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# DETERMINANTS OF THE USE OF CASHLESS PAYMENT: EVIDENCE FROM EUROZONE

Masters's thesis
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I hereby declare that I have compiled the thesis independently
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# ABSTRACT

The master thesis examines link between socio-demographic characteristics, consumers preferences, external factors and use of cashless payment methods. Sample data in this study was created using data from survey conducted in 17 Eurozone countries. Models were based on reviewed literature on cashless society, theories of consumer behavior and previous studies on determinants of choice of payment method conducted in other countries. Analysis was carried out using method of logistical regression with binary dependent variable constructed from respondents' way of payment: cash or cashless. Robustness test was conducted using additional models constructed towards payment behavior in different situations. This study results show that gender, number of people in household and children, area of living and ease of cash withdrawal do not have impact on consumers use of cashless payment methods. While preference, use of internet and online banking have great influence on individual's choice to use non-cash payment method.



Keywords: payment behavior, socio-demographics, consumer survey, cashless

# INTRODUCTION

The topic of becoming a cashless society is rapidly developing trend in the modern world. High digitalization of every aspect of everyday life leads to an inevitable change in consumers' payment needs and habits. For decades, consumers relied only on the traditional way of handling everyday payments, but technological development and increase in modern life pace changed consumers' payment practices. (Haldane 2008).

Due to technological infrastructure and policy changes, there has been an increase in the number of cashless payment methods in the last decade. Cashless is being promoted at most points of sale, creating card-only lanes in supermarkets or self-checkout cash registers. Shops without cashiers and small shops are forcing consumers to pay with non-cash. Digital media is full of advertisements of low-fee electronic payments, attracting the attention of the buyer with payment for purchases using fast and convenient payment methods without leaving home.

Controversies and problems appeared within this topic. Both cash and cashless payment methods depend highly on different consumer behaviors and socio-economic classes. Rapidly accelerating trend towards cashless society can impact both positively and badly on regular everyday consumers' behavior. (Maurer 2015)

Despite the usefulness and ease of use of cashless payment methods, debates against and for transitioning to a cashless society still going on. Risks involving the world's economic instability, global financial crisis, extreme regulation, and lack of privacy raise dilemmas if cashless society is needed. Understanding determinants of use of cashless transactions by consumers may have influence on future development of electronic payment system network and market strategies involving consumer behavior. Comparison with similar studies may present how consumer behavior changes over time.

The present graduation thesis aims to provide an analysis of effect of socio-demographic factors on the choice of cashless payment systems in terms of comparison preference, intention, drivers, and actual payment behavior. The approach of including socio-demographic characteristics in all models gives an overview of how the impact of these characteristics change with adding consumer's preference and external factors. This models' structure gives step by step results, isolating factors from each other and them combining into one final model. Results will be compared with previous studies in order to analyze changes of consumer choices over time.

The main research question is: Do socio-demographic characteristics, individual's preferences and external factors affect the use of cashless payment?

Previous studies on this topic mainly focus on one country or have cluster of countries, that do not have common determinants. The focus of this thesis is shifted towards eurozone countries as the eurozone is the largest economic sector in the world using common economic union and single currency. Countries that are members of the union must meet certain conditions, which include the price and financial stability of the country's citizens. Several eurozone countries with larger potential in economic development are becoming remarkably close to shifting their economic systems towards a strong reduction in the use of cash and implementing more convenient cashless payment instruments. (Stiglitz, 2016)

The first part will give theoretical background on the pros and cons of a cashless economy, description of consumer behavior theories, preview of previous studies done on determinants influencing use of cash and non-cash payment methods and stated hypotheses. The second chapter provides a description of the survey used for analysis, a description of variables, descriptive statistics and the methodology used for testing hypotheses. The third part will include empirical results, results from main and additional models giving results of this study. The fourth chapter will give discussion based on stated hypotheses whether they were confirmed or not.

# 1. THEORETICAL BACKGROUND

First chapter of this master's thesis focuses on the theoretical background of cashless society, its definition and its impact on modern society. The second part of this chapter will provide a description of theories on consumer behavior that will be used in construction of models used for analysis in current study. An overview of previous studies of determinants of the use of different payment methods will be given in the third part. The fourth part of this chapter described stated hypotheses based on reviewed literature and other studies.

## 1.1. Costs and benefits of cashless society

The cashless society can be defined as a society based on cashless payments and the use of electronic payments. While cash is not fully eliminated from the economic system, but the amount of paper money used on everyday basis is minimized to the lowest level. (Arvidsson 2019)

The definition of electronic payment has different perspectives. It can be seen from a pure information service system as transaction occurring through a comprehensive payment channel in electronic network. From the finance and business technology side electronic payment can be defined as a form of financial instrument where sellers and merchants are facilitated digitally without using cash. (Tella 2012) Main types of electronic payment instruments are cards, mobile payments, mobile banking, internet banking, electronic cash or e-cash, electronic wallets.

The rise in use of electronic cashless transactions is the result of developing information technology. Figure 1 shows the total rise in the number of cashless transactions made in euro area countries from 2000 to 2019. It has increased from 35278 million transactions in 2000 to 101640 million transactions in 2019.

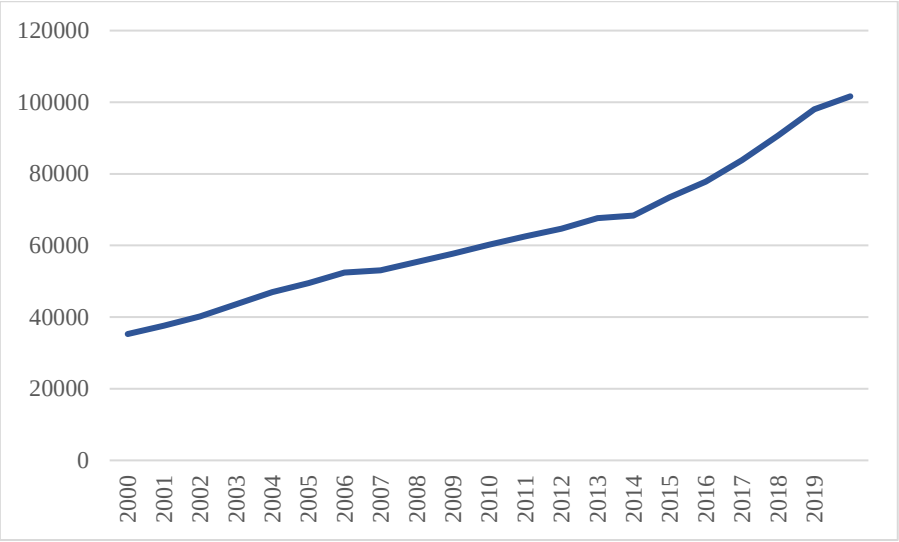


Figure 1. Number of total cashless transactions 2000-2019 in eurozone countries, million
Source: European Central Bank - Statistical Data Warehouse

Farida et al (2016) describes one of the drivers for the development of this technology is fast paced modern life. Most consumers prefer cashless system which they find more practical to achieve their goals. For quicker use of services, they only need to have a smartphone or card and do not need to carry a lot of cash. Consumers find non-cash ways of payment more practical in everyday use and consider them a more convenient way to achieve everyday life goals, such as quick payments in stores or transferring money to other people. Active users of cashless payment methods believe that a cashless society is more transparent and convenient (Farida et al. 2016). According to Gada (2016) since the launch of internet and social media, users there is an online population which ultimately today increases the worth of digital economy of a country. The more users are involved in system of cashless payments, the more increases usefulness for a regular consumer. Acceptance towards a cashless society requires a fully working network between consumers, merchants and services providing new payment methods. (Linne 2008)

A digital society will change the current way of handling payments, but not change them radically. Although there are many different options for cashless payment instruments, the use of actual cash as a payment instrument is still dominant. Some early studies (Arvidsson, 2014; Segendorf, Jansson 2012) state that not all modern cashless payment solutions are accepted easily by society. The transition from cash to other forms of money will meet challenges on its way. Although rapidly spreading digital payment methods are based on rationality and the requirements of the modern world, it should be taken into consideration that new technologies will be based on old systems and institutions. Latour (2005) in his paper presents banks and their structure as a black box,

explaining that society does not fully understand the concept of banks but has enough trust in them to hold their savings. Further technologies assume opening this black box and consumers will be able to take more responsibility for their payments. Barriers such as the need for new forms of banking and currencies may slow down progress. While more developed countries are ready for such changes, other don't have the economic infrastructure to implement new ways of payments. (Arvidsson 2019)

European Union has set goals to develop more connected and digitalized payment experience for consumers by the year 2026. In the report The Future of E-commerce: The Road to 2026 (2017) it was discussed that in ten years modern approach in segmentation of consumers will no longer be correct. Socio-demographic parameters will not have such major influence on consumers willing to use of specific payment method as e-payments will be integrated heavily into each individual's life. As new generations will grow up in fully digital world, technology use will be integral part of their life. While this is happening, transition to cashless economy is starting is world, where previous generations are still living old ways. Report done by European Parliamentary Research Service (2020) states that transitioning to non-cash ways of payment may on other hand be more positive change for citizens living in rural areas and reduce financial exclusion of unbanked persons. For example, internet payments can overcome restrictions of selling some goods in rural areas and empower consumers to buy more affordable products, as often ones that they have in their local stores are overpriced and do not have enough variety in product line. Some of the ways of cashless payment methods such as mobile do not require consumers to hold a bank account, which is a good opportunity for low-income groups who also receive their wages mostly in cash.

Despite the rapid development of cashless methods of payments, cash usage still has a significant place in most Eurozone areas, especially in low-value transactions. Italy and Germany hold high positions in cash usage among euro area countries. 82% of all payment transactions in Germany in 2008 were done using cash. (Kalckreuth et al 2014). A later survey conducted in 2016 that approximately 79% of all transactions done in all Eurozone area countries were made by cash. (Esselinnk, Hernandez 2017) Results vary between countries as a variety of cashless payment methods, charges, security, and speed vary from one country to another.

