Article

Fear of the COVID-19 Pandemic and Social Distancing as Factors Determining the Change in Consumer Payment Behavior at Retail and Service Outlets

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Abstract: The aim of this study was to identify the factors inducing customers to choose cashless payments made with payment cards at retail and service outlets during the COVID-19 pandemic. We identified factors that are crucial for consumers' functioning under pandemic conditions, but which have so far been neglected in research. The estimated logit model indicates that the variables significantly influencing the more frequent choice of payment cards at retail outlets are related to the fear of infection and perception of the advantages of new technological solutions in connection with social distancing. Our study shows that, in addition to sociodemographic characteristics such as age and level of education, emotionally motivated factors induced by the pandemic have begun to play an important role in the transition to cashless payment.

Keywords: socio-economic changes; COVID-19; cashless payments; consumer behavior; infection fear; social distancing; Poland

1. Introduction

In many economically developed countries, the last decade has seen a decrease in the use of cash in payment transactions [1,2]. This process has been relatively slow, and in many cases, despite the wide availability of cashless payment methods, cash is still extensively used [3–5]. Numerous studies indicate that consumer payment habits are difficult to change in the short term [6,7]. Giving up cash requires a change in the patterns and habits established over many years, such as those relating to tracking one's spending [4] and the anonymity of transactions [8,9].

An analysis of the literature on the subject indicates that regardless of the institutional and social characteristics of individual countries, there are common factors that encourage consumers to start preferring cashless payments or to open their minds to the possibility of using them. The main determinants of consumer use of a given payment solution are its ease of use, cost levels, security [10], speed of use, and convenience [7,11,12], and in some aspects a development of information and communication technologies (ICT) [13]. The importance of the social impact and user confidence in a given cashless payment method is also emphasized [7,14]. Payment behavior is strongly affected by demographic variables [14–16]. The behavior of users of the payment services market is also dependent to some extent on actions taken by other actors. Indeed, the payments market analyzed in this study is characterized by the presence of network externality—that is, the usefulness of a new technology rises with the increasing number of users and points where payments can be made [17,18]. It is network externality that makes consumers and merchants who are reluctant to adopt new technological solutions overcome their fears, modify the calculation of profit and loss, and decide to join in after noticing the numerous benefits resulting from the growing number of network users. The research on payment behavior to date

has paid much attention to the role of appropriate incentives, in particular financial ones, in increasing the use of alternative payment methods, indicating that this factor may be crucial to achieve critical mass for innovations in payment systems [19–21].

However, it should be noted that the above-mentioned factors have so far been studied and described under socially stable conditions. The COVID-19 pandemic has forced a change in many economic sectors and business strategies [22,23] as well as in consumer behaviors in different fields, including daily practices of making payments. This is a time when messages based on rational arguments can be received differently, and the calculation of transaction costs follows new analytical paths. In fact, the pandemic has disrupted the current pattern of responding to external stimuli and forced non-standard behaviors. During this time, the use of cashless payment methods has increased despite the lack of additional financial incentives. The pace at which societies move away from cash has increased regardless of the level of their acceptance of cashless payments recorded in the period before the outbreak of the pandemic [24–27]. The less frequent use of cash in payment transactions [24] has resulted from limited consumption due to the almost universal introduction of social distancing and lockdown of economies [28]. At the same time the pressure for adopting new, digital technologies (ICT) (including instant messaging services) has grown and has started to influence everyday practices [29,30].

However, this phenomenon may also reflect social concerns about the possibility of the virus being spread through paper money and coins. Although research on viruses and other diseases being transmitted through cash has been conducted in the period before the COVID-19 pandemic [31], this factor had never been important in determining what drives the acceptance of contactless payments. The experience of the COVID-19 pandemic has, therefore, introduced completely new factors into the process of motivating consumers and companies to reduce cash in business transactions.

This article contributes to financial studies on payment behavior in the context of extreme conditions. It presents the results of research on the influence of the fear of SARS-CoV-2 infection and the restrictions resulting from the introduction of social distancing rules on the change in consumer payment behavior. This study also considers the importance of pandemic-induced consumer perception of the usefulness of digital technologies.

The aim of this study is to identify the factors motivating customers to choose cashless payments made with payment cards at retail and service outlets during the COVID-19 pandemic. The research is designed to answer two research questions: Q1—What is the impact of the fear of SARS-CoV-2 infection on customers choice of payments at retail and service outlets? Q2—What is the impact of pandemic and fear on the acceptance of new digital solutions enabling users to make payments in accordance with social distancing rules? (Detailed questions can be found in Appendix A).

2. Literature Review—Payment Behavior during the COVID-19 Pandemic

The diagnosis of the impact that the COVID-19 pandemic has had on the payment services market is at an early stage, but we can already discuss its two main dimensions: (1) the impact on the behavior of institutional payments market participants; and (2) the impact on consumer payment behavior.

The first area includes, among others, actions taken by central banks, commercial banks, card associations, and merchants to promote cashless payments. Since the beginning of the pandemic all these institutions have strongly encourage consumers and merchants to use cashless solutions. Public awareness campaigns and even special "pay-cashless" signs for shops were produced. Substantial changes or new, pro-cashless projects were introduced. Like for example the increase of the maximum amount of contactless payment without PIN authorization at EFT-POS terminals. As observed in many countries, it was a strategy to encourage consumers to use payment cards at retail and service outlets. The aim was to simplify contactless payments in order to prevent manual contact [26,32]. The impact of the pandemic on payment services market institutions also manifested itself in the intensification of activities to introduce central bank digital currency [33,34].

