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COVID-19 AND RETAIL DEPOSITOR STRATEGIES IN RUSSIAN REGIONS: WHETHER TO WITHDRAW AND WHY?

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COVID-19 AND RETAIL DEPOSITOR STRATEGIES IN RUSSIAN REGIONS: WHETHER TO WITHDRAW AND WHY?

The COVID-19 pandemic caused a significant change in the consumption, savings, and employment patterns of individuals. This study investigates the reaction of individual bank depositors to the spread of COVID-19 from the perspective of the outflow of retail deposits and the shift in their maturity structure across Russian regions which were differently hit by the pandemic. Exploiting the cross-regional variation in COVID-19 cases in Russia from April 2020 to September 2021, we document higher deposit outflows and a shift to short-term deposits in banks that were operating in the regions with higher rates of COVID-19 relative to banks from the regions that were less affected by the pandemic. We demonstrate that these effects are driven by increased unemployment, the lack of state-financed beds in hospitals, and the lack of financial literacy. Stricter isolation measures and underdeveloped bank branch networks smoothed the withdrawals of banks deposits caused by increased number of new COVID-19 cases. The maturity shifts are additionally driven by lower regional income and increased household health expenditures. Our results do not support the alternative hypothesis that those changes were forced by market discipline mechanisms.

Keywords*:* banks, retail deposits, COVID-19, Russian regions

JEL Classification: Z

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1. Introduction

Humanity has faced pandemics throughout history, but the economic impact of COVID-19 and its global widespread are unprecedented (Fernandes, 2020). The unexpected shock led to a dramatic increase in the uncertainty of individuals resulting in significant changes in behavioral patterns, including those related to consumption, savings, and investment (Cevik, 2020). This resulted in changes in individual depositor behavior, which is crucial for the whole banking sector as deposit withdrawals that may trigger a bank run.

In this paper, we investigate the relationship between COVID-19 cases and the changes in retail bank deposits in regional banks located in Russian regions which were differently hit by the pandemic. We also examine the differences in this influence for deposits of different maturities adding to our understanding of the maturity shifts under pandemic pressure. For this purpose, we rely on the detailed financial fundamentals of all Russian regional banks and data on cross-regional variation in pandemic exposure, and regional socio-economic characteristics.

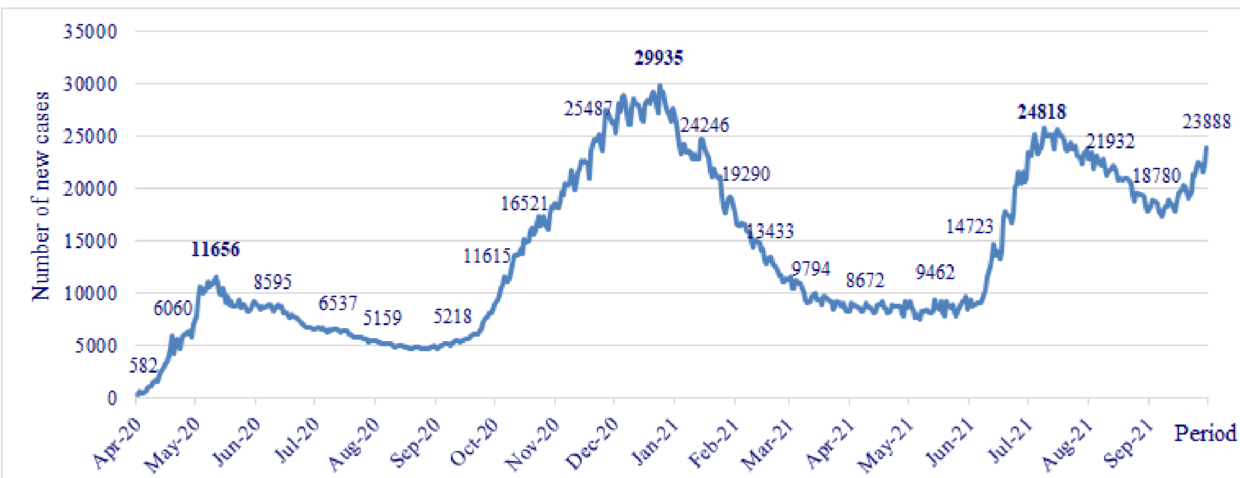

Figure 1. The number of new COVID-19 cases in Russia, April 2020–September 2021[4]

[4] Data source: https://datalens.yandex/COVID19

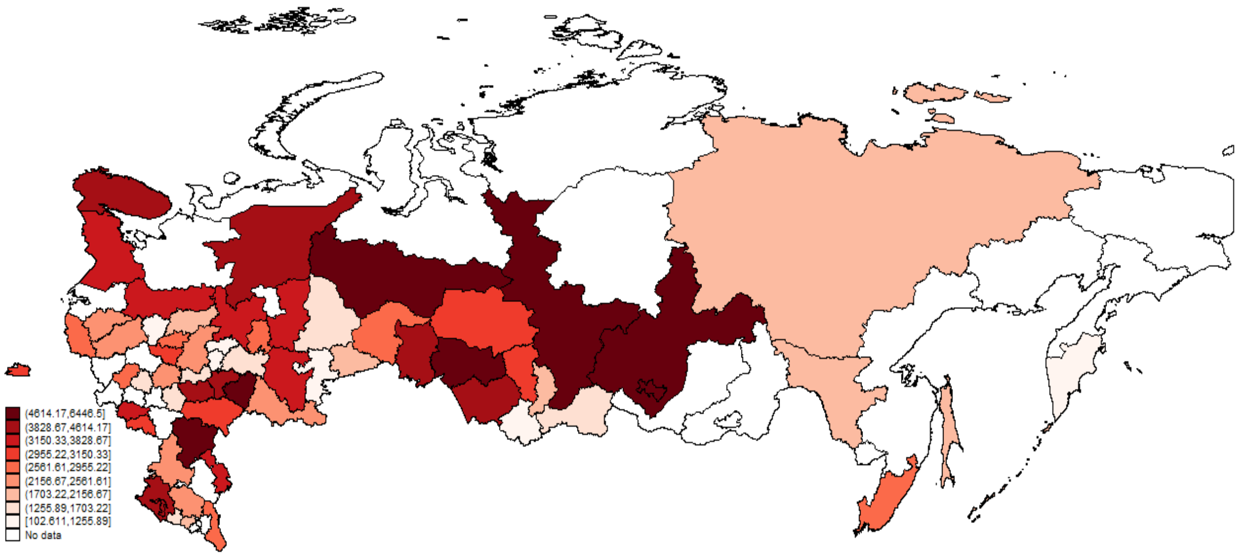

Figure 2. Heatmap of distribution of regional average of COVID-19 cases where regional banks were operating, April 2020–September 2021

The Russian deposit market presents an ideal setting for studying the impact of COVID-19 on the behavior of individual bank depositors. Russia is no exception in terms of the severity of COVID-19: there were three major outbreaks in Russia by September 2021 (Figure 1) and the number of new cases is still far from zero. Figure 2 shows Russian regions experienced considerable variation in the distribution of COVID-19 cases, allowing us to study the impact of the pandemic on the behavior of retail depositors of regional banks.

