NATIONAL RESEARCH UNIVERSITY
HIGHER SCHOOL OF ECONOMICS

Alexander Benov, Maria Semenova

BANK RUNS AND MEDIA FREEDOM: WHAT YOU DON'T KNOW WON'T HURT YOU?

BASIC RESEARCH PROGRAM
WORKING PAPERS

SERIES: FINANCIAL ECONOMICS
WP BRP 81/FE/2021

Alexander Benov[1], *Maria Semenova*[2]

BANK RUNS AND MEDIA FREEDOM: WHAT YOU DON'T KNOW WON'T HURT YOU?[3]

During periods of financial turmoil, depositor behaviour is influenced by the economic information environment, which is largely formed by the media—at least for retail depositors. Therefore the severity of bank runs during financial crises, and their efficiency might be conditional on the volume of the bad news appearing in the media during a crisis. If the news flow remains unrestrained, then the probability of bank runs will increase due to the information sensitivity of depositors. Examining whether it is possible to reduce the severity of bank runs during a crisis by controlling the media, we use the panel data 28 countries from 2001 until 2016. We analyze the impact of media freedom on the growth rate of retail deposits: the major role in bank runs is usually played by unsophisticated individual depositors. Generally the results do not support the hypothesis that changes in the degree of media freedom directly influence behavioural strategies of retail depositors during financial crises. However information limitations may be an instrument to support the market discipline mechanisms: higher media freedom during crises seems to blur the information environment depositors make decisions in. Media restrictions could also prevent the financial literacy effect from dilution during financial crises, ensuring that market discipline is not further undermined.

JEL: G21, G28

Keywords: Media freedom, Bank runs, Crisis, Market discipline, Depositors.

[1] albenov@mail.ru, VTB Bank, Moscow, Russia

[2] Corresponding author: msemenova@hse.ru, Center for Institutional Studies and School of Finance, National Research University Higher School of Economics, Moscow, Russia

[3] The paper was prepared within the framework of the Basic Research Program at the National Research University Higher School of Economics (HSE) and supported within the framework of a subsidy granted to the HSE by the Government of the Russian Federation for the implementation of the Global Competitiveness Program

The financial support from the Government of the Russian Federation within the framework of the implementation of the 5-100 Program Roadmap of the National Research University Higher School of Economics is acknowledged.

1. Introduction

In its attempt to enhance banking system stability and ensure higher standards for the evaluation and management of bank risk, banking regulation initiatives, including Basel II and III, emphasize the importance of maintaining efficient market discipline. This concept incentivizes bank stakeholders—including depositors—to contribute to the effective regulation of the banking system. Depositors can prevent banks from excessive risk-taking through the execution of monitoring and disciplining measures: they can reallocate funds from more risky banks to less risky ones or require higher interest rates on invested funds, which is expected to reduce risk appetites of banks and thus support stability of the banking system.

However, behavioural strategies of depositors are determined by a wide range of factors including access to information about economic conditions and the situation in the banking sector. The majority of papers reveal the sensitivity of different economic agents to their information environment, which is itself influenced by the media. Carroll and McCombs (2003) and Deephouse (2000) show that reputation in the media influences a company's counterparties and its performance; Tausch and Zumbuehl (2018) argue that the risk perception of individual agents is influenced by the degree of economic news coverage; Mitchell and Mulherin (1994), Barber and Odean (2007), Engelberg and Parsons (2011) and many other papers confirm that information disclosed through media channels has an impact on the behaviour of investors in the stock market. Depositor behaviour is also likely to be affected by the media coverage of economic news. This can be especially important in crisis periods when depositors become even more sensitive to the information they face: the papers confirming the impact of media freedom on depositor strategies during crises include Wisniewski and Lambe (2013), Hasan et al. (2013), Pyle et al. (2012).

The severity of bank runs might, therefore, be conditional on the volume of bad news appearing in the media during a crisis. If the news flow remains unrestrained, then the probability of bank runs will increase due to the information sensitivity of depositors.

Since depositors are information sensitive, during a crisis it seems to be reasonable to restrain the amount of negative news appearing in the media which might provoke panic and lead to inefficient, but still severe, bank runs. Such measures can be implemented given that there are possibilities for the government to regulate media sources. Although media freedom in general is supposed to have a positive effect on economic development, temporary news limitation during a crisis may be an efficient instrument to prevent deposit outflows that may damage the banking system. While most papers on market discipline (e.g., Ungan et al. (2008), Nier and Baumann (2006), Berger and Turk-Ariss (2015)) examine its presence and the characteristics and factors

determining depositor behaviour, almost nothing has been investigated about how to manage bank panics when there is a higher probability of depositor initiated bank runs.

This paper identifies whether temporary news flow limitations and a decrease the amount of information about deteriorating financial conditions in a country decrease the severity of bank runs during a crisis. We use the the panel data from 28 countries from 2001 until 2016. We analyze the impact of media freedom on the growth rate of retail deposits: the major role in bank runs is usually played by unsophisticated individual depositors who are not professional financial market participants and whose strategies are influenced by changes in their information environment. The results support the hypothesis that changes in the degree of media freedom can significantly influence the behavioural strategies of retail depositors during financial crisis. Particularly, in countries where the regulation of the media was weaker during the crisis, risks taken by banks were higher and the growth rates of private deposits decreased considerably. We show that this effect is amplified in countries with a higher overall education level: more financially literate depositors are more likely to interpret the information regarding economic issues correctly and account for it when deciding on their strategy concerning their funds. It means that, in terms of preventing the banking system from excessive outflows, the implementation of non-economic measures based on the temporary regulation of negative economic news can be effective.

The rest of the paper is organized as follows. Section 2 gives a brief review of studies on market discipline and the effects of the information environment on the behaviour of different economic agents. Section 3 describes the data used in the empirical analysis, the models and the results. Section 4 concludes.

2. Literature Review

2.1 Market discipline and efficient bank runs

With the introduction of Basel II and III, emphasizing the importance of market discipline executed by bank depositors in terms of enhancing the efficiency of bank regulation, many papers appeared examining this supplementary regulatory mechanism. The studies presented in this subsection describe the phenomenon of market discipline, its forms and the factors determining depositor discipline.

Calomiris and Kahn (1991) define market discipline through the incentives of depositors to monitor bank risk and remove their funds prematurely. They emphasize that depositors do not just act as risk-averse agents; they also limit the risk accepted by banks. Disli et al. (2013)

characterize depositor discipline as a phenomenon of rewarding or punishing banks by depositors in response to the degree of risk-taking by banks, which contributes to the stability of the banking system. They assert that depositors react to excessive risk-taking either by demanding higher interest rates on invested funds or by withdrawing funds. Therefore, there are two main types of depositor discipline defined through different mechanisms: price mechanism and quantitative mechanism.

The importance of market discipline and the disclosure of financial information lies in the need for enhanced transparency in the economy, as (Barth, 2003). Empirical analysis detects market discipline and demonstrates that the behaviour of depositors when given more detailed information, intensifies market participants' capabilities for handling bank risk.

There are many studies which detect the signs and consequences of market discipline mechanisms in different settings and for different countries. Early papers identified market discipline in the US, primarily examining discipline through the price mechanism (e.g., Ellis and Flannery, 1992), confirming that the price mechanism was revealed through demand for higher returns on uninsured bank deposits.

Bliss and Flannery (2002) distinguish "monitoring" and "influencing" as two components of market discipline: in terms of monitoring, adjustments for the changes in bank risk are accounted for in a bank's stock and bond prices, whereas influencing means that there is a real impact of economic agents on bank decisions. Jagtiani and Lemieux (2001), Morgan and Stiroh (2001), Sironi (2002) and Evanoff and Wall (2002) show that the risk premiums required by stakeholders on subordinated debt increase significantly as the values of risk measures and the probability of bank failure increase.

The price mechanism is related principally to developed countries, which have efficient financial markets with a high degree of transparency. In such countries, market participants also tend to quantitatively discipline banks: price and quantitative mechanisms were revealed, for instance, in Switzerland (Birchler and Maechler (2001)) and Japan (Murata and Hori (2006)).

The quantitative mechanism of market discipline is examined in Jagtiani and Lemieux (2001) and Hall et al. (2002). Depositors withdraw uninsured funds from banks in response to the increasing bank risk. This is reflected in the lower amounts of uninsured deposits and a higher reliance of more risky financial intermediaries on insured savings.

It is hard to overestimate the importance of market discipline for developing countries and emerging markets (Ungan et al., 2008). Banks are the main financial intermediaries in such countries and developing economies have higher probabilities of financial crises and lower efficiency of government banking supervision. The latter enhances the role of monitoring

provided by market participants in the financial stability of banks. Since financial markets in emerging markets are not as developed and transparent, market discipline by stakeholders cannot be exercised efficiently through the propagation of their assessment of bank risk in stock prices. For example, Hasan et al. (2013) claim that in Central European countries there is no market for subordinated bank debt and only a few banks are listed on stock exchanges.

