Crisis? What crisis? Bank Stability, financial development and propaganda*

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Abstract

We study the interaction between bank depositors and their government. The government controls the media at least partially. Will a rational government feed depositors biased news about the economic outlook in the hope to avert a bank run? Our Bayesian persuasion model shows that it may be optimal for the government to bias the signal depositors receive about the economic outlook even if all agents are rational and have common priors about the economic outlook. The model predicts depositors with a biased signal are less likely to run on the bank and less likely to return to the bank after the crisis. Countries with more media freedom experience more banking crises and more financial development, in line with the theory. In August 1998 Russian depositors with more access to the relatively unbiased channel NTV were not more likely to run on the bank, but much more likely to return, in line with the hypothesis that the August 1998 crisis revealed differences in bias between NTV and other TV stations.

Keywords: Bayesian persuasion, bank run, systemic stability, propaganda, media freedom

JEL: to be defined

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1 Introduction

Lipscy (2018) finds in a recent paper that democracies are historically much more prone to banking crises than autocracies, which may have gone partially unnoticed because of the historical exception of across-the-board banking system stability during the Bretton Woods System. He demonstrates that this empirical regularity is very robust in the nineteenth and twentieth century, before and after World War II, and before and after the collapse of the Bretton Woods System. He refers to a number of potential reasons for this uneasy and often neglected association as "...unintended consequences that increase the likelihood of financial instability and crisis onset. Veto players can make it difficult to take swift administrative or legislative action to forestall crises. Frequent executive turnover can make democratic leaders neglect the long-term costs of policies that encourage short-term speculative booms. Philosophical attachment to private liberty and freedom may be associated with excessive financial liberalization. Large winning coalitions tend to encourage democratic leaders to pursue economic openness, which exposes countries to international contagion."

This quote nicely summarises most arguments put forward in the literature for motivating the relation between financial crises and democracy. Most of the literature seems to implicitly assume that the higher crisis incidence is economically and socially detrimental and therefore constitutes a hidden cost of democracy (e.g., XXXXXX). This strand of the literature, however, tends to neglect that the higher incidence of crisis under democracies is accompanied by higher financial development and the associated positive effects of financial development, and may therefore eventually be economically beneficial. In an event study in support of this argument, Huang (2010) shows empirically that financial development tends to be low before democratisation and that a period of democratisation is usually followed by higher financial development and more variation of financial development.

There is however no body of theory that explains why democracy may be related to both less financial stability and more financial development. In this paper we model the effect of endogenous media bias (propaganda) on investor behavior, yielding in equilibrium the joint economic implications that more bias increases financial stability and dents financial development. The model constitutes the first consistent general theory of financial stability, financial development and endogenous propaganda, in this way unifying two hitherto separate strands of literature that associate democratisation with either crisis incidence or financial development. We start by devel-

oping a Bayesian persuasion model of endogenous media bias in a world characterised by at least partial government control of the media and by uncertainty about the state of the economy. We then pose the question whether a rational government will feed depositors biased news about the economic outlook in the hope to avert a bank run. Our Bayesian persuasion model shows that it may be optimal for the government to positively bias the signal depositors receive about the economic outlook even if all agents are rational and have common priors about the state of the economy. The model predicts depositors are less likely to run on the bank, but also less eager to make deposits in the first place, when media bias is more pronounced. After a crisis, depositors in a low media bias environment are more likely to return to the bank than depositors in a high media bias environment. This model therefore produces the result that more media bias is associated with more financial stability and less financial development. The latter is true in particular when the bias has been revealed through a previous crisis.

The propaganda literature has earlier discussed a fundamental constraint facing any government seeking to bias media signals: individuals who rely on this information to make decisions will be less likely to read, watch or listen to it (e.g. Besley and Prat (2006), Gehlbach and Sonin (2014)). This poses the government with an unsavory trade-off in setting the optimal level of media bias: excessive media bias at the margin works against the government's propaganda interest, as citizens who ignore the news cannot be influenced by it. Our theoretical framework contributes by introducing another fundamental trade-off facing any government seeking to influence media signals about the economic state of the world: media bias dents the informational content of the signal about the state of the world, thus not only lowering the likelihood that investors withdraw their money, but also reducing the likelihood that they invest their money in the first place. So autocracies can promote financial stability through propaganda, but it comes at the cost of lower financial development and the concomitant constraints on innovation, productivity growth and economic development that have been documented in the literature. This holds true in a model where the decision to watch the news is exogenous. The propaganda trade-off between financial stability and financial development in our model may obviously be moderated by the effects of propaganda on viewership. To analyse this effect we introduce endogenous viewership in an extension of the model.

In a cross-country setting tailored to testing the predictions of our theory, we observe that lower media bias, measured by voice and accountability or media freedom, is related to more financial development and a higher likelihood of financial crisis. It seems therefore that the facts are in line with theoretical predictions, unifying and clarifying two heretofore separated strands of litera-

ture. We also inspect depositor behavior at individual Russian banks around the 1998 crisis. The depositors of some banks had only access to state television media that mollified the apocalyptic state of the Russian economy until the moment of collapse, while depositors of other banks also had access to the independent television channel NTV that was much less evasive about the state of the economy. We find that banks are equally likely to suffer a bank run in 1998, but also that banks whose depositors have access to less biased media (NTV) are much more likely to see their depositors return to the bank after the 1998 crisis. This is in line with the interpretation that the 1998 crisis revealed the media bias of the government controlled channels, making depositors in this environment less willing to deposit their money in banks in the first place and in this way curbing further financial and economic development.

