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National Culture and the Demand for Physical Money During the First Year of the COVID-19 Pandemic

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Narodowy Bank Polski
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Contents

Abstract	4
1. Introduction	5
2. Data and method	8
3. Results and discussion	13
4. Findings and conclusions	16
Data Availability Statement	17
References	17

Abstract

There was a significant increase in the demand for physical money during the COVID-19 pandemic. This stood in stark contrast to the decline in demand witnessed during previous pandemics. However, the change was not uniform and varied significantly between countries. By employing the "national culture" framework to identify the drivers of this variation, this study found that uncertainty avoidance, as well as social norms regarding gratification, played a major role. This suggests that some central banks should hold larger cash reserves to mitigate the risk of uncertainty and that the national culture framework may prove useful in researching the international differences in past, present, and future money demand.

JEL Codes: E41, E51, I12

Keywords: *COVID-19 pandemic; money demand; currency in circulation; national culture; uncertainty avoidance*

1. Introduction

Physical money (also referred to as "cash" or "currency" in this paper) is being used less and less for everyday transactions. For example, the proportion of retail and person-to-person payments made in cash fell from around 79% to 73% (ECB, 2020) in the euro area, 31% to 26% in the US (Greene & Stavins, 2021), and 40% to 23% in the UK (Caswell et al., 2020) in 2016-2019. However, cash is not disappearing. On the contrary, the demand for cash has been steadily rising in absolute terms over the past few decades (Ashworth & Goodhart, 2020; Pietrucha, 2021), with non-transactional demand reported to be the major driver of this increase (Zamora-Pérez, 2021).

The COVID-19 pandemic accelerated both phenomena. Recent studies show that, during the pandemic, cashless instruments usage intensified (Greene et al., 2021; Jonker et al., 2022; Kotkowski & Polasik, 2021) while the demand for cash increased (Ashworth & Goodhart, 2021; Rösl & Seitz, 2021). Moreover, this occurred despite cash being used less frequently in retail transactions due to the fear of contracting COVID-19 through handling money (ECB, 2020; Huterska et al., 2021; Wisniewski et al., 2021) and despite the findings of Cevik (2020), who demonstrated that the demand for cash had decreased during previous epidemics (e.g. during the Ebola and SARS epidemics).

However, this observed increase in the demand for physical money was not uniform worldwide. IMF International Financial Statistics database (IMF IFS) data for 128 countries shows that the value of currency in circulation increased on average by 18.7% in 2020, but that this change varied from a 7.5% decrease to a 120.5% increase. In this paper I employ "national culture" dimensions to explain this variation. The usefulness of "national culture" is supported by the growing body of literature on the subject, which covers such broad financial topics as, for example, (i) firm behavior (Boubakri et al., 2021; Chen et al., 2015; Moro et al., 2021), (ii) financial development (Cao et al., 2020; Khan et al., 2022; Kwok & Tadesse, 2006; Makrychoriti & Pasiouras, 2021), (iii) financial literacy and inclusion (Ahunov & Van Hove, 2020b; Anyangwe et al., 2022), or (iv) stock behavior (Ashraf, 2021).

Within this framework, "national culture" is defined as the "collective programming of the mind which distinguishes the members of one human group from another (...) the interactive aggregate of common characteristics that influence a human group's response to its environment" (Hofstede,

1980, p. 25). Hofstede and his collaborators distinguished 6 "national culture" measurements (Hofstede, 2011; Hofstede et al., 2010):

(i) the power distance index (PDI), which measures the degree of acceptance of perceived unequal power distribution;

(ii) individualism vs. collectivism (IDV), which measures the degree of preference for individual over collective identity;

(iii) masculinity vs. femininity (MAS), which measures the degree of preference for assertiveness and competitiveness over passivity and cooperation;

(iv) the uncertainty avoidance index (UAI), which measures the degree of preference for fixed laws, procedures etc. over uncertainty;

(v) long-term orientation vs. short-term normative orientation (LTO), which measures the tendency for long-term saving, planning etc. in preference to short-term consumption;

(vi) indulgence vs. restraint (IVR), which measures the perceived allowance or tolerance of gratification vs. its restriction by social norms.

