



COVID-19 pandemic increases the divide between cash and cashless payment users in Europe

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ABSTRACT

This paper investigates how the COVID-19 pandemic has changed an important aspect of everyday life, viz. how people make payments. The empirical study is based on a survey of over 5000 respondents from 22 European countries. It shows that consumers who had been making cashless payments prior to the outbreak of the pandemic have been even more likely to do so since it broke out. On the other hand, the consumers who had mostly been paying in cash have often continued to do so. The divide between those who pay in cash and those who do not, therefore, seems to have widened during the pandemic. It may suggest financial inclusion issues. Additionally, we found that the probability of more frequent cashless payments as a result of the pandemic differs considerably between countries and therefore indicate the role of country-specific factors.

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1. Introduction

Consumer payment behaviour is important for the real economy and the efficiency of the payment system (Humphrey et al., 2006; Zhang et al., 2019). The ways in which payments are made depends on a plethora of factors (see e.g. Arango-Arango et al., 2018; Bagnall et al., 2016; Koulayev et al., 2016; Liñares-Zegarra and Willeson, 2021; van der Crujisen and van der Horst, 2019), and changes tend to be incremental (see e.g. ECB (2020) and Greene and Stavins (2020) for developments in Europe and the United States respectively). However, the COVID-19 pandemic (henceforth “the pandemic”), and the measures imposed by governments to contain it, appear to have had a considerable impact on consumer payment behaviour. This is most evident in the rapid increase in the adoption of cashless payments.

By drawing on the data from various national payment systems, Kraenzlin et al. (2020), Ardizzi et al. (2020) and Bounie et al. (2020) show that the volume of cashless payments increased in Switzerland, Italy and France during the pandemic, despite an overall decline in consumption expenditure. A payment diary survey conduct in the Netherlands by Jonker et al. (2020) shows an increase in debit card use since the onset of the pandemic.

However, this growth is mainly attributable to government restrictions imposed to contain the pandemic. Wisniewski et al. (2021) show that the decrease in cash transactions was due to both fear (of getting infections in connection with the use of cash) and new habits developed during enforced safety measures.

This study primarily aims to investigate how the use of cash prior to the outbreak of the pandemic have influenced consumer payment behaviour during it. It additionally examines the extent to which the specificities of particular countries have affected behavioural changes in payment patterns. The paper is structured as follows: Section 2 presents the data and discusses the methodology; Section 3 presents the empirical results, and Section 4 concludes our findings.

2. Data and method

Our analysis is based on a stratified random CAWI survey of 5504 respondents—with age, gender, and size of the respondent's locality stratification factors—conducted in 22 European countries between July and August 2020.¹ Table 1 presents details on the variables used in the study and Table 2 contains their descriptive statistics.

¹ The respondents resided in 20 European Union member states (Croatia, Cyprus, Estonia, Latvia, Luxembourg, Malta, and Slovenia were omitted), the United Kingdom, and Norway.

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Table 1
Variable definition.