By studying this question we improve our understanding of the relation between autocracy, media bias, financial stability and financial development. In particular, we document a new motivation for developed strategic autocracies to limit their extent of media bias, lest not to dent their opportunities for future financial and economic development. This new constraint limits the possibilities for modern electoral autocracies to rely media bias as opposed to repression and violence for sustaining their regime and therefore increases the scope for old-fashioned repression and regime change. In the next section we develop the model. We then lay out the empirical approach and data and discuss our results, before providing concluding remarks and suggestions for further research.

2 Related literature

We are not the first to study empirically the relation between media and finance. The media coverage of firms has received widespread attention in a multitude of academic disciplines relying on a wide array of theoretical frameworks and contextual settings. Graf-Vlachy et al. (2020) provide an excellent integrative overview of this burgeoning literature and suggest avenues and opportunities for further research. The role of media in particularly finance was recently surveyed by Raimondo (2019). Closest to our setting are Ding et al. (2018), who show empirically that the Chinese censorship of negative news and promotion of positive news in Chinese media biases the signal investors receive on the value of cross-listed Chinese companies and leads to a premium on the exclusively Chinese market for A-shares relative to the market for B-shares which is accessible to foreign investors. They conclude that bias introduced by media censorship helps to explain the foreign share discount puzzle in China.

We are also not the first to study the institutional causes of macroeconomic volatility and crisis. Acemoglu et al. (2003) find for the period 1970-1997 that large cross-country differences in macroeconomic instability have deeper institutional causes. They argue these institutional causes lead to bad macroeconomic outcomes via a variety of mediating channels, bot stop short of pinpointing the precise mechanism via which institutional weaknesses yield economic instability and crisis. Our theory focuses on one specific mechanism of institutional weakness, namely lack of media freedom and government control of the media, and shows how the resulting media bias generates both more financial instability and higher financial development, which is not fully in line with their findings. We then show empirically that this mechanism is really at work.

Related literature on political institutions, financial liberalisation and economic outcomes. Basic idea here is that incumbent elites may want to postpone liberalisation, because it allows then to maintain their grip on power and the related rents. So a lot of the empirical papers on political institutions and financial development have this kind of mechanism in mind. But we argue something else is happening: autocratic countries tend to have more media bias, leading to less banking crises, but also less financial development.

3 Country-level evidence

KOEN REMARK: an alternative and direct test of our model is dollarisation. In countries with more bias, there is less willingness to bring the money to the bank in the first place and therefore more dollarisation (like keeping cash dollars). If dollarisation is measurable across countries and time, this would be a rather cool one. We can check this at the country level, but possibly also at the bank level with a diff in diff for deposit dollarisation ?? (at least you are protected against devaluation)))

At the country level the model implies that countries with more bias in the signal about the state of nature will tend to have less financial crises, because people are less likely to withdraw provided a given state of nature. But their depositors are also less likely to deposit money in their banks in the first place, ceteris paribus contributing to lower financial development. So we have that more bias is associated with lower crisis incidence, lower deposits and lower financial development

We will use two simple measure of bias β at the country level, namely the voice and accountability index from the World Bank's World Governance Indicators, and the Media Freedom index from Freedom House, indicated by the vector $B_{c,t}$. We therefore will estimate the following set of equations:

$$\begin{aligned} \textit{Bank Deposits}_{c,t} &= \alpha_1 \boldsymbol{\beta}_{c,t-1} + \boldsymbol{\theta}\boldsymbol{\Gamma}_{c,t-1} + \mu_c + \epsilon_{c,t} \\ \textit{Financial Development}_{c,t} &= \alpha_2 \boldsymbol{\beta}_{c,t-1} + \boldsymbol{\theta}\boldsymbol{\Gamma}_{c,t-1} + \mu_c + \epsilon_{c,t} \\ \textit{Banking Crisis}_{c,t} &= \alpha_3 \boldsymbol{\beta}_{c,t-1} + \boldsymbol{\theta}\boldsymbol{\Delta}_{c,t-1} + \mu_c + \epsilon_{c,t}, \end{aligned} \tag{1}$$

Where $\boldsymbol{\beta}_{c,t-1}$ is the bias in country c at time $t-1$, $\boldsymbol{\Gamma}_{c,t-1}$ and $\boldsymbol{\Delta}_{c,t-1}$ are a battery of country and time specific predictors of financial development and banking crisis, respectively, and μ_c country fixed effects that are included in all specifications. In particular $\boldsymbol{\Gamma}_{c,t-1}$ includes inflation, the terms of trade, the Rule of Law index, population growth, consumption growth, net firm creation, and the growth in the number of bank branches, while $\boldsymbol{\Delta}_{c,t-1}$ includes debt ratio growth, government expenditure growth, the change in the current account balance, GDP per capita growth, the change in the money multiplier, inflation, the real interest rate, consumption growth and change in the

indebtedness of the private sector. They are the straightforward controls for financial development and the bank crisis incidence, respectively.

Our measures of financial development and crisis are provided by the 2020 version of the systemic banking crises database of Laeven and Valencia (2020) or by the IMF Financial Statistics. *Financial Development* and *Bank Deposits* are two ratio variables that are not limited to 1 and are analysed in a panel regression. $Banking\ Crisis_{c,t}$ is a dummy variable that equals 1 in the period t the country c is subject to a banking crisis, and zero otherwise. We estimate the Banking crisis equation therefore as a panel logit. Our model predicts that more bias will lead to a lower likelihood of financial crisis, but also a consequent lower level of deposits and financial development. Since our measures of bias are all increasing in the level of bias, our empirical hypothesis is $\alpha_1, \alpha_2, \alpha_3 > 0$.

