Switching from cash to cashless payments during the COVID-19 pandemic and beyond

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Presentation outline

1. Motivation, data and methodology

2. Results

3. Summary and conclusions

1.

Motivation, data and methodology

Research motivation and questions

- Crises often led to increased money demand.

- However, transactional use of cash during the COVID-19 pandemic might have been impacted by WHO's recommendation to 'wash hands after coming in contact with notes and coins' and media reports encouraging the use of cashless payment (contactless).

- **Potential reasons of changing payment behaviour:**
  - Fears due to the COVID-19 pandemic;
  - Anonymity preferences and other barriers;
  - Pre-existing payment and non-payment habits.

Photo by Branimir Balogović with Pexels

Research motivation and questions

- Crises often led to increased money demand. Such was a case with COVID-19 pandemic (**Goodhart and Ashworth, 2020**). Interestingly at the same time volume of cashless transaction rose significantly, as shown by e.g. **Kraenzlin *et al.* (2020)**, **Ardizzi *et al.* (2020)** and **Bounie *et al.* (2020)** for Switzerland, Italy and France respectively, which, with failing consumption, may led to conclusion that other than transactional motive of cash usage was present.

- At the same time: (i) **Jonker *et al.* (2020)** showed how measures imposed by government to contain the spread of the disease had impact on payment behaviour in the Netherlands and (ii) **Bounie *et al.* (2020)** showed substitution from in-store to online shopping during pandemic in France.

- We decided to check further for underling reasons of change:

  ❑ Our first idea was fear, as **Auer *et al.* (2020)** showed that for the first time on large scale, the speculation about the possible link between handling physical money and infections gained traction.

  - Additionally feeling of fear could have been increased by news about e.g. cash quarantines or cash burning, suggestions from officials that cashless means of payments are safer, and outright refusal to accept cash by merchants.

  ❑ Second idea was fact that only safety measures on their own are leading to change in payment behaviour, but the change of pre-existing (non-payment) habits related with these mesures affects the change pay.

Data: Coverage of the consumer survey

Methods

- The survey was conductend through pan-European internet panel Dynata as Computer-Assisted Web Interviews (CAWI).

- Sample was representative for the structure of Internet users.

- Stratified random sampling was employed, with age, gender and size of the respondent's locality acting as stratification factors.

- The study was conducted from July to August 2020.
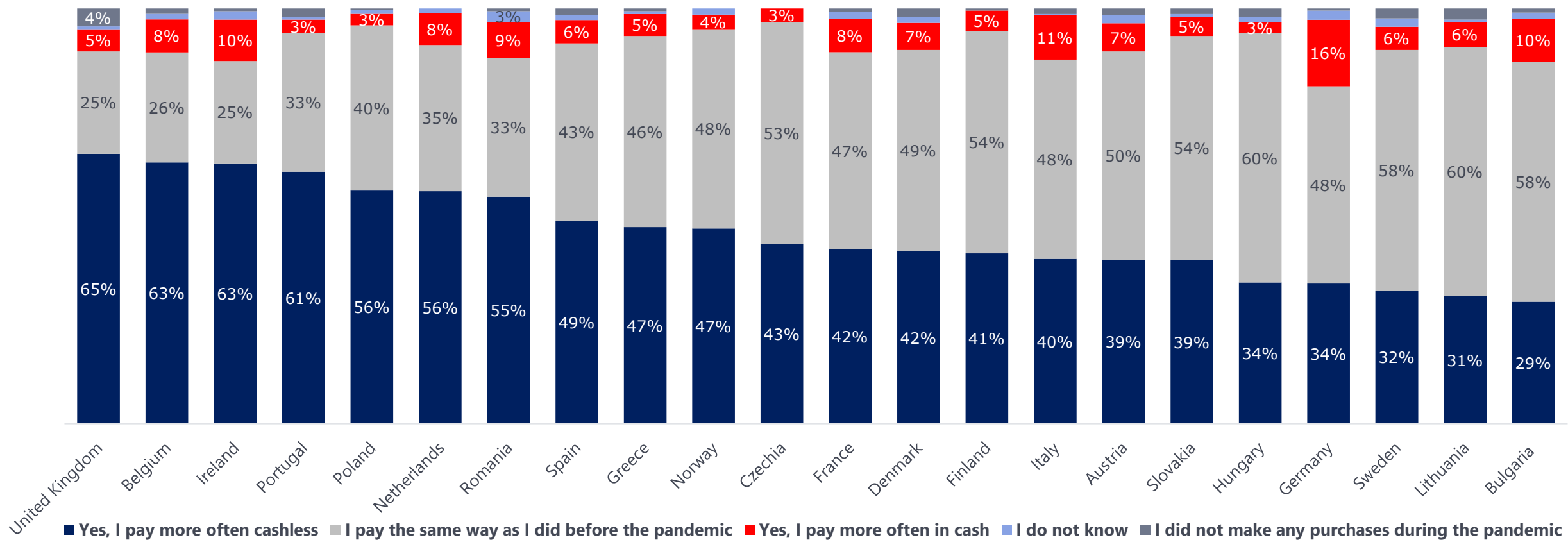
http://paytechimpact.eu/

Consumer study (2020)

- 5504 survey respondents

- 22 European countries

- According to Eurostat, Internet users in the countries covered by the study accounted for 96% of the Internet user population in the European Union.