Variable	Definition
Payment_behaviour_change	One of five possible answers to the question "Has the coronavirus pandemic (COVID-19) affected how you pay in physical stores?" These are: 1 – Yes, I pay more often cashless (by card, smartphone, smartwatch); 2 – Yes, I pay more often in cash; 3 – I pay the same way as I did before the pandemic; 4 – I do not know; 5 – I did not make any purchases during the pandemic.
Payment_behaviour_change_ordered	Ordered <i>payment_behaviour_change</i> variable with the following values assigned: 1 – for answer 1 (change towards cashless payments); 0 – for answer 3 (no change); –1 – for answer 2 (change towards cash payments).
Cash_usage	Self-reported share of cash transactions in retail payments at physical points-of-sale in the 12 months preceding the COVID-19 pandemic outbreak.
Gender	Dummy variable indicating whether the respondent is male (1) or not (0).
Age	Respondent's age in years.
Location_size	The size of the place of residence of the respondent. Responses are coded on a 6-point scale: 1 – Rural area; 2 – City with a population of less than 50,000; 3 – City with a population of between 50,000 and 100,000; 4 – City with a population of between 100,000 and 500,000; 5 – City with a population of between 500,000 and 1,000,000; 6 – City with a population of over 1,000,000.
Education_years	Respondent's years of formal education.
Income_below_average	Dummy variable indicating whether the respondent's income was below average in his country of residence (1 = yes, 0 = no).
Mobile_bank	Dummy variable indicating whether the respondent had used a mobile banking application in the 12 months prior to the survey (1 = yes, 0 = no).
Mobile_payments	Dummy variable indicating whether the respondent had used a mobile payment application (Google Pay, Apple Pay, Samsung Pay, HCE) in the 12 months prior to the survey (1 = yes, 0 = no).
Wearables_payments	Dummy variable indicating whether the respondent had used contactless payment-enabled wearables (smartwatches, smartbands and systems, e.g., Garmin Pay, Huawei Pay) in the 12 months prior to the survey (1 = yes, 0 = no).
Social_networks	Dummy variable indicating whether the respondent had a profile on a social media platform (Facebook, Instagram, etc.) (1 = yes, 0 = no).

Table 2
Descriptive statistics.

Variable	Mean	SD	Min	Median	Max
Payment_behaviour_change_ordered	0.41132	0.61366	–1.00000	0.00000	1.00000
Cash_usage	0.32716	0.30219	0.00000	0.22766	1.00000
Gender	0.48074	0.49968	0.00000	0.00000	1.00000
Age	47.12581	16.25443	18.00000	47.00000	98.00000
Location_size	2.77517	1.57503	1.00000	2.00000	6.00000
Education_years	13.85446	3.40651	0.00000	14.00000	25.00000
Income_below_average	0.12842	0.33459	0.00000	0.00000	1.00000
Mobile_bank	0.55444	0.49707	0.00000	1.00000	1.00000
Mobile_payments	0.28141	0.44973	0.00000	0.00000	1.00000
Wearables_payments	0.12730	0.33334	0.00000	0.00000	1.00000
Social_networks	0.80644	0.39513	0.00000	1.00000	1.00000

Note: The variables are defined in Table 1. The number of observations for each of the variables listed above is 5,373.

Our dependent variable (*Payment_behaviour_change*) is based on the response to the question "Has the coronavirus pandemic (COVID-19) affected how you pay in physical stores?", which had five possible answers. Respondents who could not answer the question or who stated that they did not make any purchase during the pandemic were excluded from further investigation. This left 5373 respondents and three answers, that were ordered and the following values assigned to them:

- 1 – the respondent paid cashless more frequently;
- 0 – the respondent's payment behaviour had not changed;
- 1 – the respondent paid in cash more frequently.

Generally, 47.9% of the sample indicated a move towards more cashless payments, whereas 6.7% reported a move towards cash

payments. 45.4% of respondents did not change their payment behaviour. It should be noted, however, that the responses varied widely between countries (see Table 3).

Our main explanatory variable is the self-reported share of cash transactions at physical points-of-sale in the 12 months preceding the pandemic outbreak (*Cash_usage*). We allow for a non-linear relationship between the initial share of transactions done by cash and the respective outcomes by adding the squared values of the former. Various control variables obtained in the survey are also used.

Dummy variables have additionally been included for each country (*Country_dummies*). These are used to cover unobserved

Table 3
Declared change in payment behaviour during COVID-19 pandemic.