One potential alternative explanation for the relation between media freedom/concentration and financial development could run through bank lending corruption. Houston et al. (2011) argue that media freedom and media competition may facilitate the revelation of bank lending corruption by the media. This would then embolden bank supervisors in their fight against bank corruption and boost the effectiveness in curbing bank corruption of legal provisions in support of private monitoring. They find empirically that state ownership of media and media concentration are associated with higher levels of bank corruption. State ownership of the media is found to weaken the abilities of official supervisory powers and regulations in support of market discipline to curb corruption in bank lending. In our framework, this finding would also imply that media freedom may be associated with more banking crises (the corruption scandals are more likely to be revealed) and higher ultimate financial development (less corrupt lending improves credit allocation ultimately inducing higher economic and financial development). Recently Ho et al. (2016) confirm that monitoring by the media improves performance and reduces corruption of government owned banks. We will therefore control for bank corruption in our empirical specifications to close down this alternative causal chain from media freedom to financial stability and financial development, bank crisis incidence and financial development.

Our model really works through rational depositors optimally deciding not to deposit in banks, because of media bias. It should therefore not affect the currency in which people deposit. It our story really runs via general trust of the population in the national economy, rather than specific trust in the stability of the banking system, the media bias would also affect the currency in which people hold their deposits. This connects to a much larger literature on dollarization. Our theory

entails that, while financial development should be affected by media bias, the dollarization of deposits should not be affected by it, because holding your deposits in dollars rather than national currency does only protect you against devaluations, but not against a unexpected bank run your were unaware of because of propaganda. We therefore model dollarization of deposits as a Placebo regression:

$$Dollarization_{c,t} = \alpha_4 \boldsymbol{\beta}_{c,t-1} + \boldsymbol{\theta}\boldsymbol{\Gamma}_{c,t-1} + \mu_c + \epsilon_{c,t} \tag{2}$$

Where, as before, $\boldsymbol{\beta}_{c,t-1}$ is the bias in country c at time $t-1$, $\boldsymbol{\Gamma}_{c,t-1}$ and $\boldsymbol{\Delta}_{c,t-1}$ are a battery of country and time specific predictors of dollarization / financial development. The dollarization data is the 2010 updated data set from Yeyati (2006). Since media bias should not affect the currency in which people deposit in our model, our empirical hypothesis is $\alpha_4 = 0$.

In our analysis of deposits and financial development, two very slowly moving variables, we include all RHS variables as 5 year rolling averages. We find that countries with more voice and accountability clearly have more bank deposits and higher financial development in Table **??**. In columns (1)-(3) we measure $B_{c,t-1}$ by voice and accountability, in columns (3)-(6) by the Media freedom index. Irrespective of the included controls, we find consistently $\alpha_1, \alpha_2 > 0$, i.e. less bias is associated with more future financial development and higher bank deposits.

Interestingly, we also find indications that media bias is associated with higher crisis incidence, as predicted by our model. As can be seen from the results in Table **??**, the effect of more voice and accountability and more media freedom on the incidence of financial crisis is always positive. The found effect is significant in 3 out of 6 equations. Clearly crisis incidence is hard to predict in general, but the results clearly allow us to exclude $\alpha_3 < 0$, as most theories of bank stability would have it.

We conclude for now that our theoretical prediction that less media bias is associated with a higher probability of financial crisis, but also with a higher likelihood that deposits return after the crisis, and thus with higher financial development, are corroborated by the data.

4 Theory

4.1 Setup

There is a continuum of citizens $[0, 1]$ who consider depositing \$1 into the banking system.

Those who deposited money follow the news that report the signal $S \in \{n, d\}$, where n stands for 'normal' or 'nothing happened' (the state of the world is $s = n$) and d stands for the imminent default (the state of the world is $s = d$).

The media owner (or the government that controls the media) sets the level of bias $\beta = P(S = n|s = d)$.

That is, when the state is $s = n$, the media reports $S = n$ with probability 1, and misreport the default ($s = d$) as 'normal' ($S = n$) with probability β.

Those who deposited money can at any state take an action $A \in \{k, w\}$, where k stands for keeping the money in the deposit account (the action is $a = k$) and w stands for the withdrawing the money from the deposit account (the action is $a = w$).

If there is a default, then $\delta < 1$ is paid to each depositor that kept her money in the bank.

If there is no default, these depositors receive $1 + r$.

If they withdraw they get their 1 back.

The payoffs $u_i(a, s)$ of agent i are therefore

$$\begin{aligned} u_i(k, d) &= \delta, \\ u_i(k, n) &= 1 + r, \\ u_i(w, d) &= 1, \\ u_i(w, n) &= 1. \end{aligned}$$

People are heterogeneous with respect to the opportunity cost of their deposits.

Say, r_i is the return that agent $i \in [0, 1]$ can get elsewhere; r_i is distributed uniformly over $[0, 1]$. Agents maximize their expected returns.

The government maximizes the utility function that is increasing in the number of depositors and decreasing in the probability of withdrawal, $u_G = u_G(D)$.

The government (who controls the media) and (potential) depositors share the common prior about the probability of default, $\theta = P(s = d)$.