In general terms—as De et al. [35] state—the digital payments and digital currencies will be one of the key areas shaping the functioning of societies after the COVID-19 pandemic.

An analysis of the literature on the second area impacted by the pandemic, i.e., changes in consumer payment behavior, shows, on the one hand, a decrease in the overall number of payment transactions [28] and, on the other, an increase share of cashless transactions [32]. Research by the central banks of Sweden and the Netherlands shows that the pandemic has increased the use of cashless payment methods among the age groups that have so far been the most conservative in their use of cash [27,32]. De Nederlandsche Bank [32] reports that the fall in cash use after the public first became aware of the pandemic was more pronounced among those aged 12–34 and over 65 than in other age groups. In turn, the results of an international United Nations survey [36] indicate that consumers have started buying online much more often, which is accompanied by a decrease in the average transaction amount. This may be linked to the use of e-commerce to purchase everyday products. First of all, there has been an increase in the number of online transactions for basic products, such as food and drink, which have so far been bought in-store [37]. Data reported by the online payment operator PayPal on rising revenue and the number of registered transactions may serve as a measure of the change in consumer payment behavior on a global scale, indicating the increasing importance of e-commerce [38,39]. The change in consumer payment behavior has been not only analyzed in the context of cashless payments [40], but also has been analyzed from the viewpoint of its impact on the economy. Bounie et al. [41] showed that the increased importance of e-commerce has reduced the shock caused by the pandemic in some sectors of the French economy. In turn, Liu et al. [42] found a statistically significant and positive impact of mobile payments on reducing the decline in urban household consumption observed in China during the pandemic.

The increase in the importance of the e-commerce sector signaled in the literature [43] contrasts with the new challenges faced by traditional points of sale during the pandemic. As Perlman and Yechiali showed [44], the risk of contracting a virus has influenced consumers' strategic behavior within the store space. Retail shops and service outlets have experienced not only the outflow of some customers, but also changes in payment methods [24]. Auer et al. [45] indicate that concerns about the possibility of SARS-CoV-2 virus transmission through bills and coins have made these types of tender problematic for both buyers and sellers. The desire to avoid physical contact led shops in many countries to periodically introduce a policy of refusing to accept cash [25,26,46]. Touch, physical contact related to cash payment, started to be an undesirable factor, and retailers and customers began to avoid situations requiring such direct contact. Therefore, cashless payments began to be seen as a way of minimizing the threat to health and life caused by the pandemic [46]. Thus, the present situation has triggered a series of changes in consumer behavior, giving rise to the mass-scale factors of panic [47], fear, and even disgust [48].

The literature review shows that the 'risk' factor has recently started to be analyzed in terms of health rather than finance [49]. The fear of contagion—according to latest studies—play a prominent role in the decision to abandon cash for transactional purposes [50] and was a catalyst for contactless payment technology usage [51]. Recent studies also show that the outbreak of COVID-19 played a key role in changing the acceptance and development of branchless banking [52]. Additionally, the problem of risk and fear has been present in the reports of many public finance institutions since the beginning of 2020. Central banks, and especially the World Health Organization [53], all clearly pointed to the aspect of general safety in the context of making payments.

The changes in payment behavior are also related with FinTech development and a general shift in attitudes and actual usage of all kinds of new technologies and ICT. Musyaffi et al. [54] identify that personal attitudes towards new technologies play a crucial role in the process of digital payments adoption during COVID-19 pandemic. A personal tendency to test and try new technological solutions builds intention to use digital payments. The latest researches show also [55,56] that the experience of pandemic and the

fear of the health risk of COVID-19, might exceed a fear of technology associated risks and was the reason for the FinTech adoption. New technologies, ICT and Fintech—in the context of pandemic—are perceived more and more as useful. Protective behavior and social distancing rules give consumers a strong reason to start to consider new payment and communication solutions as safe and useful [49]. The ICT is a vast area, however especially a use of instant messaging services during the pandemic, such as Whatsapp and Skype, as Sinha at al. shows [57] has significantly mitigated some of the negative effects of restrictions imposed by governments in connection with the pandemic. Not only did it help to maintain social distance and strained interpersonal relationships, but it was also used in many new institutional, formal contexts like remote firms' management, remote learning, or medical advice [58,59]. Instant messaging services have created a new field of experience for many consumers since March 2020. With this, they helped many to realize that new technologies are useful and might ease the fear and stress caused by the pandemic.

Our analysis of the literature shows that the impact of the pandemic on consumer payment behavior is an issue requiring in-depth empirical research and theoretical support. Published research on the issue of payments in the COVID-19 era refers to the decrease in the volume of payment transactions, increased use of cashless payment forms, and the rising importance of e-commerce. These studies focused on the effects or manifestations of changes in consumer payment behavior. However, a few research concerning the social and psychological factors influencing the change in consumer attitudes towards cashless payments in times of extreme conditions were identified. In contrast to previous studies, our evidence is based on the results of our own research conducted on a sample of consumers representative in terms of age, gender and place of residence. The literature review shows that the impact of factors related to the COVID-19 pandemic and social distance on consumers' transition to cashless forms of settlement has not been investigated so far. Thus, our study focuses on identification of the causes of changes in consumer payment behavior observed during the pandemic. With this, our work fills the research gap in the scientific analysis of the determinants of consumer payment behavior during the COVID-19 pandemic.

