

E.N. Semerikova

Moscow School of Management SKOLKOVO, Odintsovsky District, Moscow Region,  
Russia

## Cashless payments beyond access: What influences the intensity of use?

**Abstract.** Reaching the finite level of access to financial services governments and financial institutions start redefining their goals towards further improvements in the consumers' well-being and the state's economy due to financial services. Cashless payments is one of the most prominent financial services that increases the benefits for all economy participants. Cashless instruments have recently become even more relevant due to the COVID-19 pandemic. The aim of this research is to determine which factors affect the share of cashless payments in consumer spending. The analysis uses a representative sample of 1600 Russian consumers collected in 2021. The results show that those who perceive cashless payment as more beneficial, are from the highest spending group, and have a card with a loyalty program are more likely to have a share of cashless payments in spending of more than 50%. The positive effect of the pandemic after controlling for benefits disappeared. From a practical point of view, the results of this work emphasize a benefit-based approach to stimulate the use of payment instruments, which can be used both within the product strategies of financial service providers and by the regulator in the development of measures to stimulate financial inclusion beyond access.

**Keywords:** *cashless payments; payment instruments; consumer payment choice; financial inclusion; financial access.*

JEL Classification: G21, G5.

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### 1. Introduction

The influence of financial services on the consumer's well-being was on the radar of academic research (Liu et al., 2021) and the regulators' agenda (Demirgüç-Kunt et al., 2021) for a while. Reaching the finite level of access, governments and financial institutions start redefining their goals towards further improvements in the consumers' well-being and the state's economy due to financial services. One of such directions of financial inclusion (access to financial services) beyond access is an increase of the portion of financial services in use, for instance frequency of financial services use that might occur for different controlled and 'organic' reasons: improved quality of financial services and client's experience, individual characteristics of users, and such external factors as environmental issues.

The share of cashless payments in monthly spending varies among consumers, even with equal access to payment infrastructure and quality products (Arango-Arango et al., 2018). The choice of payment method at checkout is influenced by a range of factors, including socio-demographic characteristics, and transaction characteristics (Crujisen, Horst, 2019). Recent external factors, as the COVID-19 pandemic, also impacted consumer payment behavior (Jonker et al., 2022). However, the consumer attitudes towards and perceived value from using cashless payment instruments are

not usually considered when it comes to the frequency and intensity of payment instrument use (Kerviler, Demoulin, Zidda, 2016).

This research aims to determine whether perceived benefits of cash and non-cash payment instruments explains the portion of cashless payments in consumer spending accounting for such external shock as pandemic. The analysis uses a representative sample of 1600 Russian consumers collected in a face-to-face survey in 2021. The probit-model results show that perception of benefits of cashless instruments positively relates to the share of cashless payments in spending being more than 50%. Such socio-demographic factors as being in the low-income group negatively relate to the share of cashless payment use, while being in the highest spending group has a positive coefficient. Unexpectedly, after controlling over benefits, the positive influence of the pandemics disappears.

This work contributes to the rising literature stream on the financial inclusion beyond access (Demirgüç-Kunt et al., 2021; Klühs, 2019), on the example of consumer use of cashless payments (Crujisen, Horst, 2019; Koulayev et al., 2016; Krivosheya, Korolev, 2016). In addition, it attempts to expand the literature on the effects of the COVID-19 pandemics on consumer payment behavior (Jonker et al., 2022; Greene, Merry, Stavins, 2021; Kotkowski, Polasik, 2021). This paper considers the Russian case, one of the leading countries in terms of innovative cashless payment instruments adoption in the world (Malhotra et al., 2019). Such analysis might benefit other developed and developing countries that face similar problems of consumers still choosing cash over cashless instruments, despite the availability of necessary infrastructure, increasing levels of access, and even health risks caused by the pandemics.

Following the introduction, Section 2 will provide the theoretical framework. Section 3 presents the methodology of the research. Section 4 provides the results and discussion. Finally, Section 5 discusses the theoretical and practical contributions, limitations and directions for further research and conclusions.

## 2. Theoretical framework

According to (Klühs, 2019, p. 2) financial inclusion is defined as “access to and use of formal financial services”. The number of banked customers changed largely for the past decades. Over the a decade from 2011 to 2021, the ownership of accounts worldwide surged by 50%, resulting in 76% of the adult population across the globe possessing one (Demirgüç-Kunt et al., 2021). However, for the past several years a new perspective on financial inclusion has become more relevant: focus on usage and quality of services (for in-depth discussion on the topic see (Klühs, 2019)). Studies conducted at the national level have indicated that improved financial inclusion is connected with factors such as greater financial literacy, more transparent legal regulations, and affordable banking services (Klühs, 2019). Moreover, (Klühs, 2019) finds that using a debit card in the last year is one of four factors that persistently positively related to financial inclusion.

In fact, payments are one of the most widely used financial services. However, the classic payment market system is quite complex as it involves various stakeholders, each incurring certain costs. Retail payments are “no free lunch” (Kosse, 2014; Schmiedel, Kostova, Ruttenberg, 2012). For example, the annual social costs of a retail payment system are estimated at 1–2% of GDP in European countries (Junius et al.,

2022). Even though in countries, where cashless infrastructure is readily available, there is still wide heterogeneity in consumer payment instrument choice from those who use only cash to those who use only smartphone payments (Arango-Arango et al., 2018; Semerikova, 2019, 2020). And there are multiple factors that might explain such heterogeneity.