Policy makers in Russia conducted policies that were business-oriented and did not distribute cash to individual citizens as in some developed countries. This made individual depositors more susceptible to liquidity shocks. In recent history, Russians have experienced events that put their savings at risk, making them sensitive to external shocks such as the COVID-19 pandemic.

To our knowledge this is the first paper which investigates the behavior of individual depositors under pandemic pressure in an emerging market economy and provides evidence on two competing hypotheses: the liquidity shock hypothesis and the precautionary savings hypothesis. Under the liquidity shock hypothesis, one expects that as the pandemic evolves, people might need more cash to finance current and short-term consumption as the prospects of the spread of COVID-19 and accompanying lockdown policies are unclear. The precautionary savings theory suggests a positive relationship between the spread of COVID-19 and deposit growth as people may deposit their money under high uncertainty in order to save them for future expenditures and get some return (Levine et al., 2021). Contrary to existing studies supporting the precautionary savings hypothesis, the results for the Russian retail deposit market provides evidence in favor of the liquidity shocks hypothesis.

We are also among the first to examine quantitative market discipline in the deposit market during COVID-19, studying the influence of the pandemic on retail depositor sensitivity to bank risks. The market discipline concept implies that depositors monitor bank risk levels which might help them to secure their deposits (Nier & Baumann, 2006). In other words, in situations when bank risk increases, depositors change their financial strategies in two general ways: they require higher interest rates or reallocate funds between more and less risky banks (Martinez Peria et al., 2001). Russian households are sensitive to the increased risk of banks which leads to the withdrawals of deposits (Karas et al., 2009; Ungan et al., 2008). Our results, however, do not support the market discipline hypothesis, showing that during the pandemic depositors did not withdraw more actively from relatively riskier banks.

Our paper also adds to the literature on the maturity shifts as a mechanism of market discipline. Depositors prefer short-term deposits to long-term when the bank's risk increases (Murata et al., 2006). In other words, bank characteristics and the high uncertainty in the economy might change the structure of deposits in terms of maturity. Evidence for this mechanism is also found in Russia (Semenova, 2007). We show that under pandemic pressure this mechanism did not work properly, since there is no evidence of the simultaneous outflows of long-term retail deposits and the inflows of short-term deposits.

Finally, we examine several channels through which the pandemic may have influenced deposit outflows and maturity shifts. Our results suggest that withdrawals under COVID-19 pressure are driven by an overall drop in current income (including that caused by increased unemployment). In addition to liquidity shocks, we observe the influence of the lack of financial literacy and the underdevelopment of the regional banking sector as the drivers of deposit withdrawals.

The rest of the paper is structured as follows. Section 2 includes an analysis of literature and the hypotheses to be tested. Section 3 describes the data and methodology. Section 4 contains an interpretation of the empirical results and the results of additional methodology for testing the channels that influence the financial decisions of individuals. The policy implications of the current research are discussed in the conclusion.

2. Literature Review and Hypotheses Development

The increasing number of papers on “Coronanomics” signal the expanded impact of the COVID-19 outbreak (Barua, 2020). According to Brodeur (2020) based on Carlsson-Szlezak et al. (2020a; 2020b), there are three main channels of the pandemic’s negative influence on consumption and savings. First, the authors consider the decline of the overall demand as consumer confidence falls and consumers become more pessimistic about the economy’s growth opportunities. The beginning of the COVID-19 pandemic witnessed panic buying due to the high uncertainty at all levels (Baker et al., 2020; Brodeur et al., 2021). This phenomenon was especially pronounced by the excessive purchasing of food and sanitary products (Sim, Chua, Vieta, & Fernandez, 2020). However, since the first lockdowns and the isolation rules were enforced, the trend changed to decline in consumption (Baker et al., 2020; Bhargava et al., 2020; Lyche, 2020). This can be explained by risk avoidance behavior and pessimistic expectations about the future economy’s strength (Seonghoon, Kanghyock, 2020). As a result, some authors confirm the increase of savings due to precautionary savings (Seonghoon, Kanghyock, 2020).

Secondly, both wealth and consumption decline while people prefer to increase their savings which leads to shocks in financial markets and in the real economy. Many papers explore such household attitudes as “saving for an emergency”, “wait and see”, and “hoarding” which are common in the times of crisis (Baldwin & Tomiura, 2020; Barua, 2020; Brodeur, 2020). Moreover, the decline in long-term confidence in the country’s economy, especially among households, due to the growing number of COVID-19 cases, leads to households becoming more risk-averse in choosing investment strategies (Yue et al., 2020). Some authors discuss the increase of precautionary savings because households have fewer opportunities to spend money and they are concerned about the future (Bandarin et al., 2020). In terms of bank deposits this channel is accompanied by the phenomenon of “flight to safety” which also occurred during the COVID-19 pandemic (Levine et al., 2021; Zaremba et al., 2021). This phenomenon implies that under uncertainty or in times of crisis people prefer to invest in less risky instruments such as bank deposits. Under pandemic pressure, US banks demonstrate “massive inflows into deposits accounts” (Bolton et al., 2020). Levine et al. (2021) found that in counties with a high level of COVID-19 infection, deposit interest rates fell significantly more than in other counties. The results indicate that the influx of deposits, which led to a drop in interest rates, is due to the fact that the population tends to save for a rainy day. The main reason is the precautionary savings motive and the high volatility of the stock market. On the other hand, it is assumed that wealthier households are more likely to be able to save during the crisis period, while some groups of the population such as young or less-educated people, pensioners, or poor households become even more vulnerable. This finding was noted using the data from the China Household Finance Survey (CHFS) (Li et al., 2020). They confirm a significant decline in household consumption, emphasizing that urban households demonstrate a stronger dependence on the consumer goods market than rural households.