As it is already established that precautionary demand is positively related to higher uncertainty (Leland, 1968) a central assumption of this paper is that, in the face of extraordinary events, and, therefore, an increase in uncertainty, the demand for cash will be higher in more uncertainty-avoidant societies (with higher UAI). It can be argued that, as cash is both an asset and a secure and widely accepted means of payment that is not susceptible to technological failures (Eschelbach & Schneider, 2020; Pietrucha & Maciejewski, 2020), holding it (or even hoarding) would ease uncertainty about the future.

The other "national culture" variables are assumed by me to have a lesser impact. Nonetheless, I speculate that the demand for cash should be higher in more indulgent nations (with higher IVR) as they would probably spend more for consumption. This effect could be especially visible in countries where cash usage is high. I additionally assumed that the demand for cash will be higher in more individualistic and more competitive cultures (with higher IDV and MAS), as demand for cash is less likely to be tempered there, e.g., during periods of intensified cash demand. By contrast, demand for cash is assumed by me to be lower in nations with long-orientation (with high LTO) and with less challenged hierarchy (with higher PDI). In the former case, this is because societies with a long-term focus are less likely to react impulsively to events, especially if these risks exacerbating the situation (e.g., bank runs), and in the latter case, because more compliant societies

might better response to the authorities tries to ease up the pressure (by sending calming messages or imposing restrictions).

The paper is structured as follows: Section 2 introduces the data and the methodology; Section 3 details the empirical results; and Section 4 presents the findings and conclusions.

2. Data and method

The analysis employed in this study was based on a balanced panel dataset for 58 countries for the period between February 2020 and February 2021. However, due to the fixed nature of "national culture" variables, the analysis was performed employing a series of 12 cross-sectional OLS regressions. Each regression focused on a single month, beginning with March 2020—the month of the official declaration of the pandemic—and ending with February 2021. So, for each month *t* the following regression is calculated:

$$\frac{CiC_i^t}{CiC_i^b} = \alpha + \mathrm{NC}_i\beta^{NC} + CV_i^t\beta^{CV} + \varepsilon_i, \quad (1)$$

where: CiC_i^t is *currency-in-circulation* in country *i*, CiC_i^b is *currency-in-circulation* in country *i* in the base month (i.e. February 2020), α is a constant term, NC_i is a 6-dimensional "national culture" vector for country *i*, CV_i^t is a 5-dimensional control variable for country *i* at month *t*, β^{NC} and β^{CV} are coefficient vectors, and ε_i is an i.i.d. random variable. The model was constructed to measure the impact the explanatory variables had on the cumulative change of the dependent variable over the one-year period.

The dependent variable—*currency-in-circulation* (CiC)—is the demand for cash measured by the nominal value of cash circulating in the economy, presented as an index of the value of CiC at the end of 12 consecutive months (starting from the beginning of the pandemic) and the value of CiC just before the COVID-19 pandemic. CiC data were mainly gathered from the IMF IFS, but for some countries, the data were supplemented with National Central Banks' (NCBs') datasets. Countries under a monetary union (e.g., the euro area) or where a foreign currency is predominantly used (e.g., Montenegro or Panama), and countries experiencing hyperinflation (e.g., Argentina or Venezuela) were excluded from further analysis because of lack or unreliability of data about CiC.

The main explanatory variables are Hofstede's dimensions of "national culture", presented as a 6-dimensional "national culture" vector (NC_i). These were obtained from Hofstede Insights consultancy, which further expanded data prepared by Hofestede et al. (2010). Data in the vector take values from 0-100, but scores must be analyzed in relation to other countries and not

absolutely. It should be further noted that scores for countries were generated during long timespan, starting from data collated between 1967 and 1973. During this time culture slowly changed (e.g. people became more individualistic and less long term orientated), however, studies shown that this not necessary means that relative position between countries changed (Beugelsdijk & Welzel, 2018).