Calomiris and Powell (2001) conduct an analysis on banks in Argentina and find that depositor behaviour is sensitive to changes in financial leverage, and the riskiness of bank assets: higher interest rates are demanded by depositors given an increase in these measures. Barajas and Steiner (2000) find evidence, in a study on the disciplining behaviour of depositors in Colombia, that bank depositors prefer banks with high levels of capitalization, liquidity, profitability and a low share of defaulting loans in their portfolios. Martinez-Peria and Schmukler (2001) study the introduction of deposit insurance and crises on the disciplining behaviour of depositors in Argentina, Mexico and Chile. They identify market discipline in all 3 countries, mainly through the quantitative mechanism. The effect of deposit insurance was not revealed, since insured depositors continue to discipline banks after the deposit insurance system was introduced. The authors detected that during banking crises, the extent of market discipline rises. Ungan and Caner (2008) examine market discipline on Russian bank deposits, finding that depositors in Russia reallocate their funds from more risky banks to less risky ones and finding no significant effects of price-based discipline. The amounts of retail deposits increase in response to higher levels of bank capitalization and liquidity. Thus, discipline exists for only undercapitalized and banks with low liquidity.

Several papers analyse the factors influencing depositor discipline. Semenova (2007) shows that, after the introduction of a deposit insurance system and government guarantees in Russia in 2004, foreign and large national banks began attracting retail deposits more rapidly, whereas the share of government-owned banks in the deposit market started decreasing. Disciplining effects are different for separate groups of banks (foreign, large national banks and government banks). Depositors are sensitive to the overall amount of bank assets when choosing where to deposit, and this sensitivity remained unchanged after the introduction of government guarantees for depositors.

While most papers on market discipline investigate the presence of this phenomenon and characterize its type and the factors determining the behaviour of depositors, almost nothing is examined about the possibility of managing depositors' behavioural strategies which may change, for instance, in periods of banking crises, when the probability of inefficient bank runs significantly rises. One of the ways to manage such behaviour might be through the limitation of the information available to retail depositors about the crisis and increased bank risks. This can

be realized through the implementation of government control over national media sources during the crisis, taking into account the fact that depositor behaviour, and that of other economic agents, should be sensitive to changes in their information environment.

2.2. Media freedom and its effects on economic agents

The sensitivity of economic agents to the changing information environment is analyzed in a range of papers devoted to the influence on the strategies of economic agents of information about companies and financial institutions and the economic conditions in different media sources. It is shown that media have an impact on the behavioural strategies of economic agents.

The reputation of firms in the media might influence behavioural strategies stakeholders. Carroll and McCombs (2003) reveal the spillover effects of some particular features of a company's reputation covered in the media on the perception of other features of corporate reputation (i.e. those not described in the media) that observers perceive to be complementary. For instance, higher coverage of the financial performance of companies in the media affected public attitudes towards the financial soundness of those companies and their perception of the quality of goods, services and management. In accordance with these results, it is possible to conjecture that the reputation of a company in the media might contribute to the elimination of information asymmetries existing between this firm and its counterparties and, through the adjusted strategies of the latter, have an impact on different aspects of a company's condition: counterparties are likely to rely on the reputation of a company in the media more, not given full information to adjust their behaviour in terms of their interaction with this firm. Einwiller et al. (2010) suggest that stakeholders rely more on information from the media when it comes to analyzing features of a firm's reputation that are not directly observable. Knowledge about the reputation relevant for stakeholders is important for a firm's managers in terms of choosing the correct strategy to maintain and develop corporate reputation.

The impact of financial media on information asymmetries between internal and external agents is also discussed in Peña-Martel et al. (2018): media coverage of the financial information in newspapers is shown to enhance the content quality of non-financial firms' accounting earnings for external agents including qualified and non-qualified investors, shareholders, regulators, auditors. In particular, a positive effect on the content quality of accounting earnings is found for negative news reports. The quality of the content is detected by examining the coefficient from a regression of cumulative abnormal stock returns on net income, a significantly positive coefficient suggests that there is an information flow connecting a firm's internal information

with the market. The results indicate that media sources form a supplementary corporate governance mechanism operating externally.

Deephouse (2000) shows a firm's media reputation has an impact on its performance, defining reputation as a resource which can generate a competitive advantage for a firm. An increase in a bank's media reputation (measured with the coefficient of media favourableness) by one standard deviation could lead to a rise in ROA by 0.08 p.p., given the average sample ROA equal to 0.84%, this change of nearly 10% could provide a competitive advantage for banks. This finding has a direct implication for managers: they should expand the positive coverage of their company in the media in order to improve its performance.

The trust of economic agents in financial institutions, especially banks, is one of the major factors influencing the efficiency and stability of the economy, and media sources affect this trust significantly, as shown in Fungáčová et al. (2017). The authors conduct a cross-country analysis of the factors determining trust in financial institutions. Access to information in different media sources was considered as one of the potential factors, 3 variables were introduced to represent access to the following sources based on survey results: newspapers, television and the internet. According to the results, watching television daily positively influences trust in financial institutions in general, but the effect appeared to be insignificant for banks in particular. Reading newspapers had a significantly negative impact on trust in banks relative to other financial institutions. The influence of the internet on trust in banks was not found to be robustly significant. It is possible to conclude that trust in banks is influenced by different media sources, but the directions of the corresponding effects do not coincide. Access to information in the media is an important determinant having a significant impact of individuals' trust in banks and other financial institutions. Taking this into account, since independent media diffuse information on crisis events and worsening economic conditions, they are expected to have a substantial influence on the performance of financial institutions in crises through the impact on depositors' trust in banks.

Tausch and Zumbuehl (2018) study the relationship between media coverage of economic news and the risk perception of individual agents. They find that risk attitudes change along with the amount of economic news coverage*:* when there is an increasing flow of good news, the willingness of agents to take risks rises, however, in the long run more favourable economic news reduces incentives to take on more risk (this is because in the long run the effect of positive news probably decays). A higher flow of negative news negatively influences risk-taking behaviour in any time period (a higher concentration of bad news regarding economic issues is perceived as a signal of worsening economic conditions). Perceptions of the risk level are proxied by the extent to which individual agents are worried about economic development,

economic conditions, etc. Since risk attitudes influence individuals' decisions connected with risk-taking, changes in risk perception induced by the media coverage of economic news can determine shifts in the behaviour of economic agents.

There is a large number of papers examining the impact of the information disclosed through the media channels on the behaviour and strategies of agents in the stock market. Mitchell and Mulherin (1994) investigate whether there is a statistically significant relationship between the quantity of news announcements by Dow Jones & Company and activity on the stock market measured by changes in trading volume and stock returns. There was a direct influence of the number of news announcements on market activity and the results were robust to other factors showing a significant impact on financial markets included in the analysis (e.g., week day fixed effect or the major macroeconomic announcements): more substantial changes in individual stock returns were found to be associated with a higher number of Dow Jones announcements. The effect was stronger for individual stocks than for the market index, however, the corresponding improvements in stock returns were not characterized as large. Fluctuations in stock prices were significantly greater when headlines in economic newspapers were printed in a larger font which indicated the importance of the news item.

Antweiler and Frank (2004) study the potential effects of internet stock message boards (e.g. Yahoo Finance) on activity in the stock market. They analyzed and characterized the sentiment contained in a wide range of internet boards. It was found that quantities of news stories predicted the next day's stock returns. Although this effect was found to be short-lasting and not very strong, its statistical significance was confirmed.

A systematic study of interactions between the content of news reported in the media and stock market activity is presented in Tetlock (2007), who evaluates the degree of pessimism contained in articles of a well-known column in the Wall Street Journal. The results indicate that high levels of media pessimism are reflected in decreasing returns on the market index and an unusual intensification of pessimism in the news leads to higher trading volumes, however, the effect was temporary. Patterns of the stock market activity are shown to be determined by the degree of pessimistic sentiment in the media.

Barber and Odean (2007) consider the concept of attention-grabbing stocks, proposing that individual investors are more likely to buy those stocks which catch their attention, this effect, however, does not affect the selling behaviour. From this point of view, it is adequate to assume that media coverage which contributes to the higher attention of market participants, might have an impact on the buying behaviour of individual agents. Some evidence for this hypothesis was

found. In contrast, a similar effect for institutional investors was not identified, as they tend to use more formal criteria for their investment decisions.

Bhattacharya et al. (2009) investigate the role of media in the inflation and bursting of the internet bubble with IPOs of internet companies occurring in the late 1990s. They provide evidence that the media excessively emphasised the good news about IPOs during the bubble and excessively emphasised the negative news during the post-bubble period. The results, which included work with a large dataset of news items, confirm that the stocks of internet companies were overhyped by the media during the bubble, although the induced price shifts were not large: the difference in returns between internet and non-internet stocks was only 3%.

Huberman and Regev (2001) discuss a representative case showing that the behaviour of market participants can be irrational in terms of the reaction to news covered in the media. They describe an article published in the New York Times in 1998 that announced a discovery in cancer treatment by a company EntreMed: in one day a price for the company's stocks rose by more than 300% and, as a consequence, there was a positive influence on the stocks of other biotechnology companies. The reaction of the market was characterized as irrational by the authors, since the information was not new; the story had been covered in other news sources at the end of the previous year, and the reaction persisted.