The European Union introduced new e-Commerce rules and set a new strategy for digital Europe in 2020. New regulations aim to provide a unified payment experience and opportunities for all consumers in all European countries and reduce the use of cash. This will include a digital skills

education plan for older and low-income individuals and a widening cashless network outside urbanized areas. (European parliament 2020)

European countries set a trend towards a cashless society because it is seen as a way to reduce money laundering problems, tax evasion, and also to develop financial services. While some economists argue that cases of financial instability, failures of financial companies and even central banks show that cash is still very significant.

Studies on cross-border financial linkages show that global crises, such as the one in the euro area in 2008, change the way international banks work. Policymakers were drawn to the attention that most cross-border cashless payments and funds are made in US dollars and depend highly on currency rate fluctuations. The expansion of foreign bank funding causes small countries to become financially dependent on the financial health of other countries. This led to the situation where the GDP of developed countries is lower than actual financial assets. While there are many positive effects, such as cost reduction, improved cost allocation, and money lending, developing countries are still in the position of other countries experiencing crisis spillover. Most economies can not completely abandon international funding, but strengthening of internal banking should be a priority. (Enhels, Wooldridge 2015)

Table 1. Combined benefits and costs of cashless society.

| **Benefits** | **Costs** |
|---|---|
| Development of payment technologies | Exclusion of elderly |
| Reduce of tax evasion | Vulnerability of low-income individuals |
| Decline in money laundering | Undeveloped rural areas |
| Less cost and time consume | No alternative in case of technical issues |
| Simplicity and convenience | Privacy issues |
| | Financial crisis spill |
| | Exclusion of developing countries |

Source: Achord et al (2017)

Countries going cashless mostly impact governments, banks, and big international businesses, while disadvantages expose individuals using cash in their everyday life. The choice of payment methods still highly depends on an individual's personal characteristics, style of life and habits. In order to start the transition to a cashless society, personal characteristics of the population should

be taken into consideration. Citizens are divided by different socio-demographic groups and excluding any of them from the cashless economy may lead to the disappearance of services and ways of payment, that are still needed for selected groups to have a comfortable life. (Achord et al 2017)

## 1.2. Role of socio-demographic characteristics in consumer behavior

Consumer characteristics such as age, gender, income, education, household size, and area of living are constantly used with many other socio-demographic variables while conducting studies of consumer behavior. Analysis of demographic data allows governments and businesses to understand consumers' needs and demands. These characteristics are always used as independent variables in survey-type studies. Including socio-demographic aspects allows for making comparisons without any effect of attitude and when standardization is essential for a study. (Hoffmeyer-Zlotnik 2016) In the case of cross-county surveys, should be considered country-specific characteristics and cross-national differences. A method of harmonization is usually applied to such data. One approach is to collect data as it is presented in each country and then find common variables. The other approach is to create common definitions before collecting data, which includes generalization of characteristics to fit cultural particularities. (Ehling, Rendtel 2004)

The base profile of a consumer always includes age and gender. Age is considered as influencing factor in payment choices as different generations are raised differently under the influence of new technologies and social norms. Often, strategies and plans are segmented by generations and age. Businesses always start their market research by determining the age groups that use their service or product. Payment behaviors and patterns have huge differences between millennials (individuals born from 1981 to 1996) and baby-boomers (individuals born from 1946 to 1964).

Despite the growing trend in gender equality, men and women are still viewed as consumers with diverse needs. Gender gaps in consumer behavior rise with consumers' age. Although not pure biological factor is playing a role here, this is also associated with educational differences between women and men of older age. (Desjardins, Warnke 2012) Gender differences also vary from one country to another. There are countries where full higher education is not yet available for women. This leads to an inequality of genders and impacts on payment behavior.

Individuals with higher education and income often form separate social classes and live with dissimilar lifestyles from individuals of the middle and lower social classes. This leads to changes in payment habits and access to payment methods. Although the educational systems of different countries may vary, education is usually added to the model as a routine variable, as it does not describe the discipline of what the studies, performance, or skills were obtained. (Schneider 2016) In the case of cross-country surveys, used more general categories such as primary, secondary, and upper and university education. The income level of respondents is generally collected by categories that go with national income categories. (Hoffmeyer-Zlotnik 2016)

The number of people in a household and the number of children should be treated as different variables. A household can include individuals that contribute to the household income level and participate in everyday payments. (Ibid.) Children in households do not belong to the targeted population in surveys because of the age limit, but they do influence other individuals inside the family. Household sizes are known to be larger in rural areas. (Ayad et al 1994)

Socio-demographic characteristics provide with data, that can be easily compared and sampled. It allows to categorize consumers and draw parallels needed for research. There are also limitations to samples, that use only general characteristics of respondents. Consumer behavioral research that targets only a specific group of consumers with a specific age and gender will not take into consideration preferences and expressions regarding specific payment methods. Models constructed from multiple theories of consumer behavior allow to cross-study socio-demographic characteristics and behavioral characteristics to get more accurate results.

## 1.3. Theories of consumer behavior

Consumer choice of payment can be referred to the theory of consumer choice describing consumer behavior developed by Vilfredo Pareto at the beginning of the 20th century (Luigino, Guala 2001). This theory consists of basic categories such as consumer characteristics, consumer preferences, and consumer income. The most important factor according to this theory is preference, as every individual's choice is mainly based on their personal preferences and taste. Later, this theory was criticized as being too primitive and was described as the preference satisfaction theory. However, it started research programs that found out that if individual makes one choice over another, it does not mean that he or she prefers it (Samuelson 1938).

The Theory of Reasoned Action (TRA) is a commonly used theory in context of understanding human behavior in a research context. The model was first proposed by Ajzen and Fishbein in 1980. The theory is based on the assumption that consumer behavior is purely affected only by an individual's preferences and intentions towards planned action. The model of this theory is based on two variables: attitude and subjective norms. Attitude is described as feeling towards behavioral objectives and subjective norms show a consumer's perception towards reaching a planned goal. (Ajzen, Fishbein 1980) Overall, if individuals find a positive connection with a given action, they are more likely to perform it. At the same time, if others find this important, it will also increase the probability of the action happening. Behaviors that connect these two factors go through all populations.

The Theory of Planned Behavior (TBP) is an extension of the Theory of Reasoned Action. It was proposed by the same authors in 1985. Many actions cannot be performed due to limitations such as lack of skills, cooperation, and opportunities. Renewed theory also includes actions and factors that are not directly under consumers' volitional control. The idea to perform action does not always only depends on motivational factors alone, but also on the availability of certain action resources needed for action. Resources such as money, time, distance, or access strongly determine if a consumer will be able to perform planned action. In general, this theory states that an individual who has the intention and opportunity to perform a behavior, will succeed in this action. (Ajzen 1985)

According to TBP theory, all intendent actions made by consumers are driven by three types of beliefs: awaited consequences of an action, norms of expectations of other individuals, and control beliefs. Figure 2 shows the model of this theory. All three considerations depend on each other and can influence the consumer's intention, but depending on the situation, external control factors can overpower an individual's personal preferences, so that choice will be made purely independently of the individual's intentions. (Ajzen 1991)

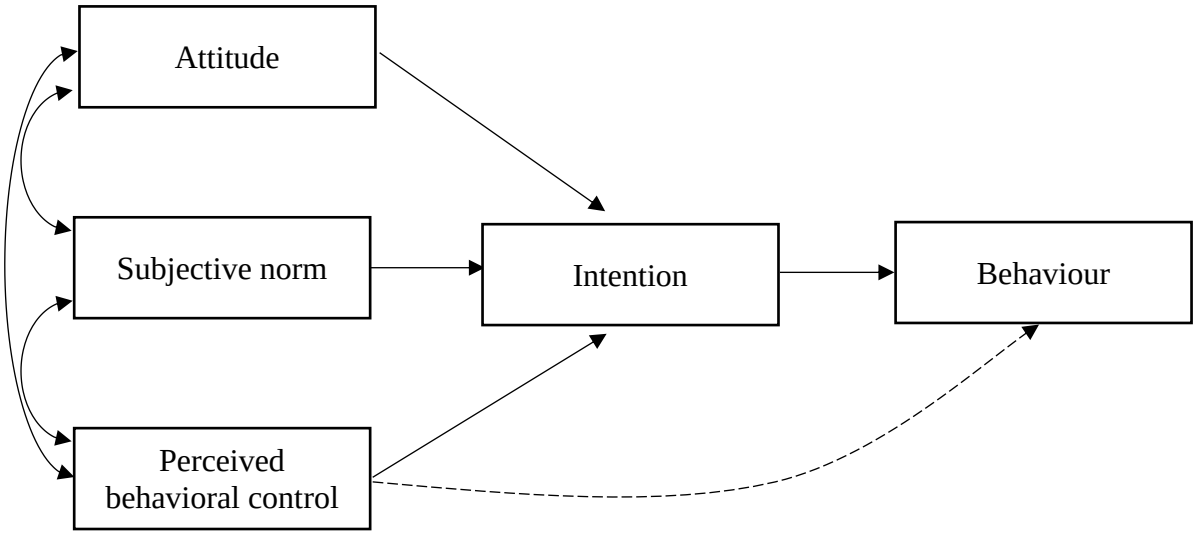


Figure 2. Theory of planned behavior
Source: Ajzen (1985)

or she negatively evaluates the result of performing the behavior. Attitude also has a definition of affect in earlier theories and is described as being cognitively based. (Triandis 1980) It was first associated with mood and emotions, but it was argued later that these factors are more likely to have an impact on perceptions of action likelihood.

