T. Rice, and H. S. Shin (2022). "Central bank digital currencies: motives, economic implications, and the research frontier." *Annual Review of Economics* 14, 697–721.

Bech, M. L. and R. Garratt (2017). "Central bank cryptocurrencies." *BIS Quarterly Review September*.

Bijlsma, M., C. van der Cruijsen, N. Jonker, and J. Reijerink (2021). "What triggers consumer adoption of CBDC?"

Bolt, W., V. Lubbersen, and P. Wierts (2022). "Getting the Balance Right: Crypto, Stablecoin and CBDC."

Briola, A., D. Vidal-Tomás, Y. Wang, and T. Aste (2022). "Anatomy of a Stablecoin's failure: The Terra-Luna case." *Finance Research Letters*, 103358.

CBDCTracker (2022). *Today's Central Bank Digital Currencies Status*. URL: `https://web.archive.org/web/20221114072014/https://cbdctracker.org/`.

Chohan, U. W. (2019). "Are cryptocurrencies truly trustless?" In: *Cryptofinance and Mechanisms of Exchange*. Springer, pp. 77–89.

Davis, F. D. (1989). "Perceived usefulness, perceived ease of use, and user acceptance of information technology." *MIS quarterly*, 319–340.

ECB (2022). *Digital euro*. URL: `https://web.archive.org/web/20221109173200/https://www.ecb.europa.eu/paym/digital_euro/html/index.en.html`.

Fishbein, M. and I. Ajzen (1977). "Belief, attitude, intention, and behavior: An introduction to theory and research." *Philosophy and Rhetoric* 10 (2).

Gao, X., G. D. Clark, and J. Lindqvist (2016). "Of two minds, multiple addresses, and one ledger: characterizing opinions, knowledge, and perceptions of Bitcoin across users and non-users." In: *Proceedings of the 2016 CHI conference on human factors in computing systems*, pp. 1656–1668.

Gefen, D., E. Karahanna, and D. W. Straub (2003). "Trust and TAM in online shopping: An integrated model." *MIS quarterly*, 51–90.

Glaser, F., K. Zimmermann, M. Haferkorn, M. C. Weber, and M. Siering (2014). "Bitcoin-asset or currency? revealing users' hidden intentions." *Revealing Users' Hidden Intentions (April 15, 2014). ECIS*.

Im, I., S. Hong, and M. S. Kang (2011). "An international comparison of technology adoption: Testing the UTAUT model." *Information & management* 48 (1), 1–8.

Jonker, N. (2018). "What drives bitcoin adoption by retailers."

Kim, Y. H. and D. J. Kim (2005). "A study of online transaction self-efficacy, consumer trust, and uncertainty reduction in electronic commerce transaction." In: *Proceedings of the 38th Annual Hawaii International Conference on System Sciences*. IEEE, pp. 170c–170c.

Laskai, L. (2022). *Let's Start With What China's Digital Currency is Not*. URL: https://web.archive.org/web/20220928112142/https://digichina.stanford.edu/work/lets-start-with-what-chinas-digital-currency-is-not/.

Lee, D. K. C., L. Yan, and Y. Wang (2021). "A global perspective on central bank digital currency." *China Economic Journal* 14 (1), 52–66.

Lee, K. S., H. S. Lee, and S. Y. Kim (2007). "Factors influencing the adoption behavior of mobile banking: a South Korean perspective." *The Journal of Internet Banking and Commerce* 12 (2), 1–9.

Lockl, J. and J.-C. Stoetzer (2021). "Trust-free banking missed the point: The effect of distrust in banks on the adoption of decentralized finance."

Lyons, R. K. and G. Viswanath-Natraj (2020). *What keeps stablecoins stable?* Tech. rep. National Bureau of Economic Research.

Madden, T. J., P. S. Ellen, and I. Ajzen (1992). "A comparison of the theory of planned behavior and the theory of reasoned action." *Personality and social psychology Bulletin* 18 (1), 3–9.

Marangunić, N. and A. Granić (2015). "Technology acceptance model: a literature review from 1986 to 2013." *Universal access in the information society* 14 (1), 81–95.

Marda, N. (2022). *TTechnical Possibilities for a U.S. Central Bank Digital Currency*. URL: https://web.archive.org/web/20221023150657/https://www.whitehouse.gov/ostp/news-updates/2022/09/16/technical-possibilities-for-a-u-s-central-bank-digital-currency/.

McKnight, D. H., V. Choudhury, and C. Kacmar (2002). "Developing and validating trust measures for e-commerce: An integrative typology." *Information systems research* 13 (3), 334–359.

