



SCHOOL OF  
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# Implementation of the Digital Euro. A Study of Trust and Awareness of University Students in Benelux.

by

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# Abstract

This thesis investigates the implementation of the digital euro, focusing on university students' trust and awareness in the Benelux region. The study addresses a gap in the existing literature by exploring perceptions among students in Belgium, the Netherlands, and Luxembourg. Through a quantitative survey of 390 respondents, the research examines if awareness of the digital euro predicts trust and if trust influences the likelihood of usage. Findings reveal that awareness significantly predicts trust, and higher trust levels correlate with increased likelihood of digital euro usage. The study offers insights for European Central Bank policymakers, emphasising the need for effective communication and trust-building to encourage adoption. The research contributes empirical evidence on trust, awareness, and digital currency adoption, suggesting that future studies should include a broader demographic and additional influencing factors.

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# 1 Introduction

Globalisation and digitalisation are two intertwined forces driving transformative changes in modern societies and economies. As globalisation fosters international integration and economic interdependence, digitalisation accelerates technological advancements, reshaping societal frameworks and consumer behaviours. In this context, the Benelux Union stands out as a crucial exemplar of regional cooperation and economic integration in Western-Central Europe. Consisting of the Kingdom of Belgium, the Kingdom of the Netherlands, and the Grand Duchy of Luxembourg, it sets noteworthy precedents for broader European integration endeavours. Against this backdrop, the emergence of Central Bank Digital Currencies (CBDCs), epitomised by the proposed digital euro, represents a significant evolution in the monetary landscape. While existing literature primarily focuses on logistical and technological aspects of CBDC implementation, gaps persist in understanding managerial challenges and public perceptions, particularly within the Benelux region. Thus, our thesis aims to address these gaps by providing a nuanced analysis of the issues of trust and awareness within CBDC implementation, with a particular emphasis on university students in the Benelux countries. Through this research, we seek to contribute to the existing body of literature and inform policymakers and stakeholders about the implications of introducing the digital euro in the region.

## 1.1 Background

The Benelux Union both outdates the European Union and acts as a model for the trade bloc, coming into effect in January of 1948, after the liberation of the Netherlands (Matthijs, 2016). The Benelux Union has led as an example for the emergence of the EU, as it introduced the free movement of goods, capital, services and labour, and lifted any sort of border control (Szarek, 2022; Tekiner, 2020). Korauš et al. (2018) highlight Benelux as a competitive force, thriving in the globalised world thanks to its economic interdependence and the adaptation to the rapid advancements in communication technologies.

Globalisation, a fundamental phenomenon fostering digitalisation, promotes international integration, economic exchange, and interconnectedness among nations (Heimberger, 2021; Mader et al., 2020). It drives economic growth, facilitates common markets, and encourages multicultural exchanges (Huh and Park, 2021). Understanding globalisation provides context to the notion of digitalisation. Innovation in digital technologies, such as big data, the Internet of Things, artificial intelligence or blockchain technology, are anticipated to revolutionise every aspect of society (OECD, 2019). According to Pichler et al. (2019), this facilitates a digital transformation which instigates significant alterations in socio-economic frameworks, business strategies, and consumption habits, whereby online banking, shopping, and similar activities have become commonplace in our daily routines. In this regard, there has been a shift in the manner in which people globally utilise money, leading to a decline in the use of cash for transactions in favour of cards and electronic payment solutions (Kamel, 2021, p.11). With banknotes and coins being the only type of legal tender issued for the public by central banks in most of the world, the decline in cash usage challenges the relevance of central banks in the monetary system, undermining financial stability (Kiff et al., 2020). To address the needs of an increasingly digital economy, there has been a growing trend in discussions about introducing retail Central Bank Digital Currencies.

The European Data Protection Supervisor (2024), an official division of the European Union (EU), defines Central Bank Digital Currencies (CBDCs) as “a new form of money that exists only in digital form. Instead of printing money, the central bank issues widely accessible digital coins so that digital transactions and transfers become simple.” The European economy is witnessing a notable shift towards digital transactions, marked by a decline in cash usage and a rise in online payments (Eurosystem, 2023). In response to this evolving landscape, the concept of a CBDC called the digital euro has emerged as a significant consideration for the European Central Bank (ECB), aiming to modernize and secure financial transactions within the euro area.

The primary objective of the digital euro is to retain the advantageous features of physical currency while embracing the efficiencies and innovations inherent in digital payments (Eurosystem, 2023). It is envisioned as a public payment option, analogous to traditional cash, with the ECB serving as its issuer and maintaining its legal tender status. The main rationale for developing a digital euro is to preserve the role of public money in a digital economy (Brunnermeier & Landau, 2022). As it stands, the digital euro project is in the preparation

phase, with possible development and deployment planned from November 2025 onwards (Eurosystem, 2024).

The European Data Protection Supervisor (n.d.) foresees positive impacts from the implementation of the digital euro, including improved privacy, control over personal data, security, and enhanced possibilities for anonymity in the payment process. Nevertheless, these claims have not been widely researched, as the digital euro is still in the initial stages of the implementation process. The ECB launched a consultation in October 2020 on the topic of privacy in reference to CBDCs with different focus groups. This consultation (2020) revealed that privacy is the most pressing concern for both citizens and professionals regarding the emergence of the digital euro, highlighting the element of trust in the implementation process.

## 1.2 Research Gap & Problem Statement

The existing literature on the digital euro reflects a growing interest in the topic. Research conducted by both central banks and academics reveals a tendency for these groups to primarily concentrate on monetary policy and economic dimensions of CBDC, largely overlooking societal considerations and implications (Tronnier et al., 2020). Some prior studies highlight public priorities in a potential digital euro and the importance of public acceptance yet lack insights into public trust and awareness and fail to address managerial challenges comprehensively (Eurosystem, 2021; Kantar Public, 2022; Passacantando, 2021, pp.113–128). Moreover, while Tronnier et al.'s (2022) study in Germany provides valuable insights into privacy concerns and trust regarding the adoption of the digital euro, it focuses solely on the German public, leaving a gap in understanding perspectives from the rest of the euro area. Our research aims to contribute to these perspectives by conducting a survey among university students in Benelux – a tight-knit political union situated at the heart of the euro area as the founding members of both the EU and the euro (European Commission, n.d.). The union is also characterised as technologically mature in regard to payments, with most transactions taking place digitally (Kantar Public, 2022). Additionally, while research has indicated a link between higher levels of education and acceptance of technology, university students, who are actively engaged in pursuing higher education, have not been specifically examined in academic discussions concerning the digital euro (Abu-Shanab, 2011). Our research aims to fill existing gaps by conducting a detailed analysis of public awareness and perceptions regarding the digital



euro, focusing specifically on the Benelux region. Our objective is to pinpoint the managerial challenges encountered by pivotal stakeholders, notably the ECB, pertaining to the intricate process of digital euro adoption. Ultimately, the study seeks to inform these stakeholders and policymakers, and to contribute valuable insights to the broader research on the digital euro.

### 1.3 Research Purpose

The purpose of this research is to (1) examine whether university students' awareness of the digital euro correlates with their level of trust in it within the Benelux region, elucidating factors influencing trust in emerging forms of currency, and (2) to investigate the impact of university students' trust in the digital euro on their willingness to use it. This study's purpose is to critically analyse the responses from the university students, acting as a supplementation to the limited existing literature on the digital euro, and a guide for further research for key stakeholders responsible for the implementation of the digital euro.

### 1.4 Research Questions

Based on the research purpose, the following research questions are to be answered:

**Research Question 1 (“RQ1”):**

Does the university students' awareness of the digital euro significantly predict their trust in it?

**Research Question 2 (“RQ2”):**

Does the level of trust significantly influence the likelihood of digital euro usage among students?

### 1.5 Delimitations

This study sets clear boundaries to guide its investigation. Firstly, it specifically targets university students in the Benelux region, allowing for a targeted examination of perceptions and knowledge related to the digital euro among this population, providing insights relevant to

the region's socio-economic context. Moreover, the study narrows down its focus to key aspects of perceptions, knowledge, and trust regarding the digital euro, excluding other variables. Furthermore, the study delimits its analysis to managerial challenges associated with the introduction of the digital euro, excluding other potential areas of investigation such as legal, technological, or policy-related aspects. These deliberate choices help ensure a thorough and detailed analysis of university students' perspectives on the digital euro in the Benelux context.

## 1.6 Outline of the Thesis

The Master's thesis is structured into five primary sections, including the introductory and concluding sections. Chapter 2 criticises and offers an overview of the existing literature surrounding the phenomena of trust, awareness, CBDCs, the digital euro itself, and the notion of change management. Chapter 3 outlines the methodology and research approach, highlighting the selection and analytical methods employed. It also critically evaluates the methodology, ensuring transparency and theoretical alignment through quantitative evaluation procedures. Chapter 4 reveals the empirical findings of the analysis and addresses the research questions, organised according to the categories established in Chapter 3. Finally, Chapter 5 presents a synthesis of the findings and key conclusions of the research, along with suggestions for future studies, fostering critical reflection on the thesis methodology.