### 2.1. Importance of payment benefits

The literature on cashless payments started to consider the benefits that provide different payment instruments. Ö. Bedre-Defolie and E. Calvano (Bedre-Defolie, Calvano, 2013) developed a theoretical model that distinguishes between fixed benefits and variable benefits for cardholders. Fixed benefits are those that do not change with the frequency of payment method in use and are primarily related to the decision to hold a payment method. These benefits include easier access to larger sums, speed of transactions, convenience, and universal acceptance (Schuh, Stavins, 2016; Semerikova, 2020). Variable benefits depend on the frequency of use and influence the decision to use a particular payment method. Examples of variable benefits include cashback, discounts, and other loyalty programs (Ching, Hayashi, 2010; Koulayev et al., 2016). The value of benefits plays a significant role in determining a consumer's decision, as they will only act if the benefits surpass a particular level (Koulayev et al., 2016; Krivosheya, 2020).

The above mentioned approach being theoretical and statistical in nature does not consider the consumer attitudes that showed to be relevant in consumer choice. (Kim, Chan, Gupta, 2007) highlight the importance of considering behavioral aspects in understanding consumer preferences and developed the Value adoption model focused on two types of perceived value or benefits: hedonic and utilitarian. Hedonic benefits are related to the enjoyment that consumers derive from owning and using payment instruments, while utilitarian benefits are related to their usefulness. (Kerviler, Demoulin, Zidda, 2016) used this model on the payments adoption case and showed that individuals evaluate certain properties of payment methods based on their characteristics and experience in the method, highlighting the perception and attitudinal aspect of consumer choice. (Semerikova, 2019, 2020) provided some evidence that consumers understand different types of benefits which in fact drive the payment instrument adoption.

**H1:** Perceived value (benefits) is positively related to the share of cashless payments.

### 2.2. External environment: pandemic specifics of regional development

There is some evidence, that the state of the external environment macro indicators might influence the choice of payment instruments (Krivosheya, 2020). The latest data on COVID-19's influence on consumer payment behavior (Table 1) showed that, in general, people have shifted towards cashless payments due to health concerns and lockdowns all over the world (Green, Merry, Stavins, 2021; Wisniewski et al., 2021; Jonker et al., 2022).

In Canada, a study by (Chen et al., 2020, 2021a, 2021b) showed that Canadian consumers reduced their use of cash at the POS in favor of debit and credit cards. However, these effects were partly temporary due increase in cash use after easing the

Table 1.

## COVID-19 related payment research

Authors	Methodology	Sample	Model	Payment instrument	Specifics
Chen et al., 2020, 2021a, 2021b	Cash Alternative Survey 2020	N= 4192 Canada	–	Aggregated cashless, cash	Frequency analysis showed temporary decrease in cash usage
Greene, Merry, Stavins, 2021	SCPC 2018–2020	N= 3,153 (2018) N= 2,238 (2019) N= 1,909 (2020) USA	Probit & tobit	Aggregated cashless instruments, aggregated paper-based instruments, cash	Pandemic shifted consumer payments from cash to digital p2p payments and from offline to online purchases
Guttman et al., 2021	RBA Online Banknotes Survey; RBA data 2020	– Australia	–	Aggregated cashless, cash	Frequency analysis showed temporary decrease in cash usage
Jonker et al., 2022	DNB/DPA Survey on Consumers' Payments 2018–2021	N= 125 651 payment transactions the Netherlands	Pooled binomial logit	Debit cards, cash	Pandemic accelerated the increased debit card use at the points of sale (POS), shifted payment preferences towards more contactless payments (especially among older generation)
Kotkowski, Polasik, 2021	Online survey (stratified random) 2020	22 European countries	Ordered logit	Aggregated cashless instruments, cash	Pandemic shifted payment behavior towards cashless. Extent of the shift varied across European countries, with those who heavily relied on cash being less likely to switch to cashless
Wisniewski et al., 2021	Online survey (stratified random) 2020	N= 5504 consumers, 22 European countries	Logit	Aggregated cashless instruments, cash	Perceived higher risk from infection positively influence current cashless payment use and future intentions

Source: summarized by the author.

lockdowns requirements. Similar trends were observed in Europe (Wisniewski et al., 2021; Kotkowski, Polasik, 2021) and Australia (Guttman et al., 2021). The authors (Wisniewski et al., 2021; Kotkowski, Polasik, 2021) examined payment behavior in 22 European countries and found that COVID-19 increased the probability to switch to cashless payments. The fear of infection contributed to its rise (Wisniewski et al., 2021). However, (Kotkowski, Polasik, 2021) found that the extent of the shift varied across European countries, with those who heavily relied on cash being less likely to switch to cashless options. In fact, those who used cashless payment instruments before the pandemic continued to do so during the pandemic while those who tended to use cash before – proceeded with their habitual behavior despite the health risks coming with cash usage. As a result, the gap between cash users and cashless users appears to have widened during the pandemic (Kotkowski, Polasik, 2021).

