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The Kings of Cash:
A Study of Socio-Demographic Characteristics' Influence on Cash Usage in Sweden

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Abstract: This thesis investigates the relationship between consumers' socio-demographic characteristics and cash usage in Sweden. To pursue this, we examine the correlation between the socio-demographic characteristics, age, education, income, region, and gender, and current cash usage, as well as the relationship between the socio-demographic characteristics and the attitude towards the decrease of cash in the Swedish society. By identifying these relationships, our thesis contributes to the ongoing investigation by the Commission of Inquiry FI 2020:12 on behalf of the Swedish Government. We fulfill this purpose by applying an ordinary least squares method of multiple linear regression. More specifically, we apply a linear probability model to examine the data on citizens' payment behavior, collected by Sveriges Riksbank in 2020. Our results suggest that there are statistically significant effects in the differences within the socio-demographic variables in relation to cash usage and attitude towards the decrease of cash in the Swedish society. The findings show that as there is an increase in age, a decrease in education, income, and population density (region), consumers' probability to use cash increases. We also conclude that consumers' probability to have a positive attitude towards the decrease of cash in society decreases if there is an increase in age, a decrease in education, income, and population density (region). Gender has a small impact on payment behavior and does not have a significant impact on attitude. The results are in line with the findings of previous studies that have been conducted focusing on other developed countries than Sweden.

Keywords: attitude, cashless society, cash usage, digital payments, socio-demographic characteristics

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1. Introduction

The payment market is in the midst of a digital transformation. Other payment methods than cash are constantly introduced, and payment systems are becoming increasingly digital. Sweden has always been at the forefront of adopting new innovations, and the adoption of digitalized payment solutions is no exception (Eriksson & Sandhill, 2020). Moreover, Sweden is predicted to be one of the first cashless societies in the world (European Payments Council, 2019). As of 2018, only 1% of Sweden's GDP represented banknotes and coins, this can be compared to an average of 11% in the Euro area (Sveriges Riksbank, 2019a). Other countries where cash circulation is a small fraction of GDP are Norway, the United Kingdom, and Canada. The actors that have the most power to promote a cashless society are the banks, businesses, and politicians (Arvidsson, 2013; SOU 2018:42, 2018). On the one hand, there are various economic factors that influence the decrease of cash usage. The availability of a smartphone and e-commerce, and the possibility for businesses to cut costs are all driving this development. On the other hand, there are also political factors. For example, digitalization can potentially be an effective solution to decrease cash robbery. Furthermore, societal trends also drive this development. In a transition towards a cashless society, it is of importance to get everyone on board to not exclude certain groups of the population. Thus, analyzing what factors that have a significant impact on choice of payment method should therefore be of interest to anyone who would like to understand how cashless societies evolve and are supported.

In this thesis, the relationship between people's cash usage and socio-demographic characteristics is examined, as well as people's attitude towards the decrease of cash in the Swedish society and socio-demographic characteristics. More specifically, how age, education, income, region, and gender, influence cash usage and attitude towards the cash decrease, amongst the Swedish population. As some predict that Sweden will be a cashless society in less than a decade (Arvidsson, 2018), Sweden is of particular interest to use as a case study as the part of the population that still uses cash provides important insights to why that is.

1.1 The Research Purpose

The ongoing digitalization is changing the payment landscape and cash usage is decreasing in Sweden. At the same time, the possibility to pay is a basic public service that needs to be guaranteed for all citizens. Due to this, the Swedish Government has commissioned an inquiry to examine the role of the State in the payment market, the Commission of Inquiry FI 2020:12 (Sveriges Riksdag, 2020). The inquiry chair, Mrs. Anna Kinberg Batra, is to report on the inquiry's remit no later than the 30th of November 2022 (Regeringskansliet, 2020a). The inquiry chair's assignment includes mapping the landscape of the current payment market and the market's future. This is to be done through a broad analysis of the digital and technological developments, in Sweden and in other countries, that change both the financial market and the payment market. Further, the historical position of the State should be examined, as well as its current position on the payment market and its future division with the business sector. The new payment methods

available and the reduced use of traditional means of payment should also be analyzed. Moreover, the inquiry chair will study the need for The Central Bank of Sweden, further referred to as Sveriges Riksbank, to provide digital central bank money, named "e-kronor".

This thesis contributes to the investigation conducted by the inquiry in regard to what socio-demographic characteristics that affect consumers cash usage. Furthermore, we provide an understanding of the Swedish population's attitude towards cash as a payment instrument. For the public authorities, it is of interest to learn more about both the population's behavior and attitude, to be able evaluate the role of the State on the future payment market. To ensure a potential transition to a cashless society that is smooth, there could be a need for the State to work proactively with the citizens' attitudes towards the decrease of cash, as well as with the availability and accessibility.

Cash usage has internationally been of great interest to researchers. However, in Sweden the relationships between cash usage and socio-demographic characteristics, as well as between attitude and socio-demographics, have not empirically been studied historically or in recent time. Every second year Sveriges Riksbank conducts a survey called "The Payment Behaviour of the Swedish Population", where data is collected through interviews with Swedish citizens about their use of payment method (Sveriges Riksbank, 2020a). However, with the gathered data Sveriges Riksbank only compiles descriptive statistics and does not look for any statistically significant correlations or potential influences between different factors and cash usage. What makes this thesis interesting is that we estimate cash usage, and the attitude towards the cash decrease in society, as a function of age, education, income, region, and gender, where other variables are kept constant. It provides the opportunity to study for example if age has an independent effect on cash usage, given a certain income or a certain level of education. This cannot be deduced from Sveriges Riksbank's compilation.

To conduct research on these relationships is of great importance as it can facilitate a potential transition to a cashless society by identifying potentially vulnerable groups. Vulnerable groups are the groups in society that extensively use cash, and that furthermore object to exclusively use other payment methods than cash. Both payment behavior, cash usage, and attitude towards a cash decrease, is examined as we believe that it is important to look at the attitude, in addition to behavior, as it provides better indicators for how the socio-demographic groups will adapt to a cashless society. Even though people use cash today, it does not necessarily imply that they will not easily adapt to other payment methods if required. However, if people have a negative attitude towards the decrease of cash in the Swedish society, and thus are likely to favor cash as a payment instrument, they might not be ready to give up cash.

The purpose of our thesis is to provide an understanding of the relationship between cash usage and socio-demographic variables, as well as the relationship between attitude towards a cash decrease in society and socio-demographic variables. As described, examining these relationships are important for policy decisions and it contributes to the economic literature to understand what drives payment behavior and attitude.

To analyze these relationships and fulfill our purpose, we use an OLS method of multiple linear regression. More specifically, by applying a linear probability model to examine the data on citizens' payment behavior, collected by Sveriges Riksbank in 2020. Our results suggest that there are statistically significant effects in the differences within the socio-demographic variables in relation to cash usage and attitude towards the decrease of cash in the Swedish society. These findings show that as there is an increase in age, a decrease in education, income, and population density (region), consumers' probability to use cash increases. We further conclude that consumers' probability to have a positive attitude towards the decrease of cash in society decreases if there is an increase in age, a decrease in education, income, and population density (region). Gender has a small impact on payment behavior and does not have a significant impact on attitude. The results are in line with the findings of previous studies conducted on other developed countries than Sweden.

The paper is organized as follows. Next, Section 2 presents the background of money as an exchange medium in general, followed by an introduction of Sweden as a cashless society. The background is concluded by showing the possible consequences of a cashless society. In Section 3, there is a review of the previous research. It presents the current state of knowledge concerning the relationship between cash usage, attitude, and different explanatory variables. In Section 4, our research questions and contribution to previous literature is introduced. In Section 5, our research method, the data set used, and methodological limitations is explained. Section 6 introduces our constructed variables and provides an outlay of the data. In Section 7, our empirical framework is described, and Section 8 presents the empirical results. Section 9 provides a discussion of our results and its wider applicability. The last section, Section 10, summarizes the paper and suggests areas for future research.

2. Background

2.1 The Concepts of Money

For centuries, people have engaged in various types of value transactions. For the value exchange to occur, different means of payment have historically been used. The payment instruments have included everything from animals, seashells, and feathers to gold, metal pieces, and paper bank notes, without means of payment there is no trade. Thus, money in all forms is of crucial importance in transactions and is today a central foundation of human life. Therefore, to understand the concept of cash usage and cashless societies, there is a need to introduce a definition of money. Broadly defined, money is a "generally accepted medium of exchange that is used as financial payment" (Platan, 2000, p. 2). For money to be effective, economists often refer to three functions that should be fulfilled (Jevons, 1875). The first is the transactional function. Hence, money should be recognized as capital and be a payment method to empower transactions. The second function is money as a measure of value. This criterion helps in comparisons of different transactions, and accordingly, asses what is most valuable. The third is the thesaurus function of money. More precisely,

money serves as a unit of account. People should be able to rely on its stability and that money holds a permanent value.

At the time when the printing press was invented, in 1436, coins were the main currency of exchange (Arvidsson, 2019). Consequently, paper notes also became the main currency of exchange in the following centuries. The paper notes and coins represent the most common form of money as we know it today and worldwide there is a collective agreement that these paper notes and metal coins retain a value. Together they are defined by the well-known term cash, and the amount of banknotes and coins in circulation is defined as the amount of cash in a society.

To this day, cash is the single payment method that is directly accessible to all (European Central Bank, 2020). Further, the importance of having a payment method accessible to all people includes ensuring privacy, social inclusion, as well as autonomy within the population. With the introduction of cashless societies, paper bills and coins will not be the most common form of money. The novel concept of a cashless society claims that individuals will exclusively use digital payment methods over the option to pay with cash (Arvidsson, 2019). These digital payment options are noncash, hence not paper bills or coins, but rather options such as debit card, credit card, Swish, and PayPal. The notion of digital payment options is an evolving phenomenon and new ways to pay are continuously developed.

2.2 Sweden as a Cashless Society

Historically, payment systems have changed and developed. New circumstances arise as nations develop and grow which create a need for new innovations in the payment sector. Digitalization enables more efficient and easier payments – people can now pay virtually using either their card or mobile phone to a larger extent than before. Swiftly arising as substitutes, these digital means of payment are taking over the payment landscape from cash (Weatherford, 1997; Kobiltz & Menezes, 2016). As previously mentioned, Sweden is predicted to be the world's first cashless society (European Payments Council, 2019).

Sweden is not only proponent of adopting technological innovations, but also advocates economic evolution. In 1661, Sweden was the first country in Europe to use bank notes and the oldest central bank is the Swedish Central Bank (Sveriges Riksbank, 2021a; Sveriges Riksbank, 2021b). In 1668 the Swedish parliament founded "Riksens Ständers Bank" and the name "Sveriges Riksbank" was later received in 1867. As Sweden was the first European country to use paper notes, it is quite ironic how Sweden is expected to be the first country to replace the bank notes with digital payment options. In Sweden the amount of cash in circulation has halved since the year of 2007. This development is unique to Sweden (Sveriges Riksbank, 2019b).

The cash usage has been in constant decline in recent years and other digital payment methods have gained prominence. Globally, Sweden has the least amount of cash transactions and as new technologies are both

common and trusted, few citizens still mainly pay with cash (Sveriges Riksbank, 2020b). The cash withdrawals have been at a steady decline rate of 10% annually between 2005 and 2017, and card payment has an increasing trend with a rate of 10% annually between 2005 and 2017. This trend could lead to a society where digital payment methods are exclusively used over the option to use cash, a cashless society.

There are many reasons as to why a cashless society arises (Arvidsson, 2013). The movement can be divided into two subcategories, namely the forces working to make the existing payment market more efficient, and forces working to change and renew the payment market. Although Sweden is predicted to be one of the first cashless societies there are conflicting views whether Sweden should strive for this development. The payment market is influenced by the development in digital technology creating new ways to pay, allowing new players on the market. Shifting the focus outside of Sweden, the European Central Bank has adopted a 2030 strategy responding to the developments that have been occurring, aiming to preserve the availability and attractiveness of the euro (European Central Bank, 2020). Furthermore, the 2030 strategy aims to secure euro cash as a reliable and competitive payment instrument.

In the Eurozone countries cash is seen as necessary and self-evident, and the citizens look to Sweden in admiration (Eriksson & Sandhill, 2020). Sweden is often modeled as a success story, as the decrease of cash in society has decreased crime rates and improved cost cutting (Rogoff, 2016; Olsen, 2018). However, the transformation has been far from perfect. There are conflicting views on whether the development has benefited society at large or only benefited certain actors, such as banks and certain businesses. Some people have been calling Swedes naïve and that Sweden is unwittingly engaging in a transformation without thinking about the potential risks of eliminating a secure and privacy-friendly payment instrument available to the Swedish population (Eriksson & Sandhill, 2020). However, the issues regarding integrity and safety are receiving increased attention, and more people are gaining knowledge about the potential risks. A strong sign of awareness is the inquiry commissioned by the Swedish Government to examine the role of the State on the payment market.

2.3 Risks and Opportunities

As some societies move towards a cashless payment market both new opportunities and risks surface. It is important to be aware of these advantages and disadvantages as it might require further monitoring, transparency, and policy changes from the Government.

There are several benefits that accrue from a cashless society and selected benefits are highlighted in this subsection. Firstly, for both the finance and payment markets, digitalization and technology developments are at its core positive (Regeringskansliet, 2020b). The innovative solutions that arise make it cheaper, easier, and faster to pay which benefit the society. Secondly, digital payment methods hinder tax evasion (Immordino & Flavino Russo, 2017). Immordino and Flavino Russo empirically show that credit and debit card payments are negatively related to VAT evasion by using European data. It is argued that the underlying

transactions of the cashless payments build a trail that is easy to identify. Thirdly, petty crimes are expected to decrease as cash usage decreases, as cash is more anonymous and harder to trace compared to digital transactions (Achord, et al., 2018).

However, there are also several drawbacks with a cashless society and selected disadvantages are presented. Firstly, the Swedish State recognizes that it might become difficult for vulnerable groups to pay in a cashless society. It is also important to monitor the development to ensure that it does not happen at the expense of consumer protection, financial stability, the work of counteracting money laundry, and terrorist financing, or the state's work against incorrect disbursements (Regeringskansliet, 2020b). Secondly, consumers could lose trust in the banking sector and the Government (Achord, et al., 2018). As cash often is seen as a safety valve, citizens can feel belittled against omnipotent governments and central banks in a cashless society. This is likely to be spurred on by the memory of the 2008 financial crisis and thus, the fear of possible bank failures. Thirdly, people fear that a cashless society might invade on their integrity as all transactions will be recorded and easier to trace. Thus, a strong regulatory and legal framework will be necessary to mitigate this. Lastly, as petty crimes might decrease, cybercrimes might be the next big fear (Fabris, 2019).

3. Literature Review

Cashless societies are a relatively new phenomenon. As of today, there is no society in the world that is completely cashless, and the term has drawn a great deal of interest. This section presents the relevant literature concerning consumers' cash usage and payment preferences. In addition, we provide a review of the conducted research on factors that influence cash usage and people's attitude towards the decrease of cash in society. Furthermore, this section investigates the potential gap in the current state of knowledge that gives rise to Sweden as our research focus, as well as to what characteristics that influence consumers' cash usage and consumers' attitude towards the decrease of cash in society.

There are two major strands of literature examining cash usage. The first strand analyzes the demand for currency, which studies the relationship between cash holding and cash spending. The empirical literature, published by Attanasio et al. (2002), Stix (2004), Alvarez and Lippi (2009), and Lippi and Secchi (2009), among others, draw on the work of Baumol (1952) and Tobin (1956) that present transaction demand for currency models. The second strand of literature analyzes consumers' payment behavior. Statistical correlations between the choice of a payment instrument and explanatory variables, such as socio-demographic characteristics, is established through various forms of regressions. This strand of literature includes Borzekowski et al. (2008), Klee (2008), Zinman (2009), Schuh and Stavins (2010), and Arango et al. (2011). As the research purpose is to analyze the relationship between cash usage, attitude, and socio-demographic characteristics, this thesis mostly gains inspiration from the second strand of literature. This strand is further elaborated on in this section.

3.1 Consumer Cash Usage

During the transformation from using cash to digital payment solutions, few researchers have used microdata and analyzed consumers' cash usage. Humphrey, Pulley, and Vesala (1996), started to compare payment systems across different countries. However, cash usage is often excluded (Bolt, et al., 2008). When comprehensive data of cash is used, new research shows that cash usage is not dissolving as societies transform from paper money to electronic means of payment (Amromin & Chakravorti, 2009; Lippi & Secchi, 2009; Evans, et al., 2013). However, they predict that the share of cash spending will decline with a modest rate in the future. Moreover, there is limited research on cash usage globally and during the last years, the payment market's digital transformation has been accelerating which requires an update on the study of payment methods amongst populations. In addition, there are only some cases where consumers' cash usage is analyzed using microdata. An early example is the research by Avery et al. (1986).