Engelberg and Parsons (2011) compare the reaction of investors to different versions of media representation of the same economic event. Announcements of the earnings of firms from S&P500 index were analyzed and patterns in trading behaviour in different regions were predicted by the local media coverage. Local trading was also a closely connected with the time of the news reporting. They provided evidence that coverage of news in the media has a significant impact on investors' strategic behaviour. Yang et al. (2017) reached the same conclusion, showing that there is a strong effect of media on the trading decisions made by individual investors. They reveal the asymmetric influence of media coverage: when there is a downward trend in the market, investors primarily follow optimistic reports ignoring negative ones; with an upward trend, the reverse is true.

Several papers reveal the influence of media coverage on the performance of financial institutions, especially banks, during crises. Shin (2009) analyses the case of Northern Rock which was exposed to liquidity risk due to the deteriorating quality of its loans and was seeking the support from the Bank of England. The day after this news was broadcast and the announcement about the provision of emergency financial support was made, a severe bank run occurred. Consequently, total retail funding fell by nearly £14 billion between December 2006 and December 2007.

Wisniewski and Lambe (2013) show there was a strong causal relationship between the amount of negative news and the deteriorating situation in the UK, the US and Canada in terms of the financial stability of banks during the sub-prime mortgage crisis in 2007. By analyzing articles where crisis events were negatively characterized, the authors detected that pessimistic coverage led to further statistically significant reductions in the market value of bank equity, demonstrating that information covered in the media can impact the movements of stock prices. The results provide evidence that, apart from transmitting the news, media actively participate in determining the behaviour of economic agents and creating economic conditions.

Depositors' actions may be influenced by negative rumours in the media more strongly than by fundamentals in periods of crisis (Hasan et al., 2013). They analysed depositor discipline during the 2008–09 financial crisis using a sample of Central European countries to examine whether depositors act relying more on fundamentals or on media reports concerning parent companies during the crisis and whether they can rationally interpret news content. According to the results, larger deposit withdrawals were associated with those banks for which there were negative reports in the media, which supports the hypothesis that depositors are rational when it comes to the interpretation of negative information reported in the media and their subsequent actions. Even unsophisticated depositors were not confused in cases when daughter and parent companies had different names, which again reveals that depositors are more likely to act rationally during a crisis. The coverage of information about financial support provision to banks was treated by depositors as an indicator of the worsening financial performance of parent companies and influenced depositors' strategies. To sum up, retail bank depositors rely on negative information in the media more considerably than on company fundamentals during crises and tend to interpret the news content correctly and act rationally in response.

Pyle et al. (2012) study bank depositor behaviour in Russia immediately after the financial crisis in 1998. The results provide evidence that a higher degree of media freedom was associated with more severe runs on the branches of the Russian bank Sberbank during the crisis – more diverse opportunities to get information about the crisis and adverse economic conditions made people more concerned about the bank and its financial performance. Significant differences were found in behavioural strategies in terms of the treatment of deposits between individuals with different preferences regarding media sources: the likelihood of deposit withdrawal was almost 40 p.p. higher for those who read the leading Russian newspaper Kommersant Daily; similarly, those who watched the more politically independent NTV channel were 15 p.p. more likely to withdraw their funds compared to those who watched only large state TV channels. Consequently, depositors who were exposed to more independent media sources showed more willingness to withdraw their deposits in the immediate aftermath of the financial crisis.

Finally, Semenova and Kaul (2017) provided an analysis of the impact of media freedom in Russian regions on depositor strategies during the 2008–9 financial crisis. The authors investigate whether it is possible to make bank panics less likely and less severe by the introduction of temporary government regulation of media sources. They demonstrated that, using Russian data, there is a significant and negative effect of regional media freedom during the crisis on the growth rate of retail deposits. This effect differs for regions with different levels of education and bank risk. As a result, the largest reductions in the deposit growth rate were observed where media were almost independent, individuals showed the highest levels of financial literacy, and where bank risks were highest. In terms of policy implications, it might be reasonable to limit media freedom in order to avoid serious bank runs in crises. The methodology used in this paper is applied to a cross-country setting to investigate whether similar effects hold for a range of countries that were influenced by the financial crisis in 2007–2009.

The results presented indicate that the behaviour of economic agents can be significantly affected by information in the media and available to these agents. Such a conclusion, if applied to bank runs, mean that government measures to temporarily limit the negative news flow might be useful for decreasing the probability of bank runs during financial crises.

3. Data and Methodology

3.1. Data description

We use panel country-level data on 28 countries for 2001–16. The relationship of interest is analyzed during the financial crisis of 2007–9 in various countries around the world. The set of countries chosen for the analysis includes those countries where the consequences of the crisis were evident: Austria, Belgium, Croatia, Denmark, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kazakhstan, Latvia, Lithuania, Luxembourg, Mongolia, the Netherlands, Nigeria, Norway, Portugal, Russia, Slovenia, Spain, Sweden, Switzerland, Ukraine, the UK and the US. They were chosen in accordance with Laeven and Valencia (2013), who developed a dating methodology for banking crises and applied it to construct a database which includes the beginning and ending dates for the crises. These dates were used in empirical analysis to set a binary variable for the periods in each country. Laeven and Valencia define a banking crisis as an event that shows 1) significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations); (2) significant banking policy intervention measures in response to significant losses in the banking system. Crisis episodes are timed according to this definition.

We now describe the variables that were used in the analysis. Since the aim of the research is to analyze the reaction of retail depositors in terms of deposit outflows from the banking system, the variable $Depgrowth_{i,t}$ was chosen to be the dependent variable of interest. It represents the growth rate of retail deposits in country i in year t, in %. The data on this indicator were collected from the websites of the central banks of the countries in the sample.

In order to reveal the impact of media independence on deposit dynamics, the Freedom House Index ($FHIndex_{i,t}$) was analysed as one of the two indices representing worldwide media freedom. It is released by the US-based NGO Freedom House, which uses a range of questions divided into three categories to derive the index: the legal environment (the legal protection of media freedom), the political environment (sources of control, censorship, access to a range of news media and the safety of journalists) and the economic environment (media ownership and its concentration, limitations to news production and distribution, etc.). This index is one of the most well-known and the most cited media freedom indices, it provides the longest series of media freedom data, allowing for comparisons across countries and across time. Possible disadvantages include subjectivity and the so-called "US bias"; as it is constructed by people with a US background, its evaluation may represent some US perspectives. Information about the index was taken from Schneider (2014). Since $FHIndex_{i,t}$ is constructed in descending order of media freedom (i.e., higher values of the index correspond to lower levels of media freedom), we introduce the variable $MF\_FH_{i,t} = 100 - FHIndex_{i,t}$, which grows in line with media freedom. $MF\_FH_{i,t}$ is used in the empirical analysis.

To check the robustness of our results all the model specifications were re-estimated using another media freedom index. $RWBIndex_{i,t}$ is another well-known index measuring media independence, released by Reporters Without Borders. The structure of the index is based on 87 questions on the topics such as Pluralism, Media independence, Environment and Self-censorship, Legislative framework, Transparency and Infrastructure of news production. For this research the index was separated into two sub-indices for two time periods from 2001 to 2011 and from 2012 to 2016, because in 2012 the methodology of RWB index changed considerably which is reflected in the index values. The information about the index was taken from Schneider (2014). Since $RWBIndex_{i,t}$ is constructed in descending order of media freedom (i.e., higher values of the index correspond to lower levels of media freedom in a country), the variable $MF\_RWB_{i,t} = 100 - RWBIndex_{i,t}$ was introduced, which grows in line with media freedom. $MF\_RWB_{i,t}$ is used in the empirical analysis.

To account for possible changes in depositor strategies with the arrival of crisis events, a dummy covering the corresponding crisis period in countries was introduced. $Crisis_{i,t}$ is equal to 1 for

the crisis period and 0 otherwise, derived on the basis of the timing of methodology of banking crises mentioned above.

The variables outlined below are the control variables which have a significant influence on retail deposit dynamics. $NPLTL_{i,(t-1)}$ is the ratio of defaulting loans to total gross loans, in %. It was taken from the website of the World Bank. This ratio characterizes the riskiness of banks and their risk-taking behaviour. Instead of the current values of the riskiness ratio, their lags are considered. A similar approach was implemented Ungan et al. (2008); depositors react to the level of bank risk observed in the previous period. $Zscore_{i,(t-1)}$ is another measure of financial stability, comparing the capitalization and returns with the volatility of returns to measure the solvency risk of a bank. It represents stability at the level of individual banks and is aggregated to show the reliability of national banking sectors. We use this variable to check the robustness of our results. Since $Zscore_{i,(t-1)}$ has negative relationship to the probability of a financial institution's insolvency, it was multiplied by -1 to characterize the level of bank risk in a country. The indicator was taken from the website of the World Bank.

$Fin\_lit_{i,t}$ is an index revealing the level of financial literacy of the population. The values were taken from the Standard & Poor's Global Financial Literacy Survey.[5] For the robustness check we replace this variable by another proxy for financial literacy, $Educ_{i,t}$, which is an index revealing the level of education of the population. The values were taken from the Human Development Reports.[6]

Macro-level factors including inflation and the wellbeing of the population are important predictors of the deposit growth rate. $CPI_{i,t}$ is the consumer price index, which represents the level of inflation, 2010 was taken as the base year. Inflation is a relevant factor determining the dynamics of deposit growth. Increasing CPI reflects the worsening welfare of the population leading to reduced incentives to save as current consumption becomes relatively more expensive. *CPI* is expected to show a negative impact on deposit growth. The data were taken from the website of International Monetary Fund, International Financial Statistics. $GDPcap_{i,t}$ is GDP per capita, in thousands of 2010 USD (i.e., in real terms). It is used as a control variable describing the economic development and the wellbeing of the population. Higher GDP per capita is supposed to positively influence deposit growth. The data were taken from World Bank national accounts data and OECD National Accounts data files.