3. Materials and Methods

This article uses data from an empirical study designed by the authors. The data was collected using the CATI (Computer Assisted Telephone Interview) method by a professional research agency—Interactive Research Center Sp. z o.o.—which was selected under a public procurement procedure. Survey research was supported by the Nicolaus Copernicus University "Excellence Initiative—Research University" programme for years 2020–2026.

CATI was the optimal method to both ensure that the results were representative and allow the survey to be implemented during the pandemic period. With widespread access of Polish citizens to telephones (of all types), the CATI method is sufficient to achieve representative results [60]. This method is superior from the CAWI (Computer Assisted Web Interview) method, as it allows to include in the research sample those who are technologically excluded (with no internet access).

The participants were selected by random generation of telephone numbers in the number ranges of the operators on the Polish market—both landline and mobile. This method is called RDD (Random Digit Dialing). The selection of respondents for the sample was random-quota. After the respondent provided basic demographic data, the interviewer invited a given person for a full interview, or gave up the interview when the quota (the number of people with a given characteristic) were already full. The sample was representative of the Polish population in terms of gender, age, and place of residence. The distributions of the survey sample (Table 1) corresponded to the distributions in Polish society in terms of the examined characteristics as reported by Statistics Poland.

Table 1. The frequency distribution for sociodemographic variables in the sample (in%).

Variable	Percentage of Response
Gender	
female	50.2
male	49.8
Age	
18–24	9.6
25–34	19.3
35–44	16.6
45–54	16.6
55–64	20.3
65+	17.6
Residence	
1—village	23.5
2—village-suburban area	8.6
3—city up to 20,000	13.9
4—city up to 100,000	17.6
5—city up to 500,000	17.1
6—city over 500,000	19.3

Source: the authors' own calculations.

The validity of the survey, including external validity, was obtained through representative sampling, which is preferred for statistical reasons in management science [61]. The questionnaire prepared by the authors was verified in a pilot survey, which allowed them to verify the comprehensibility of the questionnaire, detect errors, and correct them before conducting the main phase of the study. The full-scale survey was conducted in the period of July–August 2020 in Poland on a nationwide, representative sample of 1000 consumers aged 18 and over. The questionnaire also included control questions, e.g., allowing to determine the share of payment card holders or Internet users in Poland. The reliability of the questionnaire was examined with the Cronbach's Alpha internal reliability coefficient—0.684. The reliability test indicated satisfactory results for the value more or close to the 0.70 [62,63].

In order to investigate the impact of the explanatory variables on the dichotomous dependent variable Y, which indicates the propensity of the respondent to choose to pay by card at a physical point of sale more often during the pandemic compared to the pre-pandemic period, a logit model, a probit model and linear probability model (LPM) were estimated.

The logit model takes the following form:

$$logit(p_i) = Z_i = x_i'\beta = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_n X_{ni}, \tag{1}$$

where $logit(p_i)$ was $ln = \frac{p_i}{1-p_i}$ [64] (p. 331). The parameters $\beta_0, \beta_1, \ldots, \beta n$, which are elements of the β vector, were estimated using maximum likelihood estimation. The logit model allows for determination of the factors that influence the studied phenomenon, and the way in which they do so, expressed as numbers for a dependent variable [65].

The probit model is also a binary classification model. In this model, p_i are the values of the CDF (Cumulative Distribution Function) of the normal distribution N(0,1) at the points

$$y_1 \ (i = 1, 2, \ldots, n), \text{ where } (i = 1, 2, \ldots, n; j = 0, 1, \ldots, k) \ y_1 = \sum_{j=0}^{k} \alpha_j x_{ij}$$

that is:

$$P_i = F(y_i) \int_{-\infty}^{y_i} \frac{1}{\sqrt{2\pi}} exp(-\frac{t^2}{2}) dt. \tag{2}$$

The values of the inverse function of F, i.e., $F^{-1}(P_i) = y_i$ are called probits [66,67]. Probit models, like logit models, help describe the influence of explanatory variables on the dependent variable.

Another model used in the paper to estimate the effect of explanatory variables on the dependent variable is the linear probability model, also known as the Goldberger model [68]. This is another model of binary classification. It allows for both the prediction of the value of the dummy variable Y which determines membership in one of two classes ($Y = 0$ or $Y = 1$), and the probability of occurrence of one of the values of Y, e.g., $P(Y = 1)$, for a given set of exogenous variables X. It takes the following form [64,69].