Country	Share		
	1	0	-1
Austria	40.9%	52.1%	7.0%
Belgium	64.6%	27.2%	8.2%
Bulgaria	30.1%	59.2%	10.7%
Czechia	43.3%	53.3%	3.3%
Denmark	43.0%	50.3%	6.7%
Finland	41.2%	53.8%	5.0%
France	43.1%	48.7%	8.2%
Germany	34.7%	48.8%	16.5%
Greece	48.0%	46.6%	5.4%
Hungary	35.2%	62.1%	2.8%
Ireland	64.4%	25.3%	10.3%
Italy	40.3%	48.8%	10.8%
Lithuania	31.7%	62.1%	6.2%
Netherlands	56.7%	35.6%	7.7%
Poland	56.9%	40.3%	2.8%
Portugal	62.3%	34.2%	3.4%
Romania	56.6%	34.5%	9.0%
Slovakia	40.1%	55.1%	4.8%
Spain	50.2%	44.0%	5.8%
Sweden	33.5%	60.7%	5.9%
United Kingdom	68.4%	26.0%	5.6%
Norway	47.7%	48.7%	3.6%
average	47.9%	45.4%	6.7%

Note: The total number of observations is 5,373; 1 denotes a change towards cashless payments, 0 no change declared, and -1 a change towards cash payments.

or omitted factors.² We allow for further differences between countries by adding interaction terms between country dummies and both the cash usage prior to the outbreak of the pandemic (*Cash_usage*) and its square (in addition to the *Country_dummies* themselves).

Ordered logistic regression is used to estimate the relationship between the dependent variable and the explanatory variables. Four models are used to ensure robustness. The parameters of the first model are estimated with the main explanatory variable and basic socio-demographic controls. The second model expands on the first by adding control variables related to various banking and payment innovations and the use of social media. The third model adds dummy variables for each country, and the fourth includes the interaction terms. The full model takes the following form:

$$\begin{aligned}
 y_i^* = & \alpha_1 * \text{cash_usage}_i + \alpha_2 * \text{cash_usage}_i^2 + \sum_{j=1}^{n-1} \alpha_{3j} * \text{country } j_i \\
 & + \sum_{j=1}^{n-1} \alpha_{4j} * \text{country } j_i * \text{cash_usage}_i \\
 & + \sum_{j=1}^{n-1} \alpha_{5j} * \text{country } j_i * \text{cash_usage}_i^2 + \alpha_6 * Z_i + \mu_i \quad (1)
 \end{aligned}$$

where: i identifies the observations (respondents); j identifies the country; n is the number of countries; Z are the control variables; α are the parameters; μ is the random component with a logistic distribution; and y^* is an unobservable continuous variable which can be mapped onto the observed, ordinal variable y .

² E.g. different levels of adoption of cashless payment instruments or development of payment infrastructure (Russo, 2021), nation-specific payment behaviour (ECB, 2020), or the severity of the COVID-19 crisis and the policy responses to it (Ritchie et al., 2020).

3. Results and discussion

Fig. 1 presents the distributions of the answers for our dependent variable in a cross with *Cash_usage* (our main explanatory variable). Interestingly, it suggests that the respondents who usually paid in cash before the outbreak of the pandemic have often continued to do so, whereas those who usually made cashless payments now do so more frequently.

Table 4 presents the results of our models. The frequency of cash usage prior to the outbreak of the pandemic, our main explanatory variable, is significant, albeit in squared terms. However, results associated with this variable are not directly interpretable due to applied interaction terms. Still, the rest of the results show, that respondents that use innovative banking and payment solutions and with the increase of years of formal education the probability of change toward cashless payments is rising. However, below-average income and maleness increase the probability of different outcomes: lack of payment behaviour change or more frequent use of cash. Neither the size of the respondent's place of residence nor social network usage seems to have significantly affected payment behaviour during the pandemic.

Fig. 2 presents the calculated probabilities of making more cashless payments in response to the pandemic in different countries for various initial proportions of cash payments. The probability of change is generally negatively related to the share of cash transactions prior to the outbreak of the pandemic. However, there are notable exceptions. For example, in Belgium, Czechia, Romania, and Spain, the probability curves have a negative parabolic shape whose vertices (i.e. where the probability is greatest) correspond to an initial cash share of 25%–50%. On the other hand, the probabilities for the Netherlands and Norway exhibit an inverted relationship. Most notably, Norway is the only country in which (after a slight decline) the probability of making more cashless payments increases with the initial share of cash payments.