4.1.1 Timing

1. The media determines its bias [as in BP] β.
2. People decide whether or not to bring money to the bank.
3. Depositors receive a signal via one of two media, G or N.
4. Basing on the signal that they receive, each depositor i decides whether or not to withdraw her deposits.
5. The default either happens or not; everyone receive their payoffs

4.2 Analysis

We solve the model by backward induction, i.e. with checking each agent i's incentive compatibility constraint at the withdrawal stage. Upon receiving the signal $S = n$, i.e. that there is no imminent default, the agent i's posterior is, by the Bayes formula,

$$P(s = d|S = n) = \frac{\theta}{\theta + \beta(1 - \theta)}. \tag{3}$$

Agent i keeps her deposit if and only if

$$E(u_i(k)|S = n) \geq E(u_i(w)|S = n).$$

Using (3), one gets

$$(1 + r)\frac{\theta}{\theta + \beta(1 - \theta)} + \delta\frac{\beta(1 - \theta)}{\theta + \beta(1 - \theta)} \geq 1,$$

which is equivalent to

$$\beta \leq \frac{r\theta}{(1-\delta)(1-\theta)}.$$

As long as the amount of bias in the news, β, does not exceed the threshold amount

$$\overline{\beta} = \frac{r\theta}{(1-\delta)(1-\theta)}, \tag{4}$$

any depositor would keep her money if the news are $S = n$ (normal) and withdraw if $S = d$ (default).

Naturally, this threshold amount of bias increases with the returns on the deposit if there is no default, r, the amount that can be recovered in default, δ, and the prior θ.

If the sender (the news owner) is interested in maximizing the number of depositors non withdrawing no matter what, (4) is her optimal bias.

However, the potential depositors' incentives to make a deposit depend on the quality of the media they have access to.

Taking a step back, consider a decision of agent i with the opportunity costs r_i to make a deposit, if she has access to media with bias β. The *ex ante* expected returns are

$$\begin{aligned} Eu_i(\beta) &= P(S=n)\left(u_i(k,n)P(s=n|S=n) + u_i(k,d)P(s=d|S=n)\right) \\ &\quad + P(S=d)\left(u_i(w,d)P(s=d|S=d) + u_i(w,n)P(s=n|S=d)\right) \\ &= (\theta + \beta(1-\theta))\left[(1+r)\frac{\theta}{\theta+\beta(1-\theta)} + \delta\frac{\beta(1-\theta)}{\theta+\beta(1-\theta)}\right] + (1-\theta)(1-\beta) \\ &= 1 + r\theta - \beta(1-\delta)(1-\theta)). \end{aligned}$$

That is, given the media bias β, agent i makes a deposit if and only if

$$Eu_i(\beta) = 1 + r\theta - \beta(1-\delta)(1-\theta)) \geq r_i.$$

Given our assumption about the uniform distribution of opportunity costs r_i, the total number of deposits is equal to

$$D(\beta) = (1 + r\theta - \beta(1-\delta)(1-\theta))).$$

Naturally, the total number of deposits is maximized when depositors have access to full (unbiased) information, $\beta = 0$.

The optimal choice of β of the government (the media owner) is to trade off the amount of depositors the banks will attract, $D(\beta)$, which is a decreasing function of β, and the probability that the depositors get the signal to keep the money in banks, $S = n$, which is an increasing function of β.

$$\beta^* = \arg\max_{\beta} u_G(D(\beta), P(S = n)).$$

4.3 Discussion

The simple model above provides the following results:

(1) People are more eager to make deposits when the quality (the absence of bias) of media is higher.

(2) People are more likely to make deposits when the probability of default is lower (θ is higher), returns are higher (r is higher) and the recovery rate is higher (δ is higher).

(3) People are less likely to withdraw following a media report if the media bias (β) is higher.

KOEN REMARK: (1) and (3) are empirically true at the country level (financial development is lower and incidence of banking crisis is lower with high media bias). It is a bit more subtle at the bank level with the Russian data. There we do not see result (3) that people with low (high) NTV signal withdraw less (more). But they do deposit less (more) after the crisis, in line with (1), as they know that they are more likely to be warned about future problems. A possible theory of the missing (3) is as follows: depositors did not know the bias β of state TV versus NTV prior to the 1998 default. So there is no difference in withdrawing behavior. But the crisis informs them about the bias, they update their beliefs about the bias $E(\beta_i)$, and then result (1) applies: NTV depositors have learned their β is smaller and deposit more.

So enriching the model with beliefs about β would give us a dynamic of how, after the first crisis, countries with a lot of media bias could get stuck in a low financial development equilibrium. This also gives autocratic countries an new incentive to repress media freedom: if you repress media freedom enough, and citizens are not fully aware of the magnitude of bias, they there may be a

stable, no-financial crisis, high financial development, equilibrium (say China) for a while. This strategy would make especially sense if θ, the exogenous probability of default, is low. If, however, the first financial melt-down occurs despite the propaganda, then there will be updating about bias and the honeymoon is over for ever. Something like this happened a bit in China with Covid, where the free media were repressed for three weeks, in the hope of avoiding a crisis. Once the real crisis was revealed though, it really destroyed for a while the credibility of the state-controlled media, as people updated their beliefs about β.

So this model with updating would explain both Russia and China. Russia hit crisis right away and got stuck in low financial development. China could avoid it and ended with stability and high financial development, at least for now.

END REMARK

Note that (1) explains the observation that those who have access to freer (less biased) media are more likely to return after the crisis - as they know that they are more likely to be warned about future problems.

4.4 Possible Extensions

Now, suppose that the share of λ of all citizens has access to media that provides unbiased reporting, $S = s$. This does not affect the calculus of those who does not have access to this media, $1 - \lambda$, but might affect the government's trade-off as follows.

Suppose that the government is concerned about the probability of default, and the probability of default is a function of the share of people who withdraw.

Then, there is a probability of the following event: the state of the world is the imminent default, so the share of λ withdraws, but the state media reports $S = n$, so people stay.

If the withdrawal of the share λ increases the likelihood of, rather that guarantee, a default, then ex ante the government would want to have more bias.

In a sense, the presence of a free media should make the state media more biased (and this is without any self-selection into viewership - which, if introduced, should shift the bias even further).