McKnight, D. H., L. L. Cummings, and N. L. Chervany (1998). "Initial trust formation in new organizational relationships." *Academy of Management review* 23 (3), 473–490.

Mendoza-Tello, J. C., H. Mora, F. A. Pujol-López, and M. D. Lytras (2019). "Disruptive innovation of cryptocurrencies in consumer acceptance and trust." *Information Systems and e-Business Management* 17 (2), 195–222.

Morales-Resendiz, R., J. Ponce, P. Picardo, A. Velasco, B. Chen, L. Sanz, G. Guiborg, B. Segendorff, J. L. Vasquez, J. Arroyo, et al. (2021). "Implementing a retail CBDC: Lessons learned and key insights." *Latin American Journal of Central Banking* 2 (1), 100022.

Nakamoto, S. (2008). "Bitcoin: A peer-to-peer electronic cash system." *Decentralized Business Review*, 21260.

Ooi, S. K., C. A. Ooi, J. A. Yeap, and T. H. Goh (2021). "Embracing Bitcoin: users' perceived security and trust." *Quality & Quantity* 55 (4), 1219–1237.

Pavlou, P. A. (2003). "Consumer acceptance of electronic commerce: Integrating trust and risk with the technology acceptance model." *International journal of electronic commerce* 7 (3), 101–134.

Peytchev, A. and E. Peytcheva (2017). "Reduction of measurement error due to survey length: Evaluation of the split questionnaire design approach." In: *Survey Research Methods*. Vol. 11. 4, pp. 361–368.

Sarker, P., D. L. Hughes, and Y. K. Dwivedi (2020). "Extension of META-UTAUT for examining consumer adoption of social commerce: Towards a conceptual model." In: *Advances in digital marketing and eCommerce*. Springer, pp. 122–129.

Sas, C. and I. E. Khairuddin (2017). "Design for trust: An exploration of the challenges and opportunities of bitcoin users." In: *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, pp. 6499–6510.

Shahzad, F., G. Xiu, J. Wang, and M. Shahbaz (2018). "An empirical investigation on the adoption of cryptocurrencies among the people of mainland China." *Technology in Society* 55, 33–40.

Shaikh, A. A. and H. Karjaluoto (2015). "Mobile banking adoption: A literature review." *Telematics and informatics* 32 (1), 129–142.

Shapiro, S. P. (1987). "Policing trust." *Private policing* 194, 220.

Smith, H. J., T. Dinev, and H. Xu (2011). "Information privacy research: an interdisciplinary review." *MIS quarterly*, 989–1015.

Söilen, K. S. and L. Benhayoun (2021). "Household acceptance of central bank digital currency: the role of institutional trust." *International Journal of Bank Marketing*.

Tronnier, F., D. Harborth, and P. Hamm (2022). "Investigating Privacy Concerns and Trust in the Digital Euro in Germany." *Electronic Commerce Research and Applications*, 101158.

Tronnier, F., M. Recker, and P. Hamm (2020). "Towards Central Bank Digital Currency–A Systematic Literature Review."

Venkatesh, V. and F. D. Davis (2000). "A theoretical extension of the technology acceptance model: Four longitudinal field studies." *Management science* 46 (2), 186–204.

Venkatesh, V., M. G. Morris, G. B. Davis, and F. D. Davis (2003). "User acceptance of information technology: Toward a unified view." *MIS quarterly*, 425–478.

Voskobojnikov, A., S. Abramova, K. Beznosov, and R. Böhme (2021). "Non-Adoption of Crypto-Assets: Exploring the Role of Trust, Self-Efficacy, and Risk." In: *ECIS*.

Voskobojnikov, A., B. Obada-Obieh, Y. Huang, and K. Beznosov (2020). "Surviving the cryptojungle: Perception and management of risk among North American cryptocurrency (non) users." In: *International Conference on Financial Cryptography and Data Security*. Springer, pp. 595–614.

Wälti, S. (2012). "Trust no more? The impact of the crisis on citizens' trust in central banks." *Journal of International Money and Finance* 31 (3), 593–605.

Ward, O. and S. Rochemont (2019). "Understanding central bank digital currencies (CBDC)." *Institute and Faculty of Actuaries*.

Williams, M. D., N. P. Rana, and Y. K. Dwivedi (2015). "The unified theory of acceptance and use of technology (UTAUT): a literature review." *Journal of enterprise information management*.

Yermack, D. (2015). "Is Bitcoin a real currency? An economic appraisal." In: *Handbook of digital currency*. Elsevier, pp. 31–43.

Yousafzai, S. Y., J. G. Pallister, and G. R. Foxall (2005). "Strategies for building and communicating trust in electronic banking: A field experiment." *Psychology & Marketing* 22 (2), 181–201.