The identified gap in the literature, with limited focus on differences in cash usage, is the emphasis of Bagnall et al. in their paper "Consumer Cash Usage: A Cross-Country Comparison with Payment Diary Survey Data" (2016). The authors compare individuals' choice of payment methods in seven industrial countries. These are Australia, Austria, Canada, France, Germany, the Netherlands, and the United States. The data Bagnall et al. use is microdata, collected through large-scale payment diary surveys. The payment diary surveys represent rich information data from consumers and their individual payments over a certain period of time. The consumers continuously record their transactions, which compared to surveys that rely on consumer recall, provide more accurate data.

Drawing on the work of Stavins (2001), who predicted the effects on individual choice of payment methods influenced by consumer characteristics, such as education, income, and age, Bagnall et al. explore the determinants of consumer's payment choices more broadly. They conduct an analysis of consumer cash usage by setting up a regression model. However, they add more explanatory variables than those of Stavins (2001), such as gender, gathering inspiration from more recent publications (Borzekowski, et al., 2008). Further, Ching and Hayashi (2010) also use these variables and add race and region, when investigating the effects of payment card rewards on the payment method choice made by the consumer.

In addition, Bagnall et al., inspired by Schuh and Stavins (2010), add variables relating to transaction costs. Similarly, von Kalckreuth, Schmidt, and Stix (2014a) results indicate that the usage of cash is compatible with systematic economic decision-making. They find that choice of payment method depends on factors such as transaction characteristics, socio-demographic characteristics, and the relative cost of payment methods. Another paper Bagnall et al. gain inspiration from is Arango, Huynh, and Sabetti (2011). Arango et al. quantify the role of factors such as consumers socio-economic characteristics, transaction features, and payment instrument attributes by using discrete-choice models. In summary, Bagnall et al. draw on these various works to find suitable variables to analyze the consumers' choice of payment method. They choose to focus on transaction size, cash balances, socio-demographics (such as age, education, income,

and gender), cash card ownership, and lastly point-of-sale characteristics (such as acceptance of payment cards, spending location, and type of economic activity).

The findings by Bagnall et al. show that the cash usage decreases with transaction size. This is in line with previous research that states that transaction size highly correlates with the choice of payment method (Klee, 2008; Bouhdaoui & Bounie, 2012; von Kalckreuth, et al., 2014a; Arango, et al., 2015). Further, the findings of Bagnall et al. support the evidence that higher cash balance correlates with higher cash usage (Arango, et al., 2011; Bouhdaoui & Bounie, 2012).

Moreover, Bagnall et al. (2016) find that cash usage decreases with education and income but varies across age groups. The findings of the correlation of education and income are consistent with previous literature, as income and education increase, cash usage decreases (Schuh & Stavins, 2010; Cohen & Rysman, 2013; von Kalckreuth, et al., 2014b; Arango, et al., 2015). Cash is often chosen as a payment method by individuals who face financial constraints, as it enables monitoring of expenditures (von Kalckreuth, et al., 2014a; Bagnall, et al., 2016). Most literature states that younger consumers are more likely to adapt and use new digital payment means, while older generations have a higher cash usage rate (Daniels & Murphy, 1994; Boeschoten, 1998; Carow & Staten, 1999; Stavins, 2001; Hayashi & Klee, 2003). Regarding age, Bagnall et al. do not control for other personal characteristics or differences in expenditure patterns. For example, older consumers may purchase other services or products than younger consumers, or they may purchase items at different venues than younger consumers.

To summarize, Bagnall et al. find that apart from consumer preferences for ease of use and transaction size, demographics such as age, income, and education strongly correlate with cash usage. They interpret their results as universal factors driving cash usage since the same correlations can be found in all the studied countries. As Sweden is similar to these developed countries the findings provide a point of departure of how socio-demographic variables affect cash usage that this thesis both builds and adds to.

3.2 Choosing and Using Payment Instruments

In 2020, the European Central Bank published a paper called "A Study on the Payment Attitudes of Consumers in the Euro Area" (SPACE). The study was conducted in 2019, providing us with more information on recent payment patterns for the Eurozone countries. Similar to Bagnall et al. (2016), they also used payment diaries to collect data where respondents record all their transactions. The SPACE findings show that consumers still extensively use cash. However, cashless payment options are increasing across all countries, albeit at different pace.

The results show that across the Eurozone, there are significant differences in consumers' payment behaviors and attitudes. Related to the aim of this thesis, analyzing the socio-demographic characteristics' influence on cash usage and attitude towards the decrease of cash in society, is that SPACE expresses that

there are strong influences of the socio-demographic characteristics on both cash usage and attitude. Further, they find large differences within different population groups. Payment behavior and attitude can to a large extent be explained by diverse preferences and varying access to payment instruments. The preferences and accessibility are found to depend on age group, income, and education levels. The findings by the European Central Bank are in line with their previously published results (Esselink & Hernández, 2017), where socio-demographic characteristics have a substantial influence on whether a consumer chooses to use cash. SPACE finds that people that are older, less educated, and have a lower income use more cash. Furthermore, people living in rural communities use cash more extensively than people living in urban communities. In general, no significant differences were found within gender. The SPACE results are also consistent with the payment surveys available in other developed areas of the world (Bagnall, et al., 2016; Arango, et al., 2018).

One of the countries included in SPACE is Germany where the citizens are relatively attached to cash (Bagnall, et al., 2016). As Sweden is comparable to Germany in many aspects, it is of interest to see what factors that drive the extensive cash usage. In the research paper "Choosing and Using Payment Instruments: Evidence from German Microdata" authors von Kalckreuth, Schmidt, and Stix (2014a) explore what factors that influence consumer cash usage.

In Germany, the number of payment terminals are relatively few, and the card network is not as dense compared to other countries. However, von Kalckreuth, Schmidt, and Stix, states that this reason is insufficient in explaining the high use of cash. They rather point to the behavior of consumers. To analyze this behavior, they use transaction and personal characteristics, the relative costs of payment instruments, and consumer preferences for certain characteristics of payment methods as explanatory variables. This comprehensive set of explanatory variables is also used by Bournie and Francois (2006), Arango et al. (2011; 2018), and Bagnall et al. (2016). The findings are consistent with that consumers' cash usage depends on transaction and socio-demographic characteristics, the relative costs of using cash and card, and preferences.

Furthermore, the authors state that when choosing a payment method, individuals respond to economic incentives. For example, in Germany credit cards are mostly used for their payment function, and not their credit function, and for lower transaction values, cash is used in majority which shows the influence of pricing and that consumers react to economic incentives. Further, they explain that many still argue that the factor that dominates the effect on systematic economic decision-making is habit persistence. However, they show that habit is unlikely to be the major influence on cash usage. Another finding is that older people use cash to a greater extent than younger people and that it has to do with differences in attributes rather than age per se. Different attributes can be lower income, or lower opportunity costs of time.

3.3 The Irrationality of Payment Behavior

There is consensus in the literature that choice of payment method depends on many factors, such as socio-demographic characteristics and transaction type. Studies have also been conducted on how different payment methods drive spending. One of the papers published by Prelec and Simester (2001) presents that when considering high value transactions, consumers' willingness to pay increases if they are using a credit card instead of cash. However, there is no extensive research conducted on the rationality behind such decision-making. In general, people consider themselves as rational human beings making well-calculated decisions before acting upon them. This creates a reassuring feeling of being in control of our decisions and actions. However, our actions are influenced by various factors that could be environmental, physical, and mental. Hence, there is a fine line between conscious and unconscious behavior.

The psychological aspects of choosing to pay with digital solutions over cash, is often neglected. The researchers van der Horst and Matthijsen (2013) highlight the consciousness in people's decision-making regarding payment methods. Their findings suggest that people act out of habit and do not make planned conscious decisions. Most decisions are automated and based on emotion. Interestingly, their neuroscientific study shows that cash usage triggers a more positive emotion. However, unclear to the reason why. Further, the authors find that older people are more likely to have a preferred payment method, thus behaving habitually to a greater extent than younger people. This in contrast to von Kalckreuth, Schmidt, and Stix (2014a) that state that habit does not influence cash usage to a large extent.

Moreover, when investigating consumer payment choice, some researchers use behavioral aspects as explanatory variables. Several scholars argue that consumers use more cash because it helps to monitor their expenses (von Kalckreuth, et al., 2014b). On the contrary, other researchers claim that consumers use card as a payment instrument for the purpose of monitoring expenditures (Hernandez, et al., 2017). In addition, the features available to budget and monitor expenses, like frequency, the level of detailed account statements, and actuality, varies across countries (Bagnall, et al., 2016). Other behavioral aspects highlighted by Bagnall et al. include the trust in banks and the Government. A history of banking crisis and high inflation can affect the trust in banks and thus, consumers' cash preferences arise (Stix, 2013; Sveriges Kommuner och Regioner, 2019). This can potentially explain the extensive cash usage in Germany as they have experienced hyperinflation. Bagnall et al. further elaborates that the behavioral aspects influence on payment choice are often difficult to estimate and that people often require high levels of anonymity and security when choosing payment method. However, these concerns are often difficult to quantify empirically.

3.4 Attitude

In the paper "Why Are (Some) Consumers (Finally) Writing Fewer Checks? The Role of Payment Characteristics" by Schuh and Stavins (2010), the authors discuss that few studies have focused on how the use of payment instruments are affected by consumers' attitudes towards them. This is further stressed by

Ching and Hayashi (2010) as they state that not including attitude when evaluating payment behavior creates a large omitted variable bias. Thus, when conducting surveys and collecting data on payment behavior, attitude towards payment instruments is valuable to include. However, Schuh and Stavins (2010) discuss that attitude towards payment methods is harder to measure, as it is subjective and emotional, than for example the payment instrument characteristics. They point to future research for attitude towards payment methods to further be analyzed. The attitude towards cash as a payment method is further examined in our thesis.

Moreover, Stavins (2001) elaborates on that policy aiming to convert payment behavior and habits towards digital payment alternatives, has a greater chance of being successful if the group of interest favors the digital payment method to a larger extent than the population in general. This provides an indication of the importance of attitude at large. Furthermore, the European Central Bank (2020) highlights the role of attitude towards cash and other payment methods as an indicator for the future payment landscape and how a transition to a cashless society might appear. Their results show that there are significant differences in attitude between the Eurozone countries, but also within the individual countries between different socio-demographic groups. For example, younger and more educated people have a more positive attitude towards non-cash means of payment. Thus, the existing literature insinuates the importance of examining attitude towards cash as a payment method.

3.5 The Research Gap

The previous research presented shows the relationship between cash usage, attitude, and the socio-demographic variables. In the literature, Sweden has not been a research focus, even though Sweden is predicted to be one of the first cashless societies and has the lowest percentage of cash in circulation (Maxia, 2020). As a transition to a cashless society, and the decrease of cash in a society, is a changing phenomenon, the data used in previous literature is relatively outdated. In regard to the Swedish payment market Sveriges Riksbank has published descriptive statistics of payment behaviors. However, there has not been any research regarding the correlations or statistical tests on payment behavior. This is where we contribute. Our thesis provides an addition to the literature by using Swedish microdata on individual cash usage from 2020 and analyze the relationship between cash usage and socio-demographic factors, in order to identify potential vulnerable groups in society with limited access to cash. To further identify what drives this behavior and provide an understanding for these groups' socio-demographic characteristics, the factors that influence consumers' attitude towards the cash decrease in the Swedish society are studied. This, as attitude towards the cash decrease can serve as a proxy and provide a more precise story to what socio-demographics these groups are likely to have. Since even though people use cash today, it does not necessarily imply that they will not easily adapt to other payment methods if required. However, if people have a negative attitude towards the decrease of cash in the Swedish society, and thus are likely to favor cash as a payment instrument, they might not be ready to give up cash.

Furthermore, examining these relationships are important for policy making in Sweden. Previous studies that have been conducted in other countries, on other payment markets than the Swedish payment market, do not provide a sufficient foundation to make policy decisions upon as the different payment markets have circumstantial differences. When comparing cash usage, it is important to note that legislation differs across countries in regard to merchants having to accept cash or not. In Sweden the principal rule says that all merchants need to accept cash, however, this can be waived by putting up a sign stating that the merchant does not accept cash (Sveriges Riksbank, 2019c). In other countries, for example Denmark, this type of waiver is not possible to pursue (Forbrugerombudsmanden, 2020). Thus, this thesis provides valuable insights and a statistically significant basis for decision-making, that is based on the Swedish payment market.

In our thesis we further identify potentially vulnerable groups in the Swedish society and what socio-demographic factors that constitute these groups. This is of importance as it has been shown in studies, conducted by for example Stavins (2001), that consumers have heterogeneous preferences and that people with similar socio-demographic characteristics tend to have more homogeneous preferences. Followingly, policies that are designed to convert habits, choice of preferred payment method, are more likely to be successful if they are designed to meet the existing preferences of the group targeted. Hence, it is essential to know the characteristics of the vulnerable groups targeted, if deciding on policy changes to transition to a cashless society.

4. The Research Design

This section introduces a description of the relationships that we study, as well as the research questions and our contribution to the current state of knowledge. It is of great interest to study what factors that affect cash usage and the attitude towards the decrease of cash in society as this gives information about Swedish citizens' payment behavior and identifies the differences within the population. The research design of this thesis is based upon the previous research on countries with similar characteristics as Sweden. These are all Western developed countries, with similar polity, population demographics, and payment markets. Thus, the relationships between cash usage, attitude, and socio-demographic characteristics are predicted to be similar in Sweden.

4.1 Cash Usage and Socio-Demographic Variables

Previous research shows that there are significant relationships between certain socio-demographic variables and cash usage. In this thesis, we focus on the socio-demographic characteristics age, education, income, region, and gender. These are chosen as Stavins (2001) predicted that the consumer characteristics, such as education, income, and age, largely affect an individual's choice of payment method. More recent work has also followed this line of study (von Kalckreuth, et al., 2014a; Bagnall, et al., 2016; European Central Bank,

2020). Region is included as previous research has established that there are significant differences in cash usage depending on population density (Ching & Hayashi, 2010; European Central Bank, 2020). Earlier research has not identified a significant relationship between gender and cash usage. However, we include gender to examine if similar results can be found in Sweden. Based upon previous publications, differences in age are expected to influence cash usage, where older people are predicted to use cash to a larger extent than younger people. As for education and income, lower education and lower income are expected to have a positive correlation with cash usage. Differences in population density is believed to correlate with cash usage, where cash is expected to be used to a greater extent in less densely populated areas. Gender is not expected to have a significant impact on cash usage.

4.2 Attitude and Socio-Demographic Variables

Earlier literature identifies significant relationships between certain socio-demographic variables and the attitude towards cash as a payment method (Ching & Hayashi, 2010; Schuh & Stavins, 2010; European Central Bank, 2020). Our thesis builds on this literature and examines the relationship between attitude towards the cash decrease in the Swedish society and age, education, income, region, and gender. We believe that attitude towards the cash decrease in the Swedish society is a suitable proxy for the attitude towards cash as a payment instrument. Previous research indicates that as age increases, education decreases, and income decreases people have a more positive attitude towards cash as a payment instrument. Further, a more positive attitude is also expected in rural areas compared to urban areas. As with cash usage, gender is not expected to have a significant impact on attitude.

4.3 Contribution and Research Questions

This thesis contributes to an existing gap in the literature as recently collected data on Swedish payment behavior is used. Our thesis provides an understanding as to why certain groups, in the Swedish society, pay with cash or have a certain attitude towards the decrease of cash. Furthermore, differences within socio-demographic characteristics are determined, identifying the vulnerable groups in a potential transition to a cashless society. It is of interest to examine what socio-demographic groups that are more vulnerable and that perhaps will need more attention when forming policy, as Stavins (2001) notes that the demographic groups that are more in favor of a certain payment method, are more likely to successfully adapt to policy changes.

Although Sweden has similar traits to the developed countries in the previous research, Sweden also differs on several accounts, for example, Sweden ranks as one of the world's most innovative countries (Patent- och registreringsverket, 2020). In addition, as legislation and population characteristics, such as density, differ between nations it is of interest to not solely rely on studies on other countries, but rather conduct studies focusing primarily on Sweden. Furthermore, the angle of approach that this thesis contributes with is interesting as we estimate the use of cash as a function of the socio-demographic factors where the other

variables are kept constant. It provides the opportunity to, for example, study if age has an independent effect given the other socio-demographic variables. This cannot be deduced from the descriptive statistics that Sveriges Riksbank has compiled.

With these contributions to the existing literature, our thesis provides valuable insights to the inquiry commissioned by the Swedish Government to examine the role of the State in the payment market. Our thesis further extends and contributes to the existing economic literature in understanding how socio-demographic characteristics drive behavior and attitude. This is done by examining the relationship between behavior and attitude, and how differences in socio-demographic characteristics affect the two.

The main research questions our thesis aims to answer are:

What socio-demographic characteristics influence people's cash usage in Sweden?

What socio-demographic characteristics influence people's attitude towards the decrease of cash in the Swedish society?