KOEN REMARK This really fits our empirical framework for Russia, where λ is indeed pretty exogenous, given by some Soviet structure that gave some locations access to NTV and others not. So a fixed λ works perfectly for our case, especially if it is combined with updating $E(\beta_i)$.

Purely theoretically, though, I wonder what happens if access to λ is endogenous: depositors can choose what to watch (state TV or free media), and the government can choose whether the set $\lambda = 0$ (close the free media). The free media wants max viewers, provided they are allowed to remain open, so they have incentives to set the bias optimally, which will be somewhere between the bias of the state media and the truth (no bias). Depositor and govt payoffs are as before, but with endogenous λ. Interesting, no? END REMARK

5 Bank-level analysis

5.1 Background and data

In this subsection we provide details about the Russian crisis, media landscape and banking sector in 1998. We also introduce the respective data sets for our empirical analysis. Table VARIABLE DESCRIPTION Panel B provides detailed descriptions of all variables that we employ in our bank-level regressions.

5.1.1 Russian crisis in 1998

At the bank level we test the hypotheses derived from our theoretical model on data of Russian banks around the time of the August 1998 default. (Quadruple whammy of devaluation, default on foreign debt, default on domestic debt and banking crisis with bank runs across the board, need to write up section about this).

Based on this timeline of events, we create two dummy variables. *Default* is one during the crisis period from August to November 1998 and zero otherwise. *Recovery* is one during the period December 1998 to March 1999, when the immediate crisis was over and rescue measures started to unfold their impact, and zero otherwise. The pre-crisis period lasts from January to July 1998.

5.1.2 Russian media landscape in 1998

In 1998, the Russian media landscape was still characterised by competition at the national level. Almost all Russians had access to the two state television channels ORT and RTR. NTV, in contrast was a privately owned television channel founded in 1993. Its ambition was to become a major nation-wide channel. In 1996, the broadcasting infrastructure, i.e. the transmitters, of the former state education channel Channel 4 Ostankino was transferred to NTV by the order of Yeltsin. The location of the transmitters had been decided by Soviet central planners. Some of the infrastructure was obsolete so that NTV expanded its network over the following years mostly by repairing the inherited transmitters. Accordingly, NTV viewership increased considerably from less than 6 percent in 1995 to more than 75 percent in 1999. Figure XXX shows the location of

NTV transmitters in 1998. The figure shows that the transmitters were dispersed throughout the country, albeit the network density was lower in areas with low population in Siberia and higher in larger cities. In and around the larger cities, such as Moscow and St.Petersburg, depositors also had other independent sources of information available. For instance, there were independent local TV channels with a limited reach and there was also some diversity of opinions on the radio and in print media. However, radio and print played only a minor role as sources of political information compared to TV (Enikolopov et al. (2011)). For the vast majority of Russians, located far enough from Moscow's TV and radio transmitters, NTV was the only source of alternative information about national politics.

Around the 1998 default, the state channels created a massive bias by essentially denying the possibility of imminent default. NTV, in contrast, was much more adamant in providing information about the economic difficulties ahead and the likelihood of an economic crisis. COMMENT KAROLIN: I think we need some more info and especially references here to be convincing for those readers who are not deeply familiar with Russian history. END COMMENT

We use subregional data on the predicted probability that NTV was available as in Enikolopov et al. (2011). More specifically, *NTV probability* is constructed by using data on the location of NTV transmitters, geographical variation in signal propagation and survey evidence on NTV availability. We exclude Moscow and St. Petersburg from our sample as there is no variation in NTV availability in these two regions, while our regressions include regional fixed effects. We also exclude Chechnya, Dagestan, and Ingushetia because of the then ongoing armed conflict in Chechnya.

5.1.3 Russian banking sector in 1998

SOME DESCRIPTION OF THE RUSSIAN BANKING SECTOR

To study the effect of access to free, i.e. less biased, media on depositor behavior during the Russian crisis, we use monthly information from bank balance sheets and profit and loss accounts provided by the private information agency Mobile for the years 1998 and 1999. Ideally, we would like to know the availability of NTV to the average depositor of each bank, but we do not have information at the depositor level. Yet, during our observation period the large majority of Russian deposit banks were small, had no branches, and thus collected household deposits only from nearby households. For most banks, therefore, the availability of NTV at the bank's address is a good

proxy for the availability of NTV to its average household depositor. We collect the headquarter addresses of all Russian banks in August 1998 from data provided by the information agency Mobile and match the bank data with the NTV data via these addresses.

To improve the identification of the effect of NTV availability, we exclude all large multi-branch banks which may collect deposits from households that are not located in the vicinity of the bank from the estimation sample. Banks that do not take household deposits are also excluded, as well as banks with missing variables that we employ in the regression analysis. This leaves us with 520 small regional household deposit-taking banks and 6,452 bank-month observations in our main estimation sample. [1]

Figure 1 plots the evolution of total household deposits over our observation period for banks in subregions with high NTV probability (dashed line) and low NTV probability (solid line). High (low) NTV probability means that banks are located in subregions with at least median (below-median) *NTV probability*. In line with the predictions from our model and the country-level evidence, banks in subregions with high NTV probability have more deposits in general. Depositors at all banks withdraw massively during the *Default* period from August to November 1998. During the *Recovery* period from December 1998 to March 1999, in contrast, depositors at low NTV probability banks continue withdrawing, while depositors at high NTV probability banks stop their deposit withdrawals.