Therefore, there is some evidence that the COVID-19 pandemic impacted payment patterns in different countries, but the extent and duration of these changes vary.

**H2:** External environmental shock (e.g., pandemic) positively influences the share of cashless payments.

**H3:** Regional characteristics influence the portion of cashless payments.

### 2.3. Consistently relevant factors: socio-demographics & transaction characteristics

In the past, researchers focused on the transaction characteristics and socio-demographics of consumers. The availability of loyalty programs for the payments play a significant role (Ching, Hayashi, 2010; Krivosheya, 2020). In addition to this, the quality of the payment system also affects how smooth the transaction will go and the desire to frequently use corresponding payment method. Finally, most research have emphasized the significance of socio-demographic factors, e.g., age and income, in influencing consumer payment choices (Schuh, Stavins, 2016; Krivosheya, Korolev, 2016).

**H4:** Financial provider loyalty programs positively influences the share of cashless payments.

**H5:** Quality of the payment instrument provider positively influences the share of cashless payments.

**H6:** Socio-demographic factors influence the share of cashless payments.

## 3. Empirical set-up

### 3.1. Data

This research is based on data collected during a quantitative field study in January–February 2021 by the Centre for Research in Financial Technologies and Digital Economy of Moscow School of Management SKOLKOVO and the NAFI Research Center. The data was collected through a nationwide face-to-face survey of 1600 Russian adults aged 18 and above. The sampling technique used a three-stage probability sampling method with quotas based on such official socio-demographic indicators as sex, age, federal district, education level, as well as type of locality and sourced from the Federal State Statistics Service – Rosstat, to ensure sample representation. This survey examined consumer payment behavior in four types of merchants: offline (supermarkets, clothes and shoes, pharmacies), online, small kiosks, and cafes/restaurants. We consider only offline merchants (i.e., supermarkets, clothes and shoes, pharmacies) for this paper. There are several reasons for such a choice. First, the survey separates some questions into four types of merchants. However, the answers cannot be easily aggregated/averaged due to categorical types of questions and very dispersed behavior in different merchants. Second, 96% of respondents have visited an offline merchant at least once in the second half of 2020 despite the pandemic, according to this survey, while all other merchant types are visited much rarer: e-commerce – 33%, cafes, and restaurants – 39% and kiosks/markets – 51%. Therefore, we choose only offline merchants not to lose more than half of the sample.

### 3.2. Model

#### 3.2.1. Probit-model

Following (Semerikova, 2020)<sup>1</sup>, the probit-model is used to test the influence of benefits on the propensity to pay with cashless instruments and the intensity of cashless payments. We estimate the following model:

$$depth_i = \tilde{\alpha} + \tilde{\beta}P_i + \tilde{\gamma}SD_i + \tilde{\delta}B_i + \tilde{\nu}TC_i + \tilde{\omega}FD_i + \tilde{\varepsilon}(1),$$

<sup>1</sup> Most of the research on the subject e.g., (Schuh, Stavins, 2016), used the two-step Heckman model. However, in this work as in (Semerikova, 2020) after testing the necessity for two-step Heckman model the results showed that there was no difference between two-step Heckman and simple probit-model. Therefore, we used a probit-model for the estimation.

where  $depth_i$  – dependent variable is a dummy that takes the value of 1 if the portion of payments per month is more than 50% cashless and 0 otherwise;  $P_i$  – the pandemics influence;  $SD_i$  and  $TC_i$  – the vectors of socio-demographic and transaction related control variables, respectively;  $B_i$  – vector of benefits from cashless and cash payment instruments;  $FD_i$  – vector of regional dummies representing each federal district;  $\varepsilon$  – the vector of error terms. Other notations represent vectors of coefficients.

### 3.2.2. Choice of the dependent variable

The dependent variable is constructed based on the following question: *In a typical month for the past six months, what share of your spending was cashless?* The answers range from 0 to 10, where 0 means all spending was done in cash, while 10–100% of spending was cashless.

To minimize the influence of self-reported data, which may be affected by memory limitations and potential over- or underestimation of cashless payments in overall spending as well as cases with unavailable or non-working cashless payments infrastructure that prevented consumers from paying cashless<sup>2</sup>, we have chosen a 50% cutoff value to distinguish between individuals who predominantly use cash and those who primarily use cashless payments. This approach allows us to determine the preferred payment method more accurately for the majority of respondents, as it is generally easier for them to recall and estimate their predominant payment behavior. Thus, the 50% cutoff value appears to be the most suitable option in this situation (Rosenman, Tennekoon, Hill, 2011).

### 3.2.3. The pandemic influence measurement

One of the factors being examined in this situation is the impact of the pandemic. As the data was collected during the pandemic, it is likely that it has influenced consumer behavior in various ways, such as a shift towards online channels and payments due to hygiene issues, or social distancing requirements, or simply social attitudes towards this issue during the period which could have become entrenched in the consumer behavior (Greene, Merry, Stavins, 2021; Jonker et al., 2022).

We constructed a dummy variable based on the following question: *“Can you say that due to the pandemic, you have become more likely to pay cashless rather than in cash?”* The dummy equals 1 if a person answered «yes» and 0 if «no».