The two research questions are posed as they complement each other and provide a holistic view on cash usage. By examining what socio-demographic characteristics that influence people's cash usage in Sweden and the existing differences within these groups, we identify the current state of the payment behavior. By then also examining the socio-demographic characteristics that influence people's attitude towards the decrease of cash in the Swedish society and the existing differences within these groups, we more accurately identify the vulnerable groups in a potential cashless society. This, as attitude towards the decrease of cash in society is a more precise proxy for the likeliness to adapt successfully if Sweden transitions to a cashless society. Using cash today does not necessarily mean that people object to not use cash in the future.

The relationships between cash usage, attitude, and socio-demographic characteristics are expected to have a similar nature to the findings of the results based on previous research presented in the literature review. This leaves us with the hypothesis that as age increases, education, income, and population density decreases, cash usage is believed to increase. Followingly, gender is not believed to notably influence cash usage. Regarding the relationship between attitude towards the decrease of cash and the socio-demographic characteristics, the hypothesis follows that as age increases, education, income, and population density decreases, the negative attitude towards a cash decrease in society increases. Followingly, gender is not expected to influence the attitude.

5. Method

This section outlines the method we use to obtain the data used in this thesis. To answer the research questions, microdata on consumers' behaviors and attitudes is needed. Sveriges Riksbank collects data on payment behavior in Sweden by conducting a survey every second year where they interview citizens about

their use of payment methods. The most recent survey provides information on cash usage, attitude, and socio-demographic characteristics of consumers from 2020, which constitutes the data set that is used.

5.1 Data Collection

The data collected by Sveriges Riksbank consists of 2013 observations across 31 questions. It is obtained through a survey that is called "The Payment Behaviour of the Swedish Population". It investigates Swedish citizens' choice of payment methods to analyze the digital payment landscape and how it changes over time. The latest set of interview answers was gathered between the 12th and 31st of March in 2020. Using a market research company for the fieldwork, Sveriges Riksbank conducted the survey interviews over the internet web and over phone. In total there were 2013 randomly collected interviewees in the ages between 18-84 years. There were 1003 phone interviews and 1010 web-based interviews.

The recently collected data set allows for a relevant analysis as the transition to a cashless society is an everchanging phenomenon and every year there is a development as technology improves and habits change. Comparing the survey answers collected by Sveriges Riksbank in 2012 to the answers collected in 2020, 93% of the sample had used cash as a payment method during the last 30 days in 2012, while in 2020 that number was 50% (Sveriges Riksbank, 2020a). Moreover, in 2012, 33% of the people interviewed used cash at their latest purchase in store, while only 9% did in 2020. This is a relatively large change occurring during a short period of time. Hence, it is important for us to use up-to-date data to be able to reach relevant conclusions regarding our findings of the relationships of interest.

Furthermore, Sveriges Riksbank is the oldest central bank and have a solid reputation. Although Sveriges Riksbank is independent, it is an agency under Sveriges Riksdag, the Swedish Parliament, with a mandate to promote a secure and efficient payment system (Sveriges Riksdag, 2021). Sveriges Riksbank continuously analyze the opportunity to modernize the payment market and therefore collects data on the current state of the Swedish population's cash usage (Sveriges Riksbank, 2019d). Consequently, they work transparently to guarantee the Swedish population's trust. It can be argued that Sveriges Riksbank is biased as they are an actor in the payment market and have their own agenda. However, as it is only the microdata provided by Sveriges Riksbank that is used, this is not considered to be an issue. In addition, we use the data to perform statistical tests and base our results on these findings, rather than consulting the descriptive statistics published by Sveriges Riksbank. Moreover, the data is collected by a market research company at the request of Sveriges Riksbank. This minimizes potential faults in the assembly of individual data. Hence, the data provided by Sveriges Riksbank is reliable and is used in this thesis.

The survey questions used in this thesis that represent cash usage and attitude, as well as the important socio-demographic characteristics, and the following answer options are shown in Appendix A List A1 (p. 51). A brief summary of the collected data by Sveriges Riksbank and descriptive percentages on cash usage and attitude towards the decrease of cash in the Swedish society, that are important for our analysis are

presented in the summary statistics table, Table 1, and Table 2. If a consumer used cash and a digital payment method in the same purchase, this individual is recorded as a person that has used cash. Other characteristics from the data set, such as the socio-demographic characteristics, are shown in Appendix A Table A2 (p. 55).

Table 1: Summary Key Characteristics from the Data Set of Cash Usage

Question from Data Set	% That Used Cash	% That Not Used Cash
1. Which of the following payment methods have you used (for private usage) during the last 30 days?	**50.17%**	**49.83%**
2. How did you pay in your latest store purchase? (Physical store)	**8.20%**	**91.80%**
3. For payments in store under 100 Swedish kronor during the last 30 days, how did you mainly pay? (Physical store)	**12.18%**	**87.82%**
4. For payments in store between 100 and 500 Swedish kronor during the last 30 days, how did you mainly pay? (Physical store)	**4.58%**	**95.42%**
5. For payments in store over 500 Swedish kronor during the last 30 days, how did you mainly pay? (Physical store)	**2.51%**	**97.49%**

Table 1: Questions from the data set from Sveriges Riksbank (2020) and the percentage of interviewees that use cash or do not use cash respectively for the five questions.

Table 2: Summary Key Characteristics from the Data Set of Attitude

Question from Data Set	% Positive Attitude	% Neutral Attitude	% Negative Attitude
6. The usage of cash is decreasing in the Swedish society. Do you have a positive or negative attitude towards this development?	**40.27%**	**23.89%**	**35.84%**

Table 2: Question from the data set from Sveriges Riksbank (2020) and the percentage of interviewees that have a positive attitude, a neutral attitude, and a negative attitude towards cash decrease in the Swedish society.

Table 1 shows that 50% of the people interviewed have used cash during the last 30 days. However, when asked about the latest purchase in store, only 8% had paid with cash. Further, the data illustrates a diminishing trend of cash usage as the transaction size increases. Table 2 indicates that people tend to have an opinion on the decrease of cash, rather than appearing neutral. The data set has approximately an even distribution of people that have a positive and negative attitude, 40% and 36% respectively.

5.2 Methodological Limitations

The method of collecting the data and the data set itself has several limitations that need to be accounted for. These are important to be aware of to fully understand the wider applicability of our thesis' results.

As the data set is gathered through a survey, limitations follow. One is that people cannot be expected to pay full attention or take enough time and energy when interviewed, which can result in some inaccurate answers. In addition to this, some questions can be difficult to interpret, and as half of the interviewees did

a web-based survey they were not able to ask for clarifications about questions and the answer alternatives. This can potentially amount in false information as some people will pick any answer to move on with the survey. As this survey was distributed in March 2020, when Covid-19 started to spread and close-down the society, it was convenient that no physical meetings were required as this might have limited the data in general.

Moreover, choice of payment method can be habitual (van der Horst & Matthijsen, 2013), and thus, not a situation that is frequently reflected upon. Therefore, it can be hard to answer questions about a specific time period, as individual transactions can be difficult to remember. In other research papers payment diaries are used as they do not rely on consumer recall to the same extent as a survey. To account for this in our thesis, several questions are analyzed, regarding both cash usage at the latest store purchase as well as cash usage during a time period, in order to limit the dependence on consumers' recall. Rather than analyzing specific purchases, we focus on the overall patterns and payment methods used to capture consumers' general behavior. Further, this type of survey is used as it is an efficient way to gather a wide reach of data. Payment diaries may provide more reliable data as each transaction is recorded continuously, however, it is more time consuming and requires a large effort for the consumer which can therefore limit its reach. To have a wide reach is of importance for drawing general conclusions on Swedish consumers' payment behavior and attitude.

Furthermore, the design of the survey only allows for binary variables to be constructed from the data set. No continuous data was collected. The relationship we study is therefore a probability of whether people are more or less likely than other people to pay with cash within a certain socio-demographic group. As well as the probability of whether people are more or less likely than other people to have a positive attitude towards the decrease of cash in the Swedish society, within a certain socio-demographic group. With a binary variable, the results retrieved are in relation to the chosen base group. Even though this is a limitation, the data set still allows us to study our research questions and to examine the differences in cash usage and attitude within the socio-demographic groups.

As stated in the literature review, there are many factors that have been shown to affect cash usage and attitude in other countries that would be interesting to study in Sweden. For example, it would be interesting to study factors like transaction characteristics and relative cost of cash and card usage. Although the data set does not capture all of these, the factors that the data set does contain are highly relevant and are sufficient to answer our research questions and purpose. To summarize, there are limitations with the collection of the data set, but we account for these in various ways. Hence, we use the microdata from Sveriges Riksbank's survey on Swedish citizens' payment behavior.

6. Data

This section presents the constructed variables from the data set used in the analysis. Firstly, we create six different dependent variables to use in our regressions. They are all binary. The first one denotes if the person have used cash as payment method in the last 30 days and the second one represents if the individual used cash in their latest store purchase. The third, fourth and fifth dependent variable are coded to describe whether an individual's purchases during the last 30 days in a physical store has mainly been paid with cash for transaction sizes of less than 100 Swedish kronor, more than 100 Swedish kronor but less than 500 Swedish kronor, or exceeding 500 Swedish kronor respectively. The sixth dependent variable explains the individual's attitude towards the decrease of cash in the Swedish society. Secondly, our independent variables of interests are socio-demographic characteristics. These are age, level of education, income level, region in regard to population density, and gender. Thirdly, we include the control variables attitude and technical issues. Although, attitude is not used as a control variable when attitude is the dependent variable.

6.1 Cash Usage as Dependent Variables

Our dependent variables consist of five variables that capture cash usage, and one variable that represents individuals' attitude towards the cash decrease in society. Thus, the first five variables represent current payment behavior and the last one represents attitude which gives an indication of people's payment behavior in the future. In this subsection the construction of these six dependent variables is further explained.

Cash Usage

The first dependent variable is called *Cash Usage*. This variable is constructed from the question "Which of the following payment methods have you used (for private usage) during the last 30 days?", where the interviewees could choose more than one answer option as they were not mutually exclusive. The options were: cash, debit card, credit card, Swish, other payment apps (like Apple Pay or Samsung Pay), payment by text, online or mobile bank, direct debit, payment by mail, payment of bill with cash at bank office, bitcoin or other crypto currency, or none of the above. To make this a binary variable, if an individual has used cash as a payment method during the last 30 days, value 1 is denoted, even if they also used other payment methods. If the person did not use cash at all, the value 0 is denoted.

Cash Usage Store

The second dependent variable is called *Cash Usage Store*. The survey question that this variable is constructed from is "How did you pay in your latest store purchase? (Physical store)", where the interviewee could choose from: cash, debit card, credit card, Swish, mobile phone service, invoice, or other. The question is constructed into a dummy variable which takes the value 1 if the interviewee used cash in the last store purchase, and 0 otherwise. If an interviewee chooses the option "other" and denoted that they both used

cash and card in the same purchase, we denote this as cash usage and hence, the binary variable takes on the value 1.

Cash Usage under 100

The third dependent variable is called *Cash Usage under 100*. The survey question that this binary variable is constructed from is "For payments in store for a value less than 100 Swedish kronor during the last 30 days, how did you mainly pay? (Physical store)". The same answer alternatives as for the second dependent variable were available. Adding an option for people that have not participated in transactions for less than 100 Swedish kronor. The dummy variable takes on value 1 if the interviewee used mainly cash for payments in store for a value less than 100 Swedish kronor during the last 30 days, and 0 otherwise. If the person has used both cash and digital payment means, the dummy takes on the value 1. If the person has not participated in transactions for less than 100 Swedish kronor, the response is recorded as a missing value.

Cash Usage over 100 and under 500

The fourth dependent variable is called *Cash Usage over 100 and under 500*. The dummy variable is constructed from the question "For payments in store between 100 and 500 Swedish kronor during the last 30 days, how did you mainly pay? (Physical store)". The same answer options as in the previous question were available. Adding an answer alternative for people that have not participated in transactions with a value between 100 and 500 Swedish kronor. The binary variable takes on the value 1 if the interviewee mainly used cash for payments in store between 100 and 500 Swedish kronor during the last 30 days, and 0 otherwise. As the other dependent variables, if the person has used both cash and digital payment means, the dummy takes on the value 1. If the person has not participated in any transactions between 100 and 500 Swedish kronor, the response is recorded as a missing value.

Cash Usage over 500

The fifth dependent variable is called *Cash Usage over 500*. The survey question used to construct this variable is "For payments in store exceeding 500 Swedish kronor during the last 30 days, how did you mainly pay? (Physical store)". The same answer alternatives as previous question were available. Adding an alternative for people that have not participated in transactions exceeding 500 Swedish kronor. The dummy takes on value 1 if the person mainly used cash for payments in store exceeding 500 Swedish kronor the last 30 days, and 0 otherwise. As the other dependent variables, if both cash and digital payment means have been used, the dummy takes on the value 1. If the person has not participated in transactions exceeding 500 Swedish kronor, the response is recorded as a missing value.

Positive Attitude

The sixth dependent variable captures the attitude the individual has towards the decrease of cash in the Swedish society, and it is called *Positive Attitude*. We use attitude towards decrease of cash in the Swedish society as a proxy for attitude towards cash as a payment method. The survey question used is "The usage of cash is decreasing in Sweden. Do you have a positive or negative attitude towards this development?".

The answer alternatives for the interviewee were: positive, slightly positive, neither positive nor negative, slightly negative, negative, and lastly, have no opinion. If the person has a positive attitude the value 1 is denoted, and if the person has a negative attitude the dummy takes on value 0. The positive attitude consists of the positive and slightly positive options. The value 0 consist of the negative and slightly negative options. The answer alternative of neither positive nor negative is excluded since the neutral opinion is not of interest when attitude is a dependent variable. The selection bias possibly caused by reducing the sample is negligible since these observations do not affect the relationship of interest. If the individual answered that they have no opinion, this option is recorded as a missing value.

To conclude, the first five dependent variables represent cash usage in different situations. By including all five, it allows us to capture payment behavior on several levels. First cash usage in general is examined, and then the latest store purchase is analyzed, before shifting focus to different transaction sizes. To capture the full picture of cash usage attitude towards the decrease of cash in the Swedish society is examined.

6.2 Key Independent Variables

Our independent variables consist of five socio-demographic characteristics. These are age, education, income, region, and gender. In this subsection the construction of these five variables is further explained.

Age

Age is the first key independent variable. There are four different age groups in the data set, the first age group is 18-24 years old, the second 25-44 years old, the third 45-64 years old, and the fourth 65-84 years old. Out of these, we construct four dummy variables. If the interviewee is for example 18-24 years old, the dummy variable for that age takes on the value 1, and 0 otherwise.

Education

The level of *education* is the second key independent variable from the survey question "What is your highest completed education?". The responders could choose between: elementary school, high school, higher academic degree, other, or do not want to disclose. Three different dummies are constructed. One that takes on the value 1 if the person has not finished high school, and 0 otherwise. One that takes on the value 1 if the person has finished high school, and 0 otherwise. The last one takes on the value 1 if the person has a higher academic education, and 0 otherwise. The people that answered "other" are manually included in the three different options. For example, there were responders who had not finished elementary school, thus these are included in the first education dummy. The people that did not want to state their level of education are recorded as missing values.

Income

The level of *income* is the third key independent variable and is constructed from the survey question "How large is your monthly income before taxation?". The income includes study allowance, rent allowance,

pension etc. The interviewee could choose between 17 different income categories. We group them into three different dummy variables in income groups in line with common standards by Statistics Sweden. The first dummy, low income, denotes the value 1 if the person has an income within the range 0 and 16,499 Swedish kronor (the interviewee chooses one of the following alternatives: do not have an income, income less than 8000 Swedish kronor, or income within the ranges 8,000-9,999, 10,000-11,999, 12,000-13,999, and 14,000-16,499 Swedish kronor). The second dummy, middle income, takes on the value 1 if the person has an income within the range 16,500 and 41,999 Swedish kronor (the interviewee chooses one of the alternatives of income within the ranges 16,500-18,999, 19,000-21,999, 22,000-24,999, 25,000-29,499, 29,500-34,999, and 35,000-41,999 Swedish kronor). The third dummy, high income, takes on the value 1 if the person has an income of 42,000 Swedish kronor or more (the interviewee chooses one of the alternatives of income within the ranges 42,000-49,999, 50,000-64,999, 65,000-83,999, and 84,000 or more Swedish kronor). The people that did not want to disclose their income level are recorded as missing values.

Region

The population density of the *region* where the individual lives is the fourth key independent variable. According to the Swedish Association of Local Authorities and Regions (Sveriges Kommuner och Regioner, 2019) Sweden's municipalities are divided into three overarching regions. The municipalities are grouped based on certain criteria such as urban size, proximity to larger urban areas, and commuting patterns. To see a map of the regions, see Appendix B Map B1 (p. 62). The first dummy takes on the value 1 if the person lives in a large city or in a municipality close to large cities, and 0 otherwise. The second dummy takes on value 1 if the individual lives in a medium-sized town or in a municipality close to medium-sized towns, and 0 otherwise. The third dummy takes on value 1 if the person lives in a smaller town or a rural municipality, and 0 otherwise. See Appendix B Table B2 (p. 63) for more specific definitions of the regions. The interviewees that did not want to disclose their location, are reported as missing values.