Subjective norms come from the beliefs of other individuals. If an individual believes that people in his environment approve performing of an action, individual will have more motivation to comply and will have a positive subjective norm. A subjective norm is defined as an injunctive norm adopted in certain social networks. Certain cultures in the world are treated as indicators of normative influence as being a strong social identity for some individuals. (Ajzen 1991)

Behavioral control is added to the final model, and this is the only variable that differentiates it from the TRA model. It is placed very high in predictions of an individual's intentions and determines how difficult it would be for that individual to carry out planned action considering external factors. The concept of behavior control comes from earlier studies' concept of perceived locus. (Rotter, 1966) Locus of control describes factors that are not connected with situations or actions. This concept is more generalized and described more as an internal locus of control, whereas perceived behavioral control explores links between different forms of actions and outcomes. Atkinson (1964) in his theory of achievement motivation, has a very similar concept

approach of perceived control. The theory describes the motive to succeed as a combination of expectancy of success and a complex of factors that change from situation to situation.

The modern concept of perceived behavior control correlates with the concept of perceived self-efficacy. This concept was described by Bandura (1977) as an individual's capability to succeed in the performance of an action depending on an individual's personal characteristics and situational factors. His studies on this topic have shown that everything from preparation for an intention to effort made for this intention and actual activity is highly dependent on self-efficacy beliefs. Perceived control in TBP in very similar way from the beginning holds intention for an action, then continues with effort needed for a behavior, and concludes with actual behavior.

As natural evolution of TRA and TPB Ajzen and Fishbein introduce the Integrated Behavior Model (IBM). This model states that there are five factors that have an influence on consumer behavior: knowledge, environmental constraints, habits, salience, and actual intentions. This model is separated from the previous as attitude is rather more instrumental than evaluation of outcomes, and instead of subjective norm, it uses injunctive norm. Intention and perceived control are described in the same way as in previous theories. According to the IBM model, an individual is more likely to perform an action if there is a strong intention backed up with the needed skill, there are no external barriers for this to happen, the behavior is not new to an individual, and the behavior has an outcome. (Kasprzyk et al 2008)

All three models, TRA, TPB and IBM are designed so that the outcome is measured bipolar. A likelihood scale usually varies from "likely-unlikely" to "agree-disagree". This makes these theories and models easily adapted for regression analytic research methods in order to test relationships between different determinants. If any particular consumer behavior is under investigation, model construction based on these theories will show if the behavior is under attitudinal, normative, or perceived control. (Albarracin, Ajzen 2007) The research that implements these strategies must examine which factors are more influential to the chosen population and area of study. Also, for some behaviors, some components of the model are more influential than for other behaviors.

## 1.4. Previous studies on determinants of use of payment methods

According to Tapscott (1996) nowadays, society is not focused on digital technologies as instruments but all about how individuals use their technology, their social development, and interaction between different socio-demographic groups.

As the theory of cashless society states, cashless payment methods are an outcome of the development of new technologies. When the concept of a cashless society is discussed, it is usually done at a macro level. with governments not yet ready to transition to a cashless economy, society also needs to be prepared for changes in their payment habits.

While it has been 50 years since basic payment instruments such as cards and 30 years since internet-based transactions came into being, in the present world, not all of the population has access to the internet. (Maurer 2015) Evidence from the US states that there were about 30% of unbanked households in 2018. Low-income families find bank requirements too strict or, due to uncertain living conditions, cannot fulfill all the needed conditions for banks to open bank accounts. Surveys also confirm that nearly 14% of unbanked individuals live in rural areas, which makes it hard or unnecessary for them to even have a bank account. As a result, rural areas are more vulnerable in the event of a transition to a cashless society. (Erlanger 2019)

New technologies bring new ways of cashless payments, so studies on using these ways of payment go along with studies on acceptance of technologies. One of the modern studies of user acceptance of information technology (Viswanath et al 2003) reviewed 8 models based on different consumer behavior theories and developed a Unified Theory of Acceptance and Use of Technology. The combined model was adapted from TRA and TRB. Authors confirmed that theories of motivation in performing an action are connected with evaluation of future benefits. Results have shown that younger women are more sensitive to social influence than men, and therefore more subjected to the use of new technologies. On the other hand, the behavior of older women towards the use of new technology is more influenced by personal preferences and external factors. Knowledge necessary to use internet systems is one of the leading actions, if person is not familiar or comfortable with technologies, and it is not addressed in a way that in familiar with previous experiences, individual less likely to use it. Empirical results of the study also show that attitudes toward new technologies go in parallel with preferences and increase to the same degree.

In general, the relationship between gender and the choice of payment system is concerned. Previous studies on this topic found both positive and negative connections and considered gender as a non-factor. One of the determining facts is that women are more likely to be exposed to financial gender exclusion. A study conducted in Poland (Smyczek 2012) determined that women are more excluded from financial institutions and, therefore, will less likely use cashless methods of payment. But overall, for female individuals, perceived usefulness affects the use of cashless transactions positively but not significantly. When using cashless transactions, both men and women really feel the benefits provided by using cashless; the greater the benefits obtained, the higher the use of these cashless transactions (Subawa et al 2020). Pahl (1999) reports that males have more and use more credit cards than females. She also reports that if women have independent income, the difference is not significant. Later studies provide evidence that the use of cashless payments is not gender dependent among the younger population. (Carpenter, Moore 2008)

Dhanda and Arora's (2017) paper showed a connection between the age factor and the rapid increase in use of credit and debit cards in recent years. Teenagers find owning a card to be a great pride and are considered free from fraud by older users. Millennials and Generation X are found to be more engaged mobile banking users.

While the gender factor does not have a consistent impact on the choice of payment methods, there does, however, appear to be consistent evidence that income and education have more influence (Klee 2006; Lee, Kwon 2002) Employees with a higher position and salary are more likely to use cashless. The literature also shows that income and education correlate with credit card ownership and use.

Bagnall et al. (2016) discovered that the strongest correlation between use of cashless transactions and socio-demographic characteristics and the ability to pay cashless exists in seven countries (Australia, Austria, Canada, France, Germany, the Netherlands, and the United States) after analyzing survey data on payment behavior in seven countries (Australia, Austria, Canada, France, Germany, the Netherlands, and the United States). These studies, among most others, have researched the topic from the perspective of developed economies. Countries with a higher level of socio-economic inequality, such as India, have a dramatically different experience of demonetization. Bajaj and Damodaran (2020) in their study of cashless society in India, found that effect is unevenly distributed between urban and rural areas.

The study described in a paper published by DNB bank (Cruijsen, Horst 2016) used a conceptual socio-psychological model to test payment behavior and drivers towards intention and actual payment behavior. Constructed models were based on the Theory of Planned Behavior with the addition of emotion and habits. The authors came to the conclusion that in order to change consumers' payment behaviors, it is not enough just to provide them with needed access and technology; it is more important to influence their habits and preferences. Cash provides consumers with full control of the money they have and the straightforwardness of its use. Electronic payments should have the same vision and should increase the level of perceived control. For example, contactless payments do not require any codes to be remembered, so it would be easier to accept. There is also the influence of a particular country's cultural norms that should be addressed. Any cashless payment methods should be advertised to broader groups of people, not just to individuals.

The study on the influence of socio-demographic and attitude factors on decisions relating to payment behavior using empirical data from Uganda (Josses, Kayaga 2019) ended up with the conclusion that external factors and obstacles are far more influential than a consumer’s attitude. The authors used the Theory of Planned Behavior as a base model. Socio-demographic variables like gender, income, income level, and occupation showed less impact than perceived control. Social pressure was also determined as an important factor in payment behavior.

Usage of credit cards tested through the model of TBP (Bano 2020) resulted in conclusions that financial literacy plays a high role in successful use of credit cards. The more an individual is familiar with the system and has skill and knowledge, the more preference will be given to the use of a card. Another similar study (Rutherford, Sharon 2009) on debit and credit cards showed that attitude and convenience are the main determinants. In the same study, the case of a large household was explored. Households that have more individuals are more likely to use credit cards and cashless payments, as expenses do not usually match with income, so this fact forces to use the credit balance on the card and not cash.

An experimental study on interventions that may have an effect on the use of cards was carried out by Aydogan (2014) in Belgium. The study is based on so-called nudges, which represent soft interventions into consumers' lives, having an unobstructive influence on their choice behavior. Consumers have been influenced by external factors at the point of sale, aiming to investigate whether this intervention will have an impact on the use of card payments. These kinds of tactics

are usually used to force consumers to pay cashless in card-only lanes or self-checkout cash registers. Results show that such factors have great impact but fade with time, while constant factors such as socio-demographics and preferences will stay.

Cash withdrawal motivation and use of cash depend positively on access to ATM terminals and the number of mobile users in the country. (Titova et al 2021) A study on cash usage in European Union countries provides evidence that usage of the internet stimulates growth in internet payment transactions. Country GDP is not the main determinant, while socio-cultural factors play a higher role, such as age, education, and dependency on other people.

Another paper dedicated to analyzing cash demand in euro area households showed that the shadow economy of a country plays a large role in the use of cash. The financial crisis in 2008-2009 increased cash demand in almost all EU countries, with the exception of Scandinavian countries. Since introducing the euro as a common currency, usage of cashless payments has increased, but cash held has stayed at the same level also. One of the surprising findings is that COVID-19 reduced the use of traditional cash, but at the same time there was an increase in cash in circulation during the pandemic period. (Goodhart, Ashworth 2020))

## 1.5. Formulation of hypotheses

Previous studies are divided in their conclusions about the role of gender in the choice of cashless payment methods. Research done in countries that have big gender differences in the roles of a woman and a man shows that men are more likely to use modern technologies, while developed countries show the opposite results. The current study is based on eurozone countries, which have very similar social gender norms, with no great separation.

Urban and rural areas have their differences in access to banks and technologies providing cashless payment methods. Despite the fact that eurozone countries have their own future plans to widen the area of wireless payments, it is still at an early stage. There are no studies with results that show that rural areas are even close to urban areas in using cashless payment methods. It is safe to state that the current study will prove the same result.