## 2 Literature review

### 2.1 Trust and Awareness

The issues of trust and awareness are key components explored in our thesis in relation to the implementation process of the digital euro, as per the perception of university students about the topic. For this reason, these terms must be explored to a sufficient extent as to assert clarity into what our thesis explores and analyses.

#### 2.1.1 Trust

Trust possesses a multitude of definitions, as it can be argued that it is an abstract idea. For instance, Cambridge Dictionary (2024a), defines trust as a belief that “someone is good and honest and will not harm you, or something is safe and reliable”. Meanwhile, the Merriam-Webster Dictionary (2024a), defines it as an “assured reliance on the character, ability, strength, or truth of someone or something”. For this reason, in order to fully comprehend what trust entails, it is apt to research other perspectives that can form a definition of trust, and not limit oneself to just two definitions. Interestingly, the National Library of Medicine (2015) held a workshop about trust, where they have termed it as a complex concept. Accordingly, they have gathered multiple elements that establish trust, ranging from credibility to vulnerability (National Library of Medicine, 2015). The definition discussed that resonates the most with the ideologies explored in the workshop is that trust is a standing decision where an individual is given the benefit of the doubt on the topic (National Library of Medicine, 2015). Given the analysis of multiple definitions of trust, it is evident that the term’s definition lies somewhere between the belief of feeling secure, vulnerable, certain, and the subjective truth of a given circumstance presented.

In his book, Uslaner (2018) highlights the origins of trust in economics and philosophy, asserting that these two domains concentrate on how trust develops in human interactions. Additionally, Uslaner (2018) argues that certain groups are more likely to trust others or

political institutions, giving the example of how a sense of national identity can affect the way trust is distributed, as individuals from the same nationality may be more inclined to trust others from the same group. These assertions pose the question of whether trust plays a role in economic and political innovations, such as the implementation of CBDCs.

Trust in CBDCs is a topic rich in research. For instance, Mazambani (2024) highlights the different actors that play a major role when it comes to trust that catalyse the emergence of CBDCs, portraying the governments, institutions, and the public as major trust populations. Moreover, Gupta et al., (2023), deem trust as a main factor relevant to the implementation of a digital rupee in India, highlighting that with the risk of adaptation of a digital currency comes a negative effect on the level of trust the public possesses. Additionally, in his study, Koziuk (2021) takes the stance that institutional trust plays a key role in the implementation of digital currencies. Anna Brattström et al. (2015, p.1550043-4) further highlight that “trust implies acceptance of uncertainty”. From the literature, it is evident that trust is a sacrosanct element necessary to discuss in the sphere of digital currencies, with the digital euro not being immune to this. Clearly, in order to fully comprehend how key stakeholders, i.e., managers, wish to implement the digital euro, they must analyse how trust can affect the adaptation process.

Given the research about trust, we define the concept as one’s subjective belief in a given situation, thing, institution, or product, deeming it safe and/or reliable without necessarily possessing factual information to shape such belief. This definition acts as a basis for the exploration of trust in our thesis.

### 2.1.2 Awareness

Awareness, another key concept used for the analysis of the perception of university students on the implementation of the digital euro in our study, must also be explored in addition to trust. Similarly to trust, awareness also holds many definitions. For example, Cambridge Dictionary (2024b) defines awareness as “the mental state of knowing about something”. Meanwhile, Merriam-Webster Dictionary (2024b) defines the concept as “the quality or state of being aware: knowledge and understanding that something is happening or exists”. Interestingly, in their article, van Benthem and Velázquez-Quesada (2010) argue that awareness is not to be confused with the notion of omniscience, where an individual is perceived as all-knowing about a topic, just because they are familiar with a concept or an idea. This is key to our study, as

although the definitions may present awareness as a concept of knowing that something exists or is happening, they do not have to possess infinite knowledge about a given topic to be considered aware of it. Additionally, from a psychological perspective, Clifford et al., (2008), argue that awareness is a measurable phenomenon that can have an effect on how likely one is to make a distinction between performance without awareness or that in full awareness. What this means for our study is that the level of awareness can have an impact on the way in which one is likely to do something, i.e., utilise the digital euro.

In the context of CBDCs, awareness plays a major role in the usage and implementation of the currencies. For example, in Akindipe et al., (2023) article about the awareness of the eNaira, a Nigerian digital currency, the authors argued that because of the Central Bank of Nigeria's failed efforts to raise awareness about the eNaira, this resulted in the general public being unaware of the features and advantages of the digital currency. Worryingly, despite the fact that eNaira is an already existing and functioning digital currency, only 13.3% of the respondents in the survey strongly agree that they are aware of the digital currency existing (Akindipe et al., 2023). This highlights the importance of awareness in the implementation of digital currencies, a key concept explored in our thesis.

Per the research performed about the concept of awareness, our thesis utilises the following definition of the concept: the non-absolute state of an individual knowing information about a given thing's existence or its plans to exist. Alike the definition of trust, this definition of awareness acts as a basis for the exploration of the concept in our thesis.

## 2.2 Digitalisation of Money

ATMs, card systems, and mobile banking are examples of financial services becoming more digital (Zunzunegui, 2018). Zunzunegui (2018, p.2) argues that new payment systems are displacing cash and "governments are promoting a reduction in cash use on security and efficiency grounds". This highlights the benefits of digitalisation in the process of spending money. Additionally, one of the biggest advantages of digitalised payment systems is that they allow users to make secure payments in a straightforward manner (Zunzunegui, 2018). Digitalisation is therefore an important phenomenon that allows individuals to navigate the economy and make purchases in a facile and safe way.

Moreover, the process of digitalisation of money, in the scope of CBDCs, requires an immense level of trust, such as security to payers and payees, as well as efficiency of the process itself (Mikau & Bott, 2015). The EU has been successful at implementing digital initiatives concerning payment processes. For instance, the introduction of the Single Euro Payment Area (“SEPA”), which allows for a seamless cross-border transaction of payments in euros, has proven to be a success in the digitalisation of money (Mikau & Bott, 2015). In fact, thanks to this initiative, the European Commission “estimated the whole financial benefits of SEPA at about €122bn per year” (Mikau & Bott, 2015, p.325). In this context, digitalisation has proven a successful tool that brings economic growth. In essence, Mikau and Bott (2015) argue that SEPA is digitalisation in realisation, where the implementation of technological innovations brings benefits to the economy of the EU.

Consequently, monetary policies are affected by the continuous process of digitalisation (European Central Bank, 2021). Currently, because of interconnectedness between European countries, the euro area can process their payments thanks to the reduced levels of heterogeneity of currency. Conversely, thanks to the homogenous eurozone, and the rise of digitalisation, the slowdowns in GDP growth can be minimised if different methodologies in terms of payments are applied (European Central Bank, 2021). It is just a matter of time before the digitalisation of the euro can be assessed against these claims.

Throughout its history, the ECB has been implementing technological initiatives that citizens utilise every day, let it be SEPA transactions, or benefit from on a quotidian basis, such as when GDP growth is minimised because of digital solutions. It is a fact that our society is becoming more digital, and in order to succeed in the digital economy, it is sacrosanct that central banks work with it rather than against it. Aptly, central banks must recognise the evolution of the financial sector to remain worthy competitors in the capitalist world.

## 2.3 Central Bank Digital Currencies

Bech and Garratt (2017) introduce the concept of Central Bank Digital Currencies (CBDCs) using the "Money Flower" framework, which categorises money types based on their key characteristics: issuer, form, accessibility, and technology. Money can be issued by central or

private banks, and it can exist in digital or physical form, with varying degrees of accessibility to the public or limited to interbank transactions. Currently, bank deposits are issued by private commercial banks only. In this regard, a CBDC would operate much like bank deposits but would be directly issued by the central bank.

A literature review conducted by Ozili (2022) reveals that there are many central banks that are looking into the possibility of issuing a CBDC in the future. He further outlines the main reasons and advantages behind the issuance of CBDCs, citing the need for enhancing financial inclusion and promoting efficient digital payments. This is corroborated by a literature review conducted by Kiff et al. (2020), which additionally mentions the aim of preserving the central bank's significance within the monetary system. In the context of the digital euro, its primary objective is to uphold the role of public money in a digital economy (Brunnermeier & Landau, 2022). This objective encompasses all of the aforementioned rationales.

Furthermore, a study by Biljsma et al. (2023) looks at consumers' attitudes towards CBDCs using representative data of Dutch consumers. They report that about half of the respondents would be willing to open a CBDC account, which is parallel to the findings of a similar study conducted in Austria by Abramova et al. (2022). This is significant as it tells us that European consumers are quite split on the usage of a CBDC, such as the digital euro. Biljsma et al. (2023) additionally found that individuals with greater levels of generalised trust are more inclined to express a desire to utilise a CBDC, and the extent of money they intend to deposit in a CBDC account correlates positively with their trust in the central bank. Essentially, to ensure the successful adoption of CBDCs, Biljsma et al. (2023) recommend taking into account the public's need for privacy and security (in line with the Eurosystem (2023) study) and clearly communicating the purpose and usage possibilities of CBDCs.