Female

The fifth key independent variable is *female*. The constructed variable takes on the value 1 if the respondent identifies as a female, and 0 otherwise.

6.3 Control Variables

Regarding control variables, it is desirable to control for additional factors that could influence cash usage and the attitude towards the decrease of cash in the Swedish society. We include the two control variables technical issues and attitude. In this subsection we show how these are constructed, as well as the plausible ground to why they are included. The control variables that we include also diminish a potential omitted variable bias.

Technical Issues

The survey questions "How often do you experience that it is not possible to pay in store because of technical issues?" is made into four dummy variables. The first dummy takes on the value of 1 if the person experiences technical issues one or more times per week, and 0 otherwise. The second dummy takes on the value of 1 if the person experiences technical issues one to three times per month, and 0 otherwise. The third dummy takes on the value of 1 if the person experiences technical issues less frequently than one time per month, and 0 otherwise. The fourth dummy takes on the value of 1 if the person never experiences technical issues, and 0 otherwise. The respondents that answered that they do not know are recorded as missing values.

This control variable is included as we want to control for technical issues. We study the relationship between cash usage and the socio-demographic characteristics, as well as the relationship between attitude and the socio-demographic characteristics. Hence, we want to separate these relationships from technical issues as the technical issues might depend on pure luck. For example, the store might have a power outage, or the business can have problems with its payment service provider. It does not depend solely on the consumer. By including four different dummies, the role of technology is controlled for as we do not want this factor to influence the other variables. Furthermore, it is of importance to control for technical issues, as the technical issues that people experience today, are not likely to be relevant when studying payment behavior and attitude. For a transition to a cashless society to occur, there needs to be solutions adopted to ensure that technical issues will not hinder digital payments, and thus the digital transactions not taking place today, due to technical issues, need to be controlled for in this thesis.

Attitude

One of our dependent variables is attitude, and this control variable is based on the same survey question. *Attitude* is only used as a control variable when cash usage is the dependent variable. We construct three different dummy variables for attitude. The first takes on the value 1 if the person has a positive attitude towards the decrease of cash in the Swedish society, and 0 otherwise. The second dummy takes on the value 1, if the person has a neutral attitude, and 0 otherwise. The third binary variable takes on the value 1 if the person has a negative attitude, and 0 otherwise.

Attitude is used as a control variable to exclude people's preferences, as this is likely to play a large role in the decision to use cash or not (Bounie & Francois, 2006; von Kalckreuth, et al., 2014a; Bagnall, et al., 2016; Arango, et al., 2018). The attitude towards the cash decrease in the Swedish society is used as a proxy for people's preferences on cash. Including attitude as a control variable is also in line with what previous research suggests reducing any omitted variable bias. This is particularly stressed in the paper by Andrew T. Ching and Fumiko Hayashi (2010), where they state that attitude is important to include when evaluating consumers' payment behavior as it otherwise creates a large omitted variable bias.

6.4 Unaccounted Variables

The data set that is used to further investigate our research problem is subject to limitations. Although it provides data suitable for our model there are several other factors that affect cash usage and the attitude towards the decrease of cash in society. In order to fully understand the findings of this thesis and its wider applicability, attention needs to be drawn to these variables that could potentially affect the relationships. Moreover, there is likely to be an omitted variable bias that needs to be considered when examining the robustness of our results.

Firstly, in order for people to adopt new digital payment systems, they need to have a general trust in society (Arvidsson, 2019). This includes trust in both the banking system but also in other people. Trust is built upon many different factors and experiences. Specifically, trust in digital payment methods is based on integrity, privacy, and transparency. Trust, built on earlier experiences with payment methods, are important in determining what method to use (Tsiakis & Sthephanides , 2005). For example, if a person has a previous experience of being robbed when carrying cash, it is more likely that this person will transition into using digital payment methods to avoid such an event from happening again. Experiences and the level of trust in society will play a large role in an individual's cash usage and their attitude towards the cash decrease in society. Previous research by Bagnall et al. (2016) highlights the difficulties in quantifying trust empirically. Nevertheless, Bagnall et al. finds that trust influences consumers' cash preferences. Sweden is often mentioned as a country that has high trust in the government and high social trust, which can affect the low cash usage compared to other countries (OECD, 2020; Pew Research Center, 2020). However, as trust is hard to measure, it is not included as a variable.

Secondly, the cost of payments is of interest to use as a control variable. Rational consumers act to maximize their utility from consumption. In 1890 Alfred Marshall introduced the law of diminishing marginal utility and how it affects demand. In his book called "Principles of Economics" he stated that "the additional benefit which a person derives from a given increase of his stock of a thing, diminishes with every increase in the stock that he already has" (2009, p. 79). This implies that choice of payment method is dependent on the relative prices of other methods. Cost includes monetary costs but also personal investments such as time and energy. For example, high-income earners are likely to have access to cheaper cards and have less time, thus a higher alternative cost to use cash, than low-income earners. Hence, the cost of cash as well as the cost of digital payment methods affect cash usage and attitude towards cash decrease in society. Due to this complexity, it is hard to capture and measure every aspect of cost. However, this might not be a critical problem, as we include explanatory variables such as income and education.

Thirdly, although most of the economic theory is based upon the assumption that consumers behave rationally, it is brought to light by van der Horst and Matthijsen (2013) that in regard to deciding payment method, people tend to act out of habit and do not make planned conscious decisions. Therefore, it would be interesting to include a variable representing habit and its effect on cash usage and attitude.

6.5 Description of the Data

In this subsection we describe the key characteristics from our constructed data set to introduce consumers' payment behavior in the Swedish society. The description indicates how the data set is distributed and therefore, no general conclusions can be drawn. In Appendix B Table B3 (p. 64) there is a full variable list and the description of all variables of interest. To provide an overview of the constructed data set, five diagrams, Diagram 1, Diagram 2, Diagram 3, Diagram 4, and Diagram 5 are presented. Each diagram represents one of the five key independent variables in the constructed data set, and the percentage of interviewees in each category that use cash and have a positive attitude towards the decrease of cash.

The diagrams below give some key insights for how the data set is distributed. The first diagram shows that older people throughout use more cash and have a less positive attitude towards the cash decrease in society than younger people. The second and third diagrams illustrate that people with lower education and lower income throughout use more cash and have a less positive attitude towards the cash decrease in society. The fourth diagram shows that people living in densely populated areas use less cash. However, there is no consistent story to how a decrease in population density affects cash usage. Furthermore, as population density decreases people have a less positive attitude. The fifth diagram presents that a slightly higher fraction of men use cash than females. All diagrams indicate that there are diminishing differences in cash usage, within each socio-demographic characteristic, as transaction size increases.

Diagram 1: Age, Cash Usage, and Attitude

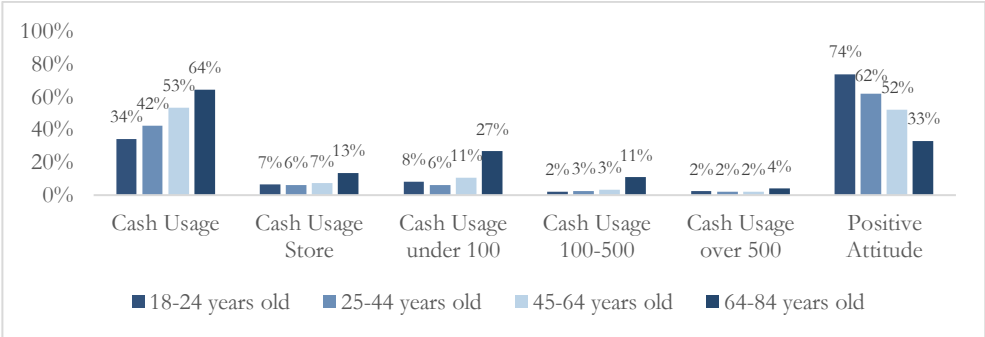

Diagram 1: Distribution of the percentage of individuals that use cash for the four age categories, as well as the percentage of individuals that have a positive attitude towards the decrease of cash in society for the four age categories. Source: Data set from Sveriges Riksbank (2020).

Diagram 2: Education, Cash Usage, and Attitude

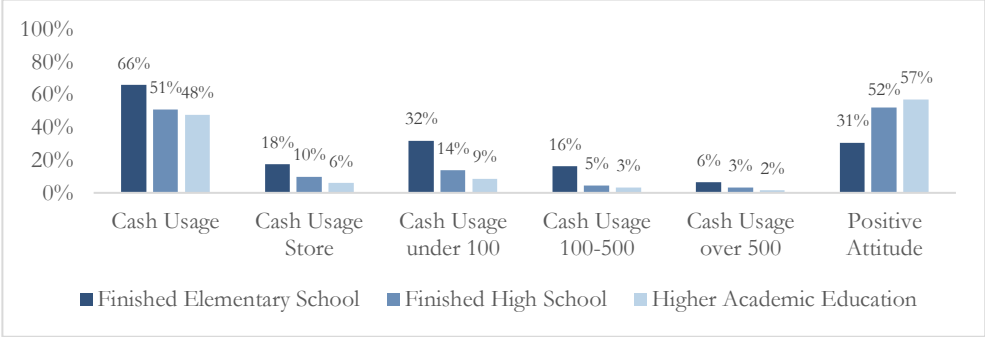

Diagram 2: Distribution of the percentage of individuals that use cash for the three education categories, and the percentage of individuals that have a positive attitude towards the decrease of cash in society for the three education categories. Source: Data set from Sveriges Riksbank (2020).

Diagram 3: Income, Cash Usage, and Attitude

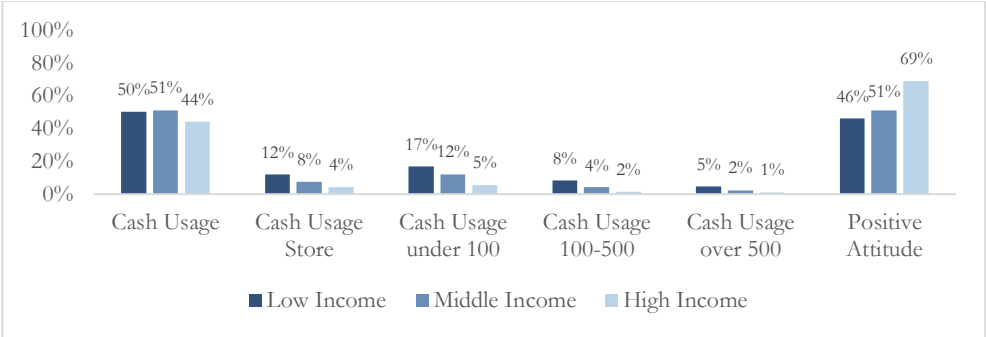

Diagram 3: Distribution of the percentage of individuals that use cash for the three income categories, as well as the percentage of individuals that have a positive attitude towards the decrease of cash in society for the three income categories. Source: Data set from Sveriges Riksbank (2020).

Diagram 4: Region, Cash Usage, and Attitude

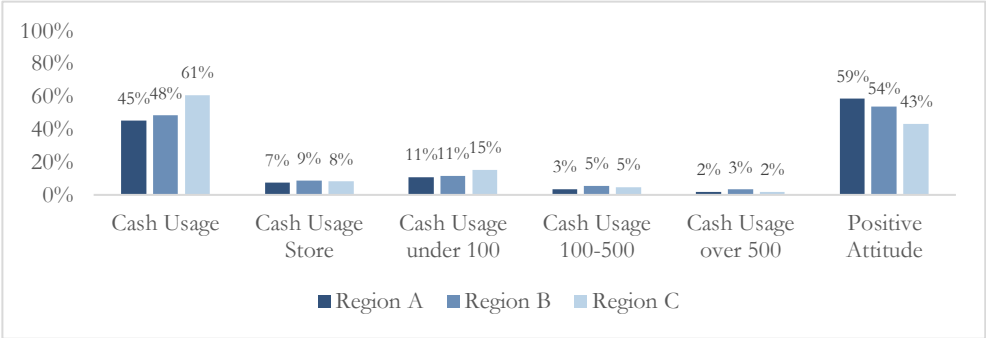

Diagram 4: Distribution of the percentage of individuals that use cash for the three region categories, as well as the percentage of individuals that have a positive attitude towards the decrease of cash in society for the three region categories. Source: Data set from Sveriges Riksbank (2020).

Diagram 5: Gender, Cash Usage, and Attitude

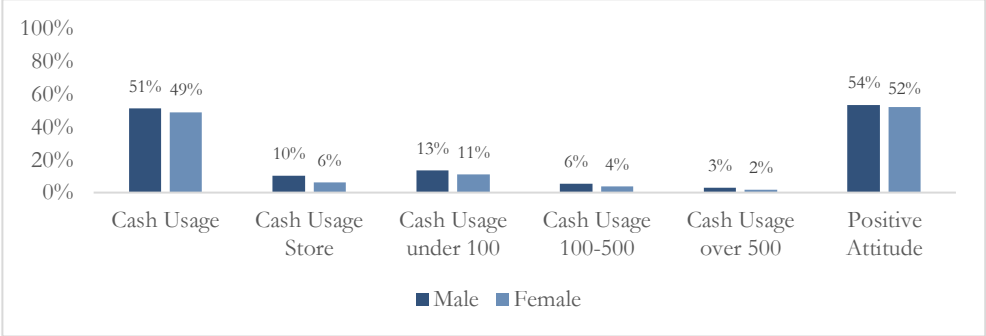

Diagram 5: Distribution of the percentage of individuals that use cash for the two gender categories, as well as the percentage of individuals that have a positive attitude towards the decrease of cash in society for the two gender categories. Source: Data set from Sveriges Riksbank (2020).

7. Empirical Framework

Our empirical framework aims to test the influence by the socio-demographic variables, age, education, income, region, and gender on people's cash usage, as well as their attitude towards the decrease of cash in the Swedish society. We apply an ordinary least squares (OLS) method of multiple linear regression to test the nature of these relationships. Hence, we estimate cash usage and attitude as a function of age, education, income, region, and gender. It provides the possibility to study an independent effect of each socio-demographic variable, where the other variables are kept constant, in contrast to the descriptive statistics

that can be gathered from Sveriges Riksbank's compilation. As mentioned in the section above, six dependent variables are used, constructed from six different interview questions in the survey. These are all treated as binary. Followingly, the key independent variables are age, education, income, region, and gender, and they are also binary. Throughout this thesis, the significance level chosen and referred to is a significance level of 5%.

7.1 Multiple Linear Regressions

In order to examine the socio-demographic characteristics' independent effect on people's cash usage and attitude towards the decrease of cash, six multiple linear regressions are estimated. By examining cash usage on several levels, multiple aspects of payment behavior are identified. Firstly, cash usage is analyzed on a general level, finding the differences in socio-demographic characteristics that determine the likeliness to use cash as a payment method. Secondly, the latest store purchase is examined to give more specific insights of the influence on cash usage by the key independent variables. Thirdly, the differences in the socio-demographic variables that affect the probability to use cash are studied as transaction size increases. This provides a more holistic view on how different socio-demographic groups' cash usage are affected by the transaction size. Lastly, to capture the full picture of the socio-demographic variables' influence on cash usage, the variables' effect on attitude towards the decrease of cash in the Swedish society is examined. Hence, we gain knowledge of people's attitude towards cash as a payment method, which informs about the likeliness to exclusively use digital payment methods over the option to pay with cash in the future.