$$y_i = \sum_0^k \alpha_j x_{ij} + \eta_i \tag{3}$$

In a linear probability model (LPM), probability $P_i = P(y_i = 1)$ is the following linear function of the explanatory variables and parameters:

$$P_i = P(y_i = 1) = x_i^T \alpha \tag{4}$$

where x_i and α are column vectors measuring $(k+1)x1$. In the LMP:

$$E(y_i) = P_i = x_i^T \alpha. \tag{5}$$

For the LPM, the following condition should be met:

$$0 \leq x^T \alpha \leq 1. \tag{6}$$

The research design is based on the choice of a specific set of variables. These variables were selected on the basis of a research that encompassed both academic papers and studies as well as public institutions reports that were presented in the Introduction and Literature Review. The reports and announcements of many central banks [24,26,70] and World Health Organization [53], as well as public campaigns of the Ministry of Health in Poland published since March 2020 were used for the purpose of a selection of a group of factors that connect the issue of payments with risks and fears induced by COVID-19 pandemic. The above institutions raised in their public communication problems such as a fear of possible contraction of the virus through touching banknotes and coins, and a need to avoid almost any social contact. Therefore, a group of variables that relate to the issue of fear of cash and virus contraction (variables named in the model as Fear_cash, No_touching and Cashless_safe and Fear_contact) is introduced in this study. Additionally, because Polish central bank-Narodowy Bank Polski-has diagnosed a stable growth of cashless transactions before 2020, and since March 2020 a growth of 18,000 new EFT-POS. Therefore a variable that refers to a general cashless preference (Every_shop_cashless) was added to the analysis.

Cashless payments are possible today because of many digital solutions. The connections between pandemic, payments and technology is more and more visible, especially that the COVID-19 pandemic has already been perceived as the accelerator of the digital transformation [29,30]. ICT, instant messaging included, FinTech solutions and all kinds of new technologies are perceived as more useful and necessary for everyday activity [57]. Because of the pandemic people have started to use more technologies and digital solutions that were relatively or objectively new in the market (like for example a growing number of EFT-POS in Poland, which are not a new technology, but has given a possibility to pay cashless in the new way for many consumers). As Musyaffi et al. [54] presented in their study, a personal innovativeness and a general tendency to try new technology are very

important in implementing digital payments during the COVID-19 pandemic. Therefore our model also includes three variables that relate to digital technologies and customers preferences and experiences (Tech_usefulness, New_Tech_like, Instant_messaging).

The variables Fear_cash, Tech_usefulness, Every_shop_cashless, No_touching, Cashless_safe, New_Tech_like, Fear_contact are assigned Likert scale responses because they relate to the respondent's feelings, perceptions or opinions. For these variables, the respondent is not always able to give a clear yes or no answer, may feel doubtful, or have no opinion. For the Instant_messaging variable, respondents were asked if they have used instant messaging services. A simple yes or no answer was enough to refer to this experience. Tables 2 and 3 provide a description—both statistical and descriptive one—of the variables used in the models presented in the paper.

Table 2. Variables used in the empirical analysis.

Y	The respondent starts making card payments or more frequently chooses to pay by card at retail and service outlets during the pandemic compared to the period before its outbreak: 1 if yes; 0 if no
Age	Age of the respondent in ranges: Age_18–24; Age_25–34; Age_35–44; Age_45–54; Age_55–64; Age_65+
Education	Educational attainment of the respondent: Edu_primary–primary and lower secondary education; Edu_vocational—basic vocational education; Edu_secondary—general or technical secondary education; Edu_bachelor—bachelor's degree or incomplete master's degree; Edu_master–master's or higher education
Residence	Size of the respondent's place of residence: ordinal variable with six settlement size categories (Residence 1—village; Residence 2—village–suburban area; Residence 3—city with population up to 20,000; Residence 4—city with population up to 100,000; Residence 5—city with population up to 500,000; Residence 6—city with population over 500,000)
Gender	Gender: 1—female; 0—male
Fear_cash	The respondent feels fear about using cash: 1—definitely not; 2—probably not; 3—I don't know/it is difficult to say; 4—probably yes; 5—definitely yes
Every_shop_cashless	The respondent expects to be able to pay cashless in every shop: 1—definitely not; 2—probably not; 3—I don't know/it is difficult to say; 4—probably yes; 5—definitely yes
No_touching	The respondent is interested in authorizing payments without touching the terminal: 1—definitely not; 2—probably not; 3—I don't know/it is difficult to say; 4—probably yes; 5—definitely yes
Cashless_safe	According to the respondent, contactless payments protect against the virus: 1—definitely not; 2—probably not; 3—I don't know/it is difficult to say; 4—probably yes; 5—definitely yes
Tech_usefulness	The coronavirus pandemic caused the respondent to see the usefulness of new technologies: 1—definitely not; 2—probably not; 3—I don't know/it is difficult to say; 4—probably yes; 5—definitely yes
New_Tech_like	The respondent likes to test new technologies: 1—definitely not; 2—probably not; 3—I don't know/it is difficult to say; 4—probably yes; 5—definitely yes
Instant_messaging	The respondent uses instant messaging services such as WhatsApp and/or Skype: 1 if yes; 0 if no
Fear_contact	The respondent fears contact with people: 1—definitely not; 2—probably not; 3—I don't know/it is difficult to say; 4—probably yes; 5—definitely yes

Source: the authors' own elaboration.

Table 3. Summary Statistics.