## 2.4 Digital Euro

According to the Eurosystem (2023), a key aspect of the digital euro is its universality, designed to be omnipresently accepted across all retail payment scenarios and accessible throughout the euro area. The Eurosystem (2023) maintains that privacy and security form the foundation of the design of the digital euro, outlining stringent measures to safeguard user data, with no personal information identifying end-users being stored or accessed by the central bank. For

merchants, the digital euro aims to reduce transaction costs, introduce instant payments, and broaden customer outreach, particularly in the context of online commerce. Banks and non-bank payment service providers (PSPs) are expected to play a pivotal role in the distribution and management of digital euro accounts, offering services and maintaining customer relationships. In the broader context of European policy, the introduction of the digital euro aligns with the objectives of enhancing strategic autonomy and fostering competitiveness within the market. By providing a pan-European public payment option, the digital euro aims to reduce dependency on external, often foreign private payment providers (such as MasterCard, Visa, etc) and promote a level playing field for financial services (Eurosysteem, 2023).

As a novel concept that is still under development at the time of writing, the existing literature on the digital euro is limited. Some examples of the existing literature include a cross-EU study that sought public input on the economic and societal impacts of introducing a digital euro (Eurosysteem, 2021). The study reported that respondents highly prioritise features such as privacy, security, ease of use, affordability, and accessibility in a potential digital euro, providing a thorough insight into the public's preferences when using this CBDC. However, the Eurosysteem's (2021) study does not provide any information regarding public trust in or understanding of the digital euro. A study commissioned by the ECB reported low awareness about the digital euro across the EU (Kantar Public, 2022). This is significant as prior awareness affects the intended adoption of CBDCs positively (Biljsma et al., 2023). Prior awareness can thus be viewed as a prerequisite for the acceptance of CBDCs. Another study examined the primary economic and political implications of the digital euro's development, highlighting that its greatest potential risk could be a failure to gain public acceptance (Passacantando, 2021, pp.113–128). The study also emphasised the potential reputational risks associated with both IT infrastructure malfunctions underlying the digital euro and the risk of being targeted by cyberattacks. This understanding suggests that some of the managerial challenges associated with the digital euro include managing the perceptions its users have towards it. However, Passacantando (2021) fails to offer any insights into public perceptions of the digital euro concerning the identified risks.

Perhaps most relevant to our research is a German study which analysed the influence of privacy concerns and different dimensions of currency-related trust on individuals' willingness to use the digital euro (Tronnier et al., 2022). Based on the answers of 1034 respondents, the



study found that awareness of the digital euro and perceived control do not have a significant effect on privacy concerns, in contrast to perceived vulnerability, which demonstrates significant effects on privacy concerns in the digital euro. The latter is in line with the findings of a case study by Tronnier and Qiu (2024) which examined the relationship between privacy apprehensions and the acceptance of a CBDC through the Chinese e-CNY, ascertaining the same. Further, Tronnier et al. (2022) report that privacy concerns negatively influence individuals' willingness to use the digital euro, providing further context to the Eurosystem's (2023) study. They also identified that perceived benefits positively influence use intentions, demonstrating the importance of adequate communication in regard to the eventual benefits of using the digital euro. Lastly, they reported that trust factors demonstrate a strong influence on the willingness to use the digital euro. Interestingly, this contrasts the findings by Tronnier and Qiu (2024), suggesting that trust factors have no effect on the concerns or usage of the e-CNY. This discrepancy suggests ambiguities in the research by the authors, posing the question of the clarity of the subject. Tronnier et al.'s 2022 study is the only current study of its kind with pivotal findings in gauging the public's perceptions of and trust in the digital euro. However, the findings do not offer any insight into comparable perceptions within the Benelux region, nor do they shed light on the perceptions of university students.

Based on the above, regarding trust in the digital euro, we hypothesise that:

- **H1<sub>0</sub>**: Awareness of the digital euro does not predict trust in it.
- **H1<sub>a</sub>**: Awareness of the digital euro does predict trust in it.

Likewise, regarding the intention to use the digital euro, we hypothesise that:

- **H2<sub>0</sub>**: There is no significant difference in the intention to use the digital euro between university students with high trust and those with low trust.
- **H2<sub>a</sub>**: University students with high trust in the digital euro demonstrate a significantly higher intention to use it compared to those with low trust.

## 2.5 Change

A major topic of discussion both within management but also within the implementation of the digital euro is change. The Cambridge Dictionary (2024c) defines the phenomenon as the process of making or becoming different or exchanging things for something of a similar type. Change management on the other hand brings into discussion the way in which stakeholders can deal with the concept. In their critical review, Todnem (2005, p.369) defines change management as “the process of continually renewing an organisation’s direction, structure, and capabilities to serve the ever-changing needs of external and internal customers”. They highlight that 70 per cent of all initiated change programmes fail, perhaps because change is complex in the sense that it comes in all shapes, forms, and sizes and is triggered by both internal and external factors (Todnem, 2005).

Nevertheless, Clegg and Walsh (2004) add that high failure rates in operations management dealing with change can be explained by the literature’s focus on the introduction of new technologies, management practices, and ways of working. Thanks to this phenomenon, they urge organisations to recognise the need to simplify and integrate different business processes in order to provide successful services (Clegg & Walsh, 2004). Additionally, they highlight that for change management to be successful, the role of users must be considered. In fact, given that user participation is often discussed in change processes, this reflects the underlying aspect of change, something that experts spend time on to seek successful change in the implementation stage of their process (Clegg & Walsh, 2004).

Additionally, the concept of change is complicated as individuals can question the trustworthiness of a given change. Lorenzi and Riley (2000) highlight that individuals may perceive that a proposed change can, in the long run, be in their own best interest, yet have short-term concerns that lead to the opposition to particular aspects of change or the entire project. Oakland and Tanner (2007) also assert that individuals are essential contributors to successful change. This is especially relevant in the sphere of the digital euro implementation, as individuals could perceive the long-term value that the CBDC may bring, but because of their concerns and worries when it comes to its implementation, they may reject the proposal. Accordingly, a way to manage the concerns of individuals is to create a vision for change and

empower the end users to act as change agents to attain said vision (Lorenzi & Riley, 2000; Oakland & Tanner, 2007).

Accordingly, one way to aid the users as change agents to mitigate their concerns is to understand the concept of resistance to change. Resistance to change can be defined as resistance to “loss of something that is valuable or loss of the known by moving to the unknown” (Yılmaz & Kılıçoğlu, 2013, p.16). The authors explain that resistance to change can concern any behaviour or attitude that affects one’s willingness to support or make a desired change. There are many types of resistance to change that can help experts understand how to approach a given resistance. For instance, blind resistance refers to individuals being afraid of change regardless of what it may be without having a knee-jerk reaction to change (Yılmaz & Kılıçoğlu, 2013). This resistance type can be relevant in the context of the implementation of the digital euro, as individuals can feel comfortable with using their current digital payment options or using physical tenders. Another type of resistance is political resistance, which concerns the resistance through one’s belief that the proposed change will lead to a loss of something when it is implemented (Yılmaz & Kılıçoğlu, 2013). Aptly, in the context of the digital euro, this can refer to individuals’ fear of losing anonymity when it comes to using physical currencies. This might be caused due to the lack of awareness of the scope of the digital euro, as the ECB claims to ensure anonymity in digital euro transactions (Yılmaz & Kılıçoğlu, 2013; Eurosystem, 2023). The last relevant type of resistance is ideological, which refers to individuals’ genuine belief that the proposed change is ill-timed, will not work, or will cause more damage than improvement (Yılmaz & Kılıçoğlu, 2013). Again, in the context of digital euro implementation, this can apply to individuals exhibiting a limited amount of trust or awareness in the innovation, as they might perceive the digital euro as an unnecessary improvement to the payment system in the EU.

# 3 Methodology

The methodology section of the thesis outlines different models utilised to collect and analyse the collected data. These include the specification of the entire research approach and the design of our study. This section highlights different statistical tests in order to ensure a well-rounded analysis of our data.

## 3.1 Research Approach and Design

A quantitative method allows for the objective measurement of findings. It ensures precision and reliability, therefore reducing the likelihood of bias that we could encounter if a qualitative approach were to be utilised. Additionally, it allows for the generalisability of our data set, thus allowing us to apply our findings to the broader population. Moreover, a quantitative approach allows for hypothesis testing, which we have applied to our thesis.

Accordingly, because we have chosen to perform a survey, we were able to ensure a higher scalability of data than if a qualitative approach were utilised, wherein, we were able to collect data efficiently. In addition, a quantitative approach allows for a more traditional and scientific reading of the data allowing us to utilise advanced analytical techniques explored further in the chapter.

Another reason for choosing a quantitative approach is due to the nature of replicability and comparability of our research for other studies. Our study can be easily replicated and compared against other social groups of interest in the digital euro, in other locations, as well as in larger population samples. We are also able to address our research questions in the most suitable way using a quantitative approach because we are focusing on the extent to which trust and awareness play a role in the intention to use the digital euro.

The questions in the survey are based on the premise to research whether awareness predicts trust in the digital euro, and whether trust predicts one's intention to use it. The questions aimed

to answer different aspects of trust and awareness which in turn allows for a deeper statistical analysis. The questions were carefully formulated given the literature review on trust and awareness. For instance, the question “How concerned are you about the issue of surveillance when making transactions with the digital euro” aims to answer the notion of trust and awareness by combining them and reframing trust with the component of privacy concerns, and awareness, through the ECB’s main priority in the implementation of the digital euro to be that of transaction safety.