PayTechImpact.EU project

- The study was funded by National Science Centre, Poland under the grant No. 2017/26/E/HS4/00858.
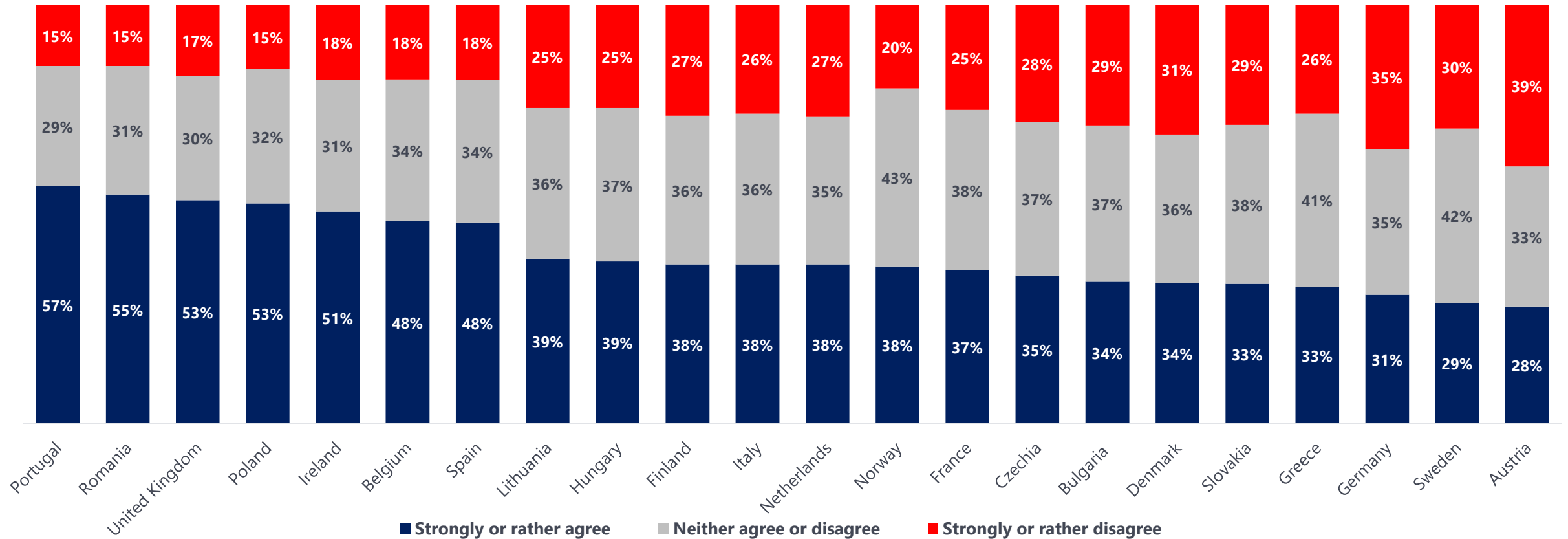
Declared change in payment behaviour in POS during COVID-19 pandemic

Country	Yes, I pay more often cashless	I pay the same way as I did before the pandemic	Yes, I pay more often in cash	I did not make any purchases during the pandemic
United Kingdom	65%	25%	5%	4%
Belgium	63%	26%	8%	
Ireland	63%	25%	10%	
Portugal	61%	33%	3%	
Poland	56%	40%	3%	
Netherlands	56%	35%	8%	
Romania	55%	33%	9%	3%
Spain	49%	43%	6%	
Greece	47%	46%	5%	
Norway	47%	48%	4%	
Czechia	43%	53%	3%	
France	42%	47%	8%	
Denmark	42%	49%	7%	
Finland	41%	54%	5%	
Italy	40%	48%	11%	
Austria	39%	50%	7%	
Slovakia	39%	54%	5%	
Hungary	34%	60%	3%	
Germany	34%	48%	16%	
Sweden	32%	58%	6%	
Lithuania	31%	60%	6%	
Bulgaria	29%	58%	10%	

Legend: ■ Yes, I pay more often cashless   ■ I pay the same way as I did before the pandemic   ■ Yes, I pay more often in cash   ■ I do not know   ■ I did not make any purchases during the pandemic

Source: PayTechImpact.EU consumer survey; n=5504.

Intention to Use More Cashless Payments <u>After</u> the Pandemic is Over

	Portugal	Romania	United Kingdom	Poland	Ireland	Belgium	Spain	Lithuania	Hungary	Finland	Italy	Netherlands	Norway	France	Czechia	Bulgaria	Denmark	Slovakia	Greece	Germany	Sweden	Austria
Strongly or rather disagree	15%	15%	17%	15%	18%	18%	18%	25%	25%	27%	26%	27%	20%	25%	28%	29%	31%	29%	26%	35%	30%	39%
Neither agree or disagree	29%	31%	30%	32%	31%	34%	34%	36%	37%	36%	36%	35%	43%	38%	37%	37%	36%	38%	41%	35%	42%	33%
Strongly or rather agree	57%	55%	53%	53%	51%	48%	48%	39%	39%	38%	38%	38%	38%	37%	35%	34%	34%	33%	33%	31%	29%	28%

■ Strongly or rather agree   ■ Neither agree or disagree   ■ Strongly or rather disagree

Source: PayTechImpact.EU consumer survey; n=5504.