### 3.2.4. Benefits measurement

Previous research highlighted the significance of perceived value in the adoption of various payment instruments (Semerikova, 2019; Kerviler, Demoulin, Zidda, 2016). To assess the perceived benefits of cashless and cash payment methods, a dedicated section in the questionnaire measures these factors with questions that prompt respondents to indicate their level of agreement with the statements outlined in Table 2.

The statements are based on the findings from (Semerikova, 2019). We have chosen the most frequently mentioned benefits for this part thus omitting more detailed view presented in that paper.

We check the correlation among benefit variables and the results show that some of them are highly correlated. To address the issue of multicollinearity, we create a new variable called «cashless benefits sum,» which represents the total number of

<sup>2</sup> It is necessary to notice that by 2021 89% of small and medium business merchants accepted cashless payments (Moscow School of Management SKOLKOVO, 2021b).

**Table 2.**

## Benefits measurement

Variable	Answer
E-commerce access	I prefer cashless payments to cash as it gives access to purchasing goods and services over the Internet (including foreign online stores)
Speed	I prefer cashless payments to cash because it speeds up purchase
Financial	I prefer cashless payment to cash, as you can get cashback and other bonuses
Trust	I prefer cashless payment to cash as it is a more reliable payment method
P2P transfer	I prefer cashless payments to cash as you can transfer money to people and organizations remotely
Acceptance	I prefer cash to cashless payments as they are accepted everywhere
Anonymity	I prefer cash to cashless payments as this is an anonymous payment method
Spending control	I prefer cash to cashless payments as it's easier to control expenses this way
Hygiene	I prefer cashless payments to cash, as it is more hygienic

**Note.** Measurement: takes the value of 1, if a person absolutely agrees or mostly agrees with a statement, and 0, if a person mostly or absolutely disagrees with a statement.

*Source:* survey questionnaire.

benefits a person agrees to when it comes to cashless payments. This variable ranges from 0 to 6. Additionally, we create two dummy variables: one for individuals who find cashless payments very beneficial (5 or 6 mentioned benefits), and another for those who do not find cashless payments beneficial at all (0 mentioned benefits). The reference category for this analysis is respondents who agreed with 1 to 4 statements.

A similar procedure is carried out for the variable «cash benefits.» The new aggregated variable for this is also on a scale of 0 to 3. We then create two dummy variables based on this variable: one for individuals who find cash very beneficial (3 mentioned benefits), and another for those who do not find cash beneficial at all (0 mentioned benefits). The reference category for this analysis is individuals who agreed with statements 1 to 2.

These four dummy variables together form the first measure of benefits perception. The correlations between these four variables are all less than or equal to 0.5, as shown in Table 3.

**Table 3.**

## Correlation between constructed benefits dummies

Variable	Cash benefits	Zero cash benefits	Cashless benefits
Cash benefits			
Zero cash benefits	-0.51		
Cashless benefits	0.35	-0.06	
Zero cashless benefits	-0.04	-0.05	-0.52

*Source:* author's calculations.

The second benefits measurement is aimed at evaluating the overall perception of cashless and cash payments benefits. The following question was addressed to all respondents:

“For you personally, if we consider all the pros and cons of using cashless and cash payment methods, which payment method has more advantages?”

Based on this question, we constructed a dummy that equals 1, if a respondent considers cashless payments have more advantages than paying with cash and 0 otherwise.

### 3.2.5. Control variables

*Socio-demographic controls.* The survey includes information on various socio-demographic factors. Following (Schuh, Stavins, 2016) to account for age, income and spending patterns we use categorical variables, where each income, age and spending groups has a dummy variable that takes a value of 1 if the respondent belongs to that group (Table 4). The reference category for age is individuals aged 60 and above; for income – a group, where people can “afford clothes but not durables”; for spending – spending below 10 th. rubles per month. Gender is represented by a variable that takes a value of 1 for males and 0 – for females. Education level is indicated by a dummy variable that takes a value of 1 if the individual has higher education (at least a full undergraduate university degree) and 0 otherwise. Marital status is controlled for using a dummy variable that equals 1 if the individual lives with a long-term partner or is married, and 0 otherwise.

**Table 4.**

Descriptive statistics and meaning of the variables

Variable	Meaning	Mean	St. Dev.	Min	Max
Intensity	Makes 50% or larger share of cashless transactions at offline merchants: supermarkets, clothes, pharmacies	0.71	0.45	0	1
CFD	Lives in Central Federal District	0.27	0.44	0	1
SoFD	Lives in South Federal District	0.11	0.32	0	1
NCFD	Lives in North Caucasian Federal District	0.07	0.25	0	1
VFD	Lives in Volga Federal District	0.20	0.40	0	1
UFD	Lives in Ural Federal District	0.08	0.28	0	1
SFD	Lives in Siberian Federal District	0.13	0.33	0	1
FEFD	Lives in Far East Federal District	0.05	0.21	0	1
Moscow + St. Petersburg	Lives either in Moscow or St. Petersburg	0.12	0.33	0	1
Village	Lives in a locality with less than 10k inhabitants	0.25	0.44	0	1
1 mln	Lives in a locality with 1 million or more inhabitants	0.11	0.31	0	1
500 000	Lives in a locality with 500 000–1 million inhabitants	0.10	0.29	0	1
100 000	Lives in a locality with 100 000–500 000 inhabitants	0.19	0.39	0	1
50 000	Lives in a locality with 50 000–100 000 inhabitants	0.06	0.24	0	1
18–24 years	Age 18–24 years	0.09	0.28	0	1
25–34 years	Age 25–34 years	0.20	0.40	0	1