Regression 1 is presented in following model (R1):

$$Cash\ usage_i = \beta_0 + \beta_1 age_i + \beta_2 educ_i + \beta_3 income_i + \beta_4 region_i + \beta_4 female_i + \beta_5 X_i + \varepsilon_i \quad (1.1)$$

Where the dependent variable is whether the individual has used cash during the last 30 days, and the independent variables are age, education, income, region, and female. The control variables are technical issues and attitude and ε_i is an error term. In the final OLS regression, the following regressors are used:

$$CashUsage_i = \beta_0 + \beta_1 age_i + \beta_2 educ_i + \beta_3 income_i + \beta_4 region_i + \beta_4 female_i + \beta_5 tech_i + \beta_6 attitude_i + \varepsilon_i \quad (1.2)$$

Regression 2 is presented in following model (R2):

$$CashUsageStore_i = \beta_0 + \beta_1 age_i + \beta_2 educ_i + \beta_3 income_i + \beta_4 region_i + \beta_4 female_i + \beta_5 X_i + \varepsilon_i \quad (2.1)$$

Where the dependent variable is whether the individual paid with cash in their latest physical store purchase, and the independent variables are age, education, income, region, and female. The control variables are technical issues and attitude and ε_i is an error term. In the final OLS regression, the following regressors are used:

$$CashUsageStore_i = \beta_0 + \beta_1 age_i + \beta_2 educ_i + \beta_3 income_i + \beta_4 region_i + \beta_4 female_i + \beta_5 tech_i + \beta_6 attitude_i + \varepsilon_i \quad (2.2)$$

Regression 3 is presented in following model (R3):

$$CashUsage100_i = \beta_0 + \beta_1 age_i + \beta_2 educ_i + \beta_3 income_i + \beta_4 region_i + \beta_4 female_i + \beta_5 X_i + \varepsilon_i \quad (3.1)$$

Where the dependent variable is whether the individual mainly paid with cash in physical store purchases, during the last 30 days, for payments where the transaction size was less than 100 Swedish kronor. The independent variables are age, education, income, region, and female. The control variables are technical issues and attitude and ε_i is an error term. In the final OLS regression, the following regressors are used:

$$CashUsage100_i = \beta_0 + \beta_1 age_i + \beta_2 educ_i + \beta_3 income_i + \beta_4 region_i + \beta_4 female_i + \beta_5 tech_i + \beta_6 attitude_i + \varepsilon_i \quad (3.2)$$

Regression 4 is presented in following model (R4):

$$CashUsage100_500_i = \beta_0 + \beta_1 age_i + \beta_2 educ_i + \beta_3 income_i + \beta_4 region_i + \beta_4 female_i + \beta_5 X_i + \varepsilon_i \quad (4.1)$$

Where the dependent variable is whether the individual mainly paid with cash in physical store purchases, during the last 30 days, for payments where the transaction size was between 100 and 500 Swedish kronor. The independent variables are age, education, income, region, and female. The control variables are technical issues and attitude and ε_i is an error term. In the final OLS regression, the following regressors are used:

$$CashUsage100_500_i = \beta_0 + \beta_1 age_i + \beta_2 educ_i + \beta_3 income_i + \beta_4 region_i + \beta_4 female_i + \beta_5 tech_i + \beta_6 attitude_i + \varepsilon_i \quad (4.2)$$

Regression 5 is presented in following model (R5):

$$CashUsage500_i = \beta_0 + \beta_1 age_i + \beta_2 educ_i + \beta_3 income_i + \beta_4 region_i + \beta_4 female_i + \beta_5 X_i + \varepsilon_i \quad (5.1)$$

Where the dependent variable is whether the individual, mainly paid with cash in physical store purchases, during the last 30 days, for payments where the transaction size exceeded 500 Swedish kronor. The independent variables are age, education, income, region, and female. The control variables are technical issues and attitude and ε_i is an error term. In the final OLS regression, the following regressors are used:

$$CashUsage500_i = \beta_0 + \beta_1 age_i + \beta_2 educ_i + \beta_3 income_i + \beta_4 region_i + \beta_4 female_i + \beta_5 tech_i + \beta_6 attitude_i + \varepsilon_i \quad (5.2)$$

Regression 6 is presented in following model (R6):

$$PositiveAttitude_i = \beta_0 + \beta_1 age_i + \beta_2 educ_i + \beta_3 income_i + \beta_4 region_i + \beta_4 female_i + \beta_5 X_i + \varepsilon_i \quad (6.1)$$

Where the dependent variable is the individual's attitude towards the cash decrease in the Swedish society. The independent variables are age, education, income, region, and female. The control variable is technical issues and ε_i is an error term. In the final OLS regression, the following regressors are used:

$$PositiveAttitude_i = \beta_0 + \beta_1 age_i + \beta_2 educ_i + \beta_3 income_i + \beta_4 region_i + \beta_4 female_i + \beta_5 tech_i + \varepsilon_i \quad (6.2)$$

The multiple linear regressions that we use are identified as linear probability models as we use binary variables. A linear probability model is by definition heteroskedastic, but it is handled with our estimator,

using robust standard errors. The problem with linear probability models is that we cannot limit the expected probability (y^*) to be between 0 and 1. That is, y^* can become <0 and >1. However, this is not predicted to be a large issue in our case as when running the regressions, the observations with a predicted y value that is above or below the 0-1 range are only a few. Hence, we do not need to use a probit or logit model to eliminate this issue and we use the OLS method.

7.2 The Gauss-Markov Theorem

The Gauss-Markov Theorem developed by Carl Freidrich Gauss and Andrey Markov justifies the use of the OLS method instead of using various competing estimators. There are five Gauss-Markov assumptions that need to be fulfilled when running our multiple linear regression. If the first four assumptions are fulfilled the estimates are unbiased, and if all five assumptions are fulfilled, the estimators are the best linear unbiased estimators (BLUEs) of the true population parameters.

The first assumption is that the parameters should have a linear relation. This assumption is quite flexible, and in our regression models above, this assumption is fulfilled. The second assumption is random sampling, as the data set from Sveriges Riksbank is randomly collected with 2013 observations. This assumption is fulfilled as there are no systematic deviations in our sampling.

The third assumption is no perfect collinearity. For example, the relationship between education and income could potentially have a high correlation. To test this assumption, we perform a test of multicollinearity to see if any independent variable is constant or if there is an exact linear relationship between our variables. This is done by using a Variance Inflation Factor (VIF). Multicollinearity may be a concern if the VIF-value is 10 or higher, this threshold is a common rule of thumb. Furthermore, the Tolerance level, defined as 1/VIF, should be higher than 0.1 (O'brien 2007). As shown in Appendix C Table C1 (p. 66), there is no indication of multicollinearity. For example, in regression 1 the highest VIF is equal to 4.82 and the mean across all variables is 2.25. The third assumption of no perfect collinearity if fulfilled.

The fourth assumption is the zero conditional mean assumption, this assumption is probably not fulfilled. The expected value of the error term is most likely not zero, given any values of the independent variables. There is a potential omitted variable bias since factors such as trust, habit, and type of purchase, are likely to correlate with the independent variables and affect the dependent variable. However, we expect that this is not a large problem for our estimations.

The fifth assumption is homoskedasticity and to ensure this, we test for heteroskedasticity in our multiple linear regressions, see Table 3. The test we use is developed by Breusch and Pagan (1979) and Cook and Weisberg (1982) called the Breusch-Pagan/Cook-Weisberg test. The null hypothesis of the test is constant variance of the error term and evaluated against the alternative hypothesis of heteroskedasticity. In our test the null hypothesis is rejected at a significance level of 5%. Hence, there is heteroskedasticity present in our

sample. The null hypothesis is that the coefficients are jointly equal to 0 and equivalent to finding homoscedasticity, no relationship between the residuals and the variables. This means that the data is not identically and independently distributed, which could potentially be due to that the error variance changes proportionally with a factor. We resolve this by using heteroskedasticity-robust standard errors in the analysis.

Table 3: Breusch-Pagan/Cook-Weisberg test for heteroscedasticity

	R1	R2	R3	R4	R5	R6
F-statistic	2.50	10.22	25.74	11.93	5.68	3.84
Prob > F	0.0012	0.0000	0.0000	0.0000	0.0000	0.0000

Table 3: Breusch-Pagan/Cook-Weisberg test for heteroscedasticity of the error term for all six regressions. H_0: Constant variance. Fitted variables: Age25_44, Age45_64, Age65_84, HighSchoolEduc, AcademicEduc, MiddleIncome, HighIncome, RegionB, RegionC, Female, TechDaily, TechWeekly, TechMonthly, PositiveAttitude, and NegativeAttitude. In Regression 6, PositiveAttitude and NegativeAttitude are excluded as fitted variables.

8. Empirical Results

This section presents the empirical findings from our multiple linear regressions to analyze the relationships between cash usage, attitude towards the decrease of cash, and the socio-demographic characteristics. First, a subsection presents the results from Regression 1 and Regression 2, where the socio-demographic characteristics' influence on cash usage in general is analyzed. The next subsection provides the findings from Regression 3, Regression 4, and Regression 5. As the transaction size increases, the socio-demographic characteristics' influence on cash usage is examined. The last subsection shows the socio-demographic characteristics' influence on the attitude towards the decrease of cash in the Swedish society derived in Regression 6.

8.1 Regression 1 and Regression 2

In Table 4 the results from Regression 1 and Regression 2 are presented. The first regression tests for having used cash overall, during the last 30 days, while the second regression focuses on the payment method used in the latest physical store purchase.

The results from the two regressions show that older people use cash significantly more often compared to younger people, keeping all else constant. The result is significant for both regressions for the age group 65-84 years compared to the base group, which is 18-24 years old. In the first regression, people aged 65-84 years old are 21.50 percentage points more likely to use cash compared to the reference group. In the second regression however, they are 5.42 percentage points more likely to use cash. The difference in the socio-demographic group age, hence the difference in percentage points, is larger in the first regression compared to the second regression. Furthermore, there is a significant difference for the age group 45-64 regarding the likeliness to have paid with cash during the last 30 days.

Regarding education, the first regression does not provide significant results. The correlation between education and cash usage is negative, where more highly educated people are less likely to use cash. However, it should be noted that as these results are not significant, the number could be coincidental. Nevertheless, the sign of correlation is in accordance with the findings from the second regression where results are significant. In the second regression the result significantly shows that people with a higher academic education are 7.37 percentage points less likely to have paid with cash at their latest store purchase compared to people that have not finished high school. Concerning income, the first regression does not give any significant results, and it does not provide a consistent story. It indicates that people with a higher income are more likely to pay with cash, although this could be purely coincidental. In the second regression the results are significant and the higher the level of income, the less likely to use cash. A person with high income is 4.93 percentage points less likely to pay with cash than a person with low income.

The socio-demographic characteristic region, that represents population density, does not provide a consistent story for the two regressions. In the first regression it is significantly found that people living in small towns and rural municipalities are 11.50 percentage points more likely to pay with cash, than people that live in large cities and in municipalities close to large cities are. In the second regression, no statistically significant results are found. However, the sign of the correlation is negative, implying that people that live in large cities and in municipalities close to large cities are more likely to pay with cash. Furthermore, gender appears to have a small influence on cash usage. The second regression presents, statistically significantly, that women are 4.26 percentage points less likely to use cash compared to men.

In regard to the control variable that controls for technical issues, no clear result is identified. Overall, the probability of cash usage increases as technical issues are experienced. It significantly shows that a person that has experienced technical issues 1-3 times a week are 29.50 percentage points more likely to pay with cash than a person that never has technical issues. Attitude, as a control variable, also has statistically significant results throughout. It illustrates that if a person has a positive attitude towards the decrease of cash in society, they are less likely to use cash compared to a person with a neutral attitude. The probabilities are 10.00 and 2.73 percentage points respectively for the two regressions. Having a negative attitude increases the possibility of using cash. The probabilities are 23.10 and 9.33 percentage points respectively for the two regressions. Thus, as both of these control variables have a significant impact on cash usage, it is important that they are included in order to isolate the effects of the socio-demographic variables.

To conclude, the results show that all socio-demographic characteristics have an independent effect on cash usage, which has several implications. To mention one, elderly people with higher income are less likely to pay with cash than elderly with low income. Another one is, among high income earners, highly educated people use cash to a lesser extent than people with a lower education.

Table 4: Multiple Linear Regressions: Regression 1 and Regression 2

	R1	**R2**
	Cash Usage	Cash Usage Store
Age25_44	0.0564	0.0271
	(0.0463)	(0.0256)
Age45_64	**0.149*** **	0.0248
	(0.0482)	(0.0258)
Age65_84	**0.215*** **	**0.0542** **
	(0.0487)	(0.0276)
HighSchoolEduc	-0.0602	0.0516
	(0.0454)	(0.0361)
AcademicEduc	-0.0624	**-0.0737** **
	(0.0455)	(0.0362)
MiddleIncome	0.0166	**-0.0358** *
	(0.0307)	(0.0206)
HighIncome	0.0053	**-0.0493** **
	(0.0413)	(0.0232)
RegionB	0.0029	-0.0036
	(0.0256)	(0.0142)
RegionC	**0.1150*** **	-0.0183
	(0.0294)	(0.0164)
Female	-0.0200	**-0.0426*** **
	(0.0229)	(0.0129)
TechDaily	**0.2950** **	0.0424
	(0.1340)	(0.1110)
TechWeekly	0.0525	0.0601
	(0.0626)	(0.0507)
TechMonthly	0.0181	-0.0110
	(0.0226)	(0.0120)
PositiveAttitude	**-0.1000*** **	**-0.0273** **
	(0.0294)	(0.0122)
NegativeAttitude	**0.2310*** **	**0.0933*** **
	(0.0303)	(0.0180)
Constant	0.3600***	0.1490***
	(0.0654)	(0.0411)
Goodness of Fit		
Number of Observations	1,814	1,814
F (15, 1798)	24.38	6.49
Prob > F	0.0000	0.0000
R-squared	0.1457	0.0752
Root MSE	0.46419	0.25862

Table 4: Regression output for multiple linear regressions models. Regression 1: Cash Usage as the dependent variable. Age, education, income, region, and female as the key independent variables. Regression 2: Cash Usage Store as the dependent variable. Age, education, income, region, and female as the key independent variables. Coefficients of all independent variables. Robust standard errors in the parentheses. Significance levels denoted ***=p<0.01, **=p<0.05, *=p<0.10.

8.2 Regression 3, Regression 4, and Regression 5

Table 5 presents the results from Regression 3, Regression 4, and Regression 5. These regressions test the influence of the socio-demographic characteristics on cash usage in physical store, during the last 30 days, for transaction sizes of: less than 100 Swedish kronor, between 100 and 500 Swedish kronor, and more than 500 Swedish kronor.

Firstly, the results show that the R^2 value is decreasing as the transaction size increases. As the size of the transaction increases, other factors than the variables used in the regressions could potentially explain why someone chooses to pay with cash. The results further presents that the coefficients for each independent variable, in almost all cases, have a diminishing correlation as the transaction size increases. This implies that the differences within the socio-demographic groups decrease as transaction size increases.

For both the third and fourth regression, differences in age appear to play a large role in the likeliness to pay with cash. The regressions illustrate that older people use cash significantly more often compared to younger people, keeping all else constant. This relationship is statistically significant. For transaction sizes of 100 Swedish kronor, people in the age group 65-84 are 18.10 percentage points more likely to pay with cash compared to people age 18-24, and people aged 45-64 are 6.01 percentage points more likely to use cash. For transaction sizes between 100 and 500 Swedish kronor, people that are 65-84 years old are 6.93 percentage points more likely to pay with cash. In Regression 5, no statistically significant results are noted.

Moreover, the results indicate that the higher the level of education, the lower the probability to pay with cash across all transaction sizes. Regression 3 statistically significantly shows that people with an academic education are 9.26 percentage points less likely to use cash compared to people that have not finished high school. While Regression 4 presents that people with an academic education are 7.33 percentage points less likely to use cash, and people with a high school education are 6.89 percentage points less likely to pay with cash than people that have not finished high school. The same sign of the relationship is identified for income, as when income level increases, cash usage decreases across all transaction sizes. Regression 4 displays that middle income earners are 3.64 percentage points less likely to use cash, while high income people are 4.36 percentage points less likely to use cash compared to low-income earners. These findings are statistically significant, whereas results from Regression 3 and 5 are significant at a 10% significance level.

In regard to region as a socio-demographic characteristic, no results are significant, and no consistent story is interpreted. The findings of the gender variable express that women are slightly less likely to pay with cash than men. The results are significant in the fourth regression, where women are 2.07 percentage points less likely to pay with cash compared to men. The same result is identified from Regression 5, however only significant at 10%.

No consistent story is found for the technical issues control variable. In general, the more technical issues people experience, the more likely people are to pay with cash across all categories of transaction size. As these results are not the focus of our research questions it is good that their effect is isolated. Furthermore, it significantly shows that attitude matters less for the likeliness to pay with cash as transaction size increases. The results also indicate that people with a negative attitude towards the cash decrease in the Swedish society are more likely to pay with cash than people with a neutral attitude, while people with a positive attitude towards the cash decrease of the Swedish society are less likely to pay with cash than people with a neutral attitude.

To conclude, the findings show that age, education, income, and gender as socio-demographic characteristics have an independent effect on cash usage. The results present that the higher the transaction size, the difference within each socio-demographic group decreases.