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Empirical model: logit regressions

$$P(Y_{jk}^i = 1 | H_{jk}, E_k, C_{jk}) = \frac{1}{1 + e^{-\left(\alpha + \beta(H_{jk}) + \varphi(E_k) + \gamma(C_{jk})\right)}}$$

- $i \in \{1, 2\}$ - *Cashless switch* or *Cashless intention* (two variants of models);

- $Y_{jk}^i = 1$ indicates that the person either switched to cashless payments during COVID-19 pandemic or wishes to do so in the future;

- H_{jk} is the vector that measures the characteristics, perceptions and confidence in using technology of person *j* living in country *k*;

- E_k is a vector of specific characteristics of country *k*;

- C_{jk} is our core vector of COVID-19-induced fears and changes in the behavior of person *j* living in country *k*.

Variables – description 1/2

Variable		Variable description
Dependent variables		
Y_{jk}^i	*Cashless switch*	A binary variable capturing the response to the questionnaire item "During the COVID pandemic, I pay more often cashless" (1= yes, 0 = no)
	Cashless intention	Dummy variable measuring respondent's agreement with the statement "After the pandemic I will use cashless payments more often" (1= yes, 0 = no)
Explanatory variables		
C_{jk}	*Change in habits related to physical contact*	First factor extracted from items "I will work more remotely", "I will meet people online more frequently", "I will travel less in my country", "I will travel less abroad", "I will eat at home more frequently" and "I will be more focused on my health" after the COVID-19 crisis is over. The items that load heavily are related to physical contact
	Change in online habits	Second factor extracted from items "I will work more remotely", "I will meet people online more frequently", "I will travel less in my country", "I will travel less abroad", "I will eat at home more frequently" and "I will be more focused on my health" after the COVID-19 crisis is over. The items that load heavily are related to online habits
	Net fear of cash	A variable constructed by taking the difference in responses to two questionnaire items: "I am afraid of contracting COVID-19 due to the usage of cash in physical stores" and "I am afraid of contracting COVID-19 as a result of operations with cashless payments in a physical stores". Higher values of this variable indicate relatively high fear of cash, as compared to cashless transactions
E_k	*COVID deaths*	Total number of COVID-19 deaths (in thousands) for the country in which the respondent resides
	Shadow economy	Size of the shadow economy as a percentage of GDP in the respondent's country of residence

Variables – description 2/2

Variable	Variable description
Gender	Dummy variable capturing respondent's gender (1 if female, 0 otherwise)
Age	Age of the respondent in years
Cards & mobile	A dummy variable measuring the possession of any card, mobile or wearable applicable at the point of sale (1 = yes, 0 = no)
Anonymity	Degree of agreement with a statement "I prefer payments for shopping to be anonymous, so that no one can see what I bought and when" measured on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree)
Convenience of cashless payments	A factor aggregating assessments of convenience of five different cashless payment technologies (contactless (NFC) payments, Google Pay, Apple Pay, QR code payments, contactless payments with wearables)
Safety of cashless payments	A factor combining perceptions of safety of five different cashless payment technologies
Popularity of cashless payments	A factor aggregating assessments of how widespread five different cashless payment instruments are
Ease of use of cashless technologies	A factor extracted from evaluations of how easy to use five cashless payment technologies are
Control over finance with cashless payments	A factor constructed from an assessment of how much control over personal finance is afforded by five different cashless payment technologies
Literacy in using mobile apps	A factor aggregating five items assessing how confident the surveyed person is in using mobile apps for transport (e.g. Uber, Bolt, Freenow), food delivery, buying tickets on public transport, paying parking fees, and tracking fitness activity
Experience in using computer payments	First factor extracted from the items measuring respondent's experience in using payment technologies such as Apple Pay, Google Pay, Amazon Pay, Alipay, MoneyGram, Samsung Pay, Wechat Pay, Western Union, Revolut, cryptocurrencies and HCE. The items that load clearly relate to computer-based payments
Experience in using mobile payments	Second factor extracted from the items measuring respondent's experience in using payment technologies such as Apple Pay, Google Pay, Amazon Pay, Alipay, MoneyGram, Samsung Pay, Wechat Pay, Western Union, Revolut, cryptocurrencies and HCE. The items that load clearly relate to mobile-based payment technologies

The rows from *Cards & mobile* through *Experience in using mobile payments* are grouped under the label H_{jk}.

Characteristics of Factors Used in the Study

Factor	Eigenvalue	Cronbach's alpha	Proportion of variance explained	Kaiser-Meyer-Olkin measure
Convenience of cashless payments	3.6510	0.8665	0.7302	0.8751
Safety of cashless payments	3.9730	0.9346	0.7945	0.8897
Popularity of cashless payments	3.7631	0.9161	0.7526	0.8735
Ease of use of cashless technologies	3.8451	0.9236	0.7690	0.8774
Control over finance with cashless payments	4.1703	0.9495	0.8341	0.8968
Literacy in using apps	2.3729	0.7208	0.4746	0.7818
Experience in using computer payments	2.1871	0.6027	0.3701	0.8265
Experience in using mobile payments	1.9133			
Change in habits related to physical contact	2.9795	0.7722	0.5710	0.8265
Change in online habits	1.0172			