The set of control variables consists of the basic macroeconomic factors used in money demand functions (Clarida et al., 1999), viz. GDP, interest rates (IR), and CPI. These data were collected from various sources, primary from the BIS and IMF IFS databases, but—whenever any data were missing—they were obtained, if possible, directly from NCBs or National Statistical Offices (NSOs). The above variables were complemented by: (i) a one-year lag in CiC, to account for country-specific trends and seasonality; and (ii) the COVID-19 Stringency Index (SI), collected from Oxford COVID-19 Government Response Tracker, which tracks the strictness of governments policies that restrict people's behavior (like lockdowns) (Hale et al., 2021).

Since the study was conducted using monthly data, quarterly GDP data were temporally disaggregated using the Denton-Cholette method (Cholette, 1984) without an indicator series (since it proved impossible to find one for such a divergent set of countries). Additionally, it should be noted that IR data were compiled with a hierarchy suggested by the monetary transmission mechanism (Taylor, 1995). Specifically, precedence in descending order, was given to "central bank policy rates", "money market rates", then "deposit rates", depending on availability. SI data were converted from daily to monthly by averaging the value of the index for a given month.

All control variables were transformed similarly to the dependent variable. The CiC lag, GDP, and CPI data for specific months were divided by the base month ($\frac{CiC_i^{t-12}}{CiC_i^{b-12}}$, $\frac{GDP_i^t}{GDP_i^b}$, and $\frac{CPI_i^t}{CPI_i^b}$ respectively). In turn, IR and SI data were averaged over the period from the base month to the consecutive month for each country ($\frac{\sum_{\tau=b}^{t} IR_\tau}{\tau-b+1}$ and $\frac{\sum_{\tau=b}^{t} SI_\tau}{\tau-b+1}$ respectively). The base month was set to be February 2019 for CiC lag and February 2020 for the other control variables (similarly to dependent variables).

Table 1 presents descriptive statistics of the variables used in the study, whereas detailed variable sources are presented in Table 2.