[5] https://gflec.org/initiatives/sp-global-finlit-survey
[6] http://hdr.undp.org/en/content/education-index

Variables characterizing the overall level of development of the banking sector, and the market for deposits in particular, significantly determine dynamics of bank deposits in a country. $DepGDP_{i,t}$ represents the ratio of total bank deposits to GDP, in %, the real values of deposits and GDP were used to calculate the ratio. This indicator measures the development level of the bank deposit market: for deposit growth to be high and stable, the banking system should be highly developed, especially the market for bank deposits. The data were taken from the website of International Monetary Fund, International Financial Statistics. $Branches_{i,t}$ is another measure for the development of bank deposit market representing the number of commercial bank branches per 100,000 adults. The data were taken from the website of the World Bank.

Table 1 shows the descriptive statistics for all the variables used, after the omission of all missing observations.

Table 1. Descriptive statistics

	N	mean	sd	min	max
Depgrowth	387	9.6057	13.1454	-23.8757	107.8652
MF_FH	387	74.2662	18.0951	15.0000	92.0000
MF_RWB_t1	387	67.6858	42.7703	0.0000	100.0000
MF_RWB_t2	387	21.9769	35.8973	0.0000	93.5400
NPLTL	387	6.0942	6.6662	0.0818	37.2533
DepIns	387	0.9793	0.1425	0.0000	1.0000
CPI	387	94.9975	17.4640	35.5066	180.6332
GDP_cap	387	36.4638	25.3892	1.3105	111.9683
Educ	387	0.8065	0.0941	0.4240	0.9340
Dep_GDP	387	65.7294	31.0047	10.8900	172.9800
Branches	387	34.5232	22.0464	0.5632	116.1659
Z_score	387	10.8982	7.0294	-0.2412	38.0192
Fin_lit	387	49.6673	13.1209	22.6503	71.8462

Table 2 presents the pairwise correlations for set of variables including Freedom House Index. There are also some moderately correlated variables, but the correlation coefficient does not exceed the level of 0.6, so there is no threat of multicollinearity and these variables can be included in the regression simultaneously.

Table 2. Correlation matrix

	Depgrowth	MF_FH	NPLTL(t-1)	CPI	GDP_cap	Educ	Dep_GDP	Branches	Z_score	Fin_lit
Depgrowth	1.000									
MF_FH	0.387*	1.000								
$NPLTL_{t-1}$	0.021	-0.530*	1.000							
CPI	-0.422*	-0.033	0.084	1.000						
GDP_cap	-0.014	-0.148*	0.040	0.001	1.000					
Educ	-0.279*	0.455*	-0.296*	0.232*	0.172*	1.000				
Dep_GDP	-0.399*	0.466*	-0.276*	0.241*	-0.126*	0.389*	1.000			
Branches	-0.146*	0.297*	-0.257*	-0.023	-0.157*	0.020	0.326*	1.000		
Z_score	-0.071	0.136*	-0.191*	0.097	-0.098	-0.107*	0.111*	0.111*	1.000	
Fin_lit	-0.255*	0.588*	-0.426*	0.118*	-0.004	0.740*	0.377*	-0.080	0.065	1.000

3.2. Models

We start the analysis by estimating the following basic model:[7]

$$Depgrowth_{i,t} = \alpha_i + \beta_0 + \beta_1 MF\_FH_{i,t} + \delta_1 NPLTL_{i,(t-1)} + \delta_2 CPI_{i,t} + \delta_3 Fin\_lit_{i,t} + \delta_4 GDPcap_{i,t} + \delta_5 DepGDP_{i,t} + \delta_6 Branches_{i,t} + \delta_7 DepIns_{i,t} + \varepsilon_{i,t}, \quad (0)$$

All the control variables are compressed in the regression equations into the one variable $Controls_{i,t}$.

$$Depgrowth_{i,t} = \alpha_i + \beta_0 + \beta_1 MF\_FH_{i,t} + \delta Controls_{i,t} + \varepsilon_{i,t}, \quad (1)$$

We expect to find a positive effect of media freedom on deposit growth ($\beta_1 > 0$) since with more independent media sources there are more chances for potential investors to know about investment products, including bank deposits and the free flow of relevant and reliable information about the economic environment may motivate people to invest their funds in banks.

Specification (2) accounts for the effect of the crisis in each country:

$$Depgrowth_{i,t} = \alpha_i + \beta_0 + \beta_1 MF\_FH_{i,t} + \beta_2 Crisis_{i,t} + \beta_3 Crisis_{i,t} \times MF\_FH_{i,t} + \delta Controls_{i,t} + \varepsilon_{i,t}, \quad (2)$$

[7] Conducted tests revealed the existence of heteroscedasticity, autocorrelation and probably cross-sectional correlation in the model. The calculation of Driscoll-Kraay robust standard errors for the coefficient estimates could account for these issues. The same analysis was carried out for each of the other models, the results were almost the same. In most cases only heteroscedasticity and autocorrelation were detected, so HAC cluster standard errors were applied instead of Driscoll-Kraay robust standard errors.

A crisis has a negative influence on the growth rates of private deposits ($\beta_2 < 0$) due to the worsening welfare of the population and increasing bank risk. The effect of the interaction between *Crisis* and *FH_index* is anticipated to reduce *Depgrowth* ($\beta_3 < 0$): in countries where media freedom is less regulated depositors are more likely to become aware of the deteriorating quality of bank assets, for instance, and other negative issues in the economy and, as a consequence, are more likely to withdraw their funds from banks. If this effect is present, then the corresponding policy implication means that it is possible to prevent serious bank runs in crises by limiting the news flow to decrease the probability of informing the population about worsening economic conditions.

Specification (3) accounts for possible differences in depositors' behaviour in response to the freedom of the media given different levels of bank riskiness in a country (captured by the ratio of non-performing loans to total loans).

$$\begin{aligned} Depgrowth_{i,t} = {} & \alpha_i + \beta_0 + \beta_1 MF\_FH_{i,t} + \beta_2 Crisis_{i,t} + \beta_3 Crisis_{i,t} \times MF\_FH_{i,t} \\ & + \beta_4 MF\_FH_{i,t} \times NPLTL_{i,(t-1)} + \beta_5 Crisis_{i,t} \times NPLTL_{i,(t-1)} \\ & + \beta_6 Crisis_{i,t} \times MF\_FH_{i,t} \times NPLTL_{i,(t-1)} + \delta Controls_{i,t} + \varepsilon_{i,t}, \end{aligned} \tag{3}$$

Bank risk ratios are important predictors of the behaviour of depositors (Ungan and Caner (2008), Berger (2015), Martinez-Peria and Schmukler (2001)). These papers apply lags of such ratios to account for the fact that balance sheet data become available to the public with a certain delay: if depositors observe that in period $t-1$ the risks in the banking system become higher, e.g. *NPLTL* increased, then in period t they will withdraw their funds from bank deposits more actively. It can be assumed that the riskiness of banks in a country may influence the dependence between deposit growth and media freedom: it is expected that in those countries with riskier banks, depositors are likely to decrease the amounts invested in deposits more rapidly if the media are more independent. A crisis is expected to intensify the negative effect of increasing bank risk ($\beta_4 < 0$, $\beta_6 < 0$).

The behaviour of depositors can be influenced not only by traditional economic factors (such as current income of a household or macroeconomic factors like the ratio of NPL in the banking system), but also by the abilities of economic agents to interpret and act on financial information, which is set by the level of financial literacy in the model specification (4). It takes into account the level of financial literacy of the population and its potential influence on the relation between media freedom and deposit growth.

$$Depgrowth_{i,t} = \alpha_i + \beta_0 + \beta_1 MF\_FH_{i,t} + \beta_2 Crisis_{i,t} + \beta_3 Crisis_{i,t} \times MF\_FH_{i,t} + \beta_4 MF\_FH_{i,t} \times Fin\_lit_{i,t} + \beta_5 Crisis_{i,t} \times Fin\_lit_{i,t} + \beta_6 Crisis_{i,t} \times MF\_FH_{i,t} \times Fin\_lit_{i,t} + \delta Controls_{i,t} + \varepsilon_{i,t}, \quad (4.1)$$

Semenova (2011), using data from Russian households in 2008, shows the financial literacy of individuals is found to predict their saving behaviour, in particular, financial education increases the willingness to save. If people are more financially educated, they tend to know more about investment opportunities, be more familiar with financial markets and understand how to manage their funds effectively. Taking such results into consideration, it can be assumed that the effect of media independence on the growth rate of deposits might vary considerably depending on the ability of population to deal with the economic and financial information obtained from media sources. It is expected that, for instance, if the population of some country has strong financial knowledge and can interpret the information about changing economic conditions transmitted in the media, then they are more able to react adequately to this information and the deposit growth rate is expected to increase more substantially with higher levels of media freedom, given that the population is more financially literate ($\beta_4 > 0$). In interaction with the dummy for a crisis, the effect is anticipated to turn negative ($\beta_6 < 0$): negative news about deteriorating conditions in the economy and the banking sector is supposed to incentivize a more financially literate population to withdraw their funds more intensively.