Essentially, the goal of the study was to gain responses from at least 383 individuals in the Benelux region. The number is based on the total number of students at the Vrije Universiteit Amsterdam (roughly 32,000 students), University of Amsterdam (roughly 42,000 students), Vrije Universiteit Brussel (roughly 20,000 students), Université Libre de Bruxelles (roughly 24,000 students), and the Université de Luxembourg with roughly 7000 students (Vrije Universiteit Amsterdam, 2022; University of Amsterdam, 2024; Vrije Universiteit Brussel, 2024, Times Higher Education, 2024, Université de Luxembourg 2024). The number is based on the total population of the students in the three countries (125,000), with a confidence level of 95%, and a margin of error of 5%. The following equation was utilised to calculate the ideal sample size of 383 individuals:

$$Necessary\ sample\ size: = \frac{(Z\text{-score})^2 \times StdDev \times (1-StdDev)}{(margin\ of\ error)^2}$$

Where the z-score is calculated based on a standard deviation of 0.5 as:

$$z = (x - \mu) / \sigma$$

We have conducted a quantitative survey (Appendix A) in order to understand the perception of university students in Benelux about the digital euro, with a specific goal to comprehend if the students are aware of the digital euro, and if they have trust in it. The survey was held between April 4<sup>th</sup> to 7<sup>th</sup> 2024. The survey was available in English, French, and Dutch. In order to protect the identity of participants, the survey was anonymous, and no personal data was collected; only the location where the participants were located was recorded. Aptly, in order to reduce bias by subconsciously asking only a certain archetype of a respondent, we applied a

systematic random sampling technique, asking every fifth person to participate in the survey that we encountered.

## 3.2 Pilot Study and Amendments

A pilot study helps researchers avoid irrevocable repercussions in terms of performing a survey and failing to account for any unclarities in the process of data collection (van Tejlingen & Vanora, 2002). Contextually, since our study was performed outside Sweden, it was sacrosanct for us to ensure the clarity of our survey before commencing formal data collection. Aptly, we performed a pilot study with ten participants in the Netherlands. Necessarily, we have not included the results from the pilot study in the final analysis of our data.

Thanks to the pilot study, we were able to amend a few details enabling us to establish a survey that ensured correct data collection, making improvements to the weaker parts of the questionnaire. For instance, of the ten participants, three of them highlighted that the current question “Do you believe that the EU should invest more in other initiatives rather than the digital euro” was initially unclear, based on the draft question of “Do you believe that the EU should invest in other initiatives”. The addition of the context helped the respondents answer the question, without the prior ambiguity. Furthermore, the participants highlighted the issue of the use of abbreviations in the survey questions, which we have amended in order to improve the survey. The issue concerned the current question of “Do you know what central bank currencies are” that was initially “Do you know what CBDCs are”. We decided to pose this question using unabbreviated forms of expression, therefore guaranteeing that individuals were able to answer the question with more lucidity, rather than posing a question with an abbreviation and assuming that the participants would be aware of its meaning. Although only 10% of the respondents outlined this issue, we deemed it necessary to amend in order to avoid any ambiguity when performing the questionnaire.

Rightfully, given that the aforementioned feedback only constituted these two improvements, we refrained from amending any other questions. This is because we did not wish to create any more unclarities within our survey by changing the wording of our questions as they were already clear. This pilot study was successful at ensuring that our survey would be understandable, comprehensive, and apt given our research topic.

### 3.3 Data Collection

Our survey comprises two main parts. The first asks the respondents general questions about whether they know what the digital euro is, if they know what the CBDCs are, if they have used any digital currencies before, and finally if they understand what the purpose of the digital euro is. Effectively, in order to make this survey possible for every respondent to finish, if they stated that they did not know what the digital euro is, or if they asserted that they did not understand the purpose of the currency, they were presented with a brief explanation of the innovation. The second part of the survey consists of six questions, using a Likert scale between one and five, with an additional option to state “I do not know”. For example, when posed with the question: “*How concerned are you about the issue of surveillance when making transactions with the digital euro?*”, the respondents were presented with the options of: “*Not concerned at all*”, “*Not so concerned*”, “*Neither concerned nor unconcerned*”, “*Slightly concerned*”, “*Very concerned*” and “*I do not know*”.

### 3.4 Statistical Analysis

This thesis utilised multiple statistical tools to present and analyse the findings of the study conducted. Firstly, descriptive results were presented to investigate the sample size per variable, and the prevalence of any missing data along with mean and standard deviation. Then a reliability analysis (Cronbach’s alpha) and a validity analysis (Confirmatory Factor Analysis) were conducted to test the possibility of creating a trust index. The trust index comprises the mean values from four questions related to concerns and comfort levels regarding digital euro transactions i.e., “How concerned are you about the issue of surveillance when making transactions with the digital euro?”, “How concerned are you about the safety of your transaction data?”, “How comfortable would you be using a digital euro for large transactions, such as purchasing real estate or high-value items?”, “How concerned are you about the potential risks of cyberattacks or hacking associated with a digital euro?”.

To determine whether the means of the digital euro awareness groups “Yes” and “No” were significantly different, we used an independent samples t-test, treating digital euro awareness as the grouping variable and the trust index as the dependent variable. Additionally, a

hierarchical regression model with covariates (CBDC awareness, prior digital currency usage, understanding of digital euro purpose) was used to assess which factors predict trust in the digital euro. Before performing these tests, we checked assumptions to ensure the model's appropriateness.

Furthermore, to explore differences in digital euro usage likelihood among university students with varying levels of trust indices, we employed a Kruskal-Wallis H test followed by a Dwass-Steel-Critchlow-Fligner test for post hoc analysis. Here, the trust index (categorised into low, medium, and high trust) served as the independent variable, while digital euro usage likelihood (classified into low, neutral, and high likelihood) was the dependent variable. Statistics were done using Jamovi version 2.5.3.0 (Jamovi, n.d.).

### 3.5 Limitations

There are multiple limitations when it comes to our study analysing the perception of university students' perceptions about the digital euro that our research simply cannot eliminate given the resources available.

The first limitation is that of the scope of our study both sample size and geography-wise. Firstly, although our ideal sample size is based on the population size of the students in the five universities mentioned in the prior sections of this thesis, we were not able to present the questionnaire to every individual university student in the Benelux region. Our study was performed in the three capital cities of the countries in question, and does not include any other metropolitan areas, let alone other cities, towns, hamlets, or rural areas. Our study did not take into consideration the voices of the students outside of the capitals, nor did it reflect all opinions of every individual student at the outlined institutions. Additionally, since our study was not a cross-cultural one, the differences in responses between each individual region were not analysed. Moreover, although not necessarily apt to the geography of our study, this research can only act as a case study for researchers to gain an insight into the perceptions of the university students, acting as a catalyst, but not an absolute case study of all university students in the EU or the Eurozone area.



Another limitation noteworthy of discussion is that of time restraint. It is probable that, although the data collection was performed at the exact timeframe in each country, we only received responses from present students at the higher education institutions. Our survey, of course, excluded any absent students. If we had had the resources to perform the investigation over an extended period of time, we would have been more inclined to receive responses not only from a grander pool of students, but also from individuals that could have not participated in the survey because of extenuating circumstances.

Intuitively, another key limitation in our research is the basis of analysing only the ideas of trust and awareness of the digital euro. Our study did not analyse every single perception relevant to the research. Any other perceptions, such as scepticism, willingness to use the digital euro, and others were not explored nor analysed in the study. Thus, in order to ensure a fully comprehensive overview of every possible perception or attitude towards the digital euro to be explored, more extensive resources would have to be made available.

### 3.6 Ethical Considerations

The questionnaire did not record any identifiable data of any respondents. The survey was conducted anonymously and was answered voluntarily. The purpose of this questionnaire was clearly explained to each respondent before the start of the survey. An outline of why, how, and what purpose the questionnaire served was provided and can be seen in Appendix A. The disclaimer was made available in English, French, and Dutch. As per the appendix, all data is to be destroyed upon successful defence of the thesis. All respondents were made aware that they could withdraw from the survey at any point and were assured that they would remain unidentifiable.

## 4 Results

The analysed 390 responses included respondents from Belgium (N = 127), Luxembourg (N = 126), and the Netherlands (N = 137). In instances where the respondents chose the option “I do not know”, the answer has been omitted from the statistical analysis, explaining the missingness of some of the variables, as shown in Table 1.

Table 1.