Similar to areas of living, access to the internet and online banking services have been seen to be great reasons why consumers still prefer cash. The Internet provides consumers with electronic

finance literacy and ways to hold money electronically, widening consumers' options in the choice of cashless ways of payment. Along with this, consumers lose the need to withdraw cash even if there is access to an ATM nearby. All theories on consumer behavior are based on the fact that preference is the main factor in individual payment choices. External factors may change its impact, but not change payment intentions significantly.

Based on reviewed literature and previous studies, the following hypotheses have been set up:

H1. There is no link between gender and the choice of payment method.
H2. Individuals living in rural areas are more likely to use cash.
H3. Individuals living in larger households and having more children are more likely to use cash.
H4. Preference has more impact on the use of the cashless method than the external factors.
H5. Individuals with no access to the internet are more likely to use cash.
H6. There is no link between individuals' ease of cash withdrawal and their choice of payment method.

# 2. DATA AND METHODOLOGY

## 2.1. Data

The empirical study of this thesis is based on a survey carried out by the European Central Bank (ECB) in 2019. The Survey is carried out every two years and aims to collect data on the payment attitudes of consumers in the euro area. Questions in the survey cover the use of cash and non-cash payment methods; factors influencing consumers' payment behavior; and the ease of access of different payment instruments. The objective scope of the primary survey is very broad, and it has covered both cash and cashless payment instruments. The survey covered domestic payments, which are payments made within the territory of the euro area, and analyzed a very wide range of instruments such as cash, debit cards, credit cards, mobile phones, bank cheques, credit transfers, direct debits, and other cashless ways of payment.

The survey was conducted by market research company Kantar Public among 41155 respondents in 17 of the 19 euro area countries from March to December 2019. Respondents were asked to fill out payment diaries for one week and capture their payment behavior each day. Diaries included questions such as payment location, payment instrument, payment amount, preferred payment instrument, use of the internet and bank services, importance of cash use, and access to various cashless payment methods. In the final interview, respondents were contacted via telephone, online, and face-to-face.

The original sample contained 199 variables; each one was assigned to the question of the survey. To meet the needs of this study, data was wrangled. The sample was differentiated by age, gender, number of persons in the household, number of children, income level, employment status, education level, area of living, frequency of internet and bank services usage, the use of cashless payment instruments, preferences in payment methods, ease of cash withdrawal, and share of regular income received in cash. The final sample contains 26601 respondents' answers and aims to achieve representativeness of the adult Eurozone population of 17 countries.

## 2.2. Descriptive statistics

The final sample consists of 19296 respondents who used cash for their payment, or 73% of the total number of observations, and 7305 respondents, or 27%, used the cashless payment method.

Table 2. Summary statistics for socio-demographic variables

| | | Cash (n=19296) | | Cashless (n=7305) | |
|---|---|---|---|---|---|
| Variable | Group | Freq | % | Freq | % |
| gender | Male | 9691 | 50% | 3717 | 51% |
| | Female | 9605 | 50% | 3588 | 49% |
| age | 18-39 | 5708 | 30% | 2806 | 38% |
| | 40-59 | 8032 | 42% | 2773 | 38% |
| | 60-75+ | 5556 | 28% | 1726 | 24% |
| education | Primary/lower secondary | 2255 | 12% | 539 | 7% |
| | Upper/post-secondary | 9092 | 47% | 3200 | 44% |
| | University/PHD/research | 7949 | 41% | 3566 | 49% |
| income | EUR 750 or less | 2433 | 13% | 761 | 10% |
| | EUR 751 and EUR 1,500 | 4812 | 25% | 1472 | 20% |
| | EUR 1501 and EUR 2500 | 5391 | 28% | 1880 | 26% |
| | EUR 2501 and EUR 4000 | 4261 | 22% | 1652 | 23% |
| | More than EUR 4000 | 2399 | 12% | 1540 | 21% |
| urban | Urban | 8206 | 43% | 3177 | 43% |
| | Rural | 11090 | 57% | 4128 | 57% |
| labour | Employed | 12438 | 64% | 5124 | 70% |
| | Unemployed or student | 6858 | 36% | 2181 | 30% |

Source: authors' calculations

Table 2 represents summary statistics for socio-geographical variables, and Table 3 presents descriptive statistics of all variables, including dependent variables, socio-demographic variables, and other variables used in this study. Statistics include data on the mean, standard deviation, median, minimum, and maximum. Data from both tables combined allows to describe respondent'ы profile.

The gender distribution among respondents who used cash and cashless methods is equal. The sample's average age falls into two groups, which includes individuals 40-59 years old. The average education level is upper or post-secondary, and the average income is between 1501 and

2500 EUR. Individuals living in rural areas represent 57% of all individuals from this sample and are employed. The average household in this sample has 3 individuals, and one of them is a child.

Table 3. Descriptive statistics of variables

| Variable | Mean | SD | p50 | Min | Max |
|---|---|---|---|---|---|
| payment_system | 0.27 | 0.45 | 0 | 0 | 1 |
| gender | 0.50 | 0.50 | 0 | 0 | 1 |
| age | 1.95 | 0.77 | 2 | 1 | 3 |
| education | 2.33 | 0.66 | 2 | 1 | 3 |
| income | 3.04 | 1.24 | 3 | 1 | 5 |
| urban | 0.57 | 0.49 | 1 | 0 | 1 |
| hhsize | 2.71 | 1.22 | 2 | 1 | 5 |
| depchildren | 0.74 | 1.03 | 0 | 0 | 4 |
| labour | 1.34 | 0.47 | 1 | 1 | 2 |
| preference | 2.02 | 0.72 | 2 | 1 | 9 |
| importance | 6.16 | 2.92 | 6 | 1 | 11 |
| c_access | 0.99 | 0.12 | 1 | 0 | 1 |
| onlineb | 0.70 | 0.46 | 1 | 0 | 1 |
| internet | 1.32 | 1.15 | 1 | 1 | 9 |
| ease | 1.61 | 0.94 | 1 | 1 | 9 |
| cash_i | 1.42 | 1.22 | 1 | 1 | 9 |
| amount | 25.72 | 74.23 | 10 | 0.01 | 3500 |
| location | 4.93 | 4.33 | 4 | 1 | 19 |

Source: author's calculations

## 2.3. Models and variables

This study is based on one dependent variable evaluated through four models based on previous studies and reviewed theories of consumer behavior. The socio-demographic model was based on previous research done on this topic and the theory of consumer choice. The second model also includes an individual's preferences and intentions as it was described in the Theory of Reasoned Action. The third model tests only external factors independently from a consumer's intentions in order to determine their pure influence on the consumer's choice. The final model includes all three models and represents something similar to the Theory of Planned Behavior. Two additional models were constructed for the robustness test. Table 4 describes all the variables used in this study.

Table 4. Variables description

| Variable | Description |
|---|---|
| **Depended** | |
| payment_system | 0 - cash, 1 - cashless |
| **Socio-demographic** | |
| gender | Binary, 0 - male, 1 - female |
| age | Age, 3 groups, low to high, where 1 - 18-39, 2 – 40-59 and 3 – 60-75+ |
| education | The highest level of education, 1 - Primary/lower secondary education, 2 - Upper/post-secondary education, 3 - University/PHD/research |
| income | Household monthly net income, 1 - EUR 750 or less, 2 - between EUR 751 and EUR 1500, 3 - between EUR 1501 and EUR 2500, 4 - between EUR 2501 and EUR 4000, 5 - more than EUR 4000 |
| urban | Binary, the respondent's area of living, 0 – urban, 1 - rural |
| hhsize | Continuous, household size, number of persons |
| depchildren | Continuous, number of the respondent's economically dependent persons |
| labour | Labour status, 1- employed, 2 - without a professional activity or student |
| **Preference** | |
| preference | The respondent's preferred payment instrument, 1 - cash, 2 - cashless, 3 - no preference |
| importance | How important for respondent to be able to pay in cash. Scale from 1 to 10 |
| **Factors** | |
| onlineb | The respondent's access to online bank, 0 - no, 1 - yes |
| ease | Ease to withdraw cash from an ATM or a bank, 1 - very easy, 2 - fairly easy, 3 - fairly difficult, 4 - very difficult |
| internet | Use of internet in the last 3 months, 1 - every day or almost every day, 2 - two or three times a week, 3 - about once a week, 4 - two or three times a month, 5 - less often, 6 - never, 7 - no internet access |
| cash_i | Share of regular income received in cash, 1 - none, 2 - up to a quarter, 3 - between a quarter and half, 4 - half of your regular income is in cash, 5 - between half and three-quarters, 6 - more than three-quarters |
| c_access | Access to cashless payment methods, 0 - no, 1 - yes |
| **Robust check** | |
| amount | Continuous, amount of payment |
| location | Location where payment was made, 15 groups, 1 - supermarket, 2 -small shop for day-to-day items, 3 - on the street or at a market, 4 - shop selling durable goods, 5 - petrol station, 6 - restaurant, bar, cafe, 7 - hotel or similar, 8 - a venue for culture, sports or entertainment, 9 -vending or ticketing machine, 10 - services outside the home, 11-services inside or around the home, 12 - office of a public authority or post office, 13 - charity, 14 - other person to person payment, 15 - other physical location |
| country | 17 countries: AT - Austria, BE - Belgium, CY - Cyprus, EE - Estonia, ES - Spain, FI - Finland, FR - France, GR - Greece, IE - Ireland, IT - Italy, LT - Lithuania, LU - Luxembourg, LV - Latvia, MT - Malta, PT - Portugal, SI - Slovenia, SK - Slovakia |

Source: compiled by the author

### 2.3.1. Dependent variable

The dependent variable *payment_system* of the current study is binary and indicates whether payment was made using a cash or cashless payment method. It was constructed from the original dataset variable labeled as "Instrument POS payment," which contains respondents' answers to the question "How did you make the payment?" There were nine categories in the original dataset: 1) Cash; 2) Debit card; 3) Credit card; 4) Phone; 5) Bank cheque; 6) Credit transfer; 7) Direct debit; 8) Other; 9) Don't know. Dummy variable was created, where 0 indicates cash payments and 1 is combined from 2–8 categories, indicating that payment was made through a cashless payment system. The last category of answers was omitted since they have no value for the model.