4. Conclusions and future studies

This paper sheds more light on the change of payment behaviour since the onset of the pandemic. Our results lead to two main conclusions.

Firstly, consumers who had been making cashless payments prior to the outbreak of the pandemic have often been doing so more frequently since, while those who had preferred to pay in cash have for the most part continued to do so. This may indicate financial inclusion issues—e.g. people without cashless instruments could have difficulties to adapt to the new situation within the bounds of imposed restrictions. It should be noted, however, that although Wisniewski et al. (2021) showed that (among other factors) change of shopping behaviour and fear of using cash due to the COVID affected both payment behaviour during the pandemic and intentions of further use of cashless payments after the pandemic, it is not obvious whether those changes will last. This could be an interesting topic for future studies.

Secondly, the change in payment patterns in response to the pandemic varies between the European countries. This suggests the significant role of country-specific factors. Further studies could potentially include research on those factors, among them: the role of various levels of adoption of payment methods or the development of payment infrastructure, size of the shadow economy, cultural differences, and the impact of the pandemic on consumers in different countries.

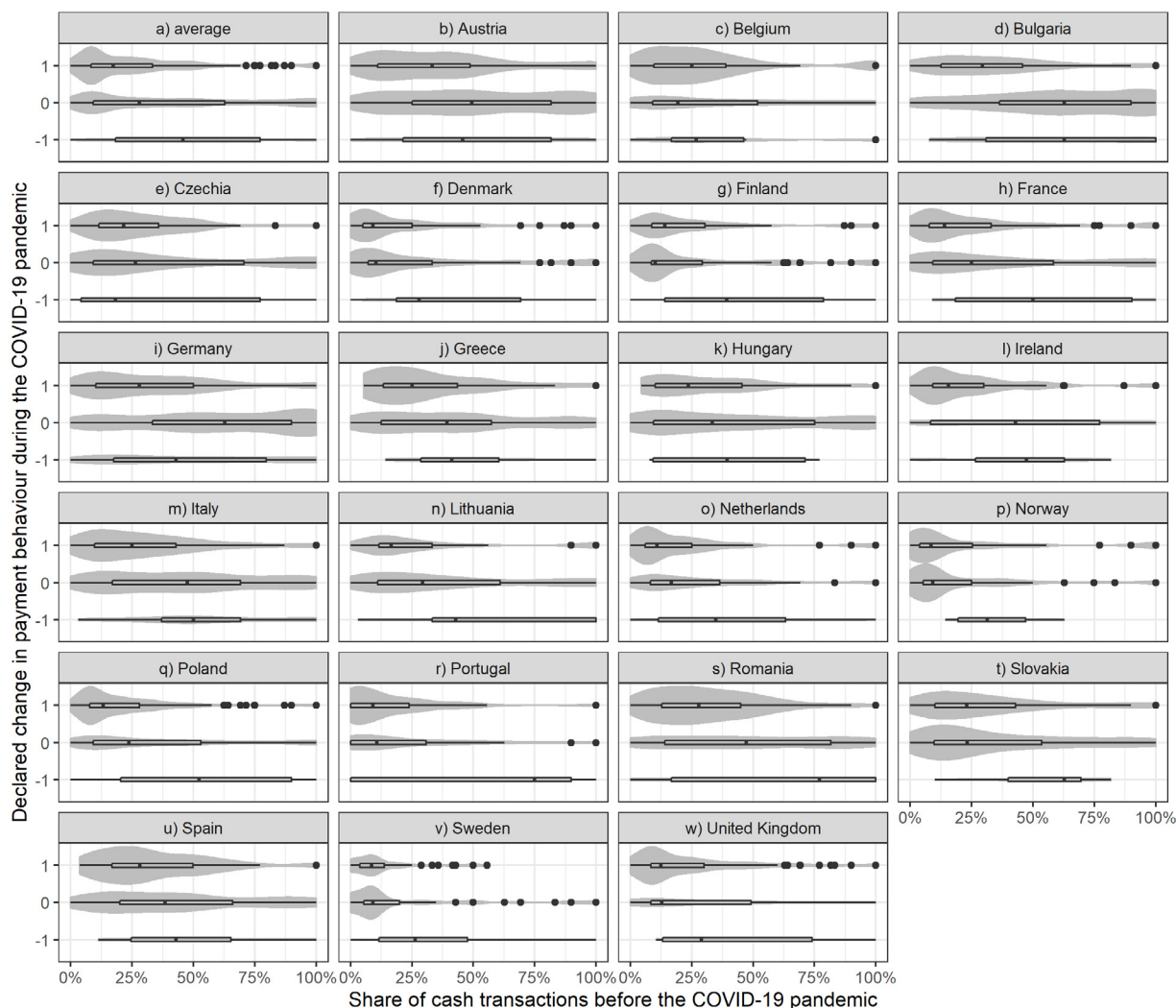


Fig. 1. Change in payment behaviour during the pandemic in relation to respondents share of cash transactions before the pandemic in different countries. Note: The total number of observations is 5373. 1 denotes a change towards cashless payments, 0 no change declared, and -1 a change towards cash payments.