*Descriptive Statistics for the Study Variables by Country*

	<b>N (proportion)</b>	<b>Missing</b>	<b>Mean</b>	<b>SD</b>
Digital euro usage likelihood	381 (98%)	9	2.483	1.237
CBDC awareness	390 (100%)	0	0.395	0.489
Prior digital currencies usage	390 (100%)	0	0.149	0.356
Trust Index	374 (96%)	16	2.024	0.896
Understanding of digital euro purpose	390 (100%)	0	0.679	0.467
Digital euro awareness	390 (100%)	0	0.367	0.483

Note: Digital euro usage likelihood = How likely are you to use the digital euro? CBDC awareness = Do you know what central bank digital currencies are? Prior digital currencies usage = Have you ever used any digital currencies before? Understanding of digital euro purpose = Do you understand the purpose of the digital euro? Trust Index = How concerned are you about the issue of surveillance when making transactions with the digital euro? & How concerned are you about the safety of your transactions data? & How comfortable would you be using a digital euro for large transactions, such as purchasing real estate or high-value items? & How concerned are you about the potential risks of cyberattacks or hacking associated with a digital euro? Digital euro awareness = Do you know what the digital euro is?

## 4.1 Hypothesis Testing

### 4.1.1 Hypothesis for RQ1

An independent samples t-test was carried out to investigate whether there is any significant variance in trust between digital euro awareness groups “Yes” and “No” (Table 2). Assumptions were checked with normality (Shapiro-Wilk, 1965) and homogeneity (Levene, 1960) values indicating a violation. However, following the rule of thumb, as the sample size is greater than 30, the test can be considered robust enough. Furthermore, regarding normality, observing the Q-Q plot, data points were evenly distributed. The results of the t-test showed significant difference between the means of the digital euro awareness groups,  $t(372) = -2.67, P = .008$ .

The following hypotheses seek to determine whether there are differences in the mean levels of trust between the two awareness groups categorised as "Yes" and "No". To clarify, the “Yes” group asserts that they are indeed aware of the digital euro, whereas the “No” group states the opposite. Ergo:

- $H_0$  – The means of the digital euro awareness groups “Yes” and “No” are not significantly different.
- $H_a$  – The means of the digital euro awareness groups “Yes” and “No” are significantly different.

Table 2.

*Independent Samples T-Test Results for Differences in the Mean Levels of Trust between digital euro awareness groups “Yes” and “No”*

		Statistic	df	P
Trust Index	Student's t	-2.67 <sup>a</sup>	372	0.008

Note.  $H_a \mu_0 \neq \mu_1$

<sup>a</sup> Levene's test is significant ( $P < .05$ ), suggesting a violation of the assumption of equal variances.

A hierarchical regression with covariates was carried out to assess factors predicting trust in the digital euro (Table 3). Assumptions were checked with no significant autocorrelation (Durbin-Watson) present (Durbin & Watson, 1951). Multicollinearity was assessed by examining the

variance inflation factor (VIF) and tolerance values. These values were found to meet the recommended thresholds, with tolerance values not falling below 0.1 and VIF values not exceeding 10 (Field, 2009). While there is a departure from normality, the test can still be considered robust due to the sample size being larger than 30. Furthermore, regarding normality, observing the Q-Q plot, data points were evenly distributed.

The hierarchical regression was conducted using two models, the first of which included the covariates “CBDC awareness”, “prior digital currencies usage”, and “Understanding of digital euro purpose”. The second model included the same covariates along with the main predictor “digital euro awareness”. The results indicate a significant difference between the two models ( $\Delta R^2 = 0.0103$ ,  $F(1, 369) = 3.94$ ,  $P = .048$ ), suggesting that adding the main predictor to the model helps to explain more variance in the outcome. The results show that both of the models, however, significantly help explain trust. In model one,  $R^2$  was found to be 0.03, with an F-value of 3.47 ( $df = 3, 370$ ), indicating a significant relationship ( $P = .016$ ), accounting for 3.0% of the variance in trust. The second model explains 4% of trust ( $R^2 = 0.04$ ,  $F(4, 369) = 3.61$ ,  $P = .007$ ). More specifically, the covariate “Understanding of digital euro purpose” was significant in both models: for model one the discovery explained 13% of trust ( $\beta = 0.13$ ,  $b = 0.25$ ,  $P = .013$ ) and for model two it explained 12% of trust ( $\beta = 0.12$ ,  $b = 0.23$ ,  $P = .019$ ). The main predictor “Digital euro awareness” explained 11% of trust in model 2 ( $\beta = 0.11$ ,  $b = 0.21$ ,  $P = .048$ ). The covariates “CBDC awareness” and “Prior digital currencies usage” do not hold significance in either of the models.

Table 3.

*Hierarchical Regression Results for Covariates Associated with the Trust Index*

Predictor	$\beta$	SE	95% Confidence Interval		t	P	R <sup>2</sup>	$\Delta R^2$
			LL	UL				
Step 1							0.03	0.02
Intercept		0.09	1.63	1.97	20.65	< .001		
CBDC awareness	0.03	0.10	-0.14	0.26	0.57	0.57		
Prior digital currencies usage	0.09	0.14	-0.05	0.49	1.63	0.11		
Understanding of digital euro purpose	0.13	0.10	0.05	0.44	2.50	0.013		
Step 2							0.04	0.03
Intercept		0.09	1.59	1.94	20.01	< .001		
CBDC awareness	-0.01	0.11	-0.24	0.19	-0.21	0.84		
Prior digital currencies usage	0.08	0.14	-0.07	0.47	1.47	0.14		
Understanding of digital euro purpose	0.12	0.10	0.04	0.43	2.35	0.019		
Digital euro awareness	0.11	0.11	0.002	0.41	1.99	0.048		

Note:  $\beta$  = standardised slope of the regression line,  $SE$  = estimate of standard errors, LL = lower limit, UL = upper limit, t = t-statistic, R<sup>2</sup> = measure of variation,  $\Delta R^2$  = measure of change in the variations

## 4.1.2 Hypothesis for RQ2

A Kruskal-Wallis Test was performed to determine the significance of difference in the intention to use the digital euro between university students with high, medium, and low trust (Table 4). The test indicated a significant difference in digital euro usage likelihood among groups with varying levels of trust ( $\chi^2 = 15.4$ ,  $df = 2$ ,  $P < .001$ ).

Table 4.

*Kruskal-Wallis Test Results for Difference in the Intention to Use the Digital Euro Based on the Level of Trust*

	$\chi^2$	df	P
Digital euro usage likelihood	15.4	2	< .001

A Dwass-Steel-Critchlow-Fligner post hoc test (Table 5) revealed that when comparing the levels of trust pairwise, there is a significant difference between the groups with low and high trust in their likelihood to use the digital euro ( $W = 5.55, P < .001$ ).

Table 5.

*Dwass-Steel-Critchlow-Fligner pairwise comparisons for digital euro usage likelihood depending on the level of trust*

Pairs	W	P
Low trust                      Medium trust	2.39	0.208
Low trust                      High trust	5.55	< .001
Medium trust                      High trust	3.15	0.067

A multinomial logistic regression with covariates was carried out to assess factors predicting the usage likelihood of the digital euro (Table 6). Multicollinearity was evaluated through the examination of variance inflation factor (VIF) and tolerance values. These metrics adhered to the suggested criteria, with tolerance values remaining above 0.1 and VIF values staying below 10 (Field, 2009). Scatter plots based on transformed categorical data indicated a linear relationship between the independent and dependent variables.

Multinomial logistic regression analysis was conducted to construct a model elucidating the association among the main predictor (trust index), covariates, and the likelihood of digital euro usage across three distinct groups categorised by low, medium, and high likelihood. The model fit, initially comprising solely the intercept and data, significantly improved upon incorporating the predictor variable alongside covariates,  $\chi^2 (10, N = 381) = 57.1$ , Nagelkerke  $R^2 = 0.10, P < 0.001$ . When comparing the group with low usage likelihood to the group with medium usage likelihood, the covariate “digital euro awareness” and main predictor “trust index” exhibited significance (odds ratio [OR] 0.306, 95% confidence interval [CI] 0.133–0.705,  $P = .005$ ; and

odds ratio [OR] 1.529, 95% confidence interval [CI] 1.043–2.240,  $P = .030$ , respectively). The covariates “CBDC awareness”, “prior digital currencies usage”, and “understanding of digital euro purpose” did not exhibit any significance when comparing the usage likelihood between the two groups. When comparing the group with low usage likelihood to the group with high usage likelihood, the covariates “prior digital currencies usage” and “understanding of digital euro purpose” along with the main predictor “trust index” exhibited significance (odds ratio [OR] 3.270, 95% confidence interval [CI] 1.242–8.608,  $P = .016$ ; odds ratio [OR] 2.519, 95% confidence interval [CI] 1.434–4.427,  $P = .001$ ; and odds ratio [OR] 1.709, 95% confidence interval [CI] 1.245–2.346,  $P < .001$ , respectively). The covariates “CBDC awareness” and “digital euro awareness” did not exhibit any significance when comparing the usage likelihood between the two groups.

Table 6.