Table 5: Multiple Linear Regressions: Regression 3, Regression 4, and Regression 5

	R3	**R4**	**R5**
	Cash Usage 100	Cash Usage 100–500	Cash Usage 500
Age25_44	0.0243	0.0230	0.0079
	(0.0251)	(0.0174)	(0.0179)
Age45_64	**0.0601****	0.0256	0.0060
	(0.0271)	(0.0177)	(0.0174)
Age65_84	**0.1810*****	**0.0693*****	0.0024
	(0.0315)	(0.0206)	(0.0191)
HighSchoolEduc	-0.0590	**-0.0689****	-0.0245
	(0.0437)	(0.0337)	(0.0279)
AcademicEduc	**-0.0926****	**-0.0733****	-0.0342
	(0.0440)	(0.0340)	(0.0276)
MiddleIncome	-0.0242	**-0.0364****	-0.0239
	(0.0237)	(0.0170)	(0.0151)
HighIncome	**-0.0493***	**-0.0436****	**-0.0270***
	(0.0263)	(0.0179)	(0.0155)
RegionB	-0.0168	0.0123	0.0093
	(0.0155)	(0.0107)	(0.0094)
RegionC	0.0095	-0.0081	**-0.0158***
	(0.0201)	(0.0118)	(0.0093)
Female	-0.0226	**-0.0207****	**-0.0132***
	(0.0148)	(0.0102)	(0.0080)
TechDaily	0.1600	0.0792	0.0917
	(0.1470)	(0.1210)	(0.1130)
TechWeekly	**0.1360****	0.0464	0.0256
	(0.0615)	(0.0448)	(0.0365)
TechMonthly	-0.0038	**-0.0192****	-0.0113
	(0.0139)	(0.0090)	(0.0072)
PositiveAttitude	**-0.0370*****	**-0.0138***	-0.0105
	(0.0139)	(0.0081)	(0.0064)

NegativeAttitude	**0.142*** **	**0.0647*** **	**0.0475*** **
	(0.0217)	(0.0141)	(0.0119)
Constant	0.128***	0.108***	0.0678**
	(0.0473)	(0.0367)	(0.0305)
Goodness of Fit			
Number of Observations	1,727	1,798	1,637
F (15, 1711)	14.20		
F (15, 1782)		5.42	
F (15, 1621)			2.71
Prob > F	0.0000	0.0000	0.0004
R-squared	0.1613	0.0838	0.0472
Root MSE	0.29314	0.19706	0.15329

Table 5: Regression output for multiple linear regressions models. Regression 3: Cash Usage under 100 as the dependent variable. Age, education, income, region, and female as the key independent variables. Regression 4: Cash Usage over 100 and under 500 as the dependent variable. Age, education, income, region, and female as the key independent variables. Regression 6: Cash Usage over 500 as the dependent variable. Age, education, income, region, and female as the key independent variables. Coefficients of all independent variables. Robust standard errors in the parentheses. Significance levels denoted ***=p<0.01, **=p<0.05, *=p<0.10.

8.3 Regression 6

Table 6 presents the results from Regression 6. The sixth regression measures the correlation between the independent variables and individuals' attitude towards the cash decrease in the Swedish society. Attitude is therefore no longer used as a control variable and is rather used as the variable of interest.

The results from the regression show that older people are less likely to have a positive attitude towards the decrease of cash in the Swedish society compared to younger people. The results are statistically significant and display that people that are 25-44 years old are 22.10 percentage points less likely to have a positive attitude compared to the age group 18-24. For people that are 45-64 the difference is 32.50 percentage points, and the difference is 48.90 percentage points for people that are 65-84 years old.

Further, there are significant results in regard to education where people that have a higher education are more likely to have a positive attitude towards the cash decrease compared to people that have not finished high school. Where people with a higher academic education are 13.80 percentage points more likely to have a positive attitude. Income also has a significantly affect where people with higher income are more likely to have a positive attitude. People with a high income are 21.70 percentage points more likely than people with a low income to have a positive attitude.

Region significantly shows that if a person lives in a small town or a rural municipality, they are 8.21 percentage points less likely to have a positive attitude towards the cash decrease in the Swedish society compared to people living in large cities or municipalities close to large cities. The result does not indicate that attitude is affected by gender.

When evaluating the variable controlling for technical issues the result significantly shows that in general, people experiencing technical issues are less likely to have a positive attitude towards the cash decrease

compared to people that never experience technical issues. The results indicate that people experiencing technical issues 1-3 times a month are 43.50 percentage points less likely to have a positive attitude. We once again emphasize the importance of including technical issues as a control variable to ensure that this effect is not attributed or included in the socio-demographic variables of interest or in the error term.

To conclude, the findings illustrate that age, education, income, and region, as socio-demographic characteristics, have an independent effect on the attitude towards the decrease of cash in the Swedish society, which has various implications. To mention one, elderly people with higher income are more likely to have a positive attitude than elderly with low income. Another one is, among high income earners, highly educated people have a more positive attitude to a larger extent than people with a lower education.

Table 6: Multiple Linear Regression: Regression 6

	R6
	Positive Attitude
Age25_44	**-0.2210*** **
	(0.0514)
Age45_64	**-0.3250*** **
	(0.0529)
Age65_84	**-0.4890*** **
	(0.0520)
HighSchoolEduc	**0.0848***
	(0.0507)
AcademicEduc	**0.1380*** **
	(0.0511)
MiddleIncome	**0.0656***
	(0.0361)
HighIncome	**0.2170*** **
	(0.0457)
RegionB	-0.0082
	(0.0290)
RegionC	**-0.0821****
	(0.0336)
Female	0.0020
	(0.0261)
TechDaily	-0.1820
	(0.2200)
TechWeekly	**-0.4350*** **
	(0.0637)
TechMonthly	**-0.0987*** **
	(0.0258)
Constant	0.7340***
	(0.0647)
Goodness of Fit	
Number of Observations	1,383

F (13, 1369)	20.25
Prob > F	0.0000
R-squared	0.1336
Root MSE	0.466

Table 6: Regression output for multiple linear regression model. Regression 6: Attitude as the dependent variable. Age, education, income, region, and female as the key independent variables. Coefficients of all independent variables. Robust standard errors in the parentheses. Significance levels denoted ***=p<0.01, **=p<0.05, *=p<0.10.

9. Discussion

This section presents a discussion of our thesis' findings. Firstly, we interpret our findings, namely the observed relationship between cash usage, attitude, and the socio-demographic characteristics, and its implications. Secondly, we answer this thesis' research questions. Thirdly, there is a general discussion of the results and its wider applicability. Lastly, areas that can be subject for future research are presented.

9.1 Results Discussion

The findings of this thesis indicate that socio-demographic characteristics influence cash usage and the attitude towards the decrease of cash in the Swedish society. It is important to remember that it is the isolated effect, ceteris paribus, from these variables that is identified when applying the OLS method.

Age, education, income, region, and gender as socio-demographic characteristics influence cash usage in various ways. More explicitly, the independent variable age influences cash usage to a large extent. Where older people are more likely to use cash. Although age largely influences cash usage, there is a diminishing effect as transaction size increases, both for age as a variable in general, but also within the variable as the differences between the different age groups decreases. In addition to this, education and income significantly influence cash usage. The variables illustrate that the higher the education level or the higher the income level, the more likely to use cash. Even if region does not provide a consistent story in regard to how it affects cash usage, the result shows that people living in smaller towns and rural municipalities are more likely to use cash. Gender does not appear to largely influence cash usage behavior, nevertheless, the results consistently illustrate that women are less likely to pay with cash. The findings from the results further indicate that as the size of the transaction increases, other factors than the variables used in the regressions could potentially explain why someone chooses to pay with cash. Furthermore, various research papers have shown that transaction size itself is highly correlated with choice of payment method (Klee, 2008; Bouhdaoui & Bounie, 2012; von Kalckreuth, et al., 2014a; Arango, et al., 2015).

The socio-demographic characteristics, age, education, income, and region, influence attitude towards the decrease of cash in the Swedish society. However, gender does not correlate significantly with attitude. More specifically, the regressions present that older people are less likely to have a positive attitude towards the decrease of cash than younger people. Further, the findings illustrate that people with higher education or

higher income levels, are more likely to have a positive attitude towards the decrease of cash. People living in smaller towns or rural municipalities are less likely to have a positive attitude. Gender does not significantly influence the attitude.

9.2 Research Questions

The research questions of our thesis can now be answered. To answer the research question regarding what socio-demographic characteristics that influence people's cash usage in Sweden, we find that differences in age, education, income, region, and gender all affect cash usage. The findings are consistent across all regressions. In Regression 1, having paid with cash in the past 30 days, differences in age is the factor that has the biggest effect, followed by differences in population density, region. Narrowing the question to the likeliness to have used cash at the latest store purchase, Regression 2, differences in age is still one of the factors that have the largest influence. Followed by differences in education. Limiting the question even further, examining the role of transaction size, Regression 3, 4, and 5, we see that for low transactions differences in age continue to be an important factor explaining the likeliness to pay with cash. In addition to this, both differences in education and income affect cash usage. As transaction size increases, differences within education tend to be slightly larger than differences within age. Nonetheless, all factors show weaker correlations to cash usage as transaction size goes up. Across all regressions, gender does not have a large impact. To answer the second research question of what socio-demographic characteristics that influence people's attitude towards the decrease of cash in the Swedish society, age also has the largest influence. In addition, differences in income, education, and region affect the attitude. However, gender does not have an influence.

The results that this thesis presents are in line with the findings of previous research conducted with data from other Western developed countries than Sweden (Bagnall, et al., 2016; von Kalckreuth, et al., 2014a), and thus our initial hypotheses. With these findings, we are successfully able to answer the research questions and fulfill our purpose of investigating if and how the socio-demographic factors influence cash usage in Sweden, by studying both behavior and attitude. Our results can further be used for policy making and by the Commission of Inquiry FI 2020:12 when further examining the State's role on the payment market. As our results are statistically significant, it is possible to draw general conclusions from the findings, compared to the previous descriptive data published by Sveriges Riksbank (2020a). This allows for a wider applicability.

9.3 General Discussion

As presented in the discussion above, the differences in the socio-demographic characteristics, age, education, income, and region affect people's likeliness to use cash, as well as their attitude towards the cash decrease. Gender is also found to affect people's likeliness to use cash, although the difference in gender is small. Applying the results in a wider setting, we can identify potentially vulnerable groups if transitioning

to a cashless society. As we examine both the current payment behavior, and people's attitude towards cash as a payment instrument, we have a solid foundation for identifying the groups that might be hesitant to exclusively use digital payment methods over the option to pay with cash, in a potential future transition.

More explicitly the results provide a foundation as to what groups in society that need to be considered to secure a smooth development if deciding to transition towards a cashless society. These vulnerable groups are identified as older people, people that have not finished high school, that have a low income, and that live in small towns or rural municipalities. From a societal perspective, it is important to acknowledge all citizens if becoming a cashless society, to minimize the risk of increased polarization that can create dissatisfaction and distrust in the state (Levitsky & Ziblatt, 2018). Thus, when major shifts in society occur it is of utmost importance to not leave groups in the population behind.

When interpreting the results and more specifically, if targeting the vulnerable groups, it is important to keep in mind what the different socio-demographic factors explain. In addition, it is important to note that choice of payment method might not always be a conscious decision and can potentially be habitual (van der Horst & Matthijsen, 2013). However, there are conflicting views, and no consensus is reached regarding the irrationality of payment behavior (von Kalckreuth, et al., 2014a). Therefore, our results are more thoroughly examined as to what underlying factors within the socio-demographic characteristics that explain the choice of payment method and attitude towards the cash decrease.

Age is in this thesis measured as a number and it does not extensively explain the characteristics of that age. Age itself does not control for differences in expenditure patterns nor does it control for personal characteristics that come with a certain age (Bagnall, et al., 2016). For example, older consumers might purchase other services or products than younger consumers, or purchase items at different venues than younger consumers. It has further been found that the most prominent underlying factor that drives cash usage among older people is not habit, but rather that they have lower opportunity cost and lower income (von Kalckreuth, et al., 2014a). This is captured in the socio-demographic variable, income, and income has an independent effect in relation to age. It is identified that people with lower income are more likely to pay with cash. Age can also represent a difference in the ability to adapt and learn new things. For example, a young consumer, who is more used to today's technology might be more prone to adopt new ways to pay and eliminate their usage of cash, while the older generation have a higher threshold to adopt new digital payment instruments (Achord, et al., 2018; Arvidsson, 2019).

Moreover, income is also examined for the underlying explanations as to why a person with higher income uses less cash and has a more positive attitude towards the decrease of cash in society. This can partly be explained by the law of diminishing marginal utility and how it affects demand as earlier presented (Marshall, 2009). This affects choice of payment method as people with low income are likely to have a higher alternative cost for using a digital means of payment than people with higher income. Thus, they will continue to use cash, while people with high income transition into using digital alternative payment

methods. Consequently, people with low income might not feel positive towards the decrease of cash in society as this will imply higher costs for them. In addition, it has also been found that cash is used more extensively by people that face financial constraints in order to monitor expenditures. People that face financial constraints are likely to have a low income, which can explain why they use cash to a larger extent than people with high income (von Kalckreuth, et al., 2014b).

Region is in this thesis measured as population density and we find that people living in small towns and rural municipalities are more likely to use cash to a greater extent than people living in large cities and municipalities close to large cities. This can have many explanations. A report about payments in Sweden, that was published by Sveriges Riksbank (2019a; Sveriges Riksbank, 2019d), discusses the fact that in rural areas in Sweden it might not be as easy to use digital payment services as the wireless technology cannot always be counted upon. Thus, this would imply that in order to transition to a cashless society, it is of importance to ensure that everyone in Sweden has access to wireless technology that is sufficient. Technical issues are controlled for and are therefore excluded from the effect that region has on cash usage and attitude. However, wireless technology coverage is not controlled for and therefore remains as an underlying factor.

Furthermore, people living in the more rural areas generally adopt new innovations later (Lengyel, et al., 2020). At the same time, it is easier to get a hold of cash in big cities as the density of ATMs is higher (SOU 2018:42, 2018). However, we believe that this effect is ambiguous in accordance with Bagnall et al. (2016) as their findings show mixed evidence concerning ATM-density and its correlation with cash usage. A high ATM-density for a country did not show a significant negative correlation with low cash usage. Furthermore, Bankomat AB, which is the leading company in Sweden for cash management, has confirmed that this appears to be the case for Sweden as well (Bankomat, 2021). Although they identify that ATMs that are located in more populous areas are more frequently used, there does not appear to be a strong relationship between ATM-density and cash usage.

In regard to education, it is not only education itself that affects cash usage and attitude. Rather it is what comes with education for example personality traits such as curiosity that drives people to acquire a higher academic education in the first place. Further, the alternative cost of using cash can also matter, as people with higher education are more likely to have a lower alternative cost in regard to human capital, than people that have not finished high school. This implies that the higher the education, the less likely to pay with cash and the more likely to have a positive attitude towards the cash decrease in society.

9.4 Future Research

In this subsection, we present areas that can be subject for future research. First, we suggest that there are some methodological modifications that can be made. For example, we believe that the study could be improved by collecting data through constructed payment diaries as done previously by Bagnall et. al (2016)

and the European Central Bank (2020). Payment diaries reduce the risk of human error, as surveys rely on consumers' recall, while payment diaries continuously are filled out as purchases are made. Another methodological modification proposed is to collect data that can be used as continuous variables instead of only using dummy variables. Another possible modification that can be of value is to further investigate the factors that are omitted in this regression in regard to what explains the correlation between the socio-demographic variables, age, education, income, and population density, and cash usage and attitude. Thus, future research can be made on how to accommodate these vulnerable groups in society if choosing to transition towards a cashless society. As this is an ongoing everchanging social phenomenon and transition in society, we hope that more researchers continue this work as it is highly topical.

Writing this thesis during the Covid-19 pandemic, it is inevitable not to mention the effect that it potentially will have on payment behavior. The global population is becoming increasingly dependent on digital payment methods as it is both more convenient to pay electronically and as banknotes themselves increase the risk of being affected by the virus (European Central Bank, 2020). In Sweden, Bankomat AB has identified a decrease of cash withdrawal by 20% during 2020, compared to the steady annual decline of 10% during the past decade (Bankomat, 2021). A large part of the population that previously used cash has been required to change their choice of payment instrument. Further, Bankomat AB has identified that this decrease is a permanent pandemic effect. This calls for future research to focus on habitual changes, in this case originated from the Covid-19 pandemic, and its effect on payment behavior and attitude.

To conclude, it is important to also highlight what implications our findings have for future policy making. We stress the importance of realizing the complexity of consumers' payment behavior and emphasize the differences identified within each socio-demographic group in society that needs to be considered when formulating policies to change the existing system.

10. Conclusion

In this thesis the relationship between cash usage and socio-demographic characteristics has been analyzed, as well as the relationship between attitude and socio-demographic characteristics. The data set from Sveriges Riksbank that we use in the analysis consist of 2013 observations. The data set comprises data on cash usage in general, cash usage in physical stores, cash usage for different transaction sizes, attitude towards the decrease of cash in the Swedish society, as well as socio-demographic characteristics. An OLS method of multiple linear regression was conducted to answer the following research questions:

What socio-demographic characteristics influence people's cash usage in Sweden?

What socio-demographic characteristics influence people's attitude towards the decrease of cash in the Swedish society?

The results suggest that there are large differences in the socio-demographic variable age in regard to both cash usage and attitude. Nevertheless, there are also statistically significant differences found in the socio-demographic variables education, income, and region, where education and income show more frequently statistically significant differences. Differences in gender do not affect attitude and have a small influence on cash usage.