The third channel is the disruption of supply chains which results in an increase in unemployment due to reduced demand for production labor or in some cases the complete suspension of production. Bonadio et al. (2020) find the negative impact of lockdowns on real GDP; Céspedes et al. (2020) indicate that lower productivity is due to the limited amount of borrowing activity and decreased employment. Aldawsari et al. (2020) investigate how the G7 have responded to the COVID-19 pandemic and argue that these developed countries are affected by the pandemic most of all as their production facilities and other businesses have been forced to suspend their operations under restrictions. In general, regardless of size, most companies faced a reduction in production (Shafeeq Nimr Al-Maliki, Salehi, & Kardan, 2022). These facts lead to “massive job loss and excessive income inequality” (Janssens et al., 2021; Mahler et al., 2020). These reduced incomes also led to the increase of precautionary savings which increased bank deposits in the US, Singapore, and Italy (Graziano, Mariano, Loschiavo, 2021; Levine et al., 2021; Seonghoon, Kanghyock, 2020). On the contrary, households could cut down both consumption and savings when they do not earn money, which leads to a decline of capital stock as a consequence of the reduction in savings (Baldwin & Tomiura, 2020). Baker et al. (2020), Mulligan (2020), Coibion et al. (2021), and Brodeur et al. (2021) find a decline in consumption but highlight the uniqueness of the ongoing pandemic and the large amount of uncertainty it causes which leads to the bias of historical data analysis. Kubota et al. (2021) examine cash withdrawals from deposit accounts by Japanese households and explain this by “the preference of Japanese households for cash over credit or debit cards for purchases”. The complete closure of deposits ahead of time when depositors lose accumulated interest and possible future cash flows can be an example of reckless actions committed by investors. Officesaca et al. (2020) show that when depositors make such a decision, they are not only skeptical about banks, assuming that, in the worst case, the credit institution may go bankrupt during the crisis, but also about their basic income, such as wages which they expect may decrease or hypothetically stop altogether.

The Russian deposit market which experienced several massive withdrawals in 2020–2021 provides excellent data to test a variety of hypotheses mentioned in the literature. Russian media reported several large outflows of retail deposits since the pandemic began. The first major outflow of deposits in Russia occurred in March 2020, when the pandemic was rapidly taking off. According to the average estimate, the amount of the first outflow of deposits was 315 billion rubles (or 1% of total deposits). The second-largest mass outflow of deposits from Russian banks occurred in May 2020—31.5 billion rubles (0.1%). This outflow was not, however, very surprising due to the long May holidays accompanied by the continuing decline of household incomes. The sharpest outflow of deposits occurred in October 2020—455 billion rubles (2%). Furthermore, there were some major outflows of retail deposits in 2021. For instance, 231, 192, and 170 billion rubles were withdrawn in March, May, and June 2021 respectively.[5]

In this paper we explore whether retail depositors tend to withdraw their deposits under pandemic pressure, facing current or expecting future liquidity shocks.

Hypothesis 1: Higher COVID-19 exposure in the region is associated with a decline in retail deposit growth.

Following the literature on the fragility of the bank run efficiency, we cannot expect withdrawals to be based on market discipline. The withdrawals, which do not appear as a reaction to the increased bank risk, do not result in an efficient redistribution of funds from risker to more reliable banks as quantitative disciplining implies.

Hypothesis 1a: Quantitative market discipline is not pronounced in the COVID-19 pandemic era.

Faced with increased uncertainty and expecting future liquidity shocks, depositors may prefer to change the deposit structure, demonstrating the use of the maturity shift mechanism, when individuals tend to save in short-term deposits due to the high uncertainty of long-term deposits. *Hypothesis 2* accounts for this effect.

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[5] The figures are taken from the official CBR monthly statistical report "On development of the banking sector in Russian Federation" (http://www.cbr.ru/analytics/bank_sector/develop/).

Hypothesis 2: In regions with higher rates of COVID-19, depositors prefer to shift their savings into short-term deposits relative to long-term ones.

There are several explanations for withdrawal decisions. The liquidity shock might be a consequence of an increase in the unemployment rate and a decrease in income. In addition, an increase in the number of infected in the region can negatively affect depositors, who assume that they will be more likely to get sick, and if so they will need money for treatment, which in the case of COVID-19 is long-term and can also deprive them of income for an extended period. Russian media reported that during COVID-19 consumer spending on medicines increased in 2020: spending increased on medicines for the treatment of diseases and for preventative measures. Consequently, the increase in medical expenses may also affect, if not the outflow of deposits, then, at least, the reduction of new investments in banks by individual depositors.

The level of financial literacy may also influence the behavior of depositors: people might demonstrate panic behavior and withdraw their deposits even without strong evidence of bank instability.

Since the COVID-19 pandemic led to restrictions on movements and to introduction of periods of self-isolation, the availability of banking institutions nearby also might be important in the withdrawal decisions.

These explanations led us to *Hypothesis 3*.

Hypothesis 3: Regional characteristics (per capita income, healthcare spending, unemployment rate, financial literacy, provision of the region with banking institutions and hospital beds, etc.) explain the cross-regional variation in the change of deposit growth and maturity shifts as a reaction to the COVID-19 pandemic.

3. Empirical Strategy

To test the hypotheses, we follow the methodology suggested by Levine et al. (2021), offering several extensions to their approach. The basic model shows the relationship between the measures of the spread of COVID-19 in Russian regions and the growth rate of retail deposits.

The baseline dynamic regression model, estimated using panel GMM techniques (Arellano-Bond estimators), is:

$$DepGrowth_{b,r,t} = \alpha_1 * DepGrowth_{b,r,t-1} + \beta_1 * COVID_{r,t-1} + \beta_2 * Bank\ Controls_{b,r,t-1} + \beta_3 * Region\ Controls_{r,t-1} + \delta_b + \tau_t + \varepsilon_{b,r,t}, \quad (1)$$

where *b* is the bank, *r* is the region, and *t* is the month;

$DepGrowth_{b,r,t}$ is the growth rate of retail bank deposits in bank *b* registered in region *r* during month *t*;

$COVID_{r,t-1}$ measures of the circulation of COVID-19. We measure it with the number of confirmed new COVID-19 cases (in thousands) in region *r* in month *t-1*. This measure is directly observed in most of the public information sources.

$Bank\ Controls_{b,r,t-1}$ are bank fundamentals for bank *b* registered in region *r* during month *t-1*;

$Region\ Controls_{r,t-1}$ are control variables for region *r* during month *t-1*;

δ_b *and* τ_t are bank and time fixed effects, respectively.

To test *Hypothesis 2*, we re-estimate the models separately for the dynamics of the short-term and long-term retail deposits, as well as for the overall maturity structure:

$$Y_{b,r,t} = Y_{b,r,t-1} + \beta_1 * COVID_{r,t-1} + \beta_2 * Bank\ Controls_{b,r,t-1} + \beta_3 * Region\ Controls_{r,t-1} + \delta_b + \tau_t + \varepsilon_{b,r,t}, \quad (1)$$

where $Y_{b,r,t}$ stands for the following three variables:

1. $ShGrowth_{b,r,t}$ is the growth rate of retail deposits with the maturity of less than 1 year;
2. $LGrowth_{b,r,t}$ is the growth rate of retail deposits with the maturity of 1 year or more;
3. $MaturityRatio_{b,r,t}$ is the ratio of short-term deposits to the long-term ones.