Table 1. Descriptive statistics and their method of calculation

type	name	method of calculation	*month*	(1) N	(2) mean	(3) sd	(4) min	(5) max
Dependent variable	CiC	Index, *month* to base = Feb 2020	Mar 2020	58	1.04	0.05	0.91	1.24
			Apr 2020	58	1.07	0.07	0.91	1.36
			May 2020	58	1.10	0.08	0.90	1.41
			Jun 2020	58	1.11	0.08	0.90	1.38
			Jul 2020	58	1.13	0.10	0.91	1.54
			Aug 2020	58	1.13	0.09	0.91	1.37
			Sep 2020	58	1.13	0.09	0.93	1.37
			Oct 2020	58	1.14	0.09	0.92	1.38
			Nov 2020	58	1.15	0.10	0.93	1.42
			Dec 2020	58	1.20	0.12	0.96	1.55
			Jan 2021	58	1.18	0.11	1.02	1.46
			Feb 2021	58	1.18	0.10	1.02	1.45
National culture	PDI	NA	NA (fixed variable)	58	67.17	20.29	18	100
	IDV			58	37.76	22.76	10	91
	MAS			58	47.84	18.10	5	95
	UAI			58	66.66	22.69	8	98
	LTO			58	44.72	24.96	4	100
	IVR			58	44.40	22.79	0	97
Control variables	CiC_lag	Index, *month* to base = Feb 2019	Mar 2019	58	1.00	0.02	0.94	1.05
			Apr 2019	58	1.02	0.03	0.93	1.08
			May 2019	58	1.03	0.06	0.92	1.28
			Jun 2019	58	1.03	0.05	0.90	1.16
			Jul 2019	58	1.03	0.06	0.89	1.18
			Aug 2019	58	1.04	0.06	0.90	1.21
			Sep 2019	58	1.04	0.06	0.89	1.22
			Oct 2019	58	1.05	0.06	0.92	1.22
			Nov 2019	58	1.06	0.06	0.91	1.21
			Dec 2019	58	1.11	0.08	0.95	1.32
			Jan 2020	58	1.08	0.06	0.94	1.26
			Feb 2020	58	1.08	0.07	0.93	1.30
	GDP	Index, *month* to base = Feb 2020	Mar 2020	58	0.96	0.03	0.87	1.03
			Apr 2020	58	0.93	0.08	0.69	1.18
			May 2020	58	0.92	0.11	0.59	1.28
			Jun 2020	58	0.95	0.12	0.60	1.32
			Jul 2020	58	1.00	0.12	0.70	1.30
			Aug 2020	58	1.06	0.13	0.78	1.39
			Sep 2020	58	1.10	0.15	0.82	1.50
			Oct 2020	58	1.14	0.17	0.84	1.72
			Nov 2020	58	1.15	0.17	0.84	1.80
			Dec 2020	58	1.13	0.14	0.84	1.66
			Jan 2021	58	1.07	0.08	0.82	1.31
			Feb 2021	58	1.05	0.07	0.81	1.28
	CPI	Index, *month* to base = Feb 2020	Mar 2020	58	1.00	0.01	0.99	1.01
			Apr 2020	58	1.00	0.01	0.96	1.04
			May 2020	58	1.00	0.02	0.96	1.06
			Jun 2020	58	1.00	0.02	0.97	1.07
			Jul 2020	58	1.01	0.02	0.97	1.08
			Aug 2020	58	1.01	0.02	0.97	1.07
			Sep 2020	58	1.01	0.02	0.97	1.09
			Oct 2020	58	1.02	0.03	0.98	1.10
			Nov 2020	58	1.02	0.03	0.97	1.12
			Dec 2020	58	1.02	0.03	0.98	1.14
			Jan 2021	58	1.03	0.03	0.98	1.16
			Feb 2021	58	1.03	0.04	0.99	1.17
	IR	Average, on the period from Feb 2020 to *month*	Mar 2020	58	3.69	3.69	-0.75	15.25
			Apr 2020	58	3.52	3.63	-0.75	15.00
			May 2020	58	3.38	3.58	-0.75	14.88
			Jun 2020	58	3.30	3.55	-0.75	14.80
			Jul 2020	58	3.21	3.51	-0.75	14.75
			Aug 2020	58	3.15	3.48	-0.75	14.71
			Sep 2020	58	3.10	3.46	-0.75	14.69
			Oct 2020	58	3.06	3.44	-0.75	14.67
			Nov 2020	58	3.04	3.45	-0.75	14.65
			Dec 2020	58	3.03	3.47	-0.75	14.64
			Jan 2021	58	3.03	3.49	-0.75	14.63
			Feb 2021	58	3.01	3.50	-0.75	14.62

SI	Average, on the period from Feb 2020 to *month*	Mar 2020	58	28.43	10.59	2.42	78.26
		Apr 2020	58	45.23	9.23	11.14	72.24
		May 2020	58	52.26	9.55	16.22	72.85
		Jun 2020	58	54.31	10.15	19.28	73.98
		Jul 2020	58	55.13	10.86	21.31	74.69
		Aug 2020	58	55.77	11.37	22.76	76.32
		Sep 2020	58	55.87	11.73	23.85	76.96
		Oct 2020	58	55.71	11.92	24.76	77.46
		Nov 2020	58	55.86	11.83	25.76	77.97
		Dec 2020	58	56.20	11.73	25.18	75.29
		Jan 2021	58	56.62	11.69	24.87	73.49
		Feb 2021	58	56.88	11.64	23.77	74.38

Note: Variables presented in column "name" are: CiC—currency-in-circulation, PDI—the power distance index, IDV—the index of individualism, MAS—the index of masculinity, UAI—the uncertainty avoidance index, LTO—the index of long-term orientation, IVR—the index of indulgence, GDP—gross domestic product, CPI—consumer price index, IR—interest rates, SI—COVID-19 Stringency Index. With the notable exception of the "national culture" variables, all data were calculated independently using the formula presented in the column "method of calculation." The sources of the data used in the calculations are presented in Table 2.