Table 4
Estimation output. Dependent variable *Payment_behaviour_change_ordered*.

	(1)	(2)	(3)	(4)
Cash_usage	-0.5929* (0.3257)	-0.1187 (0.3319)	-0.1573 (0.3500)	-0.3073 (1.5958)
Cash_usage-squared	-1.0544*** (0.3274)	-1.2527*** (0.3305)	-1.1527*** (0.3415)	-0.9178 (1.4888)
Gender	-0.1745*** (0.0550)	-0.2217*** (0.0560)	-0.2325*** (0.0566)	-0.2320*** (0.0572)
Age	-0.0045*** (0.0017)	0.0015 (0.0018)	0.0015 (0.0019)	0.0014 (0.0019)
Location_size	0.0263 (0.0174)	0.0124 (0.0176)	0.0121 (0.0182)	0.0133 (0.0184)
Education_years	0.0350*** (0.0081)	0.0326*** (0.0081)	0.0311*** (0.0084)	0.0305*** (0.0084)
Income_below_average	-0.4586*** (0.0827)	-0.4259*** (0.0833)	-0.3598*** (0.0855)	-0.3684 (0.0865)
Mobile_bank		0.2864*** (0.0611)	0.2808*** (0.0622)	0.2835*** (0.0629)
Mobile_payments		0.2469*** (0.0714)	0.2102*** (0.0734)	0.0622** (0.0750)
Wearables_payments		0.5712*** (0.0947)	0.5411*** (0.0965)	0.1810*** (0.0742)
Social_networks		0.0776 (0.0720)	0.0630 (0.0744)	0.5383 (0.0973)

(continued on next page)

Table 4 (continued).

	(1)	(2)	(3)	(4)
Country_dummies	No	No	Yes	Yes
Country_interactions	No	No	No	Yes
Observations	5373	5373	5373	5373
Pseudo R-squared	0.0473	0.0581	0.0740	0.0823

Note: Variable definitions can be found in Table 1. In model 4, due to the introduction of *Country_interactions*, parameters on *Cash_usage* and *Cash_usage*-squared are interpreted as an effect for the base country. The table presents ordered log-odds (logit) regression coefficients with standard errors shown in parentheses.

***Denote statistical significance at 1%.

**Denote statistical significance at 5%.

*Denote statistical significance at 10%.