Table 4. End

Variable	Meaning	Mean	St. Dev.	Min	Max
35–44 years	Age 35–44 years	0.19	0.39	0	1
45–59 years	Age 45–59 years	0.26	0.44	0	1
Higher education	Complete university education	0.29	0.45	0	1
Gender	Gender	0.45	0.50	0	1
Married	Marital status – “Married / In a open marriage”	0.59	0.49	0	1
Very low income	A respondent’s self-reported financial situation is “We’re hardly making ends meet. Not enough money even for groceries”	0.07	0.25	0	1
Low income	A respondent’s self-reported financial situation is “There is money for groceries but buying clothes is difficult”	0.20	0.40	0	1
High income	A respondent’s self-reported financial situation is “We can easily buy a refrigerator, TV, furniture, but I cannot afford a car” or “We can afford almost everything: a car, an apartment, a country house and much more”	0.23	0.42	0	1
Spending 10 000–15 000 roubles	Average monthly spending at offline merchants is between 10 000–15 000 roubles	0.23	0.42	0	1
Spending 15 000–20 000 roubles	Average monthly spending at offline merchants is between 15 000–20 000 roubles	0.13	0.34	0	1
Spending 20 000–25 000 roubles	Average monthly spending at offline merchants is between 20 000–25 000 roubles	0.08	0.28	0	1
Spending 25 000 roubles	Average monthly spending at offline merchants is 25 000 roubles or more	0.09	0.29	0	1
Credit card	A respondent owns either a credit or an installment payment card	0.20	0.40	0	1
Top four banks	A respondent’s main card is issued by one of the top four Russian banks: Sber, VTB, Alfa-bank, Tinkoff (now – T-bank)	0.79	0.40	0	1
MIR card	A respondent’s main card’s payment system is MIR	0.38	0.48	0	1
Premium status	A respondent’s main card has a premium status	0.05	0.22	0	1
Personal initiative	A respondent was an initiator for opening the most used card	0.66	0.47	0	1
Loyalty program	There is a loyalty program for using the card	0.47	0.50	0	1
Pandemic	A respondent agrees that pandemic made them pay more cashless	0.35	0.48	0	1
Cashless more beneficial	A respondent considers cashless payments more beneficial than cash	0.45	0.50	0	1
Cash benefits	A respondent perceives the following benefits: Acceptance, Anonymity, Spending control	0.32	0.47	0	1
Zero cash benefits	A respondent does not perceive any benefits mentioned in Cash benefits	0.35	0.48	0	1
Cashless benefits	A respondent perceives 5 or 6 of the following benefits: Speed, Financial, Trust, P2P transfer, E-commerce access, Hygiene	0.49	0.50	0	1
Zero cashless benefits	A respondent does not perceive any of the benefits mentioned in Cashless benefits	0.22	0.42	0	1

Source: author’s calculation.

*Initiative to open the card.* When it comes to cashless payment instruments and their characteristics, we consider individual usage patterns and transaction characteristics. Russia stands out as a unique market for innovative and cashless payments (Malhotra et al., 2019). Salary projects and state initiatives made it possible for employers to pay salaries and for government bodies to provide social transfers in a cashless form. This peculiarity has not been studied before in the existing literature, while this factor has been relevant for some emerging countries where such stimulation measures exist (e.g., India, Nigeria). Therefore, to control for this we construct a dummy that takes the value of 1, *if the initiator of the most used card issuance was a respondent*. The reference category is a card opened by the government for social transfers (e.g., stipend, pension, and other benefits) or the employer as part of a salary project.

*Regional characteristics.* To account for disparities in the usage of cashless payment methods, particularly in more technologically advanced regions, we include regional dummy variables for each federal district in Russia: Central, South, North Caucasian, Volga, Ural, Siberian, and Far East. The Far West district is used as the reference category.

*Loyalty programs.* Banks in Russia do not have permanent regulations on interchange fees, so they have actively implemented loyalty programs that offer cashbacks, discounts, or higher interest rates on deposits or savings accounts, making the financial benefits more apparent to consumers (Krivosheya, Korolev, 2016). According to the Bank of Russia research, 27% of consumers choose card payments due to loyalty programs (Bank of Russia, 2022). Previous research showed that the removal of loyalty programs can cause people to change their payment behavior, for example switching from cashless to cash payments (Ching, Hayashi, 2010). That's why we specifically focus on whether respondents participate in loyalty programs offered by financial providers. It is also necessary to mention that during the COVID-19 pandemic there were some temporary regulations of the interchange fee that might have influenced the loyalty programs. However, according to the data only 5% of Russians have noticed certain negative changes; other 95% either have not noticed any change or enjoyed better conditions (Moscow School of Management SKOLKOVO, 2021a). Therefore, we do not take this change as being relevant. Additionally, international and national payment systems offer different types of cards and loyalty programs (Moscow School of Management SKOLKOVO, 2021a), including classic and premium cards with varying services. Especially 'MIR' card that in 2021 offered tourist and transport cashback. Therefore, we control for the brand, status, and presence of loyalty programs on the respondent's card (Ching, Hayashi, 2010). We create three dummies: first equals 1, if respondent's card is of National payment system MIR; second – if person owns a card with premium status and third – if the respondent's main card has loyalty program, and 0 – otherwise.