Table 2. Detailed variables sources

country	CiC	PDI	IDV	MAS	UAI	LTO	IVR	GDP	CPI	IR	SI
ALB	IMF							IMF	IMF	IMF	
AUS	IMF							IMF	BIS	BIS	
AZE	IMF							NSO	IMF	IMF	
BFA	IMF							NSO	IMF	IMF	
BGR	IMF							IMF	BIS	IMF	
BIH	IMF							IMF	IMF	IMF	
BLR	IMF							IMF	IMF	IMF	
BOL	IMF							NSO	IMF	IMF	
BRA	IMF							IMF	BIS	BIS	
CAN	IMF							IMF	BIS	BIS	
CHE	NCB							IMF	BIS	BIS	
CHL	IMF							IMF	BIS	BIS	
CHN	NCB							IMF	BIS	BIS	
COL	IMF							IMF	IMF	BIS	
CPV	IMF							NSO	IMF	IMF	
CZE	IMF							IMF	BIS	BIS	
DNK	IMF							IMF	BIS	BIS	
DOM	IMF							NSO	IMF	IMF	
DZA	IMF							IMF	BIS	IMF	
EGY	IMF							NSO	IMF	IMF	
GBR	NCB							IMF	BIS	BIS	
GEO	IMF							IMF	IMF	IMF	
GHA	IMF							NSO	IMF	IMF	
HKG	IMF							IMF	BIS	BIS	
HRV	IMF							IMF	BIS	NCB	
HUN	IMF							IMF	BIS	BIS	
IDN	IMF							IMF	BIS	BIS	
IND	NCB							IMF	BIS	BIS	
ISL	IMF							IMF	BIS	BIS	
JOR	IMF							NSO	IMF	IMF	
JPN	IMF							IMF	BIS	BIS	
KAZ	IMF							NSO	IMF	IMF	
KOR	IMF							IMF	BIS	BIS	
MAR	IMF							NSO	IMF	IMF	
MDA	IMF							NSO	IMF	IMF	
MEX	IMF							IMF	BIS	BIS	
MYS	IMF							NSO	BIS	BIS	
NGA	IMF							NSO	NSO	IMF	
NOR	IMF							IMF	BIS	BIS	
NZL	IMF							IMF	BIS	BIS	
PER	IMF							NSO	BIS	BIS	
PHL	IMF							IMF	BIS	BIS	
POL	IMF							IMF	BIS	BIS	
PRY	IMF							IMF	IMF	IMF	
ROU	IMF							IMF	BIS	BIS	
RUS	IMF							IMF	BIS	BIS	
SAU	NCB							IMF	BIS	BIS	
SGP	NCB							IMF	BIS	IMF	
SRB	IMF							IMF	BIS	BIS	
SWE	NCB							IMF	BIS	BIS	
THA	IMF							IMF	BIS	BIS	
TUR	IMF							IMF	BIS	BIS	
TWN	NCB							NSO	NSO	NCB	
TZA	IMF							NSO	IMF	IMF	
UKR	IMF							IMF	IMF	IMF	
URY	IMF							NSO	IMF	IMF	
USA	NCB							IMF	BIS	BIS	
ZAF	IMF							IMF	BIS	BIS	

Hofstede Insights

OxCGRT

Note: Each row shows the origin of the data used in this study. The first column, "country", shows name of the country, encoded as 3-letter ISO code, for which data were collected. Following columns successive variables: CiC–currency-in-circulation, PDI–the power distance index, IDV–the index of individualism, MAS–the index of masculinity, UAI–the uncertainty avoidance index, LTO–the index of long-term orientation , IVR–the index of indulgence , GDP–gross domestic product, CPI–consumer price index, IR–interest rates, SI–COVID-19 Stringency Index. As for sources of information: IMF stands for International Monetary Fund's International Financial Statistics; BIS–Bank for International Settlements; NCB–respective National Central Bank; NSO–respective National Statistical; OxCGRT–Oxford COVID-19 Government Response Tracker.