Specification (5) accounts for the level of education of population and the bank risk captured by *NPLTL* simultaneously affecting the relation of interest.

$$Depgrowth_{i,t} = \alpha_i + \beta_0 + \beta_1 MF\_FH_{i,t} + \beta_2 Crisis_{i,t} + \beta_3 Crisis_{i,t} \times MF\_FH_{i,t} + \beta_4 MF\_FH_{i,t} \times Fin\_lit_{i,t} \times NPLTL_{i,(t-1)} + \beta_5 Crisis_{i,t} \times Fin\_lit_{i,t} \times NPLTL_{i,(t-1)} + \beta_6 Crisis_{i,t} \times MF\_FH_{i,t} \times Fin\_lit_{i,t} \times NPLTL_{i,(t-1)} + \beta_7 Fin\_lit_{i,t} \times NPLTL_{i,(t-1)} + \delta Controls_{i,t} + \varepsilon_{i,t}, \quad (5)$$

The estimation of specification (5) is anticipated to support the results and conclusions from specifications (3) and (4). Its construction assumes that depositors are more sensitive to free media when bank risk in their country, captured by *NPLTL*, is higher, provided that depositors can interpret financial information more correctly ($\beta_4 < 0$); a crisis is supposed to intensify the negative effect ($\beta_6 < 0$).

4. Results and Robustness Checks

4.1 Results

The estimation results for are presented in Table 3.

The effect of the media freedom index on the growth rate of households' deposits is negative. This does not fit the assumptions that there is more chance of potential depositors, given more independent media, knowing about investment opportunities and having higher confidence regarding the investment of funds in bank deposits. The reversed sign of the effect is probably explained by the fact that the influence of the level of bank risks in a country or in a crisis is not accounted for here (the effect holds for all countries regardless of the *NPLTL* level or the presence of the crisis episode), while bank risk, for example, can be an important factor impacting the dependence (the impact of countries where bank risk is at the highest level might be outweighed and let be the overall effect of media freedom on its own be negative). Such an effect makes it reasonable to consider the interactions of media freedom with a range of other significant factors.

The effect of a crisis is significantly negative, supporting our initial assumption: during a crisis deposit growth is significantly reduced. However, the interaction of media freedom with a crisis does not impact bank deposit dynamics. There are no changes in the significance of the separate negative impact of media freedom alone on deposit growth, in comparison with the first model specification. It is expected that the impact of media freedom on deposit dynamics might be revealed in interaction with some specific regional characteristics, such as the level of bank risk in a country.

In line with expectations, the share of non-performing loans decreases deposit growth rates and the significantly negative effect holds in almost all model specifications. Changes in the share of non-performing bank loans lead to opportunities for credit organizations to attract household deposits regardless of economic stability. This result is in line with the literature on market discipline, implying that bank risk reduces deposit growth. Here our results provide an unexpected and policy-relevant result. The influence of media freedom on bank deposits is closely connected with the level of bank risk in a country: for countries with lower media control, a higher level of risk in the banking system is reflected in more intensive outflows of depositor funds.

The second model shows that there is a significant market discipline effect during crises. Higher bank risk is associated with substantially lower deposit growth, which could signal massive withdrawals. A higher degree of media freedom reduces the size of the disciplinary effect as the

size of the coefficient by the tripled variable is positive. Our explanation is that the media provide some noisy signals and dilute the use of financial information for financial decisions.

Table 3. Results: linear specification

	(1) Depgrowth	(2) Depgrowth	(3) Depgrowth	(4) Depgrowth	(5) Depgrowth
MF_FH	-0.377**	-0.428**	-0.188	-2.608***	-0.167
	(0.139)	(0.196)	(0.235)	(0.973)	(0.260)
$NPLTL_{(t-1)}$	-0.610***	-0.577***	1.762**	-0.595***	-0.421
	(0.109)	(0.124)	(0.757)	(0.126)	(0.479)
CPI	-0.419***	-0.349***	-0.276***	-0.279***	-0.282***
	(0.0556)	(0.0527)	(0.0577)	(0.0619)	(0.0571)
Fin_lit	1.198**	1.524***	1.117*	-2.194	1.204**
	(0.524)	(0.584)	(0.590)	(1.726)	(0.591)
GDP_cap	0.708**	0.621**	0.657**	0.571**	0.694**
	(0.310)	(0.271)	(0.269)	(0.271)	(0.270)
Dep_GDP	-0.0962***	-0.0145	-0.00886	-0.0214	-0.0137
	(0.0277)	(0.0733)	(0.0725)	(0.0751)	(0.0726)
Branches	-0.0733	-0.0224	-0.0851	0.00483	-0.0844
	(0.0654)	(0.0869)	(0.0885)	(0.0891)	(0.0895)
DepIns	-16.75***	-18.21***	-19.10***	-21.57***	-19.39***
	(4.645)	(5.231)	(5.215)	(5.454)	(5.260)
Crisis		-12.11*	-4.801	-21.28	-2.496
		(6.196)	(8.357)	(25.36)	(8.396)
Crisis=1 # MF_FH		0.0991	-0.0282	0.177	-0.0555
		(0.0758)	(0.101)	(0.310)	(0.103)
$NPLTL_{(t-1)}$ # MF_FH			-0.0437***		
			(0.0130)		
Crisis=1 # $NPLTL_{(t-1)}$			-2.306***		
			(0.778)		
Crisis=1 # $NPLTL_{(t-1)}$ # MF_FH			0.0431***		
			(0.0134)		
Fin_lit # MF_FH				0.0475**	
				(0.0208)	
Crisis=1 # Fin_lit				0.242	
				(0.654)	
Crisis=1 # Fin_lit # MF_FH				-0.00246	
				(0.00772)	
Fin_lit # NPLTL(t-1)					0.0537**
					(0.0262)
MF_FH # Fin_lit # $NPLTL_{(t-1)}$					-0.000985***
					(0.000321)
Crisis=1 # Fin_lit # $NPLTL_{(t-1)}$					-0.0578***
					(0.0200)
Crisis=1 # MF_FH # Fin_lit # $NPLTL_{(t-1)}$					0.000993***
					(0.000319)
Constant	20.85	1.684	0.326	165.0**	-6.140
	(16.22)	(34.40)	(35.23)	(79.10)	(35.58)
Observations	358	358	358	358	358
R^2-within		0.385	0.407	0.395	0.406

Standard errors in parentheses
* $p < .1$, ** $p < .05$, *** $p < .01$

During crises, depositors withdraw more in countries with riskier banks. However, if the media is freer, the overall information environment becomes noisier and financial decisions become less based on risk and market discipline is undermined.

Satisfying the assumptions, financial literacy on its own shows a significant positive effect on deposit growth rate. Financial literacy has an impact on the effect of media freedom on deposit growth: in regions where citizens have more financial knowledge, an increase in media freedom leads to a greater rate of bank deposits. However, an attempt to identify the negative influence of higher financial literacy on the dependence between media freedom and deposit dynamics was unsuccessful in specification (4): the corresponding effects are not significant. This gives an incentive to consider the effect of this variable on deposit dynamics in interaction with other factors, such as the ratio of non-performing bank loans and with levels of media freedom.

In the final model specification (5), similarly to the estimation of the specification (3), the influence of media freedom on bank deposits is closely connected to the level of bank risk and financial literacy: for countries characterized by the most media freedom and where the population is financially literate, a higher risk level in the banking system is reflected in the most intensive outflows of deposits. In countries with the highest level of financial literacy an increase in bank risk decreases amount of bank deposits in crises the most, which is supported by the effect for the corresponding interaction. These two highly significant effects complement each other and demonstrate that the most dramatic deposit outflows take place in crises where the population is the most financially literate and where bank risk increases the most, while media freedom is highest. In other words, during crises, depositors withdraw even more in the countries with riskier banks if they are more financially literate. However the important, though indirect, role of media freedom is that this effect is undermined if the media are less free.

The identified dependencies support the hypothesis regarding the positive impact of media regulation: if the government has control over the media, it can temporarily limit the flow of negative news available to the population and thus by supporting the market discipline reduce the probability and severity of inefficient bank runs in periods of economic crises.

4.2. Robustness checks

We went through several robustness checks in our estimations. First, we replaced the share of non-performing loans with the *Z-score*. Second, we included another proxy for financial literacy:the *Education index* produced within the United Nations Human Development Program. Finally we used a different measure for the media freedom, introducing the index provided by the Reporters Without Borders foundation.

The results of the model estimation for the first robustness check are presented in Table A.1 in the Appendix. Lagged Z-score does not show a negative influence on the deposit growth rate on its own, while a slight effect is identified in the final model specification in interaction with media freedom and financial literacy: for countries characterized by the highest media freedom

where the population is financially literate, the higher risk level of the banking system (set with Z-score) is reflected in the most intensive outflows of deposits; however, no influence of a crisis on the dependence is identified.