Variable	Mean	Standard Deviation	Minimum	25th Percentile	Median	75th Percentile	Maximum
Y	0.2640	0.4410	0.0000	0.0000	0.0000	1.0000	1.0000
Age	47.8070	16.8575	18.0000	34.0000	46.0000	61.0000	86.0000
Education	3.3950	1.2184	1.0000	3.0000	3.0000	5.0000	5.0000
Residence	3.1310	1.7875	1.0000	1.0000	3.0000	5.0000	6.0000
Gender	0.5020	0.5002	0.0000	0.0000	1.0000	1.0000	1.0000
Fear_cash	1.9400	1.1890	1.0000	1.0000	2.0000	2.0000	5.0000
Every_shop_cashless	3.8530	1.3694	1.0000	3.0000	4.0000	5.0000	5.0000
No_touching	3.5590	1.3669	1.0000	2.0000	4.0000	5.0000	5.0000
Cashless_safe	4.2280	1.0193	1.0000	4.0000	5.0000	5.0000	5.0000
Tech_usefulness	3.7450	1.2647	1.0000	3.0000	4.0000	5.0000	5.0000
New_Tech_like	3.5310	1.2010	1.0000	3.0000	4.0000	4.0000	5.0000
Instant_messaging	0.7510	0.4327	0.0000	1.0000	1.0000	1.0000	1.0000
Fear_contact	2.7080	1.3626	1.0000	2.0000	2.0000	4.0000	5.0000

Note: Definitions of the variable can be found in Table 2.

Table 4 shows the correlations between the variables used in the estimated model.

Table 4. Correlations between variables.

	Y	Fear_Cash	Every _Cashless	No _Touching	Cashless _Safe	Tech _Usefulness	New_Tech _Like	Instant _Messaging	Fear_Cont
Y	1.000	0.206	0.197	0.212	0.171	0.200	0.058	0.119	0.165
Fear_cash	0.206	1.000	0.312	0.231	0.179	0.127	0.055	−0.021	0.483
Every_shop_cashless	0.197	0.312	1.000	0.398	0.255	0.271	0.228	0.153	0.212
No_touching	0.212	0.231	0.398	1.000	0.259	0.400	0.262	0.119	0.222
Cashless_safe	0.171	0.179	0.255	0.259	1.000	0.231	0.130	0.093	0.305
Tech_usefulness	0.200	0.127	0.271	0.400	0.231	1.000	0.230	0.125	0.154
New_Tech_like	0.058	0.055	0.228	0.262	0.130	0.230	1.000	0.234	−0.021
Instant_messaging	0.119	−0.021	0.153	0.119	0.093	0.125	0.234	1.000	−0.069
Fear_contact	0.165	0.483	0.212	0.222	0.305	0.154	−0.021	−0.069	1.000

Source: the authors' own calculations using SPSS software.

4. Results and Discussion

The present study was conducted in Poland where the financial sector has introduced and tested many innovative payment solutions since the mid-2000s [71,72]. Poland has been a pioneer in the field of large-scale contactless card payments. The Polish market also saw the first European implementation of mobile payments based on near-field communication (NFC) technology, and since 2009, the central bank has actively promoted cashless transactions. However, despite this dynamic development of the payments industry, Poland has for a number of years experienced what is called the "love of cash" [73]. Therefore, the cases of entrepreneurs refusing to accept cash payments during the lockdown period should be treated as an unprecedented phenomenon. These refusals, criticized by Narodowy Bank Polski as unjustified [26], are also an indicator of the level of fear that affected entrepreneurs, which in some cases modified their approach to accepting payments. The behavior of merchants, in turn, may have influenced consumer payment choices at retail and service outlets.

During the COVID-19 pandemic, the share of card payments at retail and service outlets increased for respondents from each age group. This means that respondents chose cards to pay for their purchases at retail outlets more often than before the pandemic (although, as Banco de España reported, the total card spending in the first months of the pandemic decreased [28]). Therefore, our results are consistent with those arrived at by the central banks of Sweden, the Netherlands, Switzerland and Poland [26,27,32,70]—they point to a decrease in the share of cash in transactions concluded by consumers. They confirm that COVID-19 pandemic has triggered rapid changes in consumer payment behavior. However, in our study, these changes were not observed in every age group to the same extent. COVID-19 pandemic had the strongest impact on respondents in the

18–54 age range. The increased frequency of card payments can be associated with high activity in the personal and professional life of respondents in these age groups (Table 5).

Table 5. Response distribution for dependent variable (in%).

	Age Ranges					
	18–24	**25–34**	**35–44**	**45–54**	**55–64**	**65+**
1 if yes ($Y = 1$)	28.9	32.6	27.0	26.7	23.6	21.0
0 if no ($Y = 0$)	71.1	67.4	73.0	73.3	76.4	79.0

Source: the authors' own calculations.

Tables 6–8 present the results of the estimated models.

Table 6. The results of the estimated logit model before and after elimination a posteriori ($n = 1000$).