*Credit card.* In Russia there is a bias towards preferences of debit cards since credit cards are associated with living in debt (Semerikova, 2019). However, credit card holders' behavior tends to differ from debit card holders (Schuh, Stavins, 2016). Therefore, we look at *the type of a card a person considers the main one, i.e. uses for the most of the purchases*. We construct a dummy variable that equals 1 if a person uses either a credit or an installment card for most of the purchases and 0, if a respondent prefers debit or prepaid card.

*Quality of financial services.* In recent years, Russian banks have transitioned from traditional financial institutions to data-driven technological companies, developing extensive ecosystems of products and services that offer clients a modernized experience (Bank of Russia, 2021). To assess the *quality of financial services*, we utilize a dummy variable. This variable is assigned a value of 1 for clients whose primary card is issued by one of the four ecosystem banks (Sber, Alfa-bank, VTB, or Tinkoff (now – T-bank) (Bank of Russia, 2021), and 0 for clients whose primary card is issued by other financial providers.

Table 4 provides descriptive statistics of the main variables used in the analysis. Correlation coefficients show no evidence of multicollinearity as the correlations do not exceed 50% for the variables used in the model specifications simultaneously<sup>3</sup>.

Some stylized facts about the state of the market in 2021 are the following. There have been 87% of cardholders in Russia. 41% of Russian consumers will be unsatisfied if cash becomes unavailable, while only 26% will be unsatisfied if cashless payments become unavailable.

## 4. Results and discussion

### 4.1. Probit-model results

We ran several probit-regression models. Table 5 presents the results for the major model specifications. The first model considers all the variables except for the benefits measurements.

**Table 5.**  
Model specifications

Variables	Intensity		
Moscow + St. Petersburg	0.247 (0.179)	0.289 (0.184)	0.277 (0.202)
Village	0.111 (0.141)	0.168 (0.147)	0.159 (0.165)
1mln	0.174 (0.176)	0.222 (0.182)	0.0809 (0.208)
500 000 roubles	0.0156 (0.177)	0.0355 (0.181)	0.0541 (0.195)
100 000 roubles	-0.0283 (0.145)	-0.0325 (0.149)	0.0271 (0.159)
50 000 roubles	0.552** (0.225)	0.588*** (0.224)	0.414 (0.259)
18–24 years	0.431** (0.191)	0.287 (0.199)	0.158 (0.219)
25–34 years	0.0734 (0.140)	0.0018 (0.145)	0.0129 (0.161)
35–44 years	0.194 (0.141)	0.143 (0.145)	0.00955 (0.164)
45–59 years	0.0647 (0.128)	0.00721 (0.132)	0.0988 (0.152)

<sup>3</sup> Full correlation Table is available at request.

Table 5. Continuation

Variables	Intensity		
Higher education	0.180* (0.101)	0.121 (0.103)	0.0335 (0.112)
Gender	-0.0521 (0.0901)	-0.0824 (0.0923)	-0.0578 (0.102)
Married	-0.113 (0.0952)	-0.0745 (0.0967)	-0.159 (0.107)
Very low income	-0.782*** (0.204)	-0.685*** (0.207)	-0.345 (0.237)
Low income	-0.427*** (0.119)	-0.371*** (0.123)	-0.420*** (0.136)
High income	0.0138 (0.111)	0.0373 (0.114)	-0.110 (0.124)
Spending 10 000–15 000 roubles	-0.0559 (0.110)	-0.0277 (0.113)	-0.0363 (0.129)
Spending 15 000–20 000 roubles	-0.0710 (0.135)	-0.103 (0.136)	-0.0684 (0.144)
Spending 20 000–25 000 roubles	0.0917 (0.159)	0.0058 (0.160)	0.0214 (0.169)
Spending 25 000 roubles	0.472*** (0.175)	0.509*** (0.180)	0.487** (0.190)
CFD	0.0213 (0.165)	0.0099 (0.171)	0.0258 (0.204)
SoFD	-0.182 (0.203)	-0.173 (0.210)	-0.129 (0.248)
NCFD	-0.497** (0.217)	-0.403* (0.224)	-0.395 (0.256)
VFD	0.109 (0.191)	0.124 (0.199)	0.0286 (0.239)
UFD	-0.127 (0.227)	-0.128 (0.228)	-0.124 (0.266)
SFD	-0.0390 (0.201)	-0.0430 (0.208)	-0.0127 (0.247)
FEFD	0.109 (0.287)	0.192 (0.286)	-0.173 (0.322)
Pandemic	0.305*** (0.0943)	0.135 (0.0978)	0.111 (0.111)
Personal initiative	-0.0554 (0.0958)	-0.0707 (0.0962)	-0.003 (0.108)
Credit card	0.122 (0.113)	0.144 (0.114)	0.0305 (0.128)
Top four issuer	0.170 (0.166)	0.122 (0.169)	0.140 (0.200)
'MIR' card	-0.0790 (0.0967)	-0.0681 (0.100)	-0.0706 (0.112)