Data about COVID-19 cases in Russia was taken from *Yandex DataLens*. The raw data shows the daily statistics, which were aggregated to a monthly level.

The control variables are divided into two subgroups. The first group of controls consists of bank fundamentals, which allow us to examine the market discipline mechanism.

$N1_{b,r,(t-1)}$ is the capital adequacy ratio set by the Central Bank of Russian Federation (CBR). The minimum level of this ratio is 10 %.[6] The variable is computed as the ratio of the bank's capital to the bank's assets weighted by risk and shows the bank's soundness. The depositors prefer to deposit in banks with a higher capital adequacy ratio (Semenova & Shapkin, 2019).

$NPL_{b,r,(t-1)}$ is the share of non-performing loans in the total gross loans of banks. The ratio represents the level of the bank's credit risk, which impacts the profitability and performance of the bank. We assume that depositors take into account the sustainability of banks when they decide to make deposits (Karas, Pyle, & Schoors, 2010). A lower ratio characterizes a lower level of credit risk, so we anticipated a negative relationship with the deposit growth rate.

These two variables are parts of the CAMELS framework that estimate a bank's performance from its capital adequacy and asset quality (Dzeawuni & Tanko, 2011). In addition, these variables are often used in the market discipline mechanism (Nier & Baumann, 2006).

$LnA_{b,r,(t-1)}$ is the natural logarithm of bank assets as a proxy for the bank size. We assume a positive relationship between this parameter and the growth rate of retail deposits since such banks are expected to be more reliable (Peresetsky, 2008).

The second group of control variables includes the characteristics of Russian regions.

Firstly, we control for the development level of the bank deposit market in the region. We use the $DepGRP_{r,t}$ ratio which reflects the ratio of total bank deposits to the GRP of the region in which the bank is registered. The information about the GRP is published annually.

Since the ability of depositors to invest money is correlated with their income, the variable reflecting the average per capita income in the region ($AvIncome_{r,t}$) measured in rubles is included in the analysis. It is expected that there is a reduction of incomes in Russia due to the COVID-19 pandemic which may influence the inflows and outflows of deposits.

We include a variable that measures the share of consumer spending that Russian people spent on heath during 2020, measured in the percentage of the total consumer expenditure ($HealthSpendings_{r,(t-1)}$). The increased spending on medicine might negatively influence the growth rates of individual deposits. Information about the average income and the share of spending on health is provided on a quarterly basis, therefore, these variables reflect the situation of the past quarter for each month in the sample.

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[6] Instruction of the CBR of Russia dated 16.01.2004 No. 110-I "On mandatory standards of banks"

We take into account the growth rate of unemployment in the regions ($UnemplGrowth_{r,t}$). As a source of liquidity shock, it might negatively influence retail deposit inflows. Since information about this regional characteristic is published quarterly, this variable reflects the situation of the past quarter for each month in the sample.

Another important characteristic of the regions is the level of financial literacy (Midões & Seré, 2021). We proxy it with the ratio of the number of students in the region to its total population ($FinLit_{r,t}$.) We expect that with a higher level of financial literacy in the region, less panic withdrawals will be observed. Information about the share of students is published annually.

Several important characteristics of regions are not available for all regions, so we include them in the separate specification of the model.

Since restrictions on the movements of the population were introduced during the pandemic, we assess whether the number of banking offices in the region—$BankOffices_{r,t}$—has an impact on deposit outflows. With the greater availability of banking institutions nearby, the region may experience a higher level of deposit outflow during the crisis. This variable is normalized by the size of the population in the region, that is, it is measured per million people in the region. The ratio is reported quarterly.

The availability of medicine in Russian regions may affect people's spending, which impacts the behavior of bank depositors. The proxy for this is the number of hospital beds in the region—$Hospital_{r,t}$—measured per 10,000 people in the region. The higher availability of hospital medicine—crucial for COVID-19—provided by the government might make people more confident that medical help would be provided by the authorities and additional money for treatment would not be required, meaning a lower outflow of deposits in regions with higher medical availability.

Since some of the population are forced to stay at home and self-isolate, we test the relationship between the self-isolation index—$Isolation_{r,t}$—and outflows of deposits in Russian regions. With a higher self-isolation index, people might withdraw deposits less since they are limited in their movements. The data about the self-isolation index collected from *Yandex DataLens*.[7] Yandex have created a score that shows the level of self-isolation in different Russian cities and regions: they compare the level of urban activity during the COVID-19 outbreak and

[7] Yandex: information about self-isolation in Russian regions// The official website of Yandex Research: https://yandex.ru/company/researches/2020/podomam (In Russian)

on a normal day before the pandemic. If it is the same as during the rush hour of a normal working day, it means that the level of self-isolation is very low (0 points). If the city is quiet, like at night, it equals to 5 points. In this study we use the average value of the index in region *r* in month *t*.

The data on the banks' financial indicators is collected from the CBR website, which publishes the bank financial statements regularly. The data on Russian regions comes from the Federal State Statistics Service. Table 1 contains a summary of the control variables analyzed.

Table 1. Control variables

Variable	***Description***	***Expected sign***
$N1_{(t-1)}$	The capital adequacy ratio	+
$NPL_{(t-1)}$	The ratio of non-performing loans to the total gross loans of banks	-
$LnA_{(t-1)}$	The natural logarithm of bank assets – proxy for the bank size	+
DepToGRP	The development level of bank deposit market in the region	+
$AvIncome_{(t-1)}$	The per capita income in the region, rubles	+
$HealthSpendings_{(t-1)}$	The share of consumption spending that Russian people lashed out on heath service during 2020, %	-
$UnemplGrowth_{(t-1)}$	The growth rate of unemployment in the region, %	-
FinLit	The ratio of the number of students in the region to its total population, %	+
BankOffices	The number of banking institutions per 1 million people in the region on month t	-
Hospital	The number of hospital beds per ten thousand people in the region	+
Isolation	The average isolation index in the region on month t	+

Banks registered in Moscow, Moscow Region, Saint-Petersburg, and Leningrad Region were excluded from the sample, because a significant number of banks registered in these territories have branches in different regions of Russia. However, the financial reporting of such banks is consolidated which does not allow the indicators of banks to be divided into central and regional ones, therefore regional analysis is not possible.