5.2 Identification and empirical specification

We employ the default and recovery events together with the varying NTV availability at the bank branch level in our identification strategy. The identification of the differences-in-differences effects crucially depends on the parallel trend assumption which implies that the change in deposits would have been the same in banks with varying NTV availability in the absence of the default and recovery events. Put differently, our identification strategy relies on the premise that depositors in the locations with varying access to NTV are similar in all unobserved characteristics that may drive their depositing behavior once we control for observable differences between these locations. We describe the observable characteristics that we control for and provide some evidence on the parallel

[1] In some of our empirical specifications we also control for 1998 sociodemographic characteristics which are available at the subregion-year level from the Russian statistical agency Rosstat. These data are missing for some subregions so that the number of observations drops in the respective specifications.

trends in the pre-crisis period below. However, arguably, NTV availability is largely random to the banks, and thus their depositors, in our sample. Firstly, all banks in our sample were registered before 1996, when NTV was granted the nation-wide network of transmitters of the former state education channel. It is therefore not plausible that certain banks chose their location because they wanted to be in an area with access to independent television. Secondly, NTV's broadcasting infrastructure was established in Soviet times, i.e. that NTV did not choose to broadcast in certain regions. At the same time, the state TV channels are available everywhere.

COMMENT KAROLIN: Enikolopov et al. (2011) show that transmitter location is correlated with a city dummy, population and wage but not with other socioeconomic characteristics of Russian subregions. —- I ran regressions of NTV probability on change in HH deposits alone and with increasing number of controls (I do not have a city dummy) and clustering SEs at the bank-level and I only find a significant relationship between NTV probability and change in HH deposits in the specification where I add wage and population polynomials. I guess, we can still conclude that the transmitter network is not systematically related to different depositor behavior. END COMMENT

We use a differences-in-differences estimator to evaluate the impact of NTV availability during the default and recovery periods on depositor behavior. As dependent variable, we use the monthly change in the natural logarithm of household deposits $\Delta ln(Deposits)$ and estimate the following regression:

$$\begin{aligned}\Delta \ln(\text{Deposits}_{\text{i,t,sr,r}}) = {} & \beta_1 NTV\ probability_{\text{i}} \\ & + \beta_2 Default_{\text{t}} + \beta_3 Default_{\text{t}} \cdot NTV\ probability_{\text{i}} \\ & + \beta_4 Recovery_{\text{t}} + \beta_5 Recovery_{\text{t}} \cdot NTV\ probability_{\text{i}} \\ & + \boldsymbol{\alpha}\Theta_{\text{i,t}} + \boldsymbol{\alpha}\boldsymbol{\zeta}_{\text{sr}} + \mu_{\text{r}} + \mu_{\text{i}} + \epsilon_{\text{i,t}},\end{aligned} \tag{5}$$

where subscripts i, t, sr and r stand for bank, time (i.e., year:month) subregion and region, respectively. $\boldsymbol{\Theta}_{i,t}$ contains a battery of time-varying bank-specific controls and $\boldsymbol{\zeta}_{sr}$ contains time-varying subregion-specific controls. All regressions include region fixed effects μ_r, while we add bank fixed effects μ_i to some of the regressions. We cluster all standard errors at the bank level.

We compare deposit growth rates at banks with varying *NTV probability* during three periods. In the pre-crisis period from January to July 1998, the state channels reported differently about the country's economic situation and the imminent default, essentially denying the latter. NTV, in contrast, more openly addressed the economic difficulties and the possibility of a crisis. Now suppose that depositors had no information on the media bias of the respective channels before the 1998 meltdown and that the meltdown revealed the quality of the signal. This would imply that there is no significant difference in household deposit behavior before and immediately after the default between banks with varying NTV probability, as there was no information on the media bias before the default. β_1 accounts for differences in deposit growth rates between banks with varying NTV availability in the pre-crisis period. We expect an insignificantly estimated coefficient β_1. β_2 captures changes in deposit growth rates in the *Default* period between August and November 1998 at banks with no NTV availability, while β_3 accounts for the additional change in deposit growth for banks with increasing NTV probability. According to our model and reasoning above, we expect a significant and negative coefficient β_2 and an insignificant coefficient β_3, i.e. a run on all banks immediately after the August meltdown and in the following weeks.

In the recovery period household depositors may then update their beliefs about the bias of the respective TV channels as depositors with higher NTV availability learn that they are exposed to less bias. β_4 captures changes in deposit growth rates in the *Recovery* period between December 1998 and March 1999 at banks with no NTV availability and β_5 accounts for the additional change in deposit growth at banks with increasing NTV probability. The first testable prediction from our model, which entails that depositors are more eager to make deposits when they know that the quality of media is higher (i.e. there is less bias), implies that banks with higher NTV probability will experience higher deposit growth in the recovery period. Thus, we expect β_4 to be insignificant if depositors at banks with no NTV availability slow down their withdrawals or significantly negative if they continue withdrawing because they did not deem the crisis to be over. And we expect a significant and positive coefficient β_5.

To mitigate concerns about missing variables that might drive the change in deposits and are correlated with the availability of the NTV signal we include four sets of control variables. First, $\mathbf{\Theta}_{i,t}$ includes several time-varying standard bank characteristics. *Equity/Total assets* is a measure of bank capitalization and *Liquid assets/Total assets* of bank liquidity. *NPL/Total assets* captures bank risk and *Monthly profit/Total assets* bank profitability. *Total assets* is an indicator of bank size. *State* is a dummy that is one if the bank is at least 50% state-owned, and zero

otherwise. A bank's exposure to the government in terms of assets is measured by *Government securities/Total assets*. Second, $\boldsymbol{\zeta}_{r,t}$ encompasses several time-varying subregional characteristics that may be correlated with depositor behavior and the actual viewership of NTV. To account for the size of a subregion's population and average wage, we include fifth-order polynomials of log population (*Population polynomial*) and log average wage (*Wage polynomial*). As further socioeconomic characteristics we control for the number of *Doctors* and *Nurses* per 10,000 inhabitants, the percentage of *Retired*, *Unemployed* and *Farmers* in each subregion as well as the *Migration rate* (in percent) and the *Crime rate* (number of crimes per 10,000 inhabitants). The *Average pension* is measured in thousands of rubles. Third, we include region fixed effects μ_r to account for any observable and unobservable time-invariant characteristics of regions that may influence deposit changes. Fourth, we include bank fixed effects in some regressions to focus the analysis on within-bank changes in deposit growth rates over time. In that way we control for all observable and unobservable time-invariant bank characteristics that could influence deposit growth.