Summary Statistics

Variable	Mean	Standard deviation	Minimum	25th Percentile	Median	75th Percentile	Maximum
Cashless switch	0.4671	0.4999	0.0000	0.0000	0.0000	1.0000	1.0000
Cashless intention	0.4100	0.4901	0.0000	0.0000	0.0000	1.0000	1.0000
Gender	0.5158	0.4998	0.0000	0.0000	1.0000	1.0000	1.0000
Location size	2.7698	1.5745	1.0000	1.0000	2.0000	4.0000	6.0000
Age	47.0358	16.3105	18.0000	33.0000	47.0000	62.0000	100.0000
Card & mobile	0.9001	0.3000	0.0000	1.0000	1.0000	1.0000	1.0000
Anonymity	3.2807	1.1155	1.0000	3.0000	3.0000	4.0000	5.0000
Convenience of cashless payments	0.0000	1.0000	-2.0538	-0.4539	-0.0559	0.6747	1.9426
Safety of cashless payments	0.0000	1.0000	-2.2912	-0.2061	-0.0197	0.7972	1.8791
Popularity of cashless payments	0.0000	1.0000	-2.3727	-0.3576	-0.1390	0.5573	2.0948
Ease of use of cashless technologies	0.0000	1.0000	-2.5949	-0.4494	-0.0704	0.6233	1.6960
Control over finance with cashless payments	0.0000	1.0000	-2.3564	-0.2896	-0.2896	0.7438	1.7771
Literacy in using mobile apps	0.0000	1.0000	-0.8844	-0.8855	-0.3121	0.5154	2.4248
Experience in using computer payments	0.0000	1.0000	-1.3594	-0.2036	-0.2036	-0.2036	9.6584
Experience in using mobile payments	0.0000	1.0000	-2.9746	-0.5205	-0.5205	0.4337	5.9000
Change in habits related to physical contact	0.0000	1.0000	-2.9273	-0.5275	-0.0200	0.6068	2.5595
Change in online habits	0.0000	1.0000	-3.6399	-0.5854	0.1649	0.6778	3.1936
Net fear of cash	0.2407	1.0142	-4.0000	0.0000	0.0000	0.0000	4.0000
COVID deaths	8.4880	5.1846	2.4680	4.9890	6.2470	11.4780	20.9830
Shadow economy	21.9808	7.1796	9.6000	16.7000	20.3000	27.8000	37.8000

3.

Results

Switch to Cashless Payments <u>During</u> the Pandemic

	(1)	(2)	(3)
Gender	0.1760**	0.1527**	0.1595**
Location size	0.0273	0.0151	0.0192
Age	0.0047*	0.0066**	0.0063**
Card & mobile	0.6775***	0.7445***	0.7319***
Anonymity	-0.0577*	-0.1231***	-0.1089***
Convenience of cashless payments	0.0043	-0.0264	-0.0225
Safety of cashless payments	0.1191**	0.1245**	0.1141*
Popularity of cashless payments	0.0241	-0.0431	-0.0363
Ease of use of cashless technologies	0.1534**	0.1708***	0.1607***
Control over finance with cashless payments	0.0134	-0.0208	-0.0234
Literacy in using mobile apps	0.3797***	0.3657***	0.3642***
Experience in using computer payments	0.0632*	0.0166	0.0218
Experience in using mobile payments	0.0381	0.0169	0.0180
COVID deaths	0.0261***	0.0175**	0.0188**
Shadow economy	-0.0113**	-0.0191***	-0.0194***
Net fear of cash	0.2791***		0.2422***
Change in habits related to physical contact		0.4750***	0.4537***
Change in online habits		0.0982**	0.0987**
Constant	-1.0287***	-0.6401**	-0.7289**
Observations	5,504	5,504	5,504
chi2	343.2	391.1	429.7
p-value	0	0	0
McFadden's pseudo R-squared	0.088	0.108	0.117

***, **, * denote statistical significance at 1%, 5% and 10%, respectively.

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Intention to Use More Cashless Payments <u>After</u> the Pandemic is Over

	(1)	(2)	(3)
Gender	0.1980**	0.1620*	0.1779**
Location size	0.0257	0.0064	0.0119
Age	0.0023	0.0054*	0.0046
Card & mobile	0.5755***	0.7383***	0.7210***
Anonymity	0.0084	-0.1305***	-0.1108***
Convenience of cashless payments	0.0693	0.0298	0.0339
Safety of cashless payments	0.2487***	0.2759***	0.2705***
Popularity of cashless payments	0.0518	-0.0860	-0.0775
Ease of use of cashless technologies	0.1904***	0.2312***	0.2122***
Control over finance with cashless payments	0.1219**	0.0646	0.0680
Literacy in using mobile apps	0.1522***	0.1234**	0.1159**
Experience in using computer payments	0.1187***	0.0364	0.0470
Experience in using mobile payments	0.0686	0.0379	0.0401
COVID deaths	0.0287***	0.0147*	0.0171**
Shadow economy	0.0108*	-0.0039	-0.0041
Net fear of cash	0.4405***		0.3981***
Change in habits related to physical contact		1.0011***	0.9808***
Change in online habits		0.1050**	0.1085**
Constant	-1.8311***	-1.1559***	-1.2961***
Observations	5,504	5,504	5,504
chi2	395.7	533.7	546.5
p-value	0	0	0
McFadden's pseudo R-squared	0.123	0.204	0.223