We cleaned the data of outliers. The ratio of capital adequacy ($N1_{b,r,(t-1)}$) should be higher than 10 % according to the CBR rules. At the same time, values that are higher than 100 % are unrealistic for banks with stable performance. The banks with the values of $N1_{b,r,(t-1)}$ lying outside this interval were treated as outliers. The ratio of non-performing loans ($NPL_{b,r,(t-1)}$) cannot be equal to 100 %, so, the banks that demonstrate extremely high values of this parameter were excluded from the sample as potential outliers. Finally, the observations with the relationship of total deposits to the GRP greater than 100,000 were also considered as outliers.

The final sample consists of 2427 observations. There are 64 unique regions and 140 unique banks. According to the available COVID-19 statistics in Russia, the dependent variables reflecting deposits are studied from April 2020 to September 2021. The control variables for the difference in banks are captured from March 2020 to August 2021 as lagged values.

Table 2 shows the descriptive statistics of the variables used in the regressions. Notably the growth rate of different types of deposits fluctuated from -100 % to more than 1000 %, meaning that Russian people reacted sharply and in different directions when the COVID-19 pandemic occurred. The correlation matrix appears in Table 3, confirming that the data are not exposed to the multicollinearity problem.[8]

Table 2. Descriptive statistics

	N	***Mean***	***Standard deviation***	***Min***	***Max***
		Dependent variables			
DepGrowth	2424	-0.609	8.900	-100.000	138.341
ShGrowth	2202	1.341	33.849	-94.092	1020.418
LGrowth	2130	-0.480	13.375	-100.000	394.975
MaturityRatio	2223	186.226	677.182	0.377	15571.670
		Independent and control variables			
COVID	2424	2.843	2.451	0.014	15.036
N1	2298	28.398	17.383	9.320	132.700
NPL	2296	7.225	7.689	0.000	100.000
LnA	2402	15.576	1.380	12.363	19.496
DepToGRP	2424	11443.510	17489.580	0.000	99880.530
AvIncome	2299	31037.670	8822.837	14037.000	70592.000
HealthSpendings	2299	4.389	1.063	1.957	8.239
UnemplGrowth	2299	2.866	16.302	-42.991	94.444
FinLit	2424	24.348	7.409	7.399	53.673
BankOffices	2334	208.985	42.338	29.000	321.000
Hospital	2424	82.120	11.085	63.100	113.800
Isolation	2406	1.781	0.413	0.758	3.599

[8] Multicollinearity arises when the correlation coefficient is higher than 0.7 (Kennedy, 2008).

Table 3 Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
COVID (1)	1.0000											
N1 (2)	-0.0608***	1.0000										
NPL (3)	-0.0299	-0.0365*	1.0000									
LnA (4)	0.0242	-0.5598***	0.0642***	1.0000								
DepToGRP (5)	-0.0166	-0.3681***	0.0379*	0.7364***	1.0000							
AvIncome (6)	0.1637***	-0.0168	-0.0064	0.1438***	-0.0075	1.0000						
HealthSpendings (7)	-0.0457**	-0.0613***	-0.0512**	0.0011	0.1049***	-0.1424***	1.0000					
UnemplGrowth (8)	-0.1843***	-0.0519**	0.0312	0.0385*	0.0321	-0.0910***	-0.1705***	1.0000				
FinLit (9)	-0.0583***	-0.0064	-0.1705***	0.0979***	0.1176***	-0.1869**	0.1975***	-0.0262	1.0000			
BankOffices (10)	-0.1006***	-0.2080***	-0.2096***	0.2132***	0.0949***	0.2882***	0.0069	-0.0208	0.0779***	1.0000		
Hospital (11)	0.0481**	-0.1117***	-0.0437**	-0.1141***	-0.0145	0.0842***	-0.0297	-0.0277	-0.2529***	-0.0699***	1.0000	
Isolation (12)	-0.0202	0.0373*	0.0037	-0.0143	-0.0025	-0.1178***	-0.1037***	-0.0033	0.0704***	-0.0110	-0.0513*	1.0000

p < 0.1, * *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001.

4. Results

4.1. Deposit withdrawals and maturity shifts under pandemic pressure

We start by analyzing the influence of pandemic on different regions on retail deposit growth. Table 4 contains the empirical results: column (1) demonstrates the basic results of the estimations, which include bank characteristics, showing market discipline effects. Column (2) adds a basic set of regional control variables. The model with the full set of controls is presented in column (3).

For all three specifications, we obtain stable results, showing that the increasing number of new cases of COVID-19 reduced the growth rate of deposits in Russian banks. *Hypothesis 1* is not rejected: Russian retail deposit market experienced significant retail deposit withdrawals under the pressure of the COVID-19 pandemic. Both measures of the COVID-19 scope are economically significant. A one-standard-deviation increase in the number of new cases (which means an additional 2,500 cases per quarter) results in a decrease of at least 0.32 percentage point in retail deposit growth, which equals half of the negative average growth accounting for -0.61 %. In other specifications the effect is even higher climbing up 7 percentage points.

Bank fundamentals do not provide evidence for market discipline. Despite the fact that the capital adequacy ratio demonstrates the expected positive—thought unstable—relationship with the growth rate of deposits (meaning that depositors prefer more reliable and stable banks), the ratio of non-performing loans shows the sign opposite to our expectations, signaling that deposit outflow is not associated with higher credit risks. The size of the bank, as another control to test the market discipline hypothesis, shows that larger banks suffered from outflows more than smaller ones, which contradicts the market discipline hypothesis. These findings highlight that *Hypothesis 1a* is also not rejected: during the COVID-19 outbreak Russian the retail deposit market did not demonstrate market discipline, since deposits were not withdrawn from Russian banks according to their risk level. A possible explanation of this finding might acknowledge the fact that COVID-19 is a specific crisis when the mechanisms of market discipline do not work in the conventional form (Hosono, Iwaki, & Tsuru, 2004).

Regarding the coefficients on the control variables, we observe contradictory results. The degree of the deposit market development in Russian regions shows that the growth rate of retail deposits is higher in regions where the ratio of deposits to the GRP is higher. The volume of medical spending is negatively associated with the growth of deposits which confirms the importance of this expenditure item for households during the COVID-19 pandemic. As expected, the increase in the unemployment rate negatively affects deposit growth. The reduced deposit outflow might be partially explained by self-isolation as the population did not have the physical opportunity to withdraw their funds.