### 2.3.2. Socio-demographic model

The first model is based on socio-demographic variables: *gender, age, education, income, urban, hhsize, depchildren,* and *labor*. These variables represent a combination of social and demographic factors in a specific group of people that affect the choice of payment method. This model was constructed based on literature stating that socio-demographic characteristics allow to conduct cross-country studies and represent the general profile of a consumer in a harmonized way. (Hoffmeyer-Zlotnik 2016)

Variable *gender* is binary, where 0 is male and 1 is female. Age is divided into 3 groups from younger to older, constructed from 12 variables of the original dataset and representing individuals that are older than 18 years. Education consists of 3 groups: primary or lower secondary education, upper or post-secondary education, university or PHD or research. Variable *income* has 5 groups, divided based on the income level of households, from a group with an income of less than 750 EUR a month to a household with a monthly income of more than 4000 EUR. The binary variable *urban* indicated whether a person lives in an urban area – 0 – or in a rural area – 1. Variables *hhsize* and *depchildren* are both continuous and represent the size of the household in terms of the number of individuals and the number of financially dependent individuals. Variable *labor* binary that distinguishes between respondents who are employed – 0 – and those who are not employed – 1.

### 2.3.3. Preference model

The second group of variables was constructed from answers to questions showing respondents' willingness and importance to use cash or non-cash payment methods. The preference model was created in order to check if attitude has a correlation with actual intention to pay cashless. Preference is part of all theories on consumer behavior, along with consumers' intentions. It has

been included since the earliest models and has had the main impact on an individual's intentions of performing actions. (Luigino, Guala 2001; Ajzen, Fishbein 1980; Ajzen 1985; Kasprzyk et al 2008) In current study, the preference model includes two factors: preference and importance.

Variable *prefer* reflects question "Preferred payment instrument" from the original dataset, where respondents were asked what payment instrument is preferred when he or she has a choice. 3 groups were created from the answers: cash, card or other cashless payment, no clear preference between cash and non-cash payment. Second variable *importance* is constructed from the question "How important is it for you to have the option to use cash?" indicating whether respondents have a clear belief in paying cash at the payment point. Answers were given on a scale from 1 to 10, where 1 means not important at all and 10 means very important.

### 2.3.4. Factors model

The third group of variables was created to analyze drivers and barriers that have an impact on respondents' use of payment methods, such as use of online banking, ease of cash withdrawal in respondents' area of living, access to the internet, monthly income in cash, access to cashless payment methods. The factors model was constructed based on the model of the Theory of Planned Behavior, where variable perceived behavioral control was added. (Ajzen 1985) This theory adds factors that influence consumer behavior from outside. The aim of the current model is to analyze what impact external factors have on the choice of payment system if preference is not taken into account.

Variable *onlineb*, which is binary and indicates whether the respondent has access to online banking services. Respondents' ease of withdrawing cash from an ATM or a bank is represented in variable ease and has 4 groups: very easy, fairly easy, fairly difficult, and very difficult. In order to determine individuals that use the internet on a daily basis, variable *internet* was created. This variable allowed to distinguish individuals that do not have internet access. As a basis was taken the question "Use of the internet in the last 3 months", which had 7 answers: every day or almost every day, two or three times a week, about once a week, two or three times a month, less often, never, no internet access. Variable *cash_i* shows the share of households' regular income received in cash. This information will help to understand if respondents living in rural areas receive more cash and, therefore, are more likely to use cash for their payments. The binary variable *c_accesss*

was added to determine how many people in their area do not have access to cashless payment methods.

### 2.3.5. Final model

A final model is constructed to test the impact of all variables from previous models on dependent variables in one combined model. Both the Theory of Planned Behavior and the Integrated Behavior Model state that socio-demographic, preference, and external factors should be combined together to get an accurate result in analyzing consumer behavior. (Ajzen 1985; Kasprzyk et al 2008)

### 2.3.6. Robustness test model

Two additional models were included to analyze whether the final model has robustness results. The idea of this test is taken from a research paper on the role of socio-psychological factors. (Cruijsen, Horst 2016) Authors came to the conclusion that the amount and location of payment play a great role in payment behavior and should be considered in future studies on this topic.

The first model tests whether the impact of socio-demographic, preference, and external factors depends on the amount of transaction. Results are divided by transactions that are less than 10 EUR and those that are 10 EUR or more. For this model, the continuous variable amount was constructed from the survey question "What was the amount of the payment, if any?". Since data was wrangled to include only answers where payment was made, all answers included the amount of payment.

The second robust test model shows whether there is an impact on using the cashless payment method by all variables from the final model change if an individual paid for goods or services. The variable for the second model *location* represents the location where payment was made. It includes 15 categories: supermarket, small shop for day-to-day items, on the street or at a market, shop selling durable goods, petrol station, restaurant, bar, cafe, hotel or similar, a venue for culture, sports or entertainment, vending or ticketing machine, services outside the home, services inside or around the home, office of a public authority or post office, charity, other person-to-person payment, other physical location.

## 2.4. Methodology

Several methods can be used in order to make an analysis of survey data based mostly on variables used. For this study, the method of logistic regression was used.

Logistic regression is used when the research method is focused on whether an event occurred or not and not considering the time when the event happened. (Boateng and Oduro, 2018) Logistic regression does not assume a linear relationship between the dependent and independent variables but between the logit of the outcome and the predictor values. The dependent variable must be categorical.

Logistic model function:

$$p = \frac{1}{1 + e^{-(b_0 + b_1 x_1 + b_2 x_2 + \cdots + b_p x_p)}}$$

where:
p – probability of a dependent variable
$b_0$ – value when the independent variable is equal to zero
$b_1x_{2\ldots}b_px_p$ – independent variables

The use of logistic regression on the data from this study will allows to investigate whether socio-demographic factors, preferences, transaction amounts, and access to online banking services influence payment method selection. The binary dependent variable *payment_system* is whether an individual used a cash or non-cash method of payment. If cash was used, the variable equals 0 if a non-cash variable equals 1. All models were tested using the statistical software Stata.

Since the study is based on surveys from 12 countries, some results are related to each other based on country or area of living and are unlikely to be independent. To avoid correlation of sampling within each group, clustered standard errors were used in all models and robust tests. Variable country was used as a measurement as there is no possibility to randomly sample the full population from all countries. This method allows to add flexibility to model results and randomize results from each country. (Angrist, Pischke 2008)

In addition, the country-fixed effect method was used within all tested models. Each country has its own characteristics, political, historical, cultural, and social specialties that can have an influence on predictor variables but are not captured by available measures. (Fischer, 2010) A dummy variable country was included in all models. The odds are hidden from all models and are only used to analyze the impact of other variables.

For interpreting results, was chosen odds ratio method rather than coefficients. The odds ratio of a variable is the probability that this variable has an effect on a dependent variable divided by the probability that the variable does not have an effect. Odds ratios that are greater than 1 indicate that the tested variable is more likely to have an impact as the predictor increases. Odds ratios that are less than 1 indicate that a variable is less likely to have a connection as the dependent variable increases.

A correlation matrix is another method used in this study. Statistical measure correlation coefficient is used to find relationship between movements of variables. Correlation coefficients are put together into a correlation matrix. Range is shown on a scale from-1.0 to 1.0, where -1 is called perfect negative correlation, meaning that variables move in two opposite directions, 0.0 shows that variables have no linear relationship, and 1.0 is a perfect positive relationship. (Stigler 1986) The main function of this method in the current study is to confirm findings from models and determine if variables with higher odds will have a positive correlation with the dependent variable.

Correlation coefficient equation:

$$p_{xy} = \frac{Cov(x,y)}{\sigma_x \sigma_y}$$

where:

$\rho_{xy}$ - Pearson product-moment correlation coefficient

Cov(x,y) - covariance of variables x and y

$\sigma_x$ - standard deviation of x

$\sigma_y$ - standard deviation of y

# 3. EMPIRICAL RESULTS

## 3.1. Results of socio-demographic variables through all models

Socio-demographic characteristics are used to describe the general profile of a respondent. Comparison of the results through all models will indicate whether including other variables changes their impact and will confirm theories that these variables cannot be viewed separately from other behavioral factors. Table 5 provided at the end of the chapter, includes all model results combined and a correlation matrix can be found in Appendix 1.

Results show that gender is not statistically significant in socio-demographic and factors models. While in models where preference variables are added, women are slightly less likely to use non-cash payment methods. On the one hand, these findings are consistent with previous studies in which men were found to be more frequent card payment users; on the other hand, the odds ratio of 0.94 in both models is not significantly lower than one, confirming the hypothesis that gender cannot be a determinant in payment method choice.

The original dataset had 12 age groups with an interval of 4 years in each group. Including all groups in preliminary testing showed that the trend of lowering odds with age was consistent across all models. The final three groups with increased year gaps are statistically significant at 1% level and show the same trend as in preliminary testing. Older individuals are less likely to use cashless payment methods, and the odds drop very sharply to 0.72 compared with the first age group of individuals 18–39 years old. Variable *age* also has a negative correlation with the dependent variable, confirming these results. The results are comparable to previous studies, which all came to the same conclusion: despite the spreading habits' change and learning programs, older consumers are not yet ready to transition to a cashless society. The negative correlation between age and education confirms literature statements that older people are more likely to have a lower level of education.

Earlier theories and research focused on a fact that education and income play a high role in payment behavior. The current study finds that education and income level are statistically significant only in socio-demographic and factors models that do not include preference. Both variables have a positive correlation to the dependent variable. In final model where both preferences and factors are included, only odds 1.242 of individuals with an income level of more than 4000 have a significance level of 5%. This result does not correlate with previous studies and shows that other variables have more impact on the dependent variable.