Second, we changed the proxy for financial literacy of the population: we used *Educ* variable instead of *Fin_lit* indicator as an alternative measure of financial knowledge (published in Human Development Reports and being a part of the composite Human Development Index). Although it captures financial literacy indirectly (a higher level of financial literacy correlates positively with the level of general education), and the re-estimated previously discussed model specifications with *FH_index* measuring media freedom. The results are presented in Table A.2 in the Appendix. *Educ* appears as positive and significant as *Fin_lit*. The effect of crisis on the rate of deposit growth is also significantly negative in the basic model specification (2) as before.

The influence of media freedom on bank deposits is again connected with the level of bank risk and financial literacy. For countries with more media freedom, a higher risk level in the banking system is reflected in more intensive outflows of depositor funds. Higher bank risk decreases the amounts of bank deposits in crisis periods more substantially. These negative effects on deposit growth are intensified for countries with greater financial literacy, as before. These highly significant effects prove the robustness of the results.

Third, all the model specifications were re-estimated with the use of another media freedom index: *RWB_index*. The results are presented in Tables A.3-A.5 in the Appendix. They generally support the results of the main model specifications. Table A.5, in particular, shows that for countries with higher media freedom, higher financial literacyis reflected in more intensive outflows of depositor funds in a crisis in comparison with regions with less media freedom. Although this effect does not account for the level of bank risk, it satisfies the hypothesis about the negative influence of high media freedom on bank deposits in a crisis.

5. Conclusion

The concept of depositor discipline and the factors determining the underlying behaviour of depositors have been analyzed in a wide range of studies. However, there are almost no studies examining ways of managing retail depositors' behaviour, especially, during financial crises, when bank panics are more likely to occur resulting into more harmful consequences in the banking sector and in the whole economy. Numerous papers provide evidence that depositors' behaviour, like that of other economic agents, is sensitive to the available information on economic conditions and financial stability. Hence, it might be reasonable for the government to implement temporary limitations on the amount of negative information available in the media during periods of economic downturn, to avoid serious bank panics.

In this paper a cross-country empirical study was conducted using panel data from over 28 countries from 2001 until 2016 to explore the effect of media freedom on the reduction of the retail deposit growth rate during the financial crisis of in 2007–9. In order to proxy for the degree of media freedom, two global indices were considered: The Freedom of the Press Index by Freedom House and The Press Freedom Index by Reporters Without Borders.

According to our results, deposit growth is influenced by the extent to which media channels in a country are regulated by the government, but indirectly and via the market discipline channel. The influence of media freedom on depositors' behaviour during a crisis is different for regions with different levels of bank riskiness measured by the average ratio of loan defaults in bank portfolios, and level of financial literacy of population: in countries where banks are less stable and the population is more educated, the fall in retail deposit growth during a crisis higher given a higher degree of media freedom. There is a neat interpretation of this result: when depositors are able to interpret information from the media about worsening conditions in the banking sector as a whole, and bank risk rises, higher media freedom in a crisis can provoke massive bank runs. Therefore, non-economic measures such as the introduction of temporary limitations of the news flow can inhibit the development of bank panics, avoid large and inefficient outflows of funds and maintain depositor market discipline. Such measures seem to be more efficient during crises in comparison with other possible ways to restrain rapidly accelerating bank panics, for example, direct regulation of bank risk by the government, which is more time-consuming when immediate action is required.

References

Antweiler W., Frank M. Z. Is all that talk just noise? The information content of internet stock message boards //The Journal of Finance. – 2004. – Vol. 59. – №. 3. – P. 1259-1294.

Barber B. M., Odean T. All that glitters: The effect of attention and news on the buying behavior of individual and institutional investors //The Review of Financial Studies. – 2007. – Vol. 21. – №. 2. – P. 785-818.

Barth J. R. A cross-country analysis of the bank supervisory framework and bank performance //Financial Markets, Institutions & Instruments. – 2003. – Vol. 12. – №. 2. – P. 67-120.

Berger A. N., Turk-Ariss R. Do depositors discipline banks and did government actions during the recent crisis reduce this discipline? An international perspective //Journal of Financial Services Research. – 2015. – Vol. 48. – №. 2. – P. 103-126.

Bhattacharya U., Galpin N., Ray R., Yu X. The role of the media in the internet IPO bubble //Journal of Financial and Quantitative Analysis. – 2009. – Vol. 44. – №. 3. – P. 657-682.

Birchler U., Maechler A. M. Do depositors discipline Swiss banks? – Working Paper, Study Center Gerzensee, 2001. – №. 01.06.

Bliss R. R., Flannery M. J. Market discipline in the governance of US bank holding companies: Monitoring vs. influencing //Review of Finance. – 2002. – Vol. 6. – №. 3. – P. 361-396.

Calomiris C. W., Kahn C. M. The role of demandable debt in structuring optimal banking arrangements //The American Economic Review. – 1991. – P. 497-513.

Calomiris C. W., Powell A. Can emerging market bank regulators establish credible discipline? The case of Argentina, 1992-99 //Prudential supervision: What works and what doesn't. – University of Chicago Press, 2001. – P. 147-196.

Carroll C. E., McCombs M. Agenda-setting effects of business news on the public's images and opinions about major corporations //Corporate Reputation Review. – 2003. – Vol. 6. – №. 1. – P. 36-46.

Deephouse D. L. Media reputation as a strategic resource: An integration of mass communication and resource-based theories //Journal of Management. – 2000. – Vol. 26. – №. 6. – P. 1091-1112.

Diamond D. W., Dybvig P. H. Bank runs, deposit insurance, and liquidity //Journal of Political Economy. – 1983. – Vol. 91. – №. 3. – P. 401-419.

Disli M., Schoors K., Meir J. Political connections and depositor discipline //Journal of Financial Stability. – 2013. – Vol. 9. – №. 4. – P. 804-819.

Einwiller S. A., Carroll C. E., Korn K. Under what conditions do the news media influence corporate reputation? The roles of media dependency and need for orientation //Corporate Reputation Review. – 2010. – Vol. 12. – №. 4. – P. 299-315.

Ellis D. M., Flannery M. J. Does the debt market assess large banks' risk? Time series evidence from money center CDs //Journal of Monetary Economics. – 1992. – Vol. 30. – №. 3. – P. 481-502.

Engelberg J. E., Parsons C. A. The causal impact of media in financial markets //The Journal of Finance. – 2011. – Vol. 66. – №. 1. – P. 67-97.

Evanoff D. D., Wall L. D. Measures of the riskiness of banking organizations: Subordinated debt yields, risk-based capital, and examination ratings //Journal of banking & finance. – 2002. – Vol. 26. – №. 5. – P. 989-1009.

Fungáčová Z., Hasan I., Weill L. Trust in banks //Journal of Economic Behavior and Organization. – 2017.

Hall J. R., King T. B., Meyer A. P., Vaughan M. D. Did FDICIA enhance market discipline on community banks? A look at evidence from the Jumbo-CD market. – Federal Reserve Bank of St. Louis, 2002. – №. 2002-04.

Hasan I., Jackowicz K., Kowalewski O., Kozłowski Ł. Market discipline during crisis: Evidence from bank depositors in transition countries //Journal of Banking and Finance. – 2013. – Vol. 37. – №. 12. – P. 5436-5451.

Huberman G., Regev T. Contagious speculation and a cure for cancer: A nonevent that made stock prices soar //The Journal of Finance. – 2001. – Vol. 56. – №. 1. – P. 387-396.

Jagtiani J., Lemieux C. Market discipline prior to bank failure //Journal of Economics and Business. – 2001. – Vol. 53. – №. 2-3. – P. 313-324.

Laeven L., Valencia F. Systemic banking crises database //IMF Economic Review. – 2013. – Vol. 61. – №. 2. – P. 225-270.

Martinez Peria M. S., Schmukler S. L. Do depositors punish banks for bad behavior? Market discipline, deposit insurance, and banking crises //The journal of finance. – 2001. – Vol. 56. – №. 3. – P. 1029-1051.

Mitchell M. L., Mulherin J. H. The impact of public information on the stock market //The Journal of Finance. – 1994. – Vol. 49. – №. 3. – P. 923-950.

Morgan D. P., Stiroh K. J. Market discipline of banks: The asset test //Journal of Financial Services Research. – 2001. – Vol. 20. – №. 2-3. – P. 195-208.

Murata K., Hori M. Do small depositors exit from bad banks? Evidence from small financial institutions in Japan //The Japanese Economic Review. – 2006. – Vol. 57. – №. 2. – P. 260-278.

Nier E., Baumann U. Market discipline, disclosure and moral hazard in banking //Journal of Financial Intermediation. – 2006. – Vol. 15. – №. 3. – P. 332-361.

Peña-Martel D., Pérez-Alemán J., Santana-Martín D. J. The role of the media in creating earnings informativeness: Evidence from Spain //BRQ Business Research Quarterly. – 2018.

Pyle W., Schoors K., Semenova M., Yudaeva K. Bank depositor behavior in Russia in the aftermath of financial crisis //Eurasian Geography and Economics. – 2012. – Vol. 53. – №. 2. – P. 267-284.

Schneider L. Media freedom indices: what they tell us – and what they don't //Deutsche Welle Akademie: Bonn. – 2014.