On the other hand, the assumption that in regions with higher financial literacy the population is less susceptible to panic is not confirmed. The negative relationship between the financial literacy proxy and the retail deposit growth signals that the withdrawals were a rational response to increased uncertainty. The expectation of a negative relationship between the availability of bank offices and the growth of deposits is also not confirmed: the higher availability of bank service results in deposit inflows. Results contrary to expectations are observed for the relationship between the level of the provision of medical care and the growth rate of retail deposits: withdrawals under the precautionary savings motive might be stimulated by observing an increased number of places in hospitals and considering it as a signal for an increased expected number of new COVID-19 cases. Finally, the average per capita income of the population in Russian regions shows no stable influence on deposit growth and its economic importance can be neglected.

To test *Hypothesis 2*, about the structural changes in deposit maturity, we estimate the extended model and three dependent variables: short-term deposit growth, long-term deposit growth, and the ratio of short-term to long-term deposits. Column (4) in Table 4 shows the results for short-term deposit growth, column (5) contains those for long-term deposits, and the results for the maturity ratio are presented in column (6).

The maturity shift hypothesis implies that during crises or shock periods, depositors prefer to withdraw their funds from long-term deposits and shift them to shorter-term ones due to the high level of uncertainty about the economic future. In other words, it is assumed that COVID-19 had a positive influence on the growth rate of short-term deposits and the variable reflecting the overall maturity structure, while for the growth rate of the long-term deposits a negative effect would be observed. According to the results, in both cases and in all specifications presented in Table 4, we might conclude that the hypothesis of the structural shifts is accepted: under pandemic pressure we observe the growth of short-term deposits accompanied by a simultaneous reduction of long-term ones. The proportion of short-term deposits is also higher in regions suffering from the pandemic more severely.

Table 4. Estimated coefficients of the basic and extended models

VARIABLES	(1) DepGrowth	(2) DepGrowth	(3) DepGrowth	(4) ShGrowth	(5) LGrowth	(6) MaturityRatio
$DepGrowth_{(t-1)}$	-0.194***	-0.181***	-0.195***	-0.068***	0.321***	0.650***
	(0.000)	(0.001)	(0.001)	(0.002)	(0.002)	(0.000)
$COVID_{(t-1)}$	**-0.126*** **	**-0.949*** **	**-3.052*** **	**12.415*** **	**-2.319*** **	**67.050*** **
	(0.025)	**(0.040)**	**(0.088)**	**(0.290)**	**(0.096)**	**(0.228)**
$N1_{(t-1)}$	0.117***	0.099***	-0.096***	1.891***	-0.202***	9.961***
	(0.002)	(0.006)	(0.008)	(0.080)	(0.028)	(0.063)
$NPL_{(t-1)}$	0.769***	1.131***	0.823***	-2.920***	0.621***	-21.356***
	(0.005)	(0.020)	(0.026)	(0.256)	(0.093)	(0.588)
$LnA_{(t-1)}$	-4.806***	-9.291***	-6.095***	-3.087***	3.077***	110.679***
	(0.092)	(0.296)	(0.312)	(1.099)	(0.668)	(2.947)
DepToGRP		0.001***	0.000***	0.001***	0.000	0.054***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
AvIncome		-0.000***	0.000***	0.001***	0.000***	-0.017***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$HealthSpendings_{(t-1)}$		-2.340***	-0.068	21.036***	-3.730***	4.946***
		(0.057)	(0.130)	(0.427)	(0.135)	(0.369)
UnemplGrowth		-0.372***	-0.215***	-2.884***	0.827***	-22.366***
		(0.014)	(0.013)	(0.077)	(0.034)	(0.094)
FinLit		-0.379***	-1.380***	-3.379***	1.136***	-38.511***
		(0.051)	(0.089)	(0.381)	(0.111)	(0.960)
BankOffices			0.135***	-0.896***	-0.295***	-5.545***
			(0.022)	(0.060)	(0.038)	(0.058)
Hospital			-0.326***	-0.260*	0.549***	38.611***
			(0.040)	(0.140)	(0.067)	(0.278)
Isolation			56.480***	-62.386***	19.830***	47.895***
			(0.880)	(4.235)	(1.148)	(2.637)
Constant	59.470***	162.360***	31.021***	320.089***	-113.367***	-2,650.148***
	(1.524)	(5.139)	(10.349)	(27.092)	(14.583)	(42.678)
Bank FEs	✓	✓	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓	✓	✓
Observations	2,263	2,138	2,043	1,844	1,777	1,863
Number of banks	140	140	135	129	125	122
ChiSq(p-value)	0	0	0	0	0	0
Sargan test (p-value)	0	0	0	0	0	0
Hansen test (p-value)	0.449	0.161	0.177	0.213	0.289	0.704
AR(1)	2.20e-05	9.22e-05	3.62e-05	0.875	0.0455	0.00403
AR(2)	0.561	0.741	0.685	0.0181	0.0383	0.446

Note: Robust standard errors in parentheses $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

As stated, the ratio of non-performing loans shows the opposite results to our expectations, which once again highlights the lack of the market discipline mechanism in the retail deposit market during the COVID-19 pandemic in Russian regions. In the context of maturity shifts, almost all the control variables show the same directions of influence as obtained at the previous stage. The exception is the size of the bank branch network, which is negatively associated with both long-term and short-term deposit growth, as we hypothesized. Another exception is the growing number of hospital beds available for the infected, which—as expected—stimulates the depositors to invest into long-term deposits instead of short-term ones, making them more confident about the state medical support in case of getting severely infected.

4.2 Drivers of deposit withdrawals and maturity shifts

In Section 3, we discussed explanations suggested by the literature for the outflows of retail deposits in Russian regions during the COVID-19 pandemic and possible explanations for the absence of these outflows. In this section, we check several possible reasons. Following (Schoors, Semenova, & Zubanov, 2019), for each of the regional characteristics underlying the depositors' decisions, the sample is divided into two subsamples—above and below the median of the variables—and the extended models are re-estimated.[9] This approach allows us to compare the relationship between individual behavior and the growing number of COVID-19 cases for Russian regions with different socio-economic characteristics. This approach allows us to show the possible channels that could explain individual behavior during the COVID-19 pandemic.