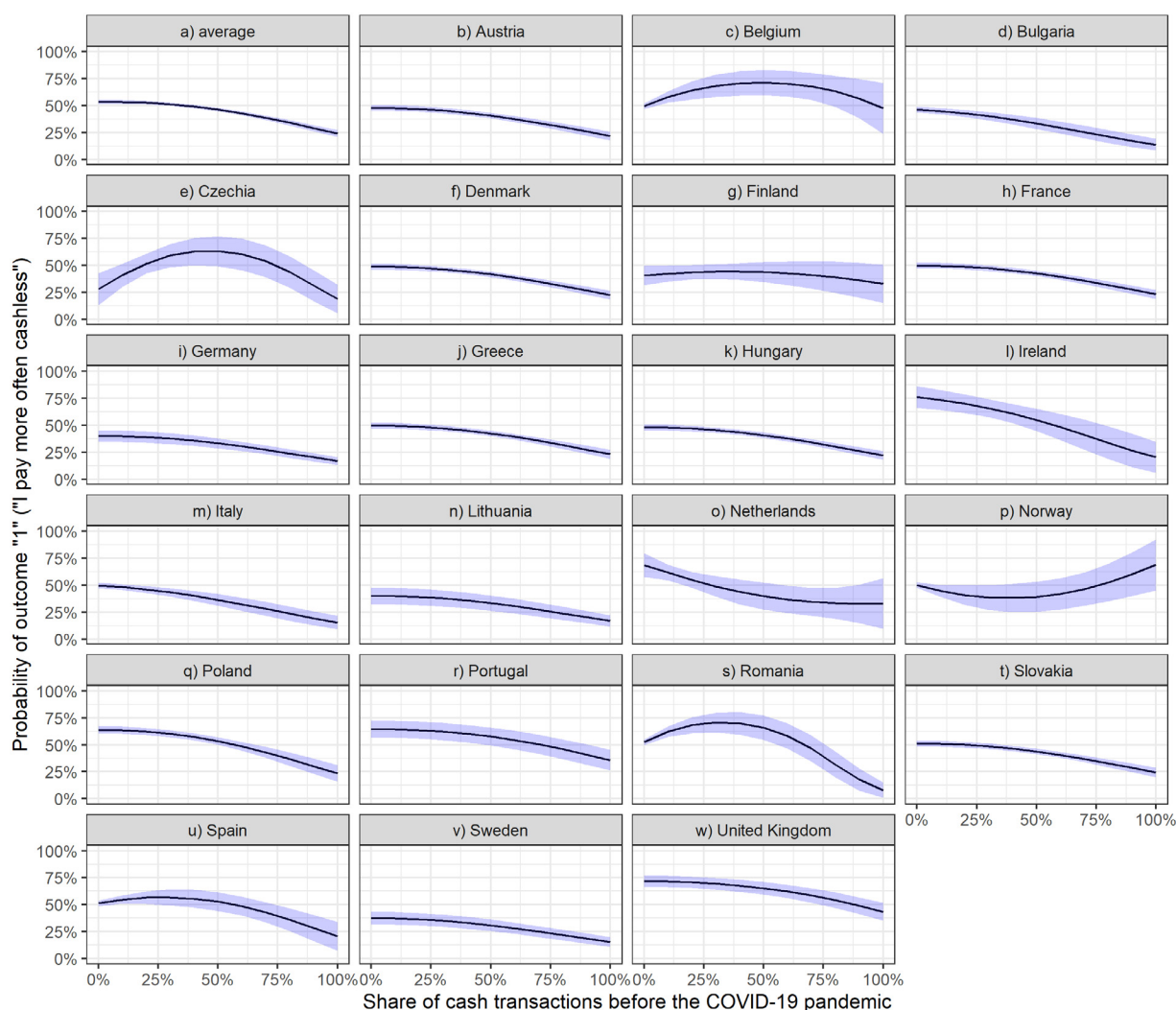


Fig. 2. Probability of adopting cashless instruments during the pandemic in different countries.

Note: Data present point estimate calculated with 95% confidence interval.

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