Semenova M. How depositors discipline banks: the case of Russia. – EERC Research Network, Russia and CIS, 2007. – №. 07-02e.

Semenova M. Save or borrow – What determines Russian households' financial strategies? //BOFIT Discussion Papers. – 2011. – №. 28.

Semenova M., Kaul A. Bank Panics and Media Freedom during the 2008-2009 Financial Crisis: Evidence from Russian Regions //The Journal of Corporate Finance Research. – 2017. – Vol. 12. – №. 2. – P. 15-31.

Shin H. S. Reflections on Northern Rock: The bank run that heralded the global financial crisis //Journal of Economic Perspectives. – 2009. – Vol. 23. – №. 1. – P. 101-19.

Sironi A. Strengthening banks' market discipline and leveling the playing field: are the two compatible? //Journal of banking & finance. – 2002. – Vol. 26. – №. 5. – P. 1065-1091.

Steiner M. R., Barajas M. A. Depositor behavior and market discipline in Colombia. – International Monetary Fund, 2000. – №. 0-214.

Tausch F., Zumbuehl M. Stability of risk attitudes and media coverage of economic news //Journal of Economic Behavior and Organization. – 2018. – Vol. 150. – P. 295-310.

Tetlock P. C. Giving content to investor sentiment: The role of media in the stock market //The Journal of Finance. – 2007. – Vol. 62. – №. 3. – P. 1139-1168.

Ungan E., Caner S., Özyıldırım S. Depositors' assessment of bank riskiness in the Russian Federation //Journal of Financial Services Research. – 2008. – Vol. 33. – №. 2. – P. 77-100.

Wisniewski T. P., Lambe B. The role of media in the credit crunch: The case of the banking sector //Journal of Economic Behavior and Organization. – 2013. – Vol. 85. – P. 163-175.

Yang W., Lin D., Yi Z. Impacts of the mass media effect on investor sentiment //Finance Research Letters. – 2017. – Vol. 22. – P. 1-4.

Appendix

Table A.1 Robustness checks: results with Z-score

	(1) Depgrowth	(2) Depgrowth	(3) Depgrowth	(4) Depgrowth	(5) Depgrowth
MF_FH	0.0782	0.00889	0.00316	-1.971**	-0.248
	(0.118)	(0.177)	(0.217)	(0.997)	(0.227)
Zsc(t-1)	-0.135	-0.0943	0.0387	-0.0941	-1.338
	(0.0967)	(0.171)	(1.269)	(0.173)	(0.883)
CPI	-0.403***	-0.332***	-0.309***	-0.270***	-0.314***
	(0.0652)	(0.0542)	(0.0555)	(0.0640)	(0.0549)
Fin_lit	1.078**	1.517**	1.291**	-1.831	1.706***
	(0.480)	(0.605)	(0.615)	(1.783)	(0.657)
GDP_cap	0.873***	0.762***	0.672**	0.714**	0.776***
	(0.229)	(0.278)	(0.289)	(0.279)	(0.293)
Dep_GDP	-0.0910**	0.00541	0.00451	-0.00473	-0.00954
	(0.0337)	(0.0760)	(0.0762)	(0.0778)	(0.0763)
Branches	0.0132	0.0557	0.0185	0.0938	0.0451
	(0.0662)	(0.0882)	(0.0897)	(0.0903)	(0.0896)
DepIns	-14.23**	-16.15***	-17.18***	-19.61***	-18.55***
	(5.336)	(5.409)	(5.588)	(5.647)	(5.598)
Crisis		-11.81*	-1.958	-9.468	-19.65
		(6.397)	(12.75)	(26.10)	(13.47)
Crisis=1 # MF_FH		0.0845	-0.0845	-0.0219	0.134
		(0.0782)	(0.161)	(0.317)	(0.168)
Zsc(t-1) # MF_FH			-0.0000898		
			(0.0155)		
Crisis=1 # Zsc(t-1)			1.208		
			(1.211)		
Crisis=1 # Zsc(t-1) # MF_FH			-0.0192		
			(0.0154)		
Fin_lit # MF_FH				0.0430**	
				(0.0215)	
Crisis=1 # Fin_lit				-0.0170	
				(0.674)	
Crisis=1 # Fin_lit # MF_FH				0.00149	
				(0.00793)	
Fin_lit # Zsc(t-1)					0.0889*
					(0.0483)
MF_FH # Fin_lit # Zsc(t-1)					-0.000764*
					(0.000453)
Crisis=1 # Fin_lit # Zsc(t-1)					-0.0240
					(0.0356)
Crisis=1 # MF_FH # Fin_lit # Zsc(t-1)					0.000212
					(0.000433)
Constant	-25.43	-47.28	-30.85	100.2	-33.82
	(19.22)	(33.82)	(35.81)	(80.67)	(36.04)
Observations	358	358	358	358	358
R^2-within		0.345	0.355	0.353	0.358

Standard errors in parentheses
* $p < .1$, ** $p < .05$, *** $p < .01$

Table A.2 Robustness checks: results with Educ

	(1) Depgrowth	(2) Depgrowth	(3) Depgrowth	(4) Depgrowth	(5) Depgrowth
MF_FH	-0.365**	-0.417**	-0.171	-0.505	-0.0795
	(0.136)	(0.193)	(0.234)	(1.762)	(0.244)
NPLTL(t-1)	-0.635***	-0.606***	1.661**	-0.618***	-1.209**
	(0.119)	(0.124)	(0.756)	(0.126)	(0.583)
CPI	-0.431***	-0.358***	-0.285***	-0.345***	-0.312***
	(0.0572)	(0.0524)	(0.0574)	(0.0622)	(0.0576)
Educ	84.29**	111.5***	85.72**	97.79	87.55**
	(30.66)	(34.28)	(34.88)	(178.5)	(34.68)
GDP_cap	0.685**	0.578**	0.620**	0.554**	0.660**
	(0.312)	(0.269)	(0.267)	(0.271)	(0.268)
Dep_GDP	-0.102***	-0.0158	-0.0118	-0.0228	-0.00165
	(0.0285)	(0.0721)	(0.0715)	(0.0743)	(0.0717)
Branches	-0.0859	-0.0312	-0.0886	-0.0417	-0.0916
	(0.0550)	(0.0846)	(0.0860)	(0.0901)	(0.0861)
DepIns	-16.64***	-18.20***	-19.10***	-18.53***	-17.99***
	(4.576)	(5.199)	(5.192)	(5.284)	(5.225)
Crisis		-13.61**	-5.934	-54.40	-4.836
		(6.154)	(8.339)	(38.26)	(8.310)
Crisis=1 # MF_FH		0.113	-0.0142	0.750	-0.0214
		(0.0748)	(0.101)	(0.625)	(0.101)
NPLTL(t-1) # MF_FH			-0.0416***		
			(0.0130)		
Crisis=1 # NPLTL(t-1)			-2.180***		
			(0.779)		
Crisis=1 # NPLTL(t-1) # MF_FH			0.0402***		
			(0.0135)		
Educ # MF_FH				0.151	
				(2.195)	
Crisis=1 # Educ				51.85	
				(47.30)	
Crisis=1 # Educ # MF_FH				-0.794	
				(0.751)	
Educ # NPLTL(t-1)					3.994***
					(1.332)
MF_FH # Educ # NPLTL(t-1)					-0.0544***
					(0.0167)
Crisis=1 # Educ # NPLTL(t-1)					-2.780***
					(1.040)
Crisis=1 # MF_FH # Educ # NPLTL(t-1)					0.0482***
					(0.0175)
Constant	14.30	-10.16	-11.99	-0.961	-21.53
	(13.29)	(32.69)	(34.24)	(138.4)	(34.37)
Observations	358	358	358	358	358
R^2-within		0.392	0.411	0.395	0.414