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Age	0.0023	0.0054*	0.0046
Card & mobile	0.5755***	0.7383***	0.7210***
Anonymity	0.0084	-0.1305***	-0.1108***
Convenience of cashless payments	0.0693	0.0298	0.0339
Safety of cashless payments	0.2487***	0.2759***	0.2705***
Popularity of cashless payments	0.0518	-0.0860	-0.0775
Ease of use of cashless technologies	0.1904***	0.2312***	0.2122***
Control over finance with cashless payments	0.1219**	0.0646	0.0680
Literacy in using mobile apps	0.1522***	0.1234**	0.1159**
Experience in using computer payments	0.1187***	0.0364	0.0470
Experience in using mobile payments	0.0686	0.0379	0.0401
COVID deaths	0.0287***	0.0147*	0.0171**
Shadow economy	0.0108*	-0.0039	-0.0041
Net fear of cash	0.4405***		0.3981***
Change in habits related to physical contact		1.0011***	0.9808***
Change in online habits		0.1050**	0.1085**
Constant	-1.8311***	-1.1559***	-1.2961***
Observations	5,504	5,504	5,504
chi2	395.7	533.7	546.5
p-value	0	0	0
McFadden's pseudo R-squared	0.123	0.204	0.223

***, **, * denote statistical significance at 1%, 5% and 10%, respectively.

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Marginal Effects for the Key Explanatory Variables

Estimates from the *Cashless switch*
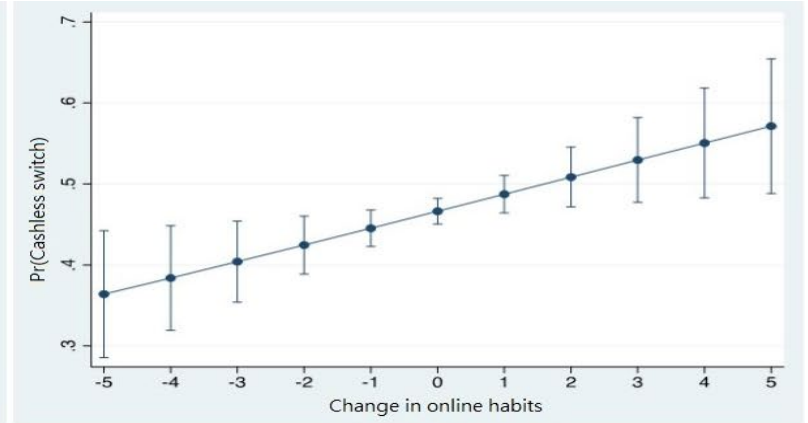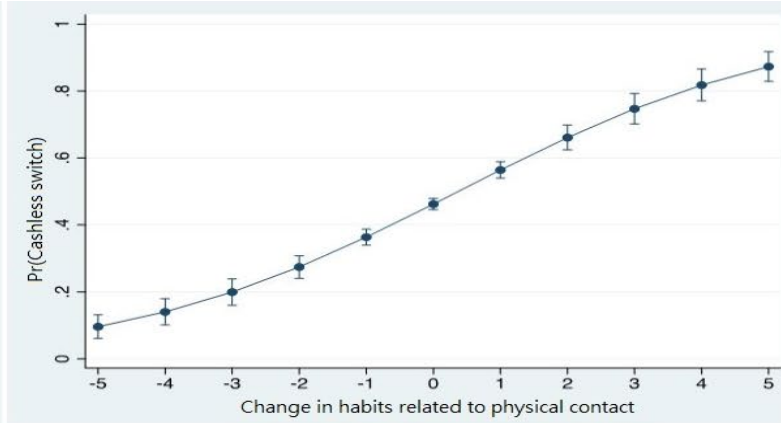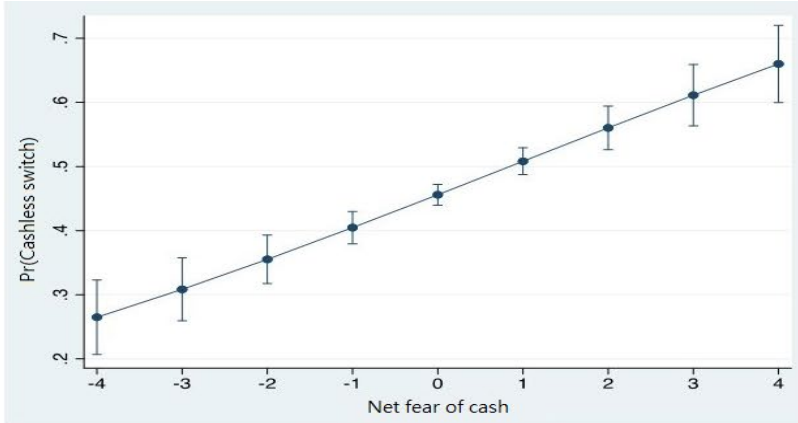
Estimates from the *Cashless intention*
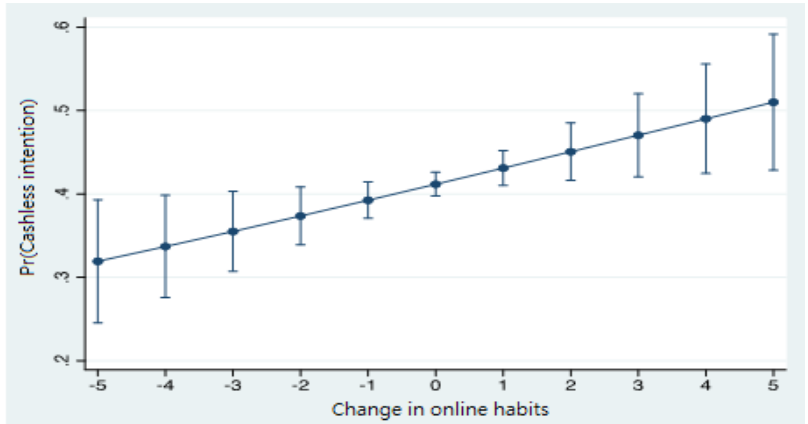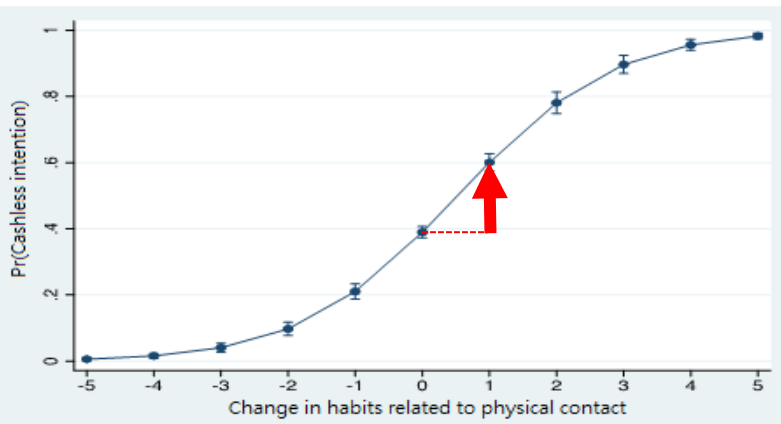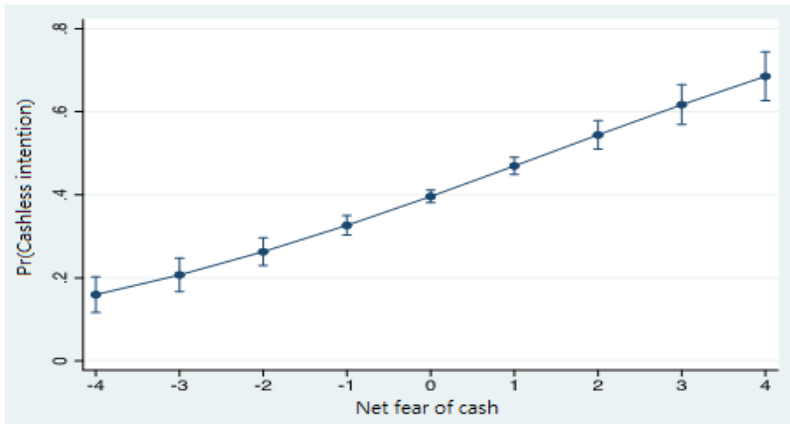
4.