3. Results and discussion

All twelve models are presented in Table 3 and Figure 1 holds summarization of "national culture" coefficient values and how they varied model-to-model. Generally, the results show that people in countries with a high UAI experienced a statistically significantly higher increase in the demand for physical money, as hypothesized. This may be associated with precautionary demand, as it has already been shown by Leland (1968) that this motive is positively related with higher uncertainty. Additionally, it is suggested by fact that the growth of value of *currency-in-circulation* in many countries was driven mainly by increase in volumes of banknotes with largest denomination (Rösl & Seitz, 2021), which also is an indicator of such motive (Assenmacher et al., 2019; Bech et al., 2018).

The increase of quantity of physical money happened also in societies with higher IVR. On the other hand, this increase in demand may be linked with transactional demand, especially in countries in which cash usage is high. The significance of this increase is apparent at the end of the analyzed period, when initial fears had abated and myths about contracting the virus as a result of handling cash had been debunked (Tamele et al., 2021). PDI, IDV, and LTO were only found to be significant in singular regressions, while MAS was found to be insignificant altogether.

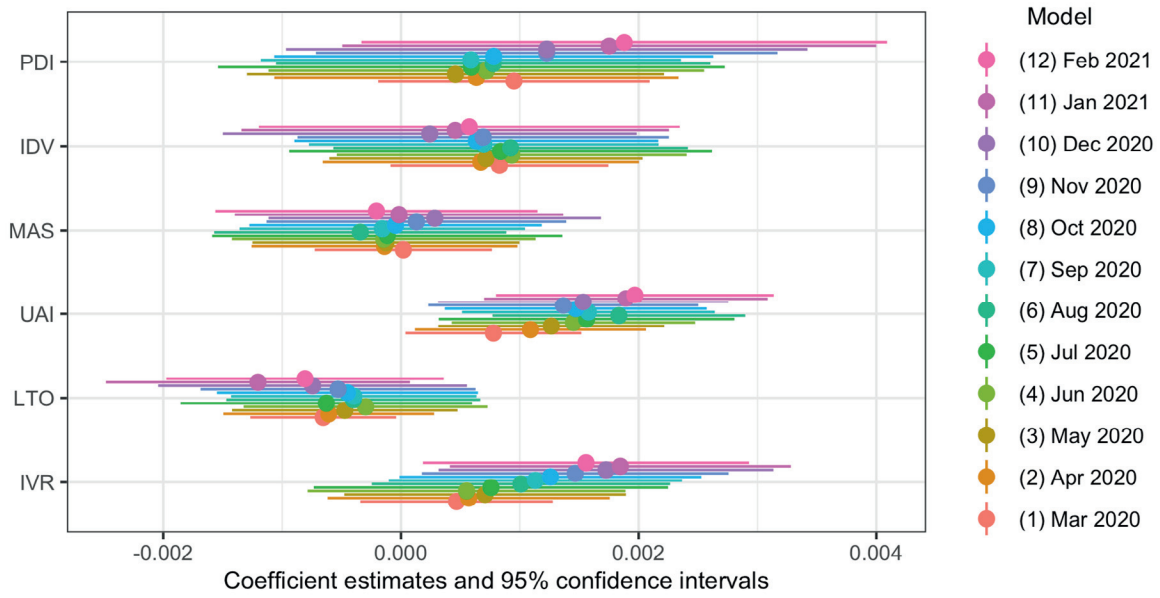
Several additional control variables were considered when constructing the model. These included ATMs per capita, the proportion of people owning debit or credit cards, and the proportion of people that had made digital payments in the recent past. All these variables were obtained from the World Bank's Global Findex Database (Demirgüç-Kunt et al., 2018). They all proved to be insignificant, although this might partly be explained by the significant gap between the time of this study (mostly 2020) and the time of the World Bank study (2017). Another type of data that was considered was data on trust in banks. These were obtained from the 7th Wave of World Values Survey (Haerpfer et al., 2022). However, these data restricted the sample to only about 30 countries and interfered with the significance of UAI. These facts, plus the additional fact that the same 30 countries had similar results to the one presented above, may be due to the fact, demonstrated by Ahunov and Van Hove (2020a), that UAI and bank trust are closely related phenomena.