First, we divide the sample by the average level of income per capita (*AvIncome*). The liquidity shock channel suggests that in response to growing the number of COVID-19 cases, the depositors in regions with lower income tend to withdraw their deposits facing a greater threat of a significant decrease in income (Kubota et al., 2021). Then we focus on a particular source of the liquidity shock—an increase in personal medical expenses (*HealthSpendings*). This channel implies that in the regions where personal medical expenses were higher, we should document an outflow of deposits under pandemic pressure. The unemployment channel suggests that the depositors are more sensitive to the spread of COVID-19 in regions suffering from growing unemployment (*UnemplGrowth*). Therefore, in regions witnessing a greater increase in unemployment, an outflow of deposits is expected (Janssens et al., 2021). Next, we check for the financial literacy channel (*FinLit*). Although financial literacy itself is associated with the outflow of retail deposits, we analyze the impact of this proxy on the relationship between the number of new COVID-19 cases and deposit growth. More financially literate depositors are expected to be less sensitive to the scope of the local pandemic. Next, we consider the size of the regional bank office network (*BankOffices*) as a factor stimulating withdrawals: in regions where bank offices are numerous it is easier to get physical access to the bank to close the deposit, therefore in these regions we expect people to be more willing to withdraw deposits under pandemic pressure. The

[9] We estimate the models for the absolute measure of COVID-19 scope, as the relative one does not provide sustainable results (data are available upon request).

state medical support channel can also provide an explanation for depositor sensitivity to the regional scope of the pandemic. We assume that with a higher provision of healthcare (*Hospital*), the depositors in the region do not seek to withdraw deposits with an increase in the number of new COVID-19 cases, since the state will be able to provide them with medical services in hospital. Finally, we test for the isolation channel. With a higher level of self-isolation in a region (*Isolation*), depositors are prevented from leaving their homes, so the deposit outflow due to increased pandemic pressure is reduced. The same channels are then tested for the maturity shifts caused by pandemic pressure.

Table 5 presents a reduced version of the results of Arellano-Bond estimates for deposit growth in Russian regions with different levels of the regional characteristics mentioned above.[10] Panel A shows the results for the first four channels, another three are presented in Panel B.

Contrary to the hypothesis behind the liquidity shock channel, our results suggest that only in regions with higher regional income are greater numbers of new cases of COVID-19 associated with a decrease in the growth rate of retail deposits (columns 1–2). This result could be explained by people's preference to save money in cash during crisis periods, supporting, to a certain extent, the precautionary savings motive (Achou et al., 2020; Kubota et al., 2021; Singh et al., 2020). The health expenditure channel is also not supported by the data: withdrawals are sensitive to the pandemic scope for regions regardless of medical expenditure, but a negative effect is observed for the regions that did not suffer from higher medical expenses (columns 3–4).

The unemployment channel underlies the relationship in the focus of this study: columns (5–6) shows that in regions with a higher rate of unemployment, a negative effect of new COVID-19 cases is observed, and the regions with a more stable labor market enjoy an inflow of deposits. The financial literacy channel is also functioning: the number of new cases of COVID-19 is negatively associated with the growth rate of retail deposits in both types of regions, but the size of the effect is significantly larger in those characterized by a lower degree of financial literacy (columns 7–8): the crisis caused by the pandemic is considered unprecedented which gives some justification to people who panic and behave irrationally. Our results also prove that a higher reduction in deposit growth in response to an increased number of cases is observed in regions with a large number of the bank offices per million inhabitants (columns 9–10). This means that the higher availability of bank services, providing the physical opportunity to make withdrawals,

[10] Full-length tables are available upon request.

significantly contributes to the outflow of retail deposits. The lower availability of state-provided medical care in a region is also important: in regions with fewer hospital bed, the depositors react more negatively to the growing number of cases resulting in a decrease in the retail deposits (columns 11–12). Finally, the introduction of regional self-isolation measures demonstrates a strong association with the decrease of the growth rate of retail deposits. In regions where the isolation restrictions were less severe, a strong negative relationship with the growth rate of retail deposits is observed (column 14), meaning that depositors having the opportunity to physically go to banks tend to withdraw their deposits at a greater rate.

Table 6 demonstrates the estimation results for the maturity shifts, where we re-estimate the models on subsamples for the maturity ratio. Both the liquidity shock channel (columns 1–2) and the health expenditures one (columns 3–4) are well pronounced: maturity shifts in favor of short-term deposits appear in regions with lower income per capita and in regions where the health expenditure is above the median. Unemployment drives maturity shifts in the same direction as deposit outflows: regions suffering from higher unemployment show depositors switching to short-term deposits in addition to deposit withdrawals (columns 5–6). Financial literacy influences the maturity shifts in the expected way, increasing deposit withdrawals: the size of this effect is much higher in regions where the degree of financial literacy is lower (columns 7–8). A lack of public hospital beds—similar to case of deposit withdrawals—stimulates depositors to switch to short-term deposits, presumably they are afraid that funds might become necessary to cover the costs of hospitalization (columns 11–12). However, neither the size of the bank branch network nor low self-isolation rates—the factors significant for deposit outflows—stimulate maturity shifts (columns 9–10, 13–14).

The results suggest the importance of the availability of state medical support, financial literacy, the size of the regional bank branch network, and the growth of unemployment in regions all influence whether people decide to withdraw their deposits in the face of a growing number of COVID-19 cases in their region. For maturity shifts, regional income and medical expenditure are additionally important, in contrast to number of bank offices and the degree of self-isolation which do not influence maturity shifts.

Table 5. Deposit withdrawals: extended models for sub-samples

Panel A

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	AvIncome		*HealthSpendings*		*UnemplGrowth$_{(t-1)}$*		*FinLit*	
	>median	<median	>median	<median	>median	<median	>median	<median
DepGrowth$_{(t-1)}$	-0.240***	-0.089***	-0.137***	-0.309***	-0.319***	-0.163***	-0.035***	-0.332***
	(0.003)	(0.008)	(0.002)	(0.001)	(0.001)	(0.001)	(0.005)	(0.006)
COVID$_{(t-1)}$	-1.641***	-0.165	0.574***	-2.220***	-0.199***	1.118***	-0.641***	-2.380***
	(0.319)	(0.245)	(0.070)	(0.091)	(0.061)	(0.044)	(0.229)	(0.436)
Control variables	✓	✓	✓	✓	✓	✓	✓	✓
Bank FEs	✓	✓	✓	✓	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓	✓	✓	✓	✓
Observations	1,030	944	977	1,066	974	1,061	1,113	930
Number of banks	79	74	121	117	128	134	73	62
ChiSq(p-value)	0	0	0	0	0	0	0	0
Sargan test (p-value)	0	1	0	0	0	0	0	0
Hansen test (p-value)	1.000	1.000	0.622	0.644	0.577	0.340	1	1
AR(1)	0.00345	0.0231	0.00356	0.0111	0.168	0.00517	0.00618	0.0358
AR(2)	0.907	0.281	0.602	0.138	0.474	0.109	0.474	0.286