Summary and conclusions

Summary and conclusions

- We expanded existing literature on factors affecting payment behaviour by showing that **payment behaviour can be influenced** by both (i) **fear associated with the usage** of particular **payment instrument** and, additionally, that the (ii) **change**, especially sudden, of other, **non-payment behaviours**, can also impact the way people pay.

- We also shown that the **impact of such changes could be not only temporary**, but could also have long lasting consequences.

- Additionally we discovered that **anonymity preference** and the extent of **shadow economy** could **reduce willingness or possibilities to change** ones payment behaviour.

Wisniewski, T. P., Polasik, M., Kotkowski, R., & Moro, A. *Switching from cash to cashless payments during the COVID-19 pandemic and beyond* (February 28, 2021). Available at SSRN: https://ssrn.com/abstract=3794790 or http://dx.doi.org/10.2139/ssrn.3794790

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5.

Appendix

Further studies focused on cross-country differences:

Kotkowski, R., Polasik, M., *COVID-19 Pandemic Increases the Divide between Cash and Cashless Payment Users in Europe* (July 5, 2021). Available at SSRN: https://ssrn.com/abstract=3881062 or http://dx.doi.org/10.2139/ssrn.3881062

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 make more frequent cashless payments (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 payment_behaviour_change 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.

# Estimation output. Dependent variable payment_behaviour_change_ordered

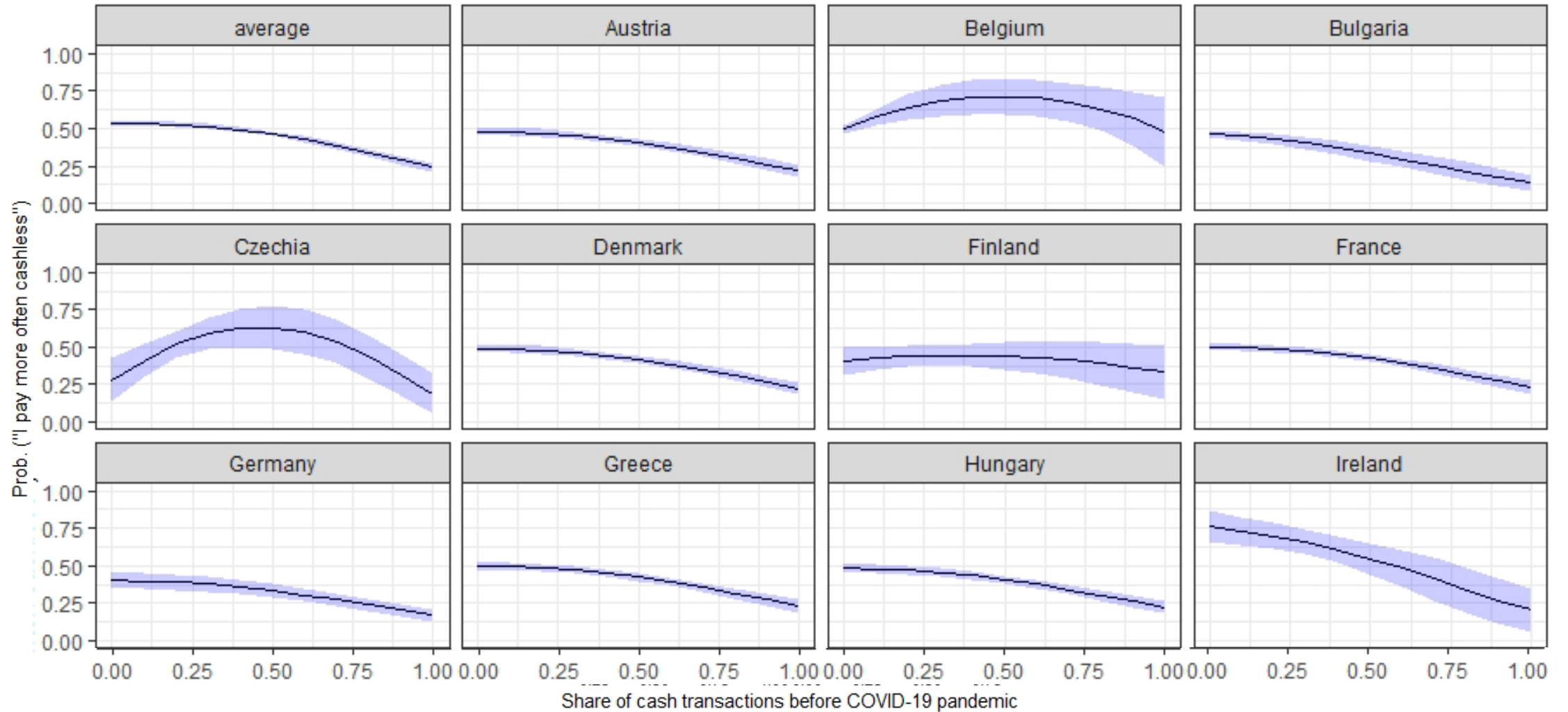|	(1)	(2)	(3)	(4)
cash_usage	-0.5929* (0.3257)	-0.1187 (0.3319)	-0.1573 (0.3500)	-0.3073 (1.5958)
cash_usage-squared	-1.0544*** (0.3274)	-1.2527*** (0.3305)	-1.1527*** (0.3415)	-0.9178 (1.4888)
male	-0.1745*** (0.0550)	-0.2217*** (0.0560)	-0.2325*** (0.0566)	-0.2320*** (0.0572)
age	-0.0045*** (0.0017)	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)
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