	Before Elimination a Posteriori			After Elimination a Posteriori		
	Coefficient	**Marginal Effect**	**p-Value**	**Coefficient**	**Marginal Effect**	**p-Value**
Constant	−4.2570		<0.0001	−4.6626		<0.0001
Age_25–34	0.0521	0.0092	0.8634			
Age_35–44	−0.3263	−0.0538	0.2920			
Age_45–54	−0.3444	−0.0561	0.2875			
Age_55–64	−0.6099	−0.0949	0.0619	−0.4148	−0.0677	0.0604
Age_65+	−0.6841	−0.1060	0.0370	−0.4569	−0.0745	0.0397
Edu_vocational	−0.7559	−0.1152	0.0736	−0.4592	−0.0746	0.0746
Edu_secondary	−0.4298	−0.0730	0.2782			
Edu_bachelor	−0.5029	−0.0775	0.2892			
Edu_master	−0.0738	−0.0128	0.8552			
Residence 2	−0.0599	−0.0103	0.8478			
Residence 3	0.2618	0.0480	0.2965			
Residence 4	0.1024	0.0182	0.6767			
Residence 5	0.3949	0.0738	0.5005			
Residence 6	−0.1900	−0.0318	0.5010			
Gender	0.0400	−0.0070	0.8089			
Fear_cash	0.2312	0.0403	0.0014	0.2707	0.0477	<0.0001
Every_shop_cashless	0.1457	0.0254	0.0483	0.1485	0.0262	0.0413
No_touching	0.1879	0.0328	0.0083	0.1921	0.0338	0.0066
Cashless_safe	0.2014	0.0351	0.0400	0.2423	0.0427	0.0106
Tech_usefulness	0.2789	0.0487	0.0003	0.2674	0.0471	0.0004
New_Tech_like	−0.1335	−0.0233	0.0743	−0.1319	−0.0232	0.0637
Instant_messaging	0.3573	0.0593	0.0962	0.3798	0.0634	0.0726
Fear_contact	0.1083	0.0189	0.1157			

Source: the authors' own calculations.

Table 7. The results of the estimated probit model before and after elimination a posteriori ($n = 1000$).

	Before Elimination a Posteriori			After Elimination a Posteriori		
	Coefficient	**Marginal Effect**	**p-Value**	**Coefficient**	**Marginal Effect**	**p-Value**
Constant	−2.5290		<0.0001	−2.7654		<0.0001
Age_25–34	0.0285	0.0088	0.8738			
Age_35–44	−0.1903	−0.0554	0.2972			
Age_45–54	−0.1917	−0.0554	0.3165			
Age_55–64	−0.3347	−0.0934	0.0799	−0.2321	−0.0670	0.0715
Age_65+	−0.3893	−0.1079	0.0433	−0.2640	−0.0760	0.0412

Table 7. *Cont.*

	Before Elimination a Posteriori			After Elimination a Posteriori		
	Coefficient	Marginal Effect	*p*-Value	Coefficient	Marginal Effect	*p*-Value
Edu_vocational	−0.4335	−0.1184	0.0823	−0.2676	−0.0768	0.0295
Edu_secondary	−0.2517	−0.0750	0.2856			
Edu_bachelor	−0.3025	−0.0831	0.2807			
Edu_master	−0.0274	−0.0083	0.9095			
Residence 2	−0.0274	−0.0083	0.8794			
Residence 3	0.1346	0.0424	0.3664			
Residence 4	0.0429	0.0132	0.7653			
Residence 5	0.2320	0.0745	0.5004			
Residence 6	−0.1106	−0.0326	0.5044			
Gender	−0.0122	−0.0037	0.9001			
Fear_cash	0.1407	0.0429	0.0012	0.1631	0.0499	<0.0001
Every_shop_cashless	0.0825	0.0251	0.0493	0.0853	0.0261	0.0400
No_touching	0.1095	0.0334	0.0081	0.1131	0.0346	0.0058
Cashless_safe	0.1313	0.0400	0.0186	0.1485	0.0455	0.0058
Tech_usefulness	0.1548	0.0472	0.0004	0.1508	0.0462	0.0004
New_Tech_like	−0.0740	−0.0225	0.0912	−0.0753	−0.0230	0.0721
Instant_messaging	0.2009	0.0589	0.1009	0.2205	0.0647	0.0693
Fear_contact	0.0561	0.0171	0.1666			

Source: the authors' own calculations.

Table 8. The results of the estimated LPM model before and after elimination a posteriori (*n* = 1000).

	Before Elimination a Posteriori			After Elimination a Posteriori		
	Coefficient	*t*-Studets Statistics	*p*-Value	Coefficient	*t*-Studets Statistics	*p*-Value
Constant	−0.1465	−2.5460	0.0111	−0.1496	−7.5090	<0.0001
Age_25–34	0.0175	0.4009	0.6886			
Age_35–44	0.0040	0.0955	0.9239			
Age_45–54	0.0060	0.1385	0.8898			
Age_55–64	0.0379	0.8981	0.3693			
Age_65+	−0.0126	−0.3019	0.7628			
Edu_vocational	−0.0355	−0.9245	0.3554			
Edu_secondary	−0.0168	−0.4273	0.6693	−0.0316	−1.9630	0.0499
Edu_bachelor	−0.0245	−0.5114	0.6092			
Edu_master	0.0628	1.4840	0.1382	0.0716	3.5670	0.0004
Residence 2	0.0237	0.6984	0.4851			
Residence 3	−0.0012	−0.0452	0.9639			
Residence 4	−0.0413	−1.7300	0.0839	−0.0375	−2.1800	0.0295
Residence 5	0.0303	1.1350	0.2564			
Residence 6	−0.0162	−0.4774	0.6332			
Gender	0.0077	0.4688	0.6393			
Fear_cash	0.0328	2.6680	0.0078	0.0348	3.0800	0.0021
Every_shop_cashless	0.0134	2.2150	0.0270	0.0142	2.8190	0.0049
No_touching	0.0283	3.8670	0.0001	0.0243	3.6660	0.0003
Cashless_safe	0.0258	4.0830	0.0000	0.0241	4.6810	0.0000
Tech_usefulness	0.0096	1.5000	0.1339	0.0120	2.0550	0.0401
New_Tech_like	−0.0080	−1.2470	0.2126			
Instant_messaging	0.0286	1.5720	0.1164			
Fear_contact	−0.0039	−0.4963	0.6198			