Table 5 reports summary statistics of all bank variables used in our regression analysis. Panel A reports statistics for all banks over the full observation period. On average, banks in our sample lose around 6 percent of deposits ($\Delta ln(Deposits)$) between January 1998 and March 1999, albeit with a relatively large standard deviation. On average, the banks have relatively large equity ratios and low NPL ratios, are small and only 5 percent are government-owned. *NTV probability* is comparably high with 70 percent on average, but ranges from 37 percent to 83 percent. Panel B splits the sample in banks located in areas with high vs. low *NTV probability* and provides the difference in means. Banks with low (high) NTV probability have an NTV probability below (at or higher than) the median NTV probability. The Table shows that banks in areas with low NTV probability have significantly higher NPL ratios, are significantly smaller and less likely to be government-owned. While we control for these bank characteristics in our main regression analysis, we will further take account of them by repeating our analysis for a matched sample of high and low NTV probability banks.

COMMENT KAROLIN: WE HAVE NOT DONE THE FOLLOWING YET. As in the country regressions we will have to rule out the alternative causal link through bank corruption. The problem is that bank corruption is not easily observed. Luckily there are wide regional differences in the average levels of corruption across Russia. Since our specification included regional fixed effects, we cannot make sure our results are not driven by average differences in bank corruption across regions. This however still leaves the possibility that our results may partially be driven

differences in bank corruption among banks within the same region. Counting official scandals would not help in measuring bank corruption for many reasons, the most obvious being that the revelation of corruption cases may be endogenous to the presence of free media, which is the main independent variable in our analysis. We may however assume that corrupt banks are more likely to cook their books, allowing us to apply Benford's law to the banks' official accounts (see Durtschi et al. (2004)) to measure bank corruption. We include these measures in our individual estimates. END

5.3 Results

In Table **??** we report the main results from our bank-level analysis. Column (1) shows the baseline specification with bank controls and region FE. We add the population and wage polynomials in column (2), the further subregion-specific controls in column (3), interactions of all bank controls with *NTV probability* in column (4) and bank FEs in column (5). The main results are qualitatively and quantitatively very similar across all five specifications.

The results are in line with our model and reasoning above. In the pre-crisis period we do not find any significant difference in depositor behavior between banks with varying *NTV probability*. The significantly negative coefficients of *Default* and *Recovery* mean that depositors of banks with no NTV availability withdraw their deposits in both periods, albeit withdrawals were larger in the *Default* period at the height of the crisis. The effects are also economically sizable with a decrease in deposits (OR DEPOSIT GROWTH RATES????) by 17-22 percent in the *Default* period and 14-20 percent in the *Recovery* period, depending on the empirical specification. Having better access to the independent TV channel NTV does not affect depositors' behavior at the height of the crisis given that the interaction term *Default*NTV probability* is insignificantly estimated. This can be explained by depositors not being aware of any media bias before the crisis hit, and therefore all depositors run on their banks once the default happens. However, the crisis events reveal to people that the state media reporting was biased, while the reporting of NTV was less so. Therefore, and in line with our model, we find that depositors at banks with more NTV availability start bringing back their deposits to their banks in the *Recovery* period. The estimated coefficient of the interaction term *Default*NTV probability* is significantly positive and economically larger than the base effect of *Recovery*. The only exception is the specification with bank FEs in column (5), where we also find a significantly positive interaction term *Default*NTV probability*, but it is economically

somewhat smaller than the base effect of *Recovery*.

To visualize the temporal pattern of *NTV probability* on changes in deposit growth rates we run an OLS regression of $\Delta ln(Deposits)$ on *NTV probability**month dummies, bank characteristics, sociodemographics and region FEs. Figure 2 depicts the average marginal effects of *NTV probability* and the respective 95% confidence intervals. The graph shows that the average marginal effects of *NTV probability* are close to zero in the pre-crisis period. This result provides reassurance that our findings on depositor behavior during the *Default* and *Recovery* periods are not driven by diverging trends before these events. Besides, the graph confirms our results from Table **??** that NTV availability influences depositor behavior significantly only in the *Recovery* period.

We conduct several robustness tests to assess the sensitivity of our main findings and report the results in Appendix 1. For each robustness check, we report results from a regression with bank controls, socioeconomic controls and region FEs as well as from the specification with bank FEs. Our first set of robustness tests is concerned with the bank controls. In our main regressions we control for contemporaneous bank characteristics. However, it is likely that depositors need some time to react to changes in bank characteristics, if they do so at all. We therefore use bank controls lagged by one month in columns (1-2), bank controls lagged by two months in columns (3-4) and bank controls measured at the beginning of our observation period in January 1998 in columns (5-6) of Appendix 1. All results regarding the effect of *NTV probability*, *Default* and *Recovery* and their interactions are qualitatively and quantitatively very similar to our main results. Next, we exclude banks with relatively few deposits, i.e. those with a January 1998-share of deposits to total liabilities in the bottom quartile of the distribution, from our sample. The results in columns (7-8) of Appendix 1 confirm our main findings, even though the economic magnitude of the effects are somewhat smaller. Lastly, in columns (9-10) we aggregate the monthly data into one observation for each bank in each of the three periods to ensure that standard errors are calculated correctly given the possible serial correlation in the monthly deposits data (Bertrand, Duflo and Mullainathan 2004). Again, our main results hold with a somewhat smaller economic significance.