From looking at the results of variable *urban* that represents respondents' area of living, it can be found that this determinant is statistically significant on a level of less than 5% across all models. The odds of using cashless payment methods (odds 1.11 in the final model) for individuals living in rural areas are higher than for individuals living in urban areas. This finding is quite surprising, since studies conducted earlier show that rural areas lack access to modern technologies and cashless payment methods. This does not confirm the stated hypothesis. The difference may still come from the fact that eurozone countries are more focused on the development of rural zones and small European countries' citizens find using cashless payments in rural areas more convenient.

According to the results from all models, increasing the number of children in the family does not increase the odds of respondent use of non-cash. These findings also cannot be used since the variable's *depchildren* significant level is more than 10%. While the overall number of people in a respondent's household can be used for analysis, the odds are between 0.96-0.97 showing that increasing number only slightly affects consumers' decisions in paying cashless.

## 3.2. Results from preference model

The second model, in addition to socio-demographic characteristics, tested determinants such as an individual's preferences on choosing cashless payment methods and the importance of having cash as a payment method.

From the results of the preference model shown in Table 5, it is clearly seen that individuals' preferences have an expectedly high odds ratio of paying cashless, confirming both the Theory of Reasoned Action and the Theory of Planned Behavior reviewed in the literature chapter. Variable *preference* has a significance level of less than 1% and correlates positively with the dependent

variable. Individuals that prefer paying cashless have 5.38 more odds of using non-cash than individuals preferring cash. Also, individuals with no preference are also more likely to use cashless payment methods (odds ratio of 2.38). This confirms statements by economists who speak of the inevitability of transferring to a cashless society because of its ease of use in everyday life. At the same time, the importance of using cash, while being significantly important for this model, has an odds ratio of 0.98, is too close to 1, and the correlation ratio with variable payment_system is-0.03, indicating it has no impact on the choice of cashless payment method.

## 3.3. Results from factors model

The third model is constructed to research the impact of actual factors that act as drivers for the choice of payment method. The model is constructed so that there is no preference or importance variable, to exclude its impact.

As predicted, individuals having access to both cash and cashles payment methods are more likely to use non-cash. Odds 5.076 and a significance level less than 1% indicate that this is the main variable in this model that has an actual impact on choice of payment method. The variable *c_access* is positively related to the dependent variable. As for the ease of cash withdrawal, only option very difficult shows odds 1.329 compared to very easy. Options fairly easy and fairly difficult are too close to 1 to be considered. This indicates that the option to withdraw cash has no actual impact on a consumer's decision to pay cashless. Only individuals living in areas that do not give them the choice physically to use cash will use non-cash more often. The average user of online banking has 1.252 more odds than those who do not use it. Labels less often than two or three times a week, never and no internet access of internet variable are not statistically significant, while only statistically significant options once a week with odds 1.418 and two or three times a month with odds 1.494 show that the more an individual uses the internet, the more likely he will pay cashless. The odds of variable *cash_i* drop sharply to 0.684 for individuals who receive their regular income in cash. This is a clear indication that individuals will not transfer money into cashless.

## 3.4. Results from final model

The final model included all variables from the socio-demographic, preference, and factors models. Overall, it can be seen that the most significant determinants of paying cashless are age, an individual's preference, importance, access to cash, use of the internet and online banking services, and receiving regular income in cash. The final model has similar odds of *preference* variable to the preference model, so including all external factors, this determinant is still the one that has the most impact on payment behavior. But still, an individual that receives more than three quarters of his or her income, with an odds of 0.612, will be more likely to use cash despite preferences or actual intentions. Attachment to cash and unwillingness to take an extra step to transfer money to a cashless network still plays a huge role in the use of non-cash.

Table 5 represents the combined results from the four main models tested in the current study. A correlation matrix of all variables can be found in Appendix 1..

Table 5. Logistic regression models

| Variables | Labels | Socio-demographic | Preference | Factors | Final |
|---|---|---|---|---|---|
| 1.gender | Female | 0.986(0.0296) | 0.935(0.0272)** | 0.986(0.03) | 0.936(0.0273)** |
| 2.age | 40-59 | 0.718(0.0305)*** | 0.726(0.027)*** | 0.719(0.0309)*** | 0.729(0.027)*** |
| 3.age | 60-75+ | 0.628(0.056)*** | 0.618(0.0522)*** | 0.637(0.057)*** | 0.613(0.051)*** |
| 2.education | Upper/post-secondary | 1.163(0.0903)* | 1.037(0.0694) | 1.099(0.0815) | 1.042(0.0714) |
| 3.education | University/PHD | 1.398(0.136)*** | 1.141(0.0941) | 1.273(0.126)** | 1.138(0.102) |
| 2.income | EUR 751 - 1500 | 1.121(0.0853) | 0.986(0.08) | 1.069(0.0849) | 0.986(0.0808) |
| 3.income | EUR 1501 - 2500 | 1.273(0.111)*** | 1.025(0.0914) | 1.162(0.097)* | 1.016(0.0847) |
| 4.income | EUR 2501 - 4000 | 1.331(0.136)*** | 0.994(0.104) | 1.196(0.116)* | 0.986(0.0967) |
| 5.income | More than EUR 4000 | 1.758(0.168)*** | 1.249(0.121)** | 1.571(0.148)*** | 1.242(0.113)** |
| 1.urban | Rural | 1.131(0.044)*** | 1.110(0.0468)** | 1.130(0.0441)*** | 1.108(0.0474)** |
| hhsize | | 0.959(0.015)*** | 0.972(0.0171) | 0.966(0.0161)** | 0.971(0.0175)* |
| depchildren | | 1.007(0.0223) | 0.991(0.0227) | 1.003(0.0224) | 0.991(0.023) |
| 2.labour | Unemployed/student | 0.936(0.0427) | 0.958(0.037) | 0.950(0.0435) | 0.962(0.0393) |
| 2.preference | Cashless | | 5.378(0.636)*** | | 5.167(0.581)*** |
| 3.preference | No preference | | 2.383(0.233)*** | | 2.303(0.217)*** |
| importance | | | 0.979(0.0047)*** | | 0.978(0.005)*** |
| 1.c_access | Yes | | | 5.076(1.339)*** | 3.492(0.926)*** |
| 1.onlineb | Yes | | | 1.252(0.0593)*** | 1.094(0.0501)** |
| 2.internet | 2 or 3 times a week | | | 0.980(0.0927) | 1.122(0.0819) |
| 3.internet | About once a week | | | 1.418(0.214)** | 1.573(0.261)*** |
| 4.internet | 2 or 3 times a month | | | 1.494(0.27)** | 1.668(0.341)** |
| 5.internet | Less often | | | 1.046(0.235) | 1.105(0.268) |
| 6.internet | Never | | | 0.918(0.157) | 1.143(0.169) |
| 7.internet | No internet access | | | 0.781(0.126) | 0.974(0.122) |
| 2.ease | Fairly easy | | | 1.070(0.031)** | 1.035(0.0303) |
| 3.ease | Fairly difficult | | | 1.159(0.0735)** | 1.078(0.0668) |
| 4.ease | Very difficult | | | 1.329(0.201)* | 1.360(0.208)** |
| 2.cash_i | Up to a quarter | | | 0.891(0.0858) | 1.022(0.0922) |
| 3.cash_i | Quarter or half | | | 1.013(0.137) | 1.255(0.175) |
| 4.cash_i | Half of income | | | 0.684(0.113)** | 0.937(0.159) |
| 5.cash_i | Half or 3 quarters | | | 0.790(0.173) | 1.166(0.234) |
| 6.cash_i | More than 3 quarters | | | 0.421(0.0651)*** | 0.612(0.093)*** |
| Constant | | 0.161(0.017)*** | 0.0998(0.018)*** | 0.0298(0.008)*** | 0.026(0.008)*** |
| Fixed country effects included. Clustered country robust standard errors in parentheses<br>*** p<0.01, ** p<0.05, * p<0.1 | | | | | |

Source: author's calculations

## 3.5. Robustness analysis

For a robustness check, two more tests were created, and only the final model was tested since it includes all variables. The first robust model was designed towards payment methods used for transactions and included two models: transactions with an amount paid less than 10 EUR and 10 EUR or more. For low-value transactions, some of the socio-demographic factors can be irrelevant, and actual payment behavior and willingness to use cashless payment methods can change. The second model divides results by payment location: payments made in shops selling goods or transactions made in a venue providing services. Locations are also considered determinants in the use of cashless payment methods. Results of robust models are provided in Appendix 2.

Analysis of models divided by transaction amount shows that females are less likely to use cash while paying an amount of less than 10 EUR, with an odds ratio 0.789 and p-value less than 1% in the final model, while for transactions amounts of more than 10 EUR there is no gender difference. Distribution by age also has visible different results. The odds of older people to pay cashless for smaller amounts of transactions are twice lower than those paying for transactions of more than 10 EUR. The amount of transactions has no effect on the income variable odds; it remains statistically insignificant across all models. While role of an individual's preference grows even more if he or she needs to pay for more expensive goods rather than for services.

A second robustness test including locations of payments shows that women and people of older age are less likely to pay cashless in venues providing services. Robustness tests were also created to test rural and urban area differences. Individuals living in rural areas have 1.21 odds of paying cashless for services, which is one more surprising finding and is inconsistent with any of the previous studies. There was no single model in this study where respondents living in urban areas had more odds of using cashless payment methods. Individuals that use the internet at least two times a week are more likely to use cashless payment methods for paying for any services, while those who never use it have drastically lower odds of 0.433 to use cashless for services.

Both robustness analyses showed that individuals' household size and the number of children in their family odds were not changed by the transaction amount, location of payment. These results correlate with the main models and refute the third hypothesis once again.

# 4. DISCUSSION

The first hypothesis states that there is no link between gender and the choice of payment method. Previous studies have had very biased results and opposite outcomes. (Smyczek 2012; Subawa et al 2020; Pahl 1999; Carpenter, Moore 2008) This indicates that gender influence can be studied only in the context of one country or area of living. Taking into consideration that this study is based on a survey of 17 countries, gender cannot be considered as the main determinant in using cashless payment. The results from all models show that there is no link, confirming the hypothesis. While robustness analysis revealed that the only time gender matters is when transactions are less than 10 EUR.