Source: the authors' own calculations.

Table 9 presents a comparison of the fit of the estimated models after a posteriori elimination to the empirical variables.

Table 9. Comparison of model fit to empirical data.

	Logit Model	Probit Model	LPM
McFedden *R*-square	0.1128	0.1139	
Coefficient of variation (*V*) [in %]			1.5681
Coefficient of determination *R*-square			0.1472
Number of cases of correct prediction	0.654	0.635	0.691
Percentage of correct prediction for *Y* = 1 [in %]	0.678	0.6331	0.4697
Percentage of correct prediction for *Y* = 0 [in %]	0.6277	0.7121	0.7703

Source: the authors' own calculations.

The model that best fit to the data was the logit model, so further conclusions were based on this model.

The results of the estimated logit model (Table 6) indicated that for respondents over 55 years of age, the probability of changing the way they paid for purchases at retail and service outlets was the lowest compared to respondents aged 18–24 years. This can be explained by the fact that young people are entering the world of advanced finance where electronic payments play a significant role, whereas mature people have already been functioning in the world of electronic banking, while the elderly are the most difficult group to convince to change their habits and use electronic forms of payment more widely.

Another variable that had a significant, positive impact on more frequent card payments for purchases at a physical outlet was educational attainment. For respondents with basic vocational education, the probability of changing the way they paid for purchases at retail and service outlets was the lowest. This may be associated with the level of financial and health awareness that increased with the level of education. The literature also shows that a higher level of education influences the use of new technological solutions and consumers' assets, which favor a higher share of card payments in total point-of-sale (POS) payments [74–76]. Thus, even in an extraordinary pandemic situation, factors related to previously acquired knowledge and culturally shaped habits play an important role. As DiMaggio [77] underlined that culture not only constrains, but also structures and fosters specific behaviors, communication processes, and ultimately decision-making. In this sense, with increased level of education, the cultural competences responsible for the ability to cope with different, changing situations create the groundwork for more widespread adoption of new solutions [78], including card payments. The final decision on the form of payment is, therefore, based on cultural factors, such as knowledge gained with education, information circulating in the cultural system, etc.

Our study showed that other demographic and sociological variables, such as gender and place of residence, did not have a significant impact on the change in respondents' behavior in terms of the examined phenomenon. Other variables included in the model were concerns about the transmission of SARS-CoV-2 virus through cash and expectations of availability of cashless settlements. The estimated logit model showed that the fear of cash had a significant, positive impact on more frequent choice of card payment. As a result of the aversion to cash arising from the fear of possible SARS-CoV-2 infection, the respondents expected cashless transactions in every store. The probability that respondents with such expectations would make card payments in comparison to the rest of the sample increased by 0.15. The respondents showed high awareness of the risk of virus transmission, making the readiness for more frequent card payments conditional on the possibility of making them without touching the terminal. The respondents' belief that contactless payments protected against the virus also increased the probability of more frequent card payments by 0.24. Thus, this exemplifies the impact of the material aspect of payments described in the literature. Paying is an activity that goes beyond simply reacting to price information. The act of payment is preceded by expectations, thoughts, and calculations, and also involves physical activities, such as taking out the wallet, cash, card, or phone, and communication activities, such as asking about the available payment

forms, receipts, etc. [46]. The factor of possible contraction of SARS-CoV-2 added another dimension for consideration by customers making payments at retail outlets. Moreover, social distancing rules inclined entrepreneurs and companies to change the layout of their shops in order to keep as safe a distance as possible from their customers. These changes also made customers perceive the payment process from a new perspective. The significance of the Fear_cash, Every_cashless, No_touching, and Cashless_safe variables shown in the model allows us to conclude that the fear of SARS-CoV-2 infection caused by the pandemic is a factor that makes customers choose cashless payments more often at retail and service outlets.

Three variables relating to the practical application of new technologies had a significant impact on the likelihood of more frequent choice of card payment. This likelihood was higher in the case of respondents who recognized the usefulness of new technologies and used instant messaging services. During the pandemic period, the practical application of new technologies was made apparent in terms of providing remote communication and enabling remote learning, work, and interpersonal contacts. Therefore, these technologies played an enormous role in mitigating the effects of social distancing restrictions. The use of new technological solutions may result more from the fact that the respondents noticed their usefulness rather than wanting to test them.