Distribution of declared change in payment behaviour the during COVID-19 pandemic by country
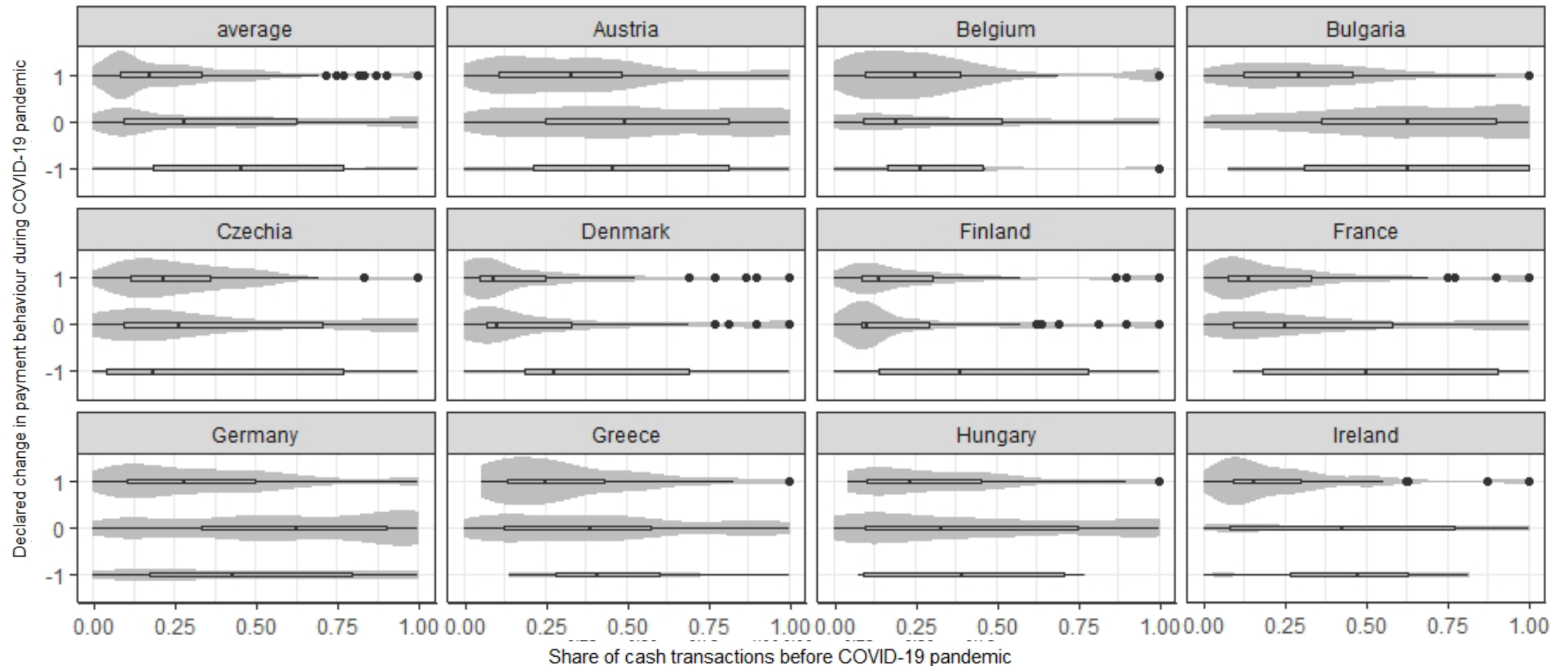
Distribution of declared change in payment behaviour the during COVID-19 pandemic by country
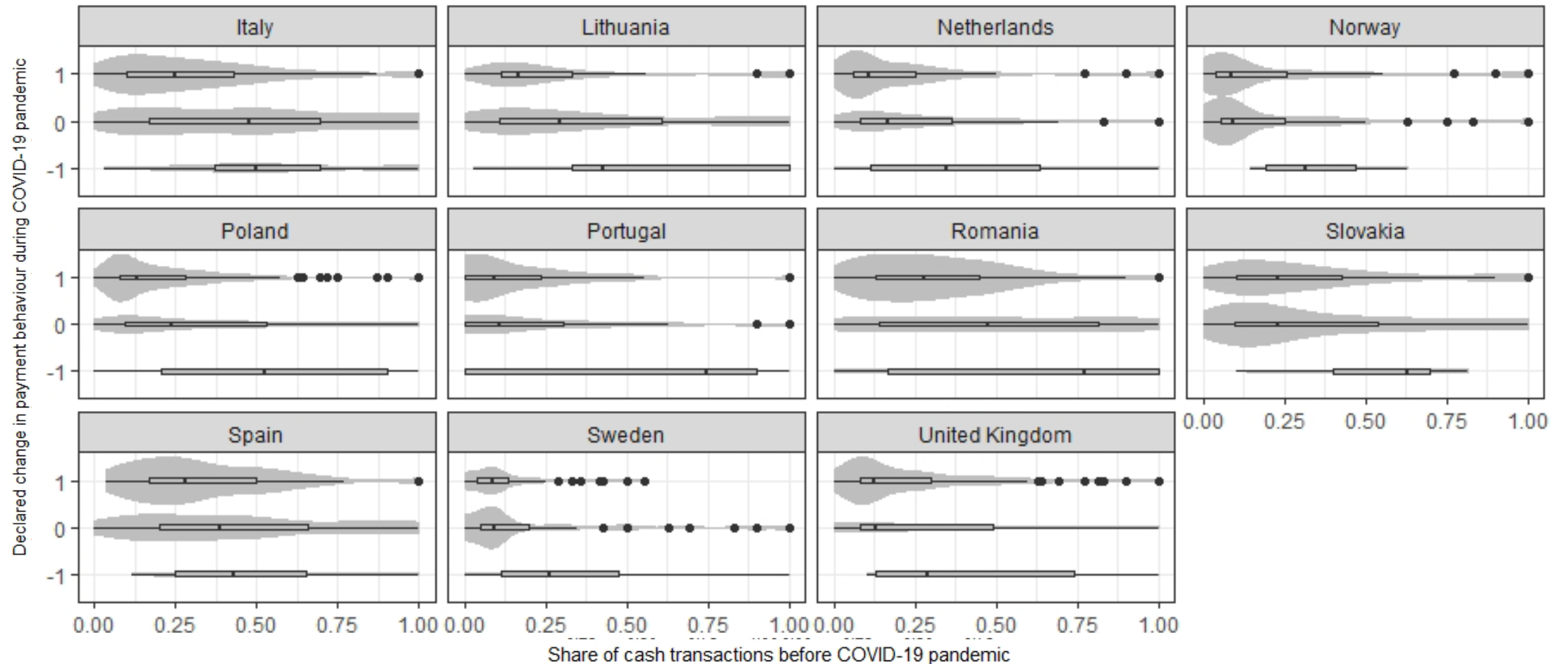
Probability of adopting cashless instruments in different countries

Probability of adopting cashless instruments in different countries