Our thesis contributes both to the ongoing investigation by the Commission of Inquiry FI 2020:12 on behalf of the Swedish Government, and the current state of knowledge in the payment behavior literature as well as the literature about attitude towards payment methods. To the investigation we provide further insights regarding what factors that influence choice of payment method in Sweden. We also identify what vulnerable groups that need to be accommodated by the state for a smooth transition to a cashless society to take place. To the existing literature we present further findings that differences in these socio-demographic variables play a large role in cash usage behavior and attitude. Moreover, we provide insights to the descriptive statistics that have previously been published by Sveriges Riksbank, by using the regressions to test whether the differences shown by the descriptive statistics are sustainable, statistically representative of the population.

Altogether, if or when a transition to a cashless society occurs it is important to acknowledge our findings as they provide useful insights. We believe that the kings of cash, who are older, less educated, have a lower income, and live in more sparsely populated areas are vulnerable as the payment market is in the midst of a digital transformation. These vulnerable groups require additional attention to ensure equal opportunities in a cashless society. We hope that our thesis inspires more research on how current payment behavior and attitude towards payment instruments can influence a potential transition to a cashless society and to examine the underlying factors constituting the kings of cash.

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Appendices

Appendix A: Data Set from Sveriges Riksbank 2020

List A1: Questions and Answer Options from Sveriges Riksbank's Survey "Svenska folkets betalningsvanor". English Translation in Italics.[1]

Return to **5.2 Overview of the Data set** (p. 19).

1. Vilka av följande betalsätt har du använt dig av (för privat bruk) under de senaste 30 dagarna?
   Which of the following payment methods have you used (for private usage) during the last 30 days?

   1. Kontanter
      Cash
   2. Bankkort - kort anslutet till konto där pengar dras direkt
      Debit card - card connected to an account where money is directly charged
   3. Kreditkort - kort med faktura varje månad
      Credit card - card with invoice every month
   4. Betalning med mobilappen Swish
      Payment by using the app Swish
   5. Andra betalappar än Swish t.ex. Apple Pay eller Samsung Pay
      Other payment apps than Swish, such as Apple Pay or Samsung Pay
   6. Betalning med sms (till exempel kommunaltrafik, rösta i TV, skänka pengar)
      Payment by text (for example public transport, voting in TV, donate money)
   7. Betalning/överföring via din Internetbank eller mobilbank
      Payment/transfer to your online bank or mobile bank
   8. Autogiro
      Direct debit
   9. Betalning/överföring via blankett som skickas på posten (t ex. privatgiro)
      Payment/transfer using a form that it sent through mail (e.g., privatgiro)
   10. Betalning av räkning med kontanter över disk, på bankkkontor eller annat ställe (via betalningsombud)
       Payment of bill with cash over the counter at a bank office or elsewhere (via a payment agent)
   11. Betalning med hjälp av Bitcoin eller annan kryptovaluta
       Payment by using Bitcoin or other crypto currency
   12. Inget av ovanstående
       None of the above

2. Hur betalade du vid ditt senaste köp i butik? (Gäller fysisk butik)
   How did you pay in your latest store purchase? (Physical store)

   1. Kontanter
      Cash
   2. Bankkort - kort anslutet till konto där pengar dras direkt
      Debit card - card connected to an account where money is directly charged
   3. Kreditkort - kort med faktura varje månad
      Credit card - card with invoice every month
   4. Betalning med mobilappen Swish
      Payment by using the app Swish
   5. Betalning med annan mobiltelefontjänst i butik (t.ex. genom att mobilen läser av en s.k. QRkod) (obs! avser ej Swish)
      Payment with another mobile phone service in store (e.g., through using the phone to read a QR-code) (Swish not included)
   6. Faktura
      Invoice
   7. Annat betalsätt nämligen:
      Other payment method:

[1] Data is in accordance with Stockholm School of Economics' GDPR policy.

3. För betalningar i butik under 100 kronor de senaste 30 dagarna, hur betalade du huvudsakligen? (Gäller fysisk butik)
   For payments in store for a value less than 100 Swedish kronor during the last 30 days, how did you mainly pay? (Physical store)

   1. Kontanter
      Cash
   2. Bankkort - kort anslutet till konto där pengar dras direkt
      Debit card - card connected to an account where money is directly charged
   3. Kreditkort - kort med faktura varje månad
      Credit card - card with invoice every month
   4. Betalning med mobilappen Swish
      Payment by using the app Swish
   5. Betalning med annan mobiltelefontjänst i butik (t.ex. genom att mobilen läser av en s.k. QRkod) (obs! avser ej Swish)
      Payment with another mobile phone service in store (e.g., through using the phone to read a QR-code) (Swish not included)
   6. Faktura
      Invoice
   7. Annat betalsätt nämligen:
      Other payment method:
   8. Har ej handlat för under 100 kronor den senaste månaden
      Have not participated in transactions for less than 100 Swedish kronor this past month

4. För betalningar i butik mellan 100 och 500 kronor de senaste 30 dagarna, hur betalade du huvudsakligen? (Gäller fysisk butik)
   For payments in store between 100 and 500 Swedish kronor during the last 30 days, how did you mainly pay? (Physical store)

   1. Kontanter
      Cash
   2. Bankkort - kort anslutet till konto där pengar dras direkt
      Debit card - card connected to an account where money is directly charged
   3. Kreditkort - kort med faktura varje månad
      Credit card - card with invoice every month
   4. Betalning med mobilappen Swish
      Payment by using the app Swish
   5. Betalning med annan mobiltelefontjänst i butik (t.ex. genom att mobilen läser av en s.k. QRkod) (obs! avser ej Swish)
      Payment with another mobile phone service in store (e.g., through using the phone to read a QR-code) (Swish not included)
   6. Faktura
      Invoice
   7. Annat betalsätt nämligen:
      Other payment method:
   8. Har ej handlat för mellan 100–500 kronor den senaste månaden
      Have not participated in transactions with a value of 100-500 Swedish kronor this past month

5. För betalningar i butik över 500 kronor de senaste 30 dagarna, hur betalade du huvudsakligen? (Gäller fysisk butik)
   For payments in store exceeding 500 Swedish kronor during the last 30 days, how did you mainly pay? (Physical store)

   1. Kontanter
      Cash
   2. Bankkort - kort anslutet till konto där pengar dras direkt
      Debit card - card connected to an account where money is directly charged
   3. Kreditkort - kort med faktura varje månad
      Credit card - card with invoice every month
   4. Betalning med mobilappen Swish
      Payment by using the app Swish
   5. Betalning med annan mobiltelefontjänst i butik (t.ex. genom att mobilen läser av en s.k. QRkod) (obs! avser ej Swish)
      Payment with another mobile phone service in store (e.g., through using the phone to read a QR-code) (Swish not included)
   6. Faktura
      Invoice

7. Annat betalsätt nämligen:
   Other payment method:
8. Har ej handlat för över 500 kronor den senaste månaden
   Have not purchased anything for more than 500 Swedish kronor this past month

6. Användningen av kontanter minskar alltmer. Har du en positiv eller negativ inställning till denna utveckling?
   The usage of cash is decreasing in Sweden. Do you have a positive or negative attitude towards this development?

   1. Mycket positiv
      Positive
   2. Ganska positiv
      Slightly positive
   3. Varken positiv eller negativ
      Neither positive nor negative
   4. Ganska negativ
      Slightly negative
   5. Mycket negativ
      Negative
   6. Har ingen uppfattning
      Have no opinion

7. Åldersgrupp
   Agegroug
   1. 18-24 år gammal
      18-24 years old
   2. 25-44 år gammal
      25-44 years old
   3. 45-64 år gammal
      45-64 years old
   4. 65-84 år gammal
      65-84 years old

8. Vilken är din högst avslutade utbildning?
   What is your highest completed level of education?
   1. Grundskola/folkskola
      Elementary School
   2. Gymnasiet
      High School
   3. Högskola/Universitet
      Higher Academic Degree
   4. Annan:
      Other:
   5. Vill ej uppge
      Do not want to disclose

9. Hur stor är din personliga månadsinkomst? Med inkomst menar vi inkomst före skatt. Studiemedel, hyresbidrag, pension m.m. räknas också som inkomst.
   What is your monthly personal income? With income we mean income before taxation. Study allowance, rent allowance, pension etc. is also included as income.
   1. Har ingen inkomst
      No Income
   2. Mindre än 8.000 kronor/månad
      Less than 8,000 Swedish kronor per month
   3. 8.000 – 9.999 kronor/månad
      8,000 - 9,999 Swedish kronor per month
   4. 10.000 – 11.999 kronor/månad
      10,000 - 11,999 Swedish kronor per month
   5. 12.000 – 13.999 kronor/månad
      12,000 - 13,999 Swedish kronor per month
   6. 14.000 – 16.499 kronor/månad
      14,000 - 16,499 Swedish kronor per month
   7. 16.500 – 18.999 kronor/månad

16,500 - 18,999 Swedish kronor per month

8. 19.000 – 21.999 kronor per månad
   19,000 - 21,999 Swedish kronor per month
9. 22.000 – 24.999 kronor per månad
   22,000 - 24,999 Swedish kronor per month
10. 25.000 – 29.499 kronor per månad
    25,000 - 29,499 Swedish kronor per month
11. 29.500 – 34.999 kronor per månad
    29,500 - 34,999 Swedish kronor per month
12. 35.000 – 41.999 kronor per månad
    35,000 - 41,999 Swedish kronor per month
13. 42.000 – 49.999 kronor per månad
    42,000 - 49,999 Swedish kronor per month
14. 50.000 – 64.999 kronor per månad
    50,000 - 64,999 Swedish kronor per month
15. 65.000 – 83.999 kronor per månad
    65,000 - 83,999 Swedish kronor per month
16. 84.000 kronor/månad eller mer
    84,000 Swedish kronor per month or more
17. Vill ej uppge
    Do not want to disclose

10. Kommunkod
    Den intervjuade fyller in sin kommunkod av de 290 kommunkoder.
    Interviewee fills in their municipal code out of the 290 municipal codes.

11. Hur ofta upplever du att det inte går att betala i en fysisk butik p.g.a. tekniska problem?
    1. En eller några gånger i veckan
       One or more times per month
    2. En till tre gånger i månaden
       One to three times per month
    3. Mer sällan än en gång i månaden
       Less frequent than one time per month
    4. Aldrig
       Never
    5. Vet ej
       Do not know

Table A2: Important Characteristics from the Data Set
Return to **5.2 Overview of the Data Set** (p. 20).

Characteristics	Percentage
Age	
18-24 years old	7.55%
25-44 years old	37.95%
45-64 years old	31.64%
65-84 years old	22.85%
Education	
Finished Elementary School	6.76%
Finished High School	36.46%
Higher Academic Education	54.35%
Other	2.43%
Monthly Income in Swedish kronor	
No Income	1.09%
< 8,000	2.43%
8,000 - 9,999	1.74%
10,000 - 11,999	4.42%
12,000 - 13, 999	3.33%
14,000 - 16,499	5.46%
16,500 - 18,999	3.68%
19,000 - 21,999	4.52%
22,000 - 24,999	4.77%
25,000 - 29,499	11.43%
29,500 - 34,999	16.59%
35,000 - 41,999	16.00%
42,000 - 49,999	8.25%
50,000 - 64,999	6.51%
65,000 - 83,999	2.43%
> 84,000	1.19%
Do not want to disclose	6.16%
Region	
0114 Upplands Väsby	0.25%
0115 Vallentuna	0.50%
0117 Österåker	0.45%
0120 Värmdö	0.30%
0123 Järfälla	1.09%
0125 Ekerö	0.20%
0126 Huddinge	0.70%
0127 Botkyrka	0.50%

0128 Salem	0.45%
0136 Haninge	0.50%
0138 Tyresö	0.75%
0139 Upplands-Bro	0.35%
0140 Nykvarn	0.05%
0160 Täby	0.84%
0162 Danderyd	0.35%
0163 Sollentuna	0.75%
0180 Stockholm	9.34%
0181 Södertälje	0.55%
0182 Nacka	0.70%
0183 Sundbyberg	0.20%
0184 Solna	1.19%
0186 Lidingö	0.55%
0187 Vaxholm	0.35%
0188 Norrtälje	0.75%
0191 Sigtuna	0.25%
0192 Nynäshamn	0.20%
0305 Håbo	0.25%
0319 Älvkarleby	0.05%
0330 Knivsta	0.10%
0331 Heby	0.05%
0360 Tierp	0.15%
0380 Uppsala	2.83%
0381 Enköping	0.55%
0382 Östhammar	0.15%
0428 Vingåker	0.05%
0461 Gnesta	0.25%
0480 Nyköping	0.75%
0481 Oxelösund	0.10%
0482 Flen	0.30%
0483 Katrineholm	0.40%
0484 Eskilstuna	0.70%
0486 Strängnäs	0.25%
0488 Trosa	0.15%
0509 Ödeshög	0.05%
0561 Åtvidaberg	0.10%
0562 Finspång	0.30%
0563 Valdemarsvik	0.15%
0580 Linköping	1.99%
0581 Norrköping	1.49%
0583 Motala	0.25%
0584 Vadstena	0.05%
0586 Mjölby	0.45%
0604 Aneby	0.10%
0617 Gnosjö	0.15%

0642 Mullsjö	0.10%
0643 Habo	0.05%
0662 Gislaved	0.15%
0665 Vaggeryd	0.30%
0680 Jönköping	1.29%
0682 Nässjö	0.40%
0683 Värnamo	0.25%
0684 Sävsjö	0.10%
0685 Vetlanda	0.30%
0686 Eksjö	0.15%
0687 Tranås	0.15%
0760 Uppvidinge	0.10%
0761 Lessebo	0.15%
0763 Tingsryd	0.15%
0764 Alvesta	0.20%
0765 Älmhult	0.05%
0767 Markaryd	0.10%
0780 Växjö	0.99%
0781 Ljungby	0.40%
0834 Torsås	0.05%
0840 Mörbylånga	0.20%
0860 Hultsfred	0.05%
0861 Mönsterås	0.25%
0862 Emmaboda	0.05%
0880 Kalmar	0.75%
0881 Nybro	0.15%
0882 Oskarshamn	0.05%
0883 Västervik	0.35%
0884 Vimmerby	0.20%
0885 Borgholm	0.15%
0980 Gotland	0.65%
1060 Olofström	0.10%
1080 Karlskrona	1.04%
1081 Ronneby	0.10%
1082 Karlshamn	0.35%
1083 Sölvesborg	0.05%
1214 Svalöv	0.05%
1230 Staffanstorp	0.15%
1231 Burlöv	0.10%
1233 Vellinge	0.20%
1256 Östra Göinge	0.10%
1257 Örkelljunga	0.15%
1260 Bjuv	0.10%
1261 Kävlinge	0.30%
1262 Lomma	0.10%
1263 Svedala	0.25%

1264 Skurup	0.05%
1266 Hörby	0.10%
1267 Höör	0.15%
1270 Tomelilla	0.10%
1273 Osby	0.05%
1275 Perstorp	0.05%
1276 Klippan	0.15%
1278 Båstad	0.10%
1280 Malmö	2.93%
1281 Lund	1.69%
1282 Landskrona	0.25%
1283 Helsingborg	1.49%
1284 Höganäs	0.50%
1285 Eslöv	0.40%
1286 Ystad	0.35%
1287 Trelleborg	0.60%
1290 Kristianstad	1.04%
1291 Simrishamn	0.20%
1292 Ängelholm	0.15%
1293 Hässleholm	0.55%
1315 Hylte	0.20%
1380 Halmstad	0.79%
1381 Laholm	0.30%
1382 Falkenberg	0.35%
1383 Varberg	0.99%
1384 Kungsbacka	0.60%
1401 Härryda	0.55%
1402 Partille	0.70%
1407 Öckerö	0.05%
1415 Stenungsund	0.40%
1419 Tjörn	0.15%
1421 Orust	0.20%
1427 Sotenäs	0.05%
1430 Munkedal	0.10%
1435 Tanum	0.05%
1438 Dals-Ed	0.05%
1440 Ale	0.20%
1441 Lerum	0.50%
1442 Vårgårda	0.10%
1443 Bollebygd	0.05%
1445 Essunga	0.05%
1446 Karlsborg	0.05%
1447 Gullspång	0.10%
1452 Tranemo	0.10%
1462 Lilla Edet	0.15%
1463 Mark	0.30%