Logit estimation showed that the willingness to test new technological solutions negatively affected the probability of more frequent use of card payments. This can be understood as card payments not being very attractive to people expecting new technological solutions. They prefer mobile payments, which, like contactless cards, eliminate contact with cash and allow for social distancing. Contactless payments, including mobile payments, not only remove the need for customers touching the terminal, but also allow them to keep their distance from the seller. Unlike cash, which has to be almost placed on the seller's hand, terminals for accepting electronic payments are sometimes located away from the seller.

Therefore, the above results indicate that the experience of the pandemic strengthens the acceptance of new digital solutions, enabling users to make payments in accordance with social distancing rules.

The variable relating to the fear of contact with people was not significant in the logit model. It seems that during the study period, i.e., after about six months of experiencing the pandemic all over the world, the approach to this phenomenon was rationalized. Fears of coronavirus infection had largely been contained. It is worth recalling the concept of three-stage consumer reaction in the pandemic—react, cope, adapt—proposed by Kirk and Rifkin [79]. In the "coping" phase, the element of rationalization is already emerging, and behavior is shifting towards a calmer analysis of transaction costs, convenience, own needs, and resources. Fear is present, but other factors come to the fore. Following this interpretation, it may be assumed that the surveyed payers had already entered the "coping" phase in terms of concerns about interpersonal contact. In this case, the rules of social distancing, facilitated by contactless payment, allowed them to function relatively normally during the pandemic.

5. Conclusions

The extreme situation of the COVID-19 pandemic has had a strong impact on consumer payment behavior. It has become a catalyst for increasing consumer acceptance of cashless payments by strengthening the impact of factors that were previously insufficiently taken into account in customer choices and research on payment preferences. Our study shows that in addition to sociodemographic characteristics, such as age and level of education, emotionally motivated factors began to play an important role in the transition to cashless payments. Fear of using cash mobilized consumers to start using cashless payments or choose them more often than before.

Not only emotional factors, but also those related to new technologies were significant in changing consumer payment behavior. The importance of technological progress in

payments for effective health care has been highlighted. As a matter of fact, one of the few positive effects of the pandemic is the widespread demonstration of practical applications of digital technology with a view to reducing the risk of contracting COVID-19. The use of contactless payment instruments allows people to maintain social distancing when making payments. In this aspect, social distancing can be understood as allowing a safe distance between the seller and the consumer, as well as the option not to touch the payment terminal. In turn, maintaining social distance protects against SARS-CoV-2 virus transmission and lowers the risk of infection, and also reduces the fear associated with shopping. It is also worth noting that the expectations of consumers regarding the possibility of paying by card and their apparent fear of using cash, as noted in this article, may also affect entrepreneurs and shape their payment processing strategies. In this sense, the pandemic not only changes consumer payment behavior, but also has an indirect effect on merchants.

The growing importance of cashless payments at retail and service outlets has been observed worldwide during the pandemic. This study fills a research gap in the literature, by identifying factors such as fear of infection and striving for social distance as important for changes in consumer payment behavior during the COVID-19 pandemic. It should be emphasized that, to a varying extent, these factors guide the payment behavior of consumers around the world. However, in order to determine whether the transition to cashless payments has become a consumer's payment habit or merely a temporary change during a pandemic, further research is needed in this area.

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Abbreviation

The following abbreviations are used in this manuscript:

EFT-POS   Electronic funds transfer at point of sale

Appendix A. Questions from the Survey Questionnaire Used in the Paper

1. Specify your gender:
    *   female
    *   male
2. What is your age?
3. Specify the level of education you have already completed:
    *   primary and lower secondary education
    *   basic vocational education
    *   general or technical secondary education
    *   bachelor's degree or incomplete master's degree
    *   master's or higher education

4. Specify the size of your place of residence:
   - village
   - village–suburban area
   - city with population up to 20,000
   - city with population up to 100,000
   - city with population up to 500,000
   - city with population over 500,000

5. The coronavirus pandemic caused that I feel fear about using cash.
   - definitely not
   - probably not
   - I don't know/it is difficult to say
   - probably yes
   - definitely yes

6. The coronavirus pandemic caused that I expect to be able to pay cashless in every shop.
   - definitely not
   - probably not
   - I don't know/it is difficult to say
   - probably yes
   - definitely yes

7. The coronavirus pandemic caused that I am interested in authorizing payments without touching the terminal.
   - definitely not
   - probably not
   - I don't know/it is difficult to say
   - probably yes
   - definitely yes

8. The coronavirus pandemic caused that I'm starting to believe that contactless payments protect me against the virus.
   - definitely not
   - probably not
   - I don't know/it is difficult to say
   - probably yes
   - definitely yes

9. The coronavirus pandemic caused that I see the general usefulness of new technologies.
   - definitely not
   - probably not
   - I don't know/it is difficult to say
   - probably yes
   - definitely yes

10. The coronavirus pandemic caused that I feel fear contact with other people.
    - definitely not
    - probably not
    - I don't know/it is difficult to say
    - probably yes
    - definitely yes

11. Have you started paying by card or do you more frequently decide to pay by card at a retail and service outlets during a pandemic, compared to the period before the outbreak:
    - yes
    - no

12. Do you use instant messaging services (such as WhatsApp and/or Skype)?:

- yes
- no

13. Do you like to test new technologies?

- definitely not
- probably not
- I don't know/it is difficult to say
- probably yes
- definitely yes

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