*Multinomial Logistic Regression Results for Covariates Associated with Digital Euro Usage Likelihood*

<i>Digital Euro Usage Likelihood</i>	<b>Predictor</b>	<b>b</b>	<b>SE</b>	<b>Z</b>	<b>P</b>	<b>OR</b>	<b>95% Confidence Interval</b>	
							<b>LL</b>	<b>UL</b>
Medium - Low	Intercept	-0.940	0.437	-2.149	0.032	0.391	0.166	0.920
	CBDC awareness	0.143	0.384	0.373	0.709	1.154	0.544	2.447
	Prior digital currencies usage	0.936	0.580	1.615	0.106	2.550	0.819	7.940
	Digital euro awareness	-1.184	0.426	-2.780	0.005	0.306	0.133	0.705
	Understanding of digital euro purpose	0.378	0.336	1.127	0.260	1.460	0.756	2.819
	Trust Index	0.424	0.195	2.176	0.030	1.529	1.043	2.240
High - Low	Intercept	-0.838	0.369	-2.273	0.023	0.433	0.210	0.891
	CBDC awareness	-0.436	0.326	-1.338	0.181	0.646	0.341	1.225
	Prior digital currencies usage	1.185	0.494	2.399	0.016	3.270	1.242	8.608
	Digital euro awareness	0.392	0.319	1.227	0.220	1.480	0.791	2.768
	Understanding of digital euro purpose	0.924	0.288	3.212	0.001	2.519	1.434	4.427
	Trust Index	0.536	0.162	3.318	<.001	1.709	1.245	2.346

Note:  $b$  = slope of the regression line,  $SE$  = estimate of standard errors,  $Z$  = z-statistic, OR = odds ratio, LL = lower limit, UL = upper limit



## 5 Discussion and Conclusion

This section of the thesis provides relevant discussions and conclusions from the analysis of the quantitative survey. This study’s purpose was to research the rapport between trust and awareness with regards to the implementation of the digital euro, embodied in the research questions sections within this chapter. This chapter voices the strengths and weaknesses of our thesis and provides an insight into the limitations. Additionally, this section also discusses the potential implications of our findings for key policymakers and stakeholders in the ECB. The chapter concludes with final notes to synthesise the thesis.

Table 7. Summary of the confirmation and rejection of the hypothesis

Hypothesis	Confirmation/Rejection
<b>H1<sub>0</sub></b> : Awareness of the digital euro does not predict trust in it.	Rejected
<b>H1<sub>a</sub></b> : Awareness of the digital euro does predict trust in it.	Confirmed
<b>H2<sub>0</sub></b> : There is no significant difference in the intention to use the digital euro between university students with high trust and those with low trust.	Rejected
<b>H2<sub>a</sub></b> : University students with high trust in the digital euro demonstrate a significantly higher intention to use it compared to those with low trust.	Confirmed

## 5.1 Research Question 1 - Does the university students' awareness of the digital euro significantly predict their trust in it?

The objective of RQ1 was to evaluate whether the awareness of the digital euro among university students correlates with their trust in it. Our findings indicate that awareness about the digital euro is a significant predictor of trust with a positive  $\beta$ -value, confirming hypothesis H1<sub>a</sub>. This contrasts with the breakthrough study by Tronnier et al. (2022), which found that awareness of the digital euro does not have a significant effect on privacy concerns. The contrasting results could be explained by the fact that our study looks at trust from a more holistic perspective, combining several constructs, whereas Tronnier et al. report on privacy concerns specifically, which is just one of the constructs forming the trust index in our study. Additionally, our investigation found that both understanding the purpose of the digital euro and prior usage of digital currencies significantly influence trust levels, with both factors showing positive  $\beta$ -values. This is supported by the findings of Koziuk (2021), illustrating that cognitive challenges linked to the characteristics of the digital realm might serve as factors that could weaken trust in digital currencies.

Put differently, affirmatively responding to any of these three significant variables amplifies trust in the digital euro. As key policymakers and stakeholders in the ECB are responsible for the successful implementation of the digital euro, our findings indicate the need to increase awareness about the digital euro, with a particular focus on ensuring that the people understand its purpose, in order to ensure a higher level of trust in it. Change is volatile and complex, therefore it is important for ECB stakeholders to ensure that any change processes in the implementation of the digital euro, will include initiatives that consist of awareness. For instance, in their research about internet banking in Yemen's small-to-medium sized enterprise, Alzubi et al. (2017) found that awareness of the existence of such services must be achieved through governmental awareness initiatives.

## 5.2 Research Question 2 - Does the level of trust significantly influence the likelihood of digital euro usage among students?

The objective of RQ2 was to determine whether the level of trust in the digital euro significantly impacts the likelihood of its usage among students. Comparing students with low likelihood of usage to those with high likelihoods, we found that trust significantly influences the likelihood of digital euro usage, with an odds ratio higher than one, confirming hypothesis H2a. This finding is supported by pivotal studies by Tronnier et al. (2022) and Biljsma et al. (2023). Interestingly, our result contradicts the findings of Tronnier and Qiu (2024). This discrepancy could be due to cultural differences, as our study, along with the supporting studies, was conducted in a European context, whereas Tronnier and Qiu examined a Chinese context. Even outside the scope of CBDCs, in their study about the citizens' trust in the context of using e-government services, Carter and Bélanger (2005, p.18) found that "higher level of perceived trustworthiness are positively related to citizens' intentions to use a state e-government service". Additionally, when comparing respondents with low usage likelihood to those with high likelihood, we found that prior usage of digital currencies and understanding the purpose of the digital euro also significantly predict its usage likelihood, with all odds ratios exceeding one. Our finding regarding the latter construct is also supported by Tronnier et al. (2022), who highlighted that the likelihood of using the digital euro is positively impacted by perceived benefits, (as understanding the purpose of the digital euro would expect one to be able to better perceive its benefits).

Simply put, high trust, prior experience using digital currency, and understanding the purpose of the digital euro are all factors that positively affect its usage likelihood. For key policymakers and stakeholders in the ECB, our findings indicate that to stimulate the usage of the digital euro among students, measures need to be taken to ensure high trust. From a point of view of change management, this is sacrosanct in order for the stakeholders to understand students as change agents, almost acting as surrogates for the wider population. This of course, can only act as a very foundation due to the limitations of the study. Additionally, clear and effective communication is necessary to ensure that the purpose of this new payment method is clearly understood. Furthermore, as people who have previously used digital currencies also exhibit

increased levels of trust in the digital euro, it is plausible that these could also be the early adopters of the platform upon its release, potentially making them effective change agents.

### 5.3 Strengths of the research

There is a multitude of strengths in our thesis. For instance, having applied a quantitative approach to our methodology, we were able to gain clear data-driven conclusions with minimised levels of biases. Our approach makes our study fully replicable and can be performed at any university anywhere within the eurozone. Furthermore, our data is significant in signposting whether awareness predicts trust in the digital euro, as well as whether the level of trust significantly influences the likelihood of digital euro usage among students.

Given the scope of our thesis, we have exceeded the recommended sample size, by gaining 390 responses rather than the minimum of 383. This makes our results reliable. Additionally, our thesis was performed on-site. This allows for an efficient and systemic sampling which would have been difficult to achieve if the survey were performed online.

Another strength of our study is the in-depth statistical analysis. Essentially, because we have taken a standardised analytical approach, and have sought five separate consultations with the Department of Statistics at Lund University, we were able to ensure that our data analysis is precise. This ensured that we were able to provide significant findings that contributed to the prior literature, such as the study by Tronnier et al. (2022). In addition, our findings led to discoveries of new findings including the relationship between awareness and trust in relation to the digital euro.

### 5.4 Limitations and Future Research

Aptly, our thesis has been successful in analysing how trust and awareness play a key role in the digital euro implementation process. Nevertheless, our study cannot act as a direct representation of all Benelux university students, the whole union itself, or the entirety of the EU. Given the design of our study, 96% of variables explaining trust in the digital euro have

been left unexplored. This could be a result of not utilising any validated models or scales when designing the survey. Moreover, most constructs were measured using just one question, with the trust index being the only exception. Using a validated scale could have improved the strength of the results. Although we have utilised precautions to minimise bias in our data collection by having an anonymous survey performed via a random systematic sampling technique, social desirability bias could have still been exhibited (Beins, 2013). Respondents may have answered in ways they believed would be viewed favourably by others, rather than providing honest responses (Beins, 2013). Moreover, while measurable quantitative data provided us with insights into correlations between various variables, it did not offer contextual explanations. A mixed methods approach, incorporating qualitative methodologies such as interviews, could have provided additional context to our results. For example, we do not understand the reason behind the negative correlation between digital euro awareness and its usage likelihood when comparing respondents with low usage likelihood to those with medium usage likelihood. Allowing respondents to explain their attitudes could have provided more clarity on such results. Overall, the literature on the topic of the digital euro is very limited, as it is still a novel concept yet to be implemented. This lack of existing research complicated the finding of relevant reference studies that could have informed our research direction. If the pool of existing research on the digital euro was larger, it would have been easier to define the concepts of trust and awareness for this study, further adding clarity.

In terms of future research, it could be beneficial to perform a similar study with a larger sample size, inclusive of other public groups as respondents. This would provide a more holistic overview of the society's attitudes towards the digital euro. It could be interesting to design the survey using validated models, such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). TAM would help identify how perceived usefulness and ease of use influence digital euro adoption while UTAUT would provide a broader perspective by considering performance expectancy, effort expectancy, social influence, and facilitating conditions (Tronnier et al., 2022). Moreover, as highlighted above, it could be beneficial to utilise a mixed methods methodological approach. In the context of Benelux, we also recommend performing a cross-cultural study, which would provide context on attitudes based on cultural differences. Ultimately, further research should be performed to provide a robust and exhaustive understanding of the major factors predicting the usage of the digital euro.