1465 Svenljunga	0.05%
1470 Vara	0.20%
1471 Götene	0.10%
1472 Tibro	0.10%
1473 Töreboda	0.15%
1480 Göteborg	6.16%
1481 Mölndal	0.65%
1482 Kungälv	0.55%
1484 Lysekil	0.30%
1485 Uddevalla	0.15%
1486 Strömstad	0.05%
1487 Vänersborg	0.55%
1488 Trollhättan	0.40%
1489 Alingsås	0.40%
1490 Borås	0.84%
1491 Ulricehamn	0.30%
1492 Åmål	0.15%
1493 Mariestad	0.40%
1494 Lidköping	0.60%
1495 Skara	0.25%
1496 Skövde	0.20%
1497 Hjo	0.15%
1498 Tidaholm	0.15%
1499 Falköping	0.35%
1715 Kil	0.05%
1730 Eda	0.05%
1737 Torsby	0.05%
1761 Hammarö	0.10%
1762 Munkfors	0.05%
1764 Grums	0.20%
1765 Årjäng	0.10%
1766 Sunne	0.20%
1780 Karlstad	1.14%
1781 Kristinehamn	0.35%
1782 Filipstad	0.05%
1783 Hagfors	0.05%
1784 Arvika	0.55%
1785 Säffle	0.05%
1814 Lekeberg	0.25%
1860 Laxå	0.10%
1861 Hallsberg	0.10%
1880 Örebro	1.49%
1881 Kumla	0.40%
1883 Karlskoga	0.15%
1885 Lindesberg	0.25%
1904 Skinnskatteberg	0.05%

1960 Kungsör	0.05%
1961 Hallstahammar	0.15%
1980 Västerås	1.74%
1981 Sala	0.25%
1983 Köping	0.35%
1984 Arboga	0.05%
2021 Vansbro	0.05%
2023 Malung-Sälen	0.10%
2026 Gagnef	0.10%
2029 Leksand	0.20%
2039 Älvdalen	0.05%
2061 Smedjebacken	0.05%
2062 Mora	0.05%
2080 Falun	0.79%
2081 Borlänge	0.79%
2082 Säter	0.15%
2083 Hedemora	0.10%
2084 Avesta	0.10%
2085 Ludvika	0.20%
2104 Hofors	0.10%
2121 Ovanåker	0.10%
2132 Nordanstig	0.05%
2161 Ljusdal	0.10%
2180 Gävle	1.24%
2181 Sandviken	0.15%
2182 Söderhamn	0.15%
2183 Bollnäs	0.30%
2184 Hudiksvall	0.45%
2260 Ånge	0.05%
2262 Timrå	0.20%
2280 Härnösand	0.40%
2281 Sundsvall	1.14%
2282 Kramfors	0.10%
2283 Sollefteå	0.05%
2284 Örnsköldsvik	0.15%
2303 Ragunda	0.10%
2309 Krokom	0.25%
2313 Strömsund	0.10%
2321 Åre	0.20%
2326 Berg	0.05%
2380 Östersund	0.70%
2401 Nordmaling	0.10%
2403 Bjurholm	0.05%
2404 Vindeln	0.20%
2417 Norsjö	0.10%
2421 Storuman	0.05%

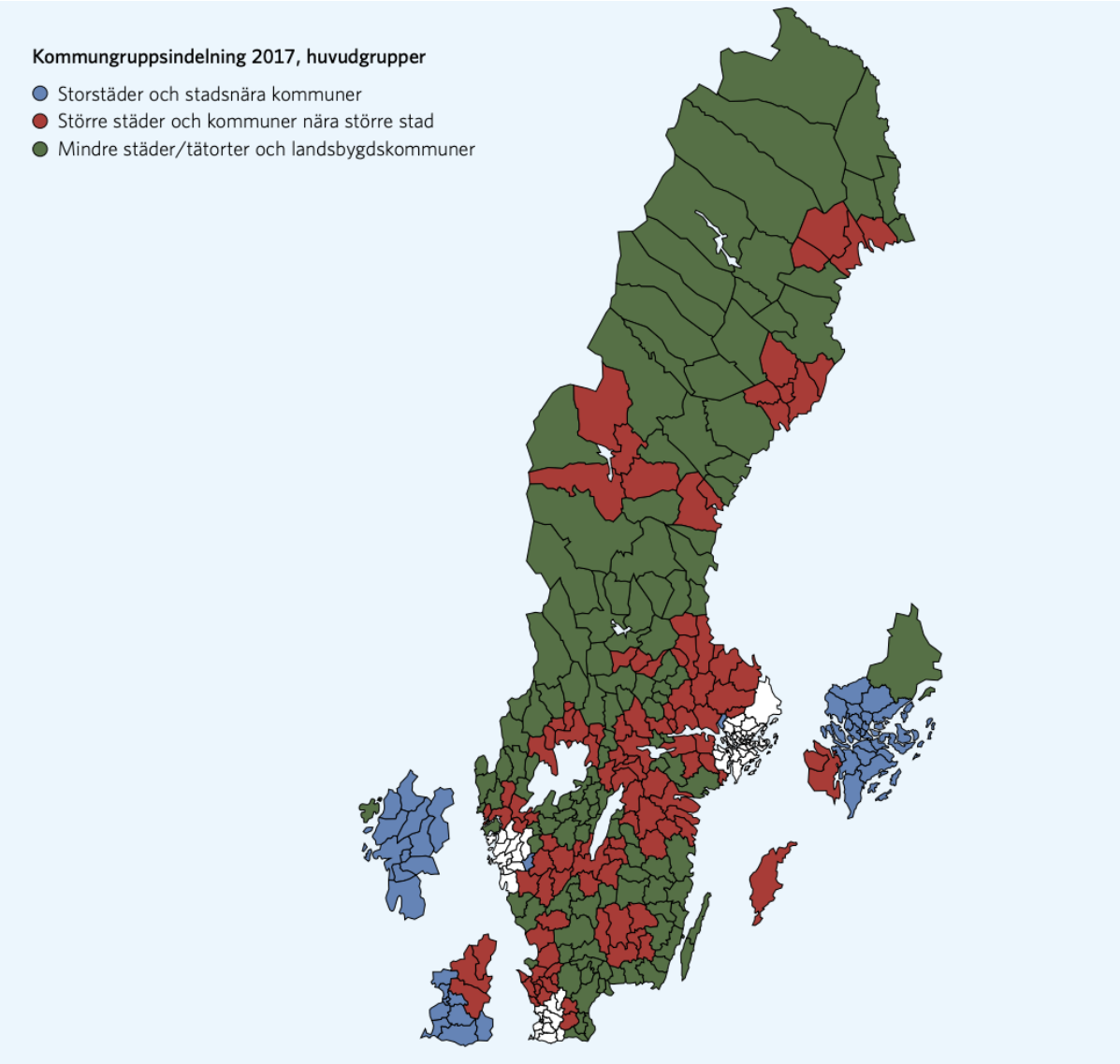
2422 Sorsele	0.10%
2462 Vilhelmina	0.05%
2480 Umeå	1.64%
2481 Lycksele	0.15%
2482 Skellefteå	0.65%
2505 Arvidsjaur	0.05%
2506 Arjeplog	0.05%
2514 Kalix	0.10%
2518 Övertorneå	0.05%
2521 Pajala	0.10%
2523 Gällivare	0.20%
2560 Älvsbyn	0.10%
2580 Luleå	0.75%
2581 Piteå	0.55%
2582 Boden	0.40%
2583 Haparanda	0.10%
2584 Kiruna	0.20%
Do not want to disclose	0.40%
Technical Issues	
One or more times per month	0.45%
One to three times per month	2.88%
Less frequent than one time per month	47.99%
Never	45.95%
Do not know	2.73%

Table A2: Important characteristics over the data set used from Sveriges Riksbank (2020).

Appendix B: Constructed Data Set

Map B1: Map over Sweden's Municipalities Divided into Three Overarching Regions.

Return to **6.2 Key Independent Variables** (p. 25).



Map B1: Map over the 290 municipalities in Sweden, divided into three overarching regions. The blue region is large cities and municipalities close to large cities. The red region is medium-sized town and municipalities near medium sized towns. The green region is smaller cities and rural municipalities.

Table B2: Classification of Swedish Municipalities

Return to **6.2 Key Independent Variables** (p. 25).

Region	Definition
A	
Larger cities	Municipalities with a population of at least 200 000 inhabitants with at least 200 000 inhabitants in the largest urban area.
Commuting municipalities near large cities	Municipalities where more than 40 % of the working population commute to work in a large city or municipality near a large city.
B	
Medium-sized towns	Municipalities with a population of at least 50 000 inhabitants with at least 40 000 inhabitants in the largest urban area.
Commuting municipalities near medium-sized towns	Municipalities where more than 40 % of the working population commute to work in a medium-sized town.
Commuting municipalities with a low commuting rate near medium-sized towns	Municipalities where less than 40 % of the working population commute to work in a medium-sized town.
C	
Small towns	Municipalities with a population of at least 15 000 inhabitants in the largest urban area.
Commuting municipalities near small towns	Municipalities where more than 30 % of the working population commute to work in a small town/ urban area or more than 30 % of the employed day population lives in another municipality.
Rural municipalities	Municipalities with a population of less than 15 000 inhabitants in the largest urban area, very low commuting rate (less than 30 %).
Rural municipalities with a visitor industry	Municipalities in rural area that fulfil at least two criteria for visitor industry, i.e., number of overnight stays, retail-, restaurant- or hotel turnover per head of population.

Table B2: Sweden's municipalities and the definition of the three different main regions, A, B, and C. The classifications are provided by the Swedish Association of Local Authorities and Regions (Sveriges Kommuner och Regioner).

Table B3: Table of the Dependent Variables, Independent Variables, and Control Variables.

Return to **6.5 Description of the Data** (p. 28).

Variable	Name	Description	Observations	Unit
Dependent Variables	*CashUsage*	Dummy variable that takes on the value 1 if the person used cash as a payment method during the last 30 days, and 0 otherwise.	2013	Binary
	CashUsageStore	Dummy variable that takes on the value 1 if the person used cash in their last store purchase, and 0 otherwise.	2013	Binary
	CashUsage100	Dummy variable that takes on the value 1 if the person used mainly cash for payments in store for a value of less than 100 Swedish kronor during the last 30 days, and 0 otherwise.	1904	Binary
	CashUsage100_500	Dummy variable that takes on the value 1 if the person used mainly cash for payments in store for a value between 100 and 500 Swedish kronor during the last 30 days, and 0 otherwise.	1989	Binary
	CashUsage500	Dummy variable that takes on the value 1 if the person used mainly cash for payments in store that exceeded 500 Swedish kronor during the last 30 days, and 0 otherwise.	1796	Binary
	PositiveAttitude	Dummy variable that takes on the value 1 if the person has a positive attitude towards the development of decreasing cash in the Swedish society, and 0 otherwise.	1510	Binary
Key Independent Variables	*Age18_24*	Dummy variable that takes on the value 1 if the person is between 18 and 24 years old, and 0 otherwise.	2013	Binary
	Age25_44	Dummy variable that takes on the value 1 if the person is between 25 and 44 years old, and 0 otherwise.	2013	Binary
	Age45_64	Dummy variable that takes on the value 1 if the person is between 45 and 64 years old, and 0 otherwise.	2013	Binary
	Age65_84	Dummy variable that takes on the value 1 if the person is between 65 and 84 years old, and 0 otherwise.	2013	Binary
	LowEduc	Dummy variable that takes on the value 1 if the person has not finished high school, and 0 otherwise.	2007	Binary
	HighSchoolEduc	Dummy variable that takes on the value 1 if the person has finished high school, and 0 otherwise.	2007	Binary
	AcademicEduc	Dummy variable that takes on the value 1 if the person has higher academic education, and 0 otherwise.	2007	Binary
	LowIncome	Dummy variable that takes on the value of 1 if the person has a lower income than 16,499 Swedish kronor, and 0 otherwise.	1889	Binary
	MiddleIncome	Dummy variable that takes on the value 1 if the person has a higher income than lower income than 16,500 Swedish kronor, but a lower income than 41,999 Swedish kronor, and 0 otherwise.	1889	Binary

	HighIncome	Dummy variable that takes on the value 1 if the person has a higher income than 42,000 Swedish kronor, and 0 otherwise.	1889	Binary
	RegionA	Dummy variable that takes on the value 1 if the person lives in a large city or in municipalities near large cities, and 0 otherwise.	2005	Binary
	RegionB	Dummy variable that takes on the value 1 if the person lives in a medium-sized town or in municipalities near medium-sized towns, and 0 otherwise.	2005	Binary
	RegionC	Dummy variable that takes on the value 1 if the person lives in a smaller town/urban area or in rural municipalities, and 0 otherwise.	2005	Binary
	Female	Dummy variable that takes on the value 1 if the person identifies as a female, and 0 otherwise.	2013	Binary
Control Variables	*TechDaily*	Dummy variable that takes on the value 1 if the person experiences technical issues one or more times per week, and 0 otherwise.	1958	Binary
	TechWeekly	Dummy variable that takes on the value 1 if the person experiences technical issues one or three times per month, and 0 otherwise.	1958	Binary
	TechMonthly	Dummy variable that takes on the value 1 if the person experiences technical issues less frequent than one time per month, and 0 otherwise.	1958	Binary
	TechNever	Dummy variable that takes on the value 1 if the person never experiences technical issues, and 0 otherwise.	1958	Binary
	PositiveAttitude	Dummy variable that takes on the value 1 if the person has a positive attitude to the decrease of cash in the Swedish society, and 0 otherwise.	1984	Binary
	NeutralAttitude	Dummy variable that takes on the value 1 if the person has a neutral attitude to the decrease of cash in the Swedish society, and 0 otherwise.	1984	Binary
	NegativeAttitude	Dummy variable that takes on the value 1 if the person has a negative attitude to the decrease of cash in the Swedish society, and 0 otherwise.	1984	Binary

Table B3: Questions from the data set from Sveriges Riksbank (2020), the constructed variables, the definitions of the dependent, key independent and control variables, as well as the number of observations and unit of these variables.

Appendix C: Estimation Outputs

Table C1: Variance Inflation Indicator

Return to **7.2 Gauss-Markov Theorem** (p. 32).

	R1			R2			R3	
Variable	VIF	Tolerance	Variable	VIF	Tolerance	Variable	VIF	Tolerance
Age25_44	4.45	0.22	Age25_44	4.45	0.22	Age25_44	4.37	0.23
Age45_64	4.32	0.23	Age45_64	4.32	0.23	Age45_64	4.20	0.24
Age65_84	3.45	0.29	Age65_84	3.45	0.29	Age65_84	3.26	0.31
HighSchoolEduc	4.44	0.23	HighSchoolEduc	4.44	0.23	HighSchoolEduc	4.57	0.22
AcademicEduc	4.77	0.21	AcademicEduc	4.77	0.21	AcademicEduc	4.90	0.20
MiddleIncome	1.95	0.51	MiddleIncome	1.95	0.51	MiddleIncome	1.98	0.51
HighIncome	2.19	0.46	HighIncome	2.19	0.46	HighIncome	2.21	0.45
RegionB	1.30	0.77	RegionB	1.30	0.77	RegionB	1.29	0.77
RegionC	1.32	0.76	RegionC	1.32	0.76	RegionC	1.31	0.76
Female	1.10	0.91	Female	1.10	0.91	Female	1.10	0.91
TechDaily	1.01	0.99	TechDaily	1.01	0.99	TechDaily	1.01	0.99
TechWeekly	1.06	0.95	TechWeekly	1.06	0.95	TechWeekly	1.06	0.94
TechMonthly	1.07	0.93	TechMonthly	1.07	0.93	TechMonthly	1.07	0.93
PositiveAttitude	1.64	0.61	PositiveAttitude	1.64	0.61	PositiveAttitude	1.64	0.61
NegativeAttitude	1.67	0.60	NegativeAttitude	1.67	0.60	NegativeAttitude	1.68	0.60

	R4			R5			R6	
Variable	VIF	Tolerance	Variable	VIF	Tolerance	Variable	VIF	Tolerance
Age25_44	4.49	0.22	Age25_44	4.80	0.21	Age25_44	4.38	0.23
Age45_64	4.36	0.23	Age45_64	4.65	0.22	Age45_64	4.25	0.24
Age65_84	3.47	0.29	Age65_84	3.55	0.28	Age65_84	3.28	0.30
HighSchoolEduc	4.47	0.22	HighSchoolEduc	4.93	0.20	HighSchoolEduc	4.36	0.23
AcademicEduc	4.79	0.21	AcademicEduc	5.24	0.19	AcademicEduc	4.63	0.22
MiddleIncome	1.95	0.51	MiddleIncome	2.09	0.48	MiddleIncome	1.95	0.51
HighIncome	2.20	0.46	HighIncome	2.34	0.43	HighIncome	2.17	0.46
RegionB	1.30	0.77	RegionB	1.29	0.78	RegionB	1.28	0.78
RegionC	1.32	0.76	RegionC	1.31	0.77	RegionC	1.30	0.77
Female	1.10	0.91	Female	1.11	0.90	Female	1.12	0.90
TechDaily	1.01	0.99	TechDaily	1.01	0.99	TechDaily	1.01	0.99
TechWeekly	1.06	0.95	TechWeekly	1.06	0.94	TechWeekly	1.04	0.96
TechMonthly	1.07	0.93	TechMonthly	1.07	0.93	TechMonthly	1.06	0.94
PositiveAttitude	1.64	0.61	PositiveAttitude	1.65	0.61			
NegativeAttitude	1.67	0.60	NegativeAttitude	1.68	0.60			

Table C1: Variance Inflation Factor for all independent variables. Multicollinearity test.