The second hypothesis states that rural areas are still using cash and it was not confirmed in any of the models of this study. One of the reasons is that it was mostly based on studies done in other countries outside of Europe. (Erlanger 2019; Bajaj, Damodaran 2020) Eurozone countries are known to be widely covered with internet connection, even in rural areas. Also, cashless payments were highly advertised as being a faster and more convenient method of payment.

The third hypothesis consisted of two determinants: household size and the number of children in the family. Literature research shows that individuals living in big families are more likely to use cash for payments and transfer money to each other. A current study showed that this hypothesis is partially confirmed. In all four models and robustness, household size increase reduced odds that a consumer will use non-cash, while the more children are in a family, the more likely a respondent is to use a cashless method. Although all odds have low statistical significance.

For testing, a fourth hypothesis was used the final model. It stated that preference has more impact on the use of the cashless method than any of the external factors. The hypothesis was confirmed. There are many theories in literature (Luigino, Guala 2001) that mention preference as one of the main determinants of using new technologies and cashless payment methods. Variable preference was statistically significant in all tested models and had higher odds than any other variable. It can

be concluded that among socio-geographic characteristics and external factors, preference is still influenced by using the cashless payment method the most.

As the internet is considered to promote electronic payment transactions, consumers who have access to it and use it on a daily basis are more likely to use cashless payment methods. In order to test the fifth hypothesis, variables derived from questions asking whether respondents use internet banking and the internet were added to the model. Analysis of the third with additional variables *c_access, onlineb, internet, ease, cash_i* showed that individuals with no internet access are less likely to use online banking and electronic payments. This result correlates with previous studies. (Titova et al 2021)

The last hypothesis stated that there is no link between individuals' ease of cash withdrawal and their choice of payment method. This hypothesis was based on the assumption that even if there is a way to withdraw cash, using cashless payments is still more convenient and faster, so there will be no link between these two factors. As a cashless society is based on fast paced modern life, making payments faster should be the main goal. (Farida et al 2016). This study confirmed this hypothesis. Results from third model testing show that there are very small odds that an individual with access to cash withdrawal will still use cash for payments.

Results of the hypotheses' testing show that the impact of gender, area of living, and household size becomes irrelevant in time. Previous studies had clear results in testing the impact of socio-demographic characteristics, while the current study showed that the only characteristic from an individual's profile that has an influence on their choice of payment method is age. All the others have very small correlations or are not statistically significant. While individuals' preferences and use of new technologies play a huge role, no matter of gender, age, or income.

# CONCLUSION

The latest trends in developing cashless societies and modern technologies force regular consumers to change their spending habits. As a cashless society is predicted to be implemented in the economies of many developed countries in the near future, consumer preferences and drivers of use of cashless payments should be studied more closely and more often. While cash is still the most used payment method in today's society, future generations prefer to use electronic payments. The results of studies on determinants of the use of non-cash change drastically as time goes by. Many other previous studies and research have already been done on this topic. Despite this, even studies done ten years ago lose their relevance very quickly.

The aim of this graduation thesis was to determine what factors have an impact on consumer use of cashless payment methods using a survey conducted in eurozone countries in 2019. As main determinants, socio-demographic characteristics, individual preferences, and external factors influencing payment choice were used.

Reviewed literature on pros and cons of a cashless society showed that while there are visible positive effects of cashless society such as costs reduction and convenience is use, there are still too many barriers in using non-cash: people do not trust bank too much and hold saving in cash, fear of crisis, lack of literacy in using electronic money, exclusion from cashless system of elder and individuals living in rural areas.

Hypotheses were tested using data from a survey conducted by the European Central Bank in 17 euro area countries. Models were constructed from the Theory of Reasoned Action, the Theory of Planned Behavior, and the Integrated Behavior Model. Each model included socio-demographic, preference, or other factors variables. The final model based on the Theory of Planned Behavior included all determinants combined. Four models were tested in STATA software using the logistic regression method to determine what factors affect the use of cashless payments. These models explain the choice of payment methods in general. Extra models were tailored to check whether

there were any robust conclusions based on transaction amounts and location of payment. The robustness test was based on previous studies.

To follow up the aim of the thesis, after reviewing literature and previous studies, six hypotheses were set up. The results show that four hypotheses were confirmed and two were rejected:

H1. There is no link between gender and the choice of payment method.
Confirmed. Gender cannot be considered as a determinant of the use of cashless payment methods.
H2. Individuals living in rural areas are more likely to use cash.
Rejected. According to this study, there is no significant impact of the area of living on the choice of payment method in eurozone countries.
H3. Individuals living in larger households and having more children are more likely to use cash.
Rejected. The number of children and household size do not play a role in the use of non-cash.
H4. Preference has more impact on the use of the cashless method than the external factors.
Confirmed. Preference is the main determinant in consumers' choice of payment methods.
H5. Individuals with no access to the internet are more likely to use cash.
Confirmed. Individuals who never use the internet or online banking are more likely to use cash for any amount of transactions and at any payment location.
H6. There is no link between individuals' ease of cash withdrawal and their choice of payment method.
Confirmed. Easy access to cash withdrawals does not make an individual pay with cash.

As technology evolves, more advanced applications of electronic payments will emerge. Future research on that topic should also include the popularity of more innovative cashless instruments such as cryptocurrency or digital currencies. As many studies are focused only on socio-demographics, it is advisable to pay more attention to consumer attitudes, preferences, and habits. There is evidence that banks are trying to find ways to implement central digital currencies as they will substitute for cash. In the same way, the COVID-19 pandemic reshaped very drastically consumers' views on using cash. People were forced to use cashless payment methods. This fact will have a certain effect on payment habits. The current study was based on data collected just before the pandemic and can be used as a point of comparison with future surveys based on the same topic.

# KOKKUVÕTE

## SULARAHATA MAKSETE KASUTAMISE MÄÄRAVAD TEGURID: EUROTSOONI RIIKIDE NÄITEL

Anžela Nakoljuškina

Uusimad trendid sularahavaba ühiskonna ja kaasaegsete tehnoloogiate arendamises sunnivad tavatarbijaid oma makseharjumusi muutma. Kuna lähitulevikus ennustati sularahata ühiskonna juurutamist paljude arenenud riikide majandusele, tuleks tarbijate eelistusi ja sularahata maksete kasutamise ajendeid lähemalt ja sagedamini uurida. Kuigi sularaha on tänapäeva ühiskonnas endiselt enimkasutatav makseviis, eelistavad tulevased põlvkonnad kasutada elektroonilisi makseid. Mittesularaha kasutamist määravate tegurite uuringute tulemused muutuvad aja jooksul drastiliselt. Sellel teemal on juba tehtud palju muid varasemaid uuringuid ja uuringuid. Sellest hoolimata kaotavad isegi kümme aastat tehtud uuringud väga kiiresti oma aktuaalsuse.

Käesoleva lõputöö eesmärk oli 2019. aastal eurotsooni riikides läbi viidud uuringu abil välja selgitada, millised tegurid mõjutavad tarbijate sularahavabade makseviiside kasutamist. Peamiste määrajatena kasutati sotsiaaldemograafilisi tunnuseid, inimeste eelistusi ja väliseid tegureid, mis mõjutavad raha valikut. makse.

Läbi vaadatud kirjandus sularahata ühiskonna plusside ja miinuste kohta näitas, et kuigi sularahata ühiskonnal on nähtavad positiivsed mõjud, nagu kulude vähenemine ja kasutamise mugavus, on sularahata kasutamisel siiski liiga palju takistusi: inimesed ei usalda panka liiga palju ja hoiavad oma raha sularahas, sularahas säästmine, hirm kriisi ees, puudulik kirjaoskus e-raha kasutamisel, eakate ja maapiirkondades elavate inimeste sularahavabast süsteemist väljajätmine.

Hüpoteeside kontrollimisel kasutati Euroopa Keskpanga 17 euroala riigis läbi viidud uuringu andmeid. Mudelid koostati põhjendatud tegevuse teooriast, planeeritud käitumise teooriast ja integreeritud käitumismudelist. Iga mudel sisaldas sotsiaal-demograafilisi, eelistusi või tegurite muutujaid. Planeeritud käitumise teoorial põhinev lõplik mudel hõlmas kõiki determinante kombineeritult. STATA tarkvaras testiti nelja mudelit, kasutades logistilise regressiooni meetodit, et teha kindlaks, millised tegurid mõjutavad sularahata maksete kasutamist. Need mudelid selgitavad makseviiside valikut üldiselt, lisamudelid koostati selleks, et kontrollida, kas

tehingusummade ja makse asukoha põhjal tehti kindlaid järeldusi. Robustsuse test põhines varasematel uuringutel.

Lõputöö eesmärgi täitmiseks püstitati pärast kirjanduse ja varasemate uuringute läbivaatamist kuus hüpoteesi. Tulemused näitavad, et neli hüpoteesi said kinnitust ja kaks lükati tagasi:

H1. Soo ja makseviisi valiku vahel puudub seos.
Kinnitatud. Sugu ei saa pidada sularahata makseviiside kasutamise määravaks teguriks.
H2. Maapiirkondades elavad inimesed kasutavad tõenäolisemalt sularaha.
Tagasi lükatud. Selle uuringu kohaselt ei ole euroala riikides elamispinnal olulist mõju makseviisi valikule.
H3. Suuremates leibkondades elavad inimesed, kellel on rohkem lapsi, kasutavad tõenäolisemalt sularaha.
Tagasi lükatud. Mittesularaha kasutamisel ei mängi rolli laste arv ja leibkonna suurus.
H4. Eelistus mõjutab sularahavaba meetodi kasutamist rohkem kui välised tegurid.
Kinnitatud. Eelistus on peamine tegur tarbija makseviiside valikul
H5. Inimesed, kellel puudub juurdepääs Internetile, kasutavad suurema tõenäosusega sularaha.
Kinnitatud. Inimesed, kes ei kasuta kunagi Internetti või Interneti-panka, kasutavad suurema tõenäosusega sularaha mis tahes tehingusumma tegemiseks ja mis tahes maksekohas.
H6. Üksikute sularaha väljavõtmise lihtsuse ja makseviisi valiku vahel puudub seos.
Kinnitatud. Lihtne juurdepääs sularaha väljavõtmisele ei sunni inimesi sularahaga maksma.