## 5.5 Thesis Conclusion

This thesis highlights how crucial trust and awareness are for university students in the Benelux region when it comes to adopting the digital euro. Our research shows that students who are more aware of the digital euro tend to trust it more, and those who trust it are more likely to use it. This means that for the European Central Bank (ECB) to successfully implement the digital euro, they need to focus on building awareness and trust among potential users.

The survey of 390 students confirmed that awareness of the digital euro leads to higher levels of trust, and that trust strongly influences whether students would use the digital currency. This supports the idea that trust is essential for the success of digital currencies. Additionally, the study found that students who have used digital currencies before and who understand the digital euro's purpose are more likely to trust and use it.

Despite its strengths, the study has some limitations. It focuses on university students in the Benelux region, which may not represent the broader population. The use of quantitative methods also means we might miss some of the deeper reasons behind the students' attitudes. Future research should include a larger and more diverse sample, use well-established models, and combine quantitative and qualitative methods for a fuller picture.

Aptly, this thesis adds to the understanding of how trust and awareness affect the adoption of the digital euro. For the ECB to promote the digital euro effectively, they need to communicate clearly and build public trust. By doing so, they can better support the digital transformation of Europe's monetary system.

## 5.6 Key Notes

### **Conflict of interest**

The authors of this thesis report no conflict of interest in performing this study.

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# Appendix A

## Survey/Enquête/Vragenlijst

**La version française est disponible ci-dessous.  
De Nederlandse versie vindt u hieronder.**

This survey aims to ask about you (the respondent) about your perspectives about the digital euro. By taking part in this survey, you acknowledge that all of your responses will be fully anonymous and confidential. By participating in this survey, you understand that none of your personal information will be shared with anyone. This survey aims to be answered by university students in Benelux, therefore, by participating, you assert that you are the target respondent.

Because of the nature of this survey, at no point will your age, gender, or the place where you answer this questionnaire will be identifiable. Therefore, by participating in this survey, you acknowledge that you will not be able to opt-out from answering this survey once it is submitted. However, you are free to stop answering this survey at any point in the process.

This survey is conveyed by Damian Jakub Kubik and Eger Tiitus ("the students"), students at Lund University School of Economics and Management ("LUSEM"), Sweden, enrolled in the Master of Science programme in Management ("MSc course"). You are able to identify them both with the Lund University student ID worn by them when conducting this survey, and by contacting Lund University, or by reaching out to the students via their university e-mails. The contact information is as follows:

LUSEM: [info@ehl.lu.se](mailto:info@ehl.lu.se)  
Damian Jakub Kubik: [da7008ku-s@student.lu.se](mailto:da7008ku-s@student.lu.se)  
Eger Tiitus: [eg1014ti-s@student.lu.se](mailto:eg1014ti-s@student.lu.se)

By participating in this survey, you acknowledge that you have familiarised yourself with the contact information provided above, and took a note of the contacts. The students confirm that, if you do contact them, they will forward your query to the relevant body at LUSEM in due time.

If at any point you have felt uncomfortable with the way this survey was conducted by the students, or have any other queries, please report this via the contact details provided.

This survey aims to analyse the perception of university students in Benelux about the digital euro. This survey is performed as a part of the MSc course to fulfil the criteria of a final thesis assignment. This thesis is supervised by Dr Martin Blom, a lecturer at LUSEM.

Because this survey will be utilised as a part of research at LUSEM, you acknowledge that by participating in this survey, the data will be shared with LUSEM. Therefore, you assert that you are comfortable with the students using this data in their thesis, allow other

researchers to use this data, permit supervisor and examiners to share your data which will ensure your anonymity, enable the publication of this data in any relevant publication site, written or online, both at LUSEM and outside, and are comfortable with sharing the results of this thesis with relevant institutions, educational, economic, political and the like.

Your data will only stored for a period of time necessary to complete the academic assignment in question. All of the responses will be deleted once the thesis project is finalised and graded. If there are any disputes to the academic grading of the thesis, or any other relevant and within reason unforeseen circumstances were to arise, you acknowledge your data will be stored until the point when the process will be finalised.

By taking part in this survey you also acknowledge the before-mentioned information as well as the following: (1) you understand the information about the project associated with this survey, (2) you have been given the opportunity to ask questions about the project and your participation, (3) you voluntarily agree to participate in the project, (4) the procedures regarding confidentiality have been clearly explained, (5) the use of data in research, publications, sharing, and archiving has been explained to you, (6) you understand that other researchers will have access to this data only if they agree to preserve the confidentiality of the data and if they agree to the terms the students have specified in this form, and (7) you, along with the students, agree to sign and data this informed consent form in the shape of a survey via electronic means.

If at any point any of the information was unclear or you had any other questions, by participating in this survey, you assert that these were answered and that you understood the implications of it. By proceeding with this survey, you are comfortable with all the requirements, and confirm you are a university student in Benelux.

### **La v ersion fran aise**

Cette enqu ete vise   recueillir vos perspectives sur l'euro num erique. En participant   cette enqu ete, vous reconnaissez que toutes vos r ponses seront enti rement anonymes et confidentielles. En participant   cette enqu ete, vous comprenez que aucune de vos informations personnelles ne sera partag ee avec quiconque. Cette enqu ete vise    tre compl et ee par des  tudiants universitaires du Benelux, donc, en participant, vous affirmez  tre le r pondant cibl e.

En raison de la nature de cette enqu ete,   aucun moment votre  ge, votre sexe, ou l'endroit o  vous r pondez   ce questionnaire ne seront identifiables. Par cons equent, en participant   cette enqu ete, vous reconnaissez que vous ne pourrez pas choisir de ne pas r pondre   cette enqu ete une fois qu'elle est soumise. Cependant, vous  tes libre d'arr ter de r pondre   cette enqu ete   tout moment du processus.

Cette enqu ete est men ee par Damian Jakub Kubik et Eger Tiitus ("les  tudiants"),  tudiants   l' cole d' conomie et de Gestion de l'Universit  de Lund ("LUSEM"), en Su de, inscrits au programme de Master en sciences de la gestion ("cours de MSc"). Vous pouvez les identifier tous les deux avec l'identifiant  tudiant de l'Universit  de Lund qu'ils portent lors



de la réalisation de cette enquête, et en contactant l'Université de Lund, ou en contactant les étudiants via leurs e-mails universitaires. Les coordonnées sont les suivantes :

LUSEM : info@ehl.lu.se

Damian Jakub Kubik : da7008ku-s@student.lu.se

Eger Tiitus : eg1014ti-s@student.lu.se

En participant à cette enquête, vous reconnaissez avoir pris connaissance des coordonnées fournies ci-dessus et en avoir pris note. Les étudiants confirment que, si vous les contactez, ils transmettront votre demande à l'instance compétente de LUSEM en temps voulu.

Si à un moment donné vous vous êtes senti mal à l'aise avec la manière dont cette enquête a été menée par les étudiants, ou si vous avez d'autres questions, veuillez signaler cela via les coordonnées fournies.

Cette enquête vise à analyser la perception des étudiants universitaires du Benelux sur l'euro numérique. Cette enquête est réalisée dans le cadre du cours de MSc pour répondre aux critères d'un mémoire de fin d'études. Cette dissertation est supervisée par le Dr Martin Blom, enseignant à LUSEM.

Étant donné que cette enquête sera utilisée dans le cadre de recherches à LUSEM, vous reconnaissez qu'en participant à cette enquête, les données seront partagées avec LUSEM. Par conséquent, vous affirmez être à l'aise avec l'utilisation de ces données par les étudiants dans leur mémoire, permettre à d'autres chercheurs d'utiliser ces données, autoriser le superviseur et les examinateurs à partager vos données tout en assurant votre anonymat, permettre la publication de ces données sur tout site de publication pertinent, écrit ou en ligne, tant à LUSEM qu'à l'extérieur, et être à l'aise avec le partage des résultats de ce mémoire avec des institutions pertinentes, éducatives, économiques, politiques, et autres.

Vos données ne seront stockées que pendant la période nécessaire à l'achèvement de l'assignation académique en question. Toutes les réponses seront supprimées une fois le projet de dissertation finalisée et notée. En cas de litige concernant l'évaluation académique du mémoire, ou si d'autres circonstances imprévues et raisonnables survenaient, vous reconnaissez que vos données seront stockées jusqu'à ce que le processus soit finalisé.

En participant à cette enquête, vous reconnaissez également les informations susmentionnées ainsi que ce qui suit : (1) vous comprenez les informations sur le projet associé à cette enquête, (2) vous avez eu la possibilité de poser des questions sur le projet et votre participation, (3) vous acceptez volontairement de participer au projet, (4) les procédures concernant la confidentialité vous ont été clairement expliquées, (5) l'utilisation des données dans la recherche, les publications, le partage et l'archivage vous a été expliquée, (6) vous comprenez que d'autres chercheurs auront accès à ces données uniquement s'ils acceptent de préserver la confidentialité des données et s'ils acceptent

les termes spécifiés par les étudiants dans ce formulaire, et (7) vous, ainsi que les étudiants, acceptez de signer et de dater ce formulaire de consentement éclairé sous forme d'enquête par des moyens électroniques.