Table 3. Estimation output of OLS regressions. Dependent variable: *CiC*

	(1) Mar 2020	(2) Apr 2020	(3) May 2020	(4) Jun 2020	(5) Jul 2020	(6) Aug 2020	(7) Sep 2020	(8) Oct 2020	(9) Nov 2020	(10) Dec 2020	(11) Jan 2021	(12) Feb 2021
Constant	0.7586	0.9864	0.4842	-0.4094	-0.2741	-0.1205	-0.1150	-0.1666	-0.1853	-0.2939	0.2662	0.3668
	(1.6301)	(0.7613)	(0.8297)	(1.2600)	(1.5373)	(1.2068)	(0.8399)	(0.7099)	(0.6947)	(0.7642)	(0.8072)	(0.7367)
PDI	0.0010**	0.0006	0.0005	0.0007	0.0006	0.0008	0.0006	0.0008	0.0012	0.0012	0.0018*	0.0019*
	(0.0004)	(0.0008)	(0.0008)	(0.0008)	(0.0009)	(0.0008)	(0.0008)	(0.0008)	(0.0009)	(0.0010)	(0.0010)	(0.0011)
IDV	0.0008**	0.0007	0.0007	0.0009*	0.0008	0.0009	0.0007	0.0006	0.0007	0.0002	0.0005	0.0006
	(0.0003)	(0.0004)	(0.0005)	(0.0005)	(0.0007)	(0.0006)	(0.0006)	(0.0007)	(0.0006)	(0.0007)	(0.0007)	(0.0007)
MAS	0.0000	-0.0001	-0.0001	-0.0001	-0.0001	-0.0003	-0.0002	0.0000	0.0001	0.0003	0.0000	-0.0002
	(0.0002)	(0.0003)	(0.0003)	(0.0005)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0006)
UAI	0.0008***	0.0011***	0.0013***	0.0015***	0.0016***	0.0018***	0.0016***	0.0015***	0.0014**	0.0015***	0.0019***	0.0020***
	(0.0003)	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.0006)	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0006)
LTO	-0.0007*	-0.0006	-0.0005	-0.0003	-0.0006	-0.0004	-0.0004	-0.0005	-0.0005	-0.0007	-0.0012**	-0.0008
	(0.0003)	(0.0004)	(0.0004)	(0.0005)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
IVR	0.0005**	0.0006	0.0007	0.0006	0.0008	0.0010*	0.0011**	0.0013**	0.0015***	0.0017***	0.0018***	0.0016**
	(0.0002)	(0.0004)	(0.0005)	(0.0006)	(0.0008)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0006)
CiC_lag	0.9040**	0.7734*	0.6482**	0.2870	0.3826	0.3519	0.3763	0.4667**	0.4548**	0.5541**	0.1046	0.0645
	(0.4451)	(0.3940)	(0.2788)	(0.3459)	(0.3616)	(0.2672)	(0.2253)	(0.2084)	(0.2228)	(0.2437)	(0.2651)	(0.2647)
GDP	0.0751	-0.0411	-0.0460	-0.0488	0.0819	0.0714	0.1126	0.0998	0.0965	0.1458	0.4884*	0.5716*
	(0.1966)	(0.1163)	(0.0920)	(0.1063)	(0.1929)	(0.1247)	(0.1063)	(0.0877)	(0.0810)	(0.1192)	(0.2822)	(0.2935)
CPI	-0.8706	-0.8896	-0.3037	0.9572	0.6315	0.4547	0.3991	0.3855	0.4046	0.3768	-0.0985	-0.2465
	(1.4955)	(0.6913)	(0.6859)	(1.0387)	(1.1852)	(0.9960)	(0.7259)	(0.6471)	(0.6433)	(0.7625)	(0.8386)	(0.7225)
IR	-0.0004	0.0037	0.0032	-0.0006	0.0025	-0.0009	-0.0017	-0.0012	-0.0020	-0.0044	-0.0050	-0.0037
	(0.0021)	(0.0045)	(0.0041)	(0.0049)	(0.0056)	(0.0061)	(0.0058)	(0.0064)	(0.0074)	(0.0075)	(0.0075)	(0.0076)
SI	0.0011*	0.0018**	0.0026***	0.0023**	0.0019*	0.0024**	0.0025**	0.0020*	0.0016	0.0016	0.0018	0.0019
	(0.0006)	(0.0008)	(0.0010)	(0.0010)	(0.0011)	(0.0010)	(0.0010)	(0.0011)	(0.0012)	(0.0012)	(0.0012)	(0.0011)
Observations	58	58	58	58	58	58	58	58	58	58	58	58
R-squared	0.2646	0.3470	0.4598	0.3666	0.3750	0.4497	0.4518	0.4659	0.4629	0.5348	0.4726	0.4478