Table 5. End

Variables	Intensity		
Premium status	-0.213 (0.172)	-0.221 (0.180)	-0.345* (0.189)
Loyalty program	0.446*** (0.0919)	0.355*** (0.0941)	0.267** (0.107)
Cashless more beneficial		0.621*** (0.0964)	
Zero benefits cash			0.600*** (0.148)
Cash benefits			-0.352*** (0.110)
Zero benefits cashless			-0.684*** (0.184)
Cashless benefits			0.400*** (0.109)
Constant	0.184 (0.288)	0.0412 (0.298)	0.346 (0.341)
Observations	1,094	1,088	955

**Note.** Robust standard errors in parentheses \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.1$ .

*Source:* author's calculations.

Notably, the pandemic, youngest age range, and having higher education in this specification have a positive and significant coefficient. However, after adding different measurements of benefits into specifications 2 and 3, the significance of pandemic disappears. The H2 is not supported. Models 2 and 3 have expected signs for the benefits coefficient supporting H1.

In specification 2, those who consider cashless as more beneficial than cash are likely to pay more than 50% cashless, with the marginal effect (ME) of 0.1896 (Table 6).

Table 6.

Marginal effects for benefits in specification (2) and (3)<sup>4</sup>

Marginal effects after probit (Specification 2)							
$y = \text{Pr}(\text{intensity}) (\text{predict}) = 0.77147844$							
Variable	dy/dx	Std. Err.	z	$P >  z $	[95% C.I.]		X
Cashless more beneficial	0.18963	0.0294	6.46	0.000	0.1321	0.2472	0.5377
(*) dy/dx is for discrete change of dummy variable from 0 to 1							
Marginal effects after probit (Specification 3)							
$y = \text{Pr}(\text{intensity}) (\text{predict}) = 0.78439209$							
Variable	dy/dx	Std. Err.	z	$P >  z $	[95% C.I.]		X
Cash benefits	-0.1073	0.0347	-3.09	0.234	-0.0318	0.1302	0.2335
Zero benefits cashless	-0.2376	0.0712	-3.34	0.190	-0.0311	0.1567	0.1158
Cashless benefits	0.1206	0.0335	3.60	0.843	-0.0946	0.1159	0.1002
(*) dy/dx is for discrete change of dummy variable from 0 to 1							

*Source:* author's calculations.

<sup>4</sup> The detailed tables on marginal effects are available at request.

In specification 3, those who do not see any benefits in cashless payments or agreed to statements about cash benefits are less likely to pay more than 50% cashless. The marginal effects in this case, are  $-0.10732$  and  $-0.2375$ , respectively. On the contrary, those who see all or almost all the benefits in cashless payments and none in cash will be more likely to use cashless instruments for most of their spending (the likelihood increases by  $0.1206$  and  $0.156$ , respectively).

Other variables that keep their significant positive sign in all three specifications are loyalty programs (supporting H4) and spending above 25 000 rubles together with the significant negative sign for low-income consumers (supporting H6). Models 1 and 2 also show a highly significant and negative coefficient of being in a very low-income group and a highly significant and positive coefficient of living in the locality with 50 thousand inhabitants. However, the significance disappears in model 3. This might happen for several reasons. First, there is a decrease in observations by 12% (from 1018 to 955). Second, the perception of benefits of cashless and cash instruments are considered for proponents of either one or the other that might be better explanatory variables than cashless instruments preference. The federal district variables do not show any significance in models 2 and 3, except for the weak significance of the North Caucasian Federal District showing lack of support for H3. Additionally, neither of the models provides any evidence for the significance of the quality of the financial provider, indicating no support for H5.

#### 4.2. Discussion

Analyzing the results, it is interesting to note that the significance of the pandemic in explaining the share of cashless spending perceived by consumers diminishes after adding variables related to benefits. This could be partially explained by how the dependent variable was measured. It is possible that some consumers shifted from using cashless instruments for less than 50% of their spending to more than 50% due to pandemic. This aligns with existing evidence on the pandemic influence (Kotkowski, Polasik, 2021). Those who were already using cashless for more than 50% of their transactions may have further increased their share of cashless payments. However, a limitation of the presented models is that they only capture movement from less than 50% to more than 50% cashless and do not account for movement within the groups. It is worth mentioning that during the survey period, there were no lockdowns or severe restrictions for offline merchants. Therefore, it is possible that cash users continued or returned to their habitual behavior of using cash.

From a perspective of benefits, the results align with previous research on adoption levels (Semerikova, 2020; Kerviler, Demoulin, Zidda, 2016) and are intuitive. People who perceive various benefits of cashless instruments are more likely to use them for payments. Those who perceive more benefits are also more likely to increase their usage intensity. Nonetheless, it's important to acknowledge that there is still a segment of consumers who fail to grasp or perceive the widely accepted benefits as advantageous to them.