Si à un moment donné l'une des informations était peu claire ou si vous aviez d'autres questions, en participant à cette enquête, vous affirmez que celles-ci ont été répondues et que vous en avez compris les implications. En poursuivant cette enquête, vous êtes à l'aise avec toutes les exigences, et confirmez être un étudiant universitaire du Benelux.

### **De Nederlandse versie**

Deze vragenlijst heeft tot doel uw mening te vragen over de digitale euro. Door deel te nemen aan deze vragenlijst erkent u dat al uw antwoorden volledig anoniem en vertrouwelijk zullen zijn. Door deel te nemen aan deze vragenlijst begrijpt u dat geen van uw persoonlijke gegevens met anderen zal worden gedeeld. Deze vragenlijst is bedoeld om te worden ingevuld door universiteitsstudenten in de Benelux, daarom bevestigt u door deel te nemen dat u de beoogde respondent bent.

Vanwege de aard van deze vragenlijst zullen op geen enkel moment uw leeftijd, geslacht of de plaats waar u dit vragenlijst beantwoordt identificeerbaar zijn. Daarom erkent u door deel te nemen aan deze vragenlijst dat u niet kunt kiezen om niet te antwoorden nadat deze is ingediend. U bent echter vrij om op elk moment tijdens het proces te stoppen met het beantwoorden van deze vragenlijst.

Deze vragenlijst wordt uitgevoerd door Damian Jakub Kubik en Eger Tiitus ("de studenten"), studenten aan de School of Economics and Management van de Universiteit van Lund ("LUSEM"), Zweden, ingeschreven in het Master of Science-programma in Management ("MSc-cursus"). U kunt hen identificeren met het Lund University-studentenidentificatienummer dat zij dragen tijdens het uitvoeren van deze vragenlijst, en door contact op te nemen met de Universiteit van Lund, of door contact op te nemen met de studenten via hun universitaire e-mails. De contactgegevens zijn als volgt:

LUSEM: [info@ehl.lu.se](mailto:info@ehl.lu.se)

Damian Jakub Kubik: [da7008ku-s@student.lu.se](mailto:da7008ku-s@student.lu.se)

Eger Tiitus: [eg1014ti-s@student.lu.se](mailto:eg1014ti-s@student.lu.se)

Door deel te nemen aan deze vragenlijst erkent u dat u zich vertrouwd heeft gemaakt met de hierboven verstrekte contactgegevens en deze heeft genoteerd. De studenten bevestigen dat, als u contact met hen opneemt, zij uw vraag tijdig zullen doorsturen naar het relevante orgaan bij LUSEM.

Als u op enig moment ongemakkelijk bent geweest met de manier waarop deze vragenlijst door de studenten is uitgevoerd, of als u andere vragen heeft, meld dit dan via de verstrekte contactgegevens.

Deze vragenlijst heeft tot doel de perceptie van universiteitsstudenten in de Benelux over de digitale euro te analyseren. Deze vragenlijst wordt uitgevoerd als onderdeel van de MSc-cursus om te voldoen aan de criteria van een eindthesisopdracht. Deze scriptie wordt begeleid door Dr. Martin Blom, een docent aan LUSEM.

Omdat deze vragenlijst zal worden gebruikt als onderdeel van onderzoek aan LUSEM, erkent u dat door deel te nemen aan deze vragenlijst, de gegevens zullen worden gedeeld met LUSEM. Daarom bevestigt u dat u comfortabel bent met het gebruik van deze gegevens door de studenten in hun scriptie, andere onderzoekers toestaat deze gegevens te gebruiken, toestemt in het delen van uw gegevens door de supervisor en examinatoren om uw anonimiteit te waarborgen, het publiceren van deze gegevens op elke relevante publicatiesite, geschreven of online, zowel bij LUSEM als daarbuiten, en dat u comfortabel bent met het delen van de resultaten van deze scriptie met relevante instellingen, educatieve, economische, politieke en dergelijke.

Uw gegevens worden slechts gedurende de benodigde tijd bewaard om de academische opdracht in kwestie te voltooien. Alle antwoorden worden verwijderd zodra het scriptieproject is afgerond en beoordeeld. Als er geschillen zijn over de academische beoordeling van de scriptie, of als er andere relevante en redelijke onvoorziene omstandigheden zouden ontstaan, erkent u dat uw gegevens worden bewaard totdat het proces is afgerond.

Door deel te nemen aan deze vragenlijst erkent u ook de hierboven genoemde informatie, evenals het volgende: (1) u begrijpt de informatie over het project dat aan deze vragenlijst is gekoppeld, (2) u hebt de mogelijkheid gekregen om vragen te stellen over het project en uw deelname, (3) u stemt vrijwillig in met deelname aan het project, (4) de procedures met betrekking tot vertrouwelijkheid zijn duidelijk uitgelegd, (5) het gebruik van gegevens in onderzoek, publicaties, delen en archiveren is aan u uitgelegd, (6) u begrijpt dat andere onderzoekers toegang zullen hebben tot deze gegevens alleen als zij akkoord gaan met het bewaren van de vertrouwelijkheid van de gegevens en als zij akkoord gaan met de voorwaarden die de studenten in dit formulier hebben gespecificeerd, en (7) u, samen met de studenten, stemt ermee in om dit geïnformeerde toestemmingsformulier te ondertekenen en te dateren in de vorm van een vragenlijst via elektronische middelen.

Als op enig moment een van de informatie onduidelijk was of als u andere vragen had, bevestigt u door deel te nemen aan deze vragenlijst dat deze zijn beantwoord en dat u de implicaties ervan begreep. Door verder te gaan met deze vragenlijst, bent u comfortabel met alle vereisten en bevestigt u dat u een universiteitsstudent in de Benelux bent.

eg1014ti-s@student.lu.se [Switch account](#)



Not shared

\* Indicates required question

Where are you being interviewed?/Où êtes-vous interviewé(-e) ?/Waar wordt u geïnterviewd? \*

- The Kingdom of Netherlands/Le Royaume des Pays-Bas/Het Koninkrijk der Nederlanden
- The Kingdom of Belgium/Le Royaume de Belgique/Het Koninkrijk België
- The Grand Duchy of Luxembourg/Le Grand-Duché de Luxembourg/Het Groothertogdom Luxemburg

Do you know what central bank digital currencies are? \*

Savez-vous que sont les devises numériques de banques centrales ?

Weet u wat digitale valuta van de centrale bank zijn?

- Yes/Oui/Ja
- No/Non/Nee

Have you ever used any digital currencies before? \*

Avez-vous déjà utilisé devises numériques auparavant ?

Heeft u ooit eerder digitale valuta gebruikt?

- Yes/Oui/Ja
- No/Non/Nee

Do you know what the digital euro is? \*

Savez-vous ce qu'est l'euro numérique ?

Weet u wat de digitale euro is?

Yes/Oui/Ja

No/Non/Nee

Do you understand the purpose of the digital euro? \*

Comprenez-vous le but de l'euro numérique ?

Begrijpt u het doel van de digitale euro?

Yes/Oui/Ja

No/Non/Nee

How likely are you to use the digital euro? \*

Quelle est la probabilité que vous utilisiez l'euro numérique ?

Hoe waarschijnlijk is het dat u de digitale euro gaat gebruiken?

Choose

How ready is the Dutch/Belgian/Luxembourgish society for the digital euro? \*

Dans quelle mesure la société belge (luxembourgeoise) est-elle prête pour l'euro numérique ?

Hoe klaar is de Nederlandse/Belgische samenleving voor de digitale euro?

Choose

Do you believe that the EU should invest more in other initiatives rather than the digital euro? \*

Pensez-vous que l'UE devrait investir davantage dans des initiatives autres que l'euro numérique ?

Bent u van mening dat de EU meer in andere initiatieven moet investeren dan in de digitale euro?

Choose

How concerned are you about the issue of surveillance when making transactions with the digital euro? \*

Dans quelle mesure êtes-vous concerné(-e) par la question de la surveillance lors des transactions avec l'euro numérique ?

Hoe bezorgd bent u over de kwestie van toezicht bij het uitvoeren van transacties met de digitale euro?

Choose

How concerned are you about the safety of your transactions data? \*

Dans quelle mesure êtes-vous concerné(-e) par la sécurité de vos données de transactions ?

Hoe bezorgd bent u over de veiligheid van uw transactiegegevens?

Choose

How comfortable would you be using a digital euro for large transactions, such as purchasing real estate or high-value items? \*

Seriez-vous à l'aise avec l'utilisation d'un euro numérique pour des transactions importantes, telles que l'achat de biens immobiliers ou d'objets de grande valeur ?

Hoe comfortabel zou u een digitale euro gebruiken voor grote transacties, zoals de aankoop van onroerend goed of waardevolle spullen?

Choose

How concerned are you about the potential risks of cyberattacks or hacking associated with a digital euro? \*

Dans quelle mesure êtes-vous concerné(-e) par les risques potentiels de cyberattaques ou de piratage associés à un euro numérique ?

Hoe bezorgd bent u over de potentiële risico's van cyberaanvallen of hacking die verband houden met een digitale euro?

Choose