Standard errors in parentheses
* $p < .1$, ** $p < .05$, *** $p < .01$

Table A.3 Robustness checks: results with RWB Index

	(1) Depgrowth	(2) Depgrowth	(3) Depgrowth	(4) Depgrowth	(5) Depgrowth
MF_RWB_t1	-0.209	-0.160	-0.0758	-1.990**	-0.165
	(0.165)	(0.173)	(0.228)	(0.780)	(0.232)
MF_RWB_t2	-0.227	-0.196	-0.116	-1.814**	-0.196
	(0.192)	(0.194)	(0.244)	(0.827)	(0.251)
NPLTL(t-1)	-0.559***	-0.500***	0.150	-0.519***	-0.378
	(0.101)	(0.122)	(0.981)	(0.122)	(0.518)
CPI	-0.435***	-0.396***	-0.351***	-0.355***	-0.352***
	(0.0604)	(0.0502)	(0.0567)	(0.0554)	(0.0559)
Fin_lit	1.285**	1.805***	1.741***	-1.954	1.853***
	(0.582)	(0.613)	(0.632)	(1.634)	(0.633)
GDP_cap	0.698**	0.646**	0.643**	0.602**	0.642**
	(0.305)	(0.275)	(0.279)	(0.275)	(0.279)
Dep_GDP	-0.0970***	-0.0116	-0.00174	-0.00420	0.00950
	(0.0273)	(0.0744)	(0.0760)	(0.0754)	(0.0764)
Branches	-0.0780*	-0.0633	-0.0509	-0.0358	-0.0485
	(0.0437)	(0.0894)	(0.0917)	(0.0911)	(0.0920)
DepIns	-14.84**	-16.32***	-18.04***	-16.56***	-18.18***
	(5.652)	(5.259)	(5.396)	(5.249)	(5.380)
Crisis		-2.749	-1.282	-41.46*	-3.149
		(3.119)	(4.658)	(21.63)	(4.878)
Crisis=1 # MF_RWB_t1		-0.0191	-0.0184	0.337	0.00642
		(0.0349)	(0.0507)	(0.241)	(0.0530)
NPLTL(t-1) # MF_RWB_t1			-0.00421		
			(0.0116)		
NPLTL(t-1) # MF_RWB_t2			-0.00587		
			(0.0108)		
Crisis=1 # NPLTL(t-1)			-0.172		
			(0.515)		
Crisis=1 # NPLTL(t-1) # MF_RWB_t1			-0.00315		
			(0.00697)		
Fin_lit # MF_RWB_t1				0.0386**	
				(0.0157)	
Fin_lit # MF_RWB_t2				0.0362**	
				(0.0163)	
Crisis=1 # Fin_lit				0.615*	
				(0.345)	
Crisis=1 # Fin_lit # MF_RWB_t1				-0.00560	
				(0.00387)	
Fin_lit # NPLTL(t-1)					-0.00195
					(0.0336)
MF_RWB_t1 # Fin_lit # NPLTL(t-1)					0.000106
					(0.000296)
MF_RWB_t2 # Fin_lit # NPLTL(t-1)					-0.0000163
					(0.000328)
Crisis=1 # Fin_lit # NPLTL(t-1)					0.00126
Crisis=1 # MF_RWB_t1 # Fin_lit # NPLTL(t-1)					-0.000185
					(0.000146)
Constant	7.611	-27.30	-36.28	146.4*	-34.44
	(11.54)	(35.95)	(37.02)	(80.39)	(37.04)
Observations	358	358	358	358	358
R^2-within		0.378	0.384	0.392	0.386

Standard errors in parentheses
* $p < .1$, ** $p < .05$, *** $p < .01$

Table A.4 Robustness checks: results with RWB Index and Z-score

	(1) Depgrowth	(2) Depgrowth	(3) Depgrowth	(4) Depgrowth	(5) Depgrowth
MF_RWB_t1	0.0906	0.123	0.151	-1.541*	0.0620
	(0.140)	(0.162)	(0.240)	(0.794)	(0.251)
MF_RWB_t2	0.0964	0.0920	0.108	-1.448*	0.0204
	(0.171)	(0.185)	(0.283)	(0.845)	(0.303)
Zsc(t-1)	-0.145	-0.0999	-0.234	-0.131	-0.442
	(0.109)	(0.173)	(1.637)	(0.177)	(0.797)
CPI	-0.392***	-0.350***	-0.339***	-0.311***	-0.334***
	(0.0693)	(0.0502)	(0.0509)	(0.0559)	(0.0526)
Fin_lit	1.121*	1.822***	1.724***	-1.564	1.751***
	(0.526)	(0.629)	(0.638)	(1.676)	(0.653)
GDP_cap	0.874***	0.795***	0.746***	0.749***	0.712**
	(0.243)	(0.279)	(0.283)	(0.280)	(0.289)
Dep_GDP	-0.0912**	0.0157	0.0297	0.0206	0.0322
	(0.0335)	(0.0763)	(0.0765)	(0.0775)	(0.0768)
Branches	0.0159	0.0211	0.0170	0.0556	0.0251
	(0.0395)	(0.0892)	(0.0926)	(0.0911)	(0.0930)
DepIns	-14.70**	-16.80***	-15.50***	-17.11***	-15.98***
	(5.599)	(5.419)	(5.491)	(5.412)	(5.464)
Crisis		-2.397	-1.624	-33.52	-3.310
		(3.199)	(5.678)	(22.19)	(5.721)
Crisis=1 # MF_RWB_t1		-0.0372	-0.0929	0.219	-0.0761
		(0.0355)	(0.0617)	(0.247)	(0.0629)
Zsc(t-1) # MF_RWB_t1			0.00260		
			(0.0167)		
Zsc(t-1) # MF_RWB_t2			0.00125		
			(0.0202)		
Crisis=1 # Zsc(t-1)			0.113		
			(0.375)		
Crisis=1 # Zsc(t-1) # MF_RWB_t1			-0.00563		
			(0.00432)		
Fin_lit # MF_RWB_t1				0.0348**	
				(0.0161)	
Fin_lit # MF_RWB_t2				0.0337**	
				(0.0167)	
Crisis=1 # Fin_lit				0.498	
				(0.354)	
Crisis=1 # Fin_lit # MF_RWB_t1				-0.00397	
				(0.00398)	
Fin_lit # Zsc(t-1)					0.0176
					(0.0420)
MF_RWB_t2 # Fin_lit # Zsc(t-1)					-0.000127
					(0.000439)
Crisis=1 # Fin_lit # Zsc(t-1)					-0.000285
					(0.00632)
Crisis=1 # MF_RWB_t1 # Fin_lit # Zsc(t-1)					-0.0000840
Constant	-30.74*	-71.44**	-69.11	85.58	-61.80
	(14.35)	(35.31)	(42.20)	(81.40)	(42.39)
Observations	358	358	358	358	358
R^2-within		0.346	0.359	0.358	0.361

Standard errors in parentheses
* $p < .1$, ** $p < .05$, *** $p < .01$

Table A.5 Robustness checks: results with RWB Index and Educ

	(1) Depgrowth	(2) Depgrowth	(3) Depgrowth	(4) Depgrowth	(5) Depgrowth
MF_RWB_t1	-0.174	-0.114	-0.0245	-2.965**	-0.0269
	(0.154)	(0.174)	(0.226)	(1.294)	(0.232)
MF_RWB_t2	-0.188	-0.140	-0.0572	-2.058	-0.0441
	(0.179)	(0.194)	(0.242)	(1.538)	(0.250)
NPLTL(t-1)	-0.575***	-0.520***	0.245	-0.551***	-1.382**
	(0.107)	(0.121)	(0.965)	(0.124)	(0.629)
CPI	-0.442***	-0.401***	-0.351***	-0.335***	-0.373***
	(0.0614)	(0.0501)	(0.0564)	(0.0568)	(0.0558)
Educ	87.59**	122.7***	122.6***	-221.2	122.9***
	(32.87)	(36.44)	(37.08)	(155.3)	(37.15)
GDP_cap	0.683**	0.618**	0.614**	0.609**	0.637**
	(0.302)	(0.274)	(0.277)	(0.272)	(0.277)
Dep_GDP	-0.100***	-0.00776	-0.00168	-0.0243	0.0125
	(0.0291)	(0.0734)	(0.0750)	(0.0755)	(0.0748)
Branches	-0.0907**	-0.0809	-0.0660	-0.0549	-0.0616
	(0.0338)	(0.0875)	(0.0894)	(0.0887)	(0.0893)
DepIns	-14.87**	-16.44***	-18.38***	-16.73***	-17.38***
	(5.497)	(5.237)	(5.370)	(5.267)	(5.359)
Crisis		-3.574	-1.707	-115.2**	-2.752
		(3.124)	(4.635)	(50.26)	(4.695)
Crisis=1 # MF_RWB_t1		-0.0135	-0.0164	1.186*	-0.0000877
		(0.0345)	(0.0505)	(0.633)	(0.0511)
NPLTL(t-1) # MF_RWB_t1			-0.00502		
			(0.0114)		
NPLTL(t-1) # MF_RWB_t2			-0.00712		
			(0.0106)		
Crisis=1 # NPLTL(t-1)			-0.212		
			(0.508)		
Crisis=1 # NPLTL(t-1) # MF_RWB_t1			-0.00318		
			(0.00690)		
Educ # MF_RWB_t1				3.510**	
				(1.557)	
Educ # MF_RWB_t2				2.479	
				(1.805)	
Crisis=1 # Educ				127.6**	
				(56.69)	
Crisis=1 # Educ # MF_RWB_t1				-1.374*	
				(0.721)	
Educ # NPLTL(t-1)					2.374
					(1.901)
MF_RWB_t1 # Educ # NPLTL(t-1)					-0.00631
					(0.0164)
MF_RWB_t2 # Educ # NPLTL(t-1)					-0.0154
					(0.0165)
Crisis=1 # Educ # NPLTL(t-1)					-0.0594
Crisis=1 # MF_RWB_t1 # Educ # NPLTL(t-1)					-0.00935
					(0.00864)
Constant	-0.463	-38.55	-51.23	234.5*	-52.73
	(11.10)	(35.69)	(37.00)	(127.4)	(37.07)
Observations	358	358	358	358	358
R^2-within		0.383	0.390	0.400	0.396

Standard errors in parentheses
* $p < .1$, ** $p < .05$, *** $p < .01$

Corresponding author:
Maria Semenova
National Research University Higher School of Economics (Moscow, Russia).
Senior Research Fellow at the Center for Institutional Studies
Associate Professor at the School of Finance
E-mail: msemenova@hse.ru

Any opinions or claims contained in this Working Paper do not necessarily reflect the views of HSE.