Tehnoloogiliste murrangute jätkumine võimaldab elektrooniliste maksete täiustatud kasutusvõimalusi. Tulevased selleteemalised uuringud peaksid hõlmama ka uuenduslikumate sularahata instrumentide, nagu krüptovaluuta või digitaalvaluuta, populaarsust. Kuna paljud uuritud on keskendunud ainult sotsiaaldemograafiale, on soovitatav pöörata rohkem tähelepanu tarbija suhtumisele, eelistustele ja harjumustele. On tõendeid selle kohta, et pangad püüavad leida viise kesksete digitaalsete valuutade kasutuselevõtuks, kuna need asendavad sularaha. Samamoodi muutis Covid-19 pandeemia väga drastiliselt tarbijate seisukohti sularaha kasutamise kohta. Inimesed olid sunnitud kasutama sularahata makseviise; see asjaolu avaldab makseharjumustele teatud mõju. Praegune uuring tehti vahetult enne pandeemiat kogutud andmete põhjal ja seda saab kasutada võrdluspunktina tulevaste samal teemal põhinevate uuringutega.

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# APPENDICES

## Appendix 1. Correlation matrix

| | payment_system | gender | age | education | income | urban | hhsize | depchildren | labour | amount | location | cashle~s | onlineb | internet | ease | cash_i | preference | importance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| payment_system | 1.00 | | | | | | | | | | | | | | | | | |
| gender | -0.01 | 1.00 | | | | | | | | | | | | | | | | |
| age | -0.08 | -0.02 | 1.00 | | | | | | | | | | | | | | | |
| education | 0.08 | 0.02 | -0.13 | 1.00 | | | | | | | | | | | | | | |
| income | 0.10 | -0.12 | -0.02 | 0.19 | 1.00 | | | | | | | | | | | | | |
| urban | -0.01 | -0.01 | -0.06 | 0.10 | 0.01 | 1.00 | | | | | | | | | | | | |
| hhsize | -0.02 | 0.00 | -0.27 | 0.05 | 0.22 | -0.01 | 1.00 | | | | | | | | | | | |
| depchildren | 0.01 | 0.02 | -0.18 | 0.06 | 0.17 | -0.02 | 0.63 | 1.00 | | | | | | | | | | |
| labour | -0.05 | 0.06 | 0.42 | -0.21 | -0.17 | -0.04 | -0.20 | -0.24 | 1.00 | | | | | | | | | |
| amount | 0.13 | -0.01 | 0.00 | -0.02 | 0.03 | -0.01 | 0.02 | 0.03 | -0.01 | 1.00 | | | | | | | | |
| location | -0.09 | -0.01 | -0.01 | 0.06 | 0.07 | -0.01 | 0.02 | 0.03 | -0.04 | 0.10 | 1.00 | | | | | | | |
| c_access | 0.06 | -0.03 | -0.05 | 0.11 | 0.10 | 0.04 | 0.00 | 0.01 | -0.08 | 0.01 | 0.02 | 1.00 | | | | | | |
| onlineb | 0.10 | -0.06 | -0.07 | 0.21 | 0.27 | 0.02 | 0.01 | 0.05 | -0.14 | -0.01 | 0.06 | 0.15 | 1.00 | | | | | |
| internet | -0.05 | 0.05 | 0.23 | -0.22 | -0.18 | -0.04 | -0.11 | -0.09 | 0.22 | 0.01 | -0.06 | -0.17 | -0.29 | 1.00 | | | | |
| ease | -0.00 | 0.04 | -0.02 | -0.05 | -0.06 | -0.01 | 0.02 | 0.02 | 0.03 | 0.01 | 0.00 | -0.20 | -0.06 | 0.10 | 1.00 | | | |
| cash_i | -0.09 | 0.00 | -0.05 | -0.09 | -0.15 | 0.02 | 0.05 | 0.01 | 0.01 | 0.03 | -0.02 | -0.12 | -0.13 | 0.06 | 0.07 | 1.00 | | |
| preference | 0.07 | 0.02 | 0.03 | 0.06 | 0.07 | 0.00 | -0.02 | 0.01 | -0.02 | -0.02 | 0.03 | 0.12 | 0.12 | -0.09 | -0.05 | -0.11 | 1.00 | |
| importance | -0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | -0.01 | 0.00 | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 | 0.00 | 0.01 | 1.00 |

## Appendix 2. Robustness test models

| Variables | Labels | Less than 10 EUR | 10 EUR and more | Shops | Services |
|---|---|---|---|---|---|
| 1.gender | Female | 0.962(0.0421) | 0.789(0.0429)*** | 0.959(0.0353) | 0.787(0.0423)*** |
| 2.age | 40-59 | 0.770(0.0378)*** | 0.577(0.0345)*** | 0.752(0.0337)*** | 0.580(0.0453)*** |
| 3.age | 60-75+ | 0.704(0.0604)*** | 0.335(0.0554)*** | 0.661(0.0561)*** | 0.396(0.0393)*** |
| 2.education | Upper/post-secondary | 1.057(0.0685) | 1.306(0.209)* | 1.037(0.0666) | 1.057(0.153) |
| 3.education | University/PHD | 1.147(0.095)* | 1.536(0.313)** | 1.163(0.0919)* | 1.210(0.209) |
| 2.income | EUR 751 - 1500 | 0.970(0.0645) | 0.906(0.126) | 1.045(0.0944) | 0.772(0.105)* |
| 3.income | EUR 1501 - 2500 | 0.979(0.0973) | 0.936(0.0847) | 1.114(0.109) | 0.862(0.124) |
| 4.income | EUR 2501 - 4000 | 0.954(0.0915) | 0.986(0.126) | 1.123(0.133) | 0.857(0.132) |
| 5.income | EUR 4000 and more | 1.153(0.116) | 1.302(0.195)* | 1.336(0.152)** | 1.238(0.208) |
| 1.urban | Rural | 1.085(0.0498)* | 1.162(0.0732)** | 1.084(0.0568) | 1.204(0.0801)*** |
| hhsize | | 0.972(0.0217) | 0.958(0.0407) | 0.969(0.0237) | 0.945(0.0381) |
| depchildren | | 0.983(0.0265) | 0.938(0.0313)* | 1.011(0.0268) | 0.941(0.042) |
| 2.labour | Unemployed/student | 0.951(0.0534) | 1.001(0.0713) | 0.969(0.0504) | 0.815(0.0602)*** |
| 2.preference | Cashless | 5.743(0.653)*** | 6.925(0.959)*** | 6.156(0.824)*** | 4.664(0.622)*** |
| 3.preference | No preference | 2.364(0.222)*** | 3.025(0.512)*** | 2.552(0.287)*** | 2.125(0.257)*** |
| importance | | 0.973(0.0045)*** | 0.994(0.0109) | 0.976(0.0068)*** | 0.98(0.0125) |
| 1.c_access | Yes | 4.533(1.741)*** | 1.668(0.928) | 3.962(1.377)*** | 3.680(2.547)* |
| 1.onlineb | Yes | 1.153(0.058)*** | 1.216(0.0879)*** | 1.157(0.0572)*** | 1.039(0.104) |
| 2.internet | 2 or 3 times a week | 1.114(0.124) | 1.04(0.177) | 1.128(0.0984) | 0.991(0.202) |
| 3.internet | About once a week | 1.748(0.303)*** | 0.879(0.251) | 1.428(0.281)* | 2.041(0.744)* |
| 4.internet | 2 or 3 times a month | 1.485(0.374) | 1.288(0.484) | 1.603(0.333)** | 2.682(1.292)** |
| 5.internet | Less often | 0.849(0.246) | 2.030(1.043) | 1.155(0.238) | 0.814(0.542) |
| 6.internet | Never | 1.063(0.19) | 1.108(0.27) | 1.152(0.192) | 0.433(0.161)** |
| 7.internet | No internet access | 0.962(0.125) | 0.897(0.25) | 0.885(0.097) | 0.899(0.661) |
| 2.ease | Fairly easy | 1.086(0.0309)*** | 0.941(0.0426) | 1.042(0.0421) | 1.103(0.0755) |
| 3.ease | Fairly difficult | 1.153(0.071)** | 0.948(0.101) | 1.114(0.112) | 1.167(0.12) |
| 4.ease | Very difficult | 1.293(0.225) | 1.353(0.429) | 1.400(0.239)** | 1.217(0.324) |
| 2.cash_i | Up to a quarter | 0.977(0.104) | 0.848(0.0806)* | 0.964(0.0865) | 1.111(0.163) |
| 3.cash_i | Quarter or half | 1.043(0.125) | 1.071(0.264) | 1.043(0.183) | 1.914(0.283)*** |
| 4.cash_i | Half of income | 0.814(0.154) | 0.729(0.304) | 0.853(0.177) | 0.938(0.275) |
| 5.cash_i | Half or 3 quarters | 1.049(0.27) | 0.953(0.236) | 1.047(0.177) | 1.088(0.34) |
| 6.cash_i | More than 3 quarters | 0.552(0.0972)*** | 0.603(0.134)** | 0.509(0.0955)*** | 0.954(0.273) |
| Constant | | 0.026(0.0102)*** | 0.0186(0.0115)*** | 0.0226(0.00874)*** | 0.0176(0.0112)*** |
| Fixed country effects included. Clustered country robust standard errors in parentheses<br>*** p<0.01, ** p<0.05, * p<0.1 | | | | | |

Source: author's calculations

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