Note: Do to the heteroskedasticity issues present in regressions (11) and (12) data in parentheses presents Robust Standard Errors. ***, **, * denote statistical significance at 1%, 5% and 10%, respectively.

Figure 1. National culture variables coefficient behavior summary



Furthermore, to ensure that the increase in foreign demand for safe-haven currencies (e.g. USD, EUR), which could be as much as 50% (Judson, 2017; Lalouette et al., 2021), did not skew the results, countries that issued these currencies were excluded in further robustness checks. As the euro area countries had already been excluded from the study, the three currencies that were chosen were the US dollar, Swiss franc, and Japanese yen (Cho & Han, 2021; Hossfeld & MacDonald, 2015). There were no significant changes in the results.

Finally, it should be noted that employing the same methodology on the data from recent years proved that both UAI and IDV were only significant factors in occasional regressions.

4. Findings and conclusions

This study shows that some aspects of "national culture", e.g. UAI, and IVR, impacted the demand for cash during the COVID-19 pandemic. This suggests that these same factors also affected the decisions of individuals during previous crises and may well do likewise during future ones.[a] This approach to analyses of the demand for cash might therefore be a promising avenue for further studies.

This finding also has a potential practical application. Central banks in societies that are more indulgent (especially a few months after a crisis) and, particularly, in nations where uncertainty is avoided should be prepared to fulfill a greater demand for cash during distressful times. Rumors about a lack of cash could exacerbate negative feelings, trigger coping mechanisms, and increase money demand even further, thereby resulting in a negative feedback loop and possibly causing bank runs. This in turn could undermine the stability of individual banks or the banking sector. Potential countermeasures include greater cash reserves being held by NCBs and monitoring the quality of the cash supply chain.

[a] While this paper was being written, the Russian invasion of Ukraine, which began in February 2022, significantly increased the demand for cash in Ukraine's non-euro area neighbors (Belarus, Hungary, Moldova, Poland and Romania). In April 2022, the value of currency in circulation in those countries was on average 7.9% higher than in January 2022 (the month prior to the invasion). Interestingly, all these countries are characterized by an average UAI of 91 points.

Data Availability Statement

The data that support the findings of this study are openly available in Mendeley Data at https://data.mendeley.com/datasets/hngpw44b8z/1 (Kotkowski, 2022).

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