Panel B

VARIABLES	(9)	(10)	(11)	(12)	(13)	(14)
	BankOffices		*Hospital*		*Isolation*	
	>median	<median	>median	<median	>median	<median
DepGrowth$_{(t-1)}$	-0.279***	-0.029**	0.050***	-0.336***	-0.209***	-0.364***
	(0.003)	(0.015)	(0.010)	(0.003)	(0.001)	(0.003)
COVID$_{(t-1)}$	-1.957***	-1.061*	-0.653***	-1.000**	0.267***	-7.187***
	(0.342)	(0.554)	(0.210)	(0.471)	(0.083)	(0.225)
Control variables	✓	✓	✓	✓	✓	✓
Bank FEs	✓	✓	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓	✓	✓
Observations	1,036	892	992	1,051	1,092	951
Number of banks	70	60	66	69	133	109
ChiSq(p-value)	0	0	0	0	0	0
Sargan test (p-value)	0	0.0585	6.27e-05	0	0	0
Hansen test (p-value)	1	1	1	1	0.856	0.998
AR(1)	0.00614	1.81e-06	0.00584	0.0196	0.0105	0.172
AR(2)	0.781	0.332	0.0754	0.245	0.160	0.893

Note: Robust standard errors in parentheses $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 6. Maturity shifts: extended models for sub-samples

Panel A								
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	AvIncome		*HealthSpendings*		*UnemplGrowth*$_{(t-1)}$		*FinLit*	
	>median	<median	>median	<median	>median	<median	>median	<median
MaturityRatio$_{(t-1)}$	0.641***	0.901***	1.109***	0.585***	1.235***	0.510***	0.985***	0.546***
	(0.001)	(0.001)	(0.005)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)
COVID$_{(t-1)}$	-20.013***	16.315***	207.357***	-4.275***	50.000***	-55.922***	4.013***	118.967***
	(1.630)	(0.197)	(2.769)	(0.157)	(0.422)	(0.297)	(0.279)	(2.282)
Control variables	✓	✓	✓	✓	✓	✓	✓	✓
Bank FEs	✓	✓	✓	✓	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓	✓	✓	✓	✓
Observations	936	865	889	974	900	957	1,027	836
Number of banks	72	67	112	105	117	121	66	56
ChiSq(p-value)	0	0	0	0	0	0	0	0
Sargan test (p-value)	0	0	0	0	0	0	0	0
Hansen test (p-value)	1.000	1	0.971	0.972	0.855	0.788	1	1
AR(1)	0.0221	0.0844	0.294	0.348	0.299	0.741	0.534	0.0200
AR(2)	1.28e-05	0.672	0.0403	0.0273	0.156	0.591	0.124	4.30e-06

Panel B						
VARIABLES	(9)	(10)	(11)	(12)	(13)	(14)
	BankOffices		*Hospital*		*Isolation*	
	>median	<median	>median	<median	>median	<median
DepGrowth$_{(t-1)}$	0.584***	0.906***	0.953***	0.486***	0.747***	0.565***
	(0.001)	(0.004)	(0.002)	(0.001)	(0.001)	(0.001)
COVID$_{(t-1)}$	-98.296***	6.157***	9.326***	26.305***	22.761***	-78.922***
	(2.711)	(0.880)	(1.444)	(3.771)	(0.108)	(2.602)
Control variables	✓	✓	✓	✓	✓	✓
Bank FEs	✓	✓	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓	✓	✓
Observations	942	806	908	955	1,018	845
Number of banks	64	53	59	63	121	98
ChiSq(p-value)	0	0	0	0	0	0
Sargan test (p-value)	0	0	0	0	0	0
Hansen test (p-value)	1	1	1	1	0.979	0.999
AR(1)	0.00114	0.0703	0.226	0.917	0.393	0.000346
AR(2)	0.000217	0.449	0.112	0.280	0.396	0.723

Note: Robust standard errors in parentheses $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

5. Conclusion

The COVID-19 virus was first announced in December 2019, its nature and the possible consequences were previously unknown, which is still experiencing the impact of the pandemic. The generally accepted view that the Coronacrisis cannot be compared with previous crises and their causes and consequences leads to the fact that the policy measures taken or the responses of the population are not always effective and might lead to a deterioration of the situation (Barua, 2020). However, it is expected that the uncertainty caused by the COVID-19 pandemic will gradually be replaced by measures to help the global economy out of the crisis.

Personal finances were seriously affected by the pandemic and changes in household strategies for saving management under pandemic pressure is the focus of numerous empirical studies. This research tested how Russian depositors acted during the COVID-19 pandemic. Using bank-level data on retail deposits of banks registered in Russian regions, the characteristics of Russian regions, and different measures of the spread of the COVID-19 virus, we document that the negative relationship between the severity of the COVID-19 in the regions and the outflow of total retail deposits is in line with the liquidity shock literature (Diamond & Dybvig, 1983). However, we provide no evidence for the rationality of withdrawals as the Russian retail deposit market showed no signs of market discipline which again highlights the uniqueness of the COVID-19 pandemic.

Secondly, our results support the maturity shift hypothesis: there is strong evidence that under growing pandemic pressure Russian depositors withdrew long-term deposits and transferred the funds into short-term ones. This result is crucial in terms of long-term bank investments, making the banking sector even less stable.

Thirdly, our results suggest the channels via which the pandemic influenced retail deposit withdrawal decisions. We show that the liquidity shock stimulates withdrawals only via increased unemployment. Increased health expenditure did not result in a reduction in deposit growth. The lack of financial literacy or insufficient state medical support in case of the need for hospitalization are possible reasons why an increase in the number of COVID-19 cases results in deposit fund outflows. Physical limitations—isolation or the lack of bank offices nearby—are factors smoothing the reduction in deposit growth. Maturity shifts are also driven by increased unemployment, a lack of financial literacy, and lack of hospital beds (but not by the number of bank branches or isolation). In addition, lower income and high health expenditure push depositors to switch from long-term to short-term deposits.

Our results imply several policy implications which might be used by regulators to prevent massive outflows of retail deposits or their structure change in favor of short-term deposits under the pressure of an unexpected and severe non-economic shock and the resulting increased uncertainty. The results suggest that the measures supporting employment could help to avoid the liquidity shock effect which results in deposit withdrawals. We also show that if the government provides sufficient medical care for cases of serious infection, depositors do not have to accumulate liquid precautionary savings to pay for medical services themselves if needed. Financial literacy enhancement programs, which historically help gaining stability during financial crises, are reasonable under pandemic pressure as well. The isolation measures, aimed at a direct contraction of the number of COVID-19 cases, had an additional side-effect of keeping deposits in the banking sector. In addition, government subsidies in low-income regions or to compensate for health-related costs could be considered as measures to prevent maturity shifts, preserve the share of long-term deposits in the banking sector and, therefore, support long-term investment opportunities. All these measures would add to the stability of the banking sector during the crisis, which is extremely important in periods of increased uncertainty.

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