Considering socio-demographics, income continues to play a significant role. Individuals from very low-income groups are more likely to belong to the segment that predominantly uses cash for payments, whereas those belonging to the highest spend-

ing group tend to prefer cashless payment methods. However, despite income, overall, the use of cashless instruments in Russia is relatively homogeneous.

Regarding card characteristics, it is expected that the presence of a loyalty program is a significant factor in the share of cashless spending. Russian consumers enjoy bonuses and cashback, and the proliferation of loyalty programs in the market further encourages engagement with such offerings (Semerikova, 2019). Many banks were transformed into ecosystems (Bank of Russia, 2021), incentivizing their customers through cashless payments and discounts to use their ecosystem products.

## 5. Conclusions

In this study, we aim to explain the choices consumers make when it comes to using cashless payment methods for most of their expenses, based on quantitative data collected from 1600 Russian consumers in 2021. While some research examined the benefits of adopting different payment instruments, our findings highlight the need for further investigation into the significance of these benefits in influencing consumer behavior in the retail payments market.

This study contributes to the extended research on financial inclusion beyond access (Klühs, 2019; Demirgüç-Kunt et al., 2021) on the example of cashless payments (Crujnsen, Horst, 2019; Koulayev et al., 2016; Mukhopadhyay, 2016) and specifically Russian case (Krivosheya, Korolev, 2016; Semerikova, 2019, 2020). This work implies that the measurement of benefits (Kerviler, Demoulin, Zidda, 2016; Krivosheya, 2020) becomes an important part in prediction of the cashless payments' frequency use. Accounting for benefits might improve the forecasting of payment instrument preferences in different circumstances, especially rapidly changing environment and external shocks providing a deeper understanding of societal shifts towards financial technology use.

As for practical implications, financial services providers can use the benefits approach to reassess the element of their product strategies by defining key functional and emotion-evoking attributes of the proposed payment instruments and related products to arrive at more personalized financial services. This is especially important to the ecosystem businesses where payments have become the key data provider and serve as a connecting link providing a seamless and rewarding customer experience.

This research is also relevant in the context of the increased number of central banks based financial innovations (e.g., central bank digital currencies) within their financial inclusion and financial system development strategies, e.g., in China or Russia. Accounting for benefits might help define strategies that will prompt consumers to shift from banking cards and cash to the new payment method. The context of the Russian payments market, which is one of the global leaders in terms of financial innovations, may be helpful for other countries, which aim to foster the dissemination of payments innovations.

This work is not free from limitations. First, the quantitative research analysis uses the self-reported data, which might be biased due to memory limitations of a respondent, especially when it comes to the evaluation of the share of transactions. In addition, there is no unified approach to measure payment instrument benefits. It is important to note that due to the limited number of questions on benefits available in the questionnaire, this research did not consider certain issues related to

cashless payments, such as the increase in fraudulent activities or the dependence on internet availability for merchants in particular Russian regions. However, to partially address this limitation, this study used the aggregated measurements of benefits in the model, rendering such granularity less relevant. One of the main directions for further research is to examine better measurements of the intensity of cashless payment and more detailed benefit measurements.

Second is the aggregation of the cashless payment instruments considering construction of the questionnaire. The choice of payment instruments is no longer binary with respect to cashless payments and cash-based payments. It might be a fruitful research idea to compare specific payment instrument choice from the bundle and how benefits influence a bundle formation. Third, certain regional and infrastructure specifics, e.g., spread of cashless payment infrastructure among merchants or possibility to pay with cashless payments most of the time, might be included in further research. Finally, further research will benefit from assessing longer-term pandemic's influence and analyzing cross-country differences in consumer payment behavior.

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**Е.Н. Семерикова**

Московская школа управления СКОЛКОВО, деревня Сколково, Одинцовский район, Московская обл.

## **Безналичные платежи за пределами доступности: что влияет на частоту использования?**

**Аннотация.** Достигая 100% уровня доступа к финансовым услугам, государственным и финансовые институты начинают пересматривать свои цели для улучшения благосостояния потребителей и экономики за счет финансовых услуг. Безналичные платежи — одна из наиболее значимых финансовых услуг, увеличивающая выгоды всех участников экономики. В связи с пандемией COVID-19 использование безналичных инструментов стало еще более актуальным. Цель данного исследования — определить, какие факторы влияют на долю безналичных платежей в тратах потребителей. В анализе используется репрезентативная выборка в 1600 россиян, собранная в ходе опроса, проведенного в 2021 г. Результаты показывают, что те, кто воспринимает выгоды от безналичных инструментов, участвуют в программах лояльности провайдеров финансовых услуг и тратят более 25 тыс. руб. в месяц, с большей вероятностью будут иметь долю безналичных платежей выше 50%. Результаты данной работы подчеркивают важность оценки выгод и необходимость стимулировать использование платежных инструментов, что может быть учтено как в рамках продуктовых стратегий поставщиков финансовых услуг, так и государственных институтов для разработки мер стимулирования вовлеченности в финансовые услуги.

**Ключевые слова:** безналичные платежи; платежные инструменты; финансовая инклюзивность; финансовая доступность; выбор метода платежа потребителями; доступ к финансовым услугам.

Классификация JEL: G21, G5.

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