Overall, our robustness tests confirm that having access to independent media does not affect depositor behavior in the pre-crisis period and immediately after the default. However, depositors of banks in areas with a higher *NTV probability* start re-depositing money with their banks earlier or at least slow down their withdrawals much more than depositors of banks in areas with lower access to the independent TV channel NTV. An explanation for this pattern is that depositors

were not aware of the media bias before the default. However, once the default happened the bias was revealed and depositors updated their beliefs. And those depositors that realized that they had actually received the more truthful news then believed more in the news that the worst of the crisis was over after November 1998.

5.4 Matched Sample results

Although the availability of NTV, i.e. its transmitter network, is arguably as good as random with respect to the banks and thus their depositors in our sample, Table 5 shows that there are significant differences in some characteristics of banks in areas with high vs. low *NTV probability*. In our main regressions, we control for these bank characteristics. In the following, we take a different approach and match banks in areas with a high availability of NTV to their similar counterparts in areas with low NTV availability. For our matching procedure we use a nearest-neighbor matching of propensity scores (originally developed by Rosenbaum and Rubin (1983)). Specifically, we first run a probit regression with a dummy variable indicating whether a bank is located in an area with high NTV availability ("high NTV banks" heneceforth) or in an area with low NTV availability ("low NTV banks" henceforth) as the dependent variable. Low (high) NTV banks have an *NTV probability* below (at or higher than) the median NTV probability. As explanatory variables we include all bank characteristics from our main analysis but at the beginning of 1998 and region FEs. We then use the propensity scores from the probit estimation and match every high NTV bank to its three nearest low NTV bank neighbors.[2] As some banks have missings in their January 1998 balance sheet and profit and loss account data, only 402 banks are included in the probit regression.

Table **??** shows that after matching there are no statistically significant differences in bank characteristics observable between high and low NTV banks. We then repeat our analysis on the effect of NTV availability on depositor behavior during the default and recovery periods. For this analysis, we drop banks that are not on the common support area, which is the case for 13 banks. This leaves us with a sample of 389 banks and 4,840 bank-month observations for our matched sample analysis. We still include the bank characteristics as control variables because we do the matching on the beginning-of-1998 values, whereas the regressions include all monthly observations between January 1998 and March 1999. The results in Table **??** fully confirm our full sample results. We

[2]Matching on any number of one to five nearest neighbors has very little effect on the estimated results.

again find that there is no statistically significant difference in depositor behavior at banks with varying degrees of NTV availability in the pre-crisis and default periods. In the recovery period, however, depositors at banks in areas with no NTV availability keep on withdrawing their money, while depositors at banks in areas with NTV availability start bringing back their money (columns 1-4) or at least stop withdrawing more (column (5)). These findings can be inferred from the significantly negative coefficient on *Recovery* and the significantly positive and larger, or equal, coefficient on the interaction term *Recovery*NTV probability*.

6 Conclusion and discussion

This could be a hell of a paper all right

Combining our country-level and bank-level results identifies the mechanism through which media bias can lead to both lower crisis incidence and lower financial development in a cross-country setting: If there is a lot of media bias, there may be fewer crises as shown in our cross-country results, but depositors will also be less likely to return to banks once a crisis has struck (individual bank results), leading in the long run to less financial development (see the cross-country results).

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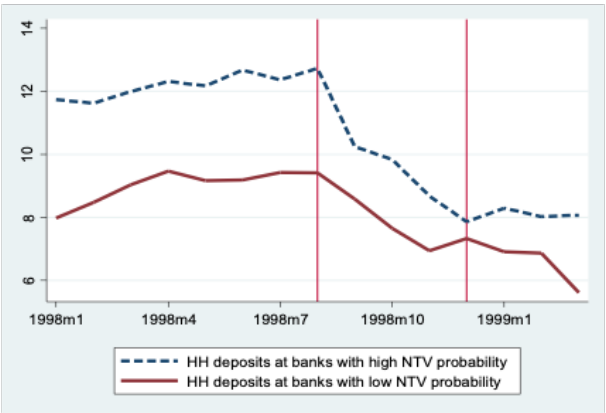
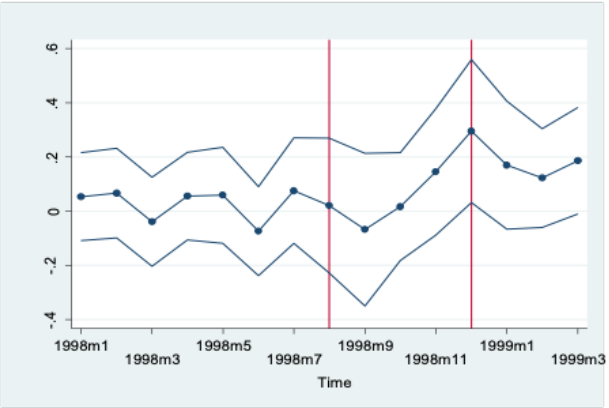
Figure 1. Household deposits in high vs. low NTV probability banks over time



Notes: Evolution of log total household deposits of banks located in areas with high (dashed line) vs. low (solid line) NTV probability over time. Banks with low (high) NTV probability have an NTV probability below (at or higher than) the median NTV probability. The red vertical lines indicate the beginning of the Default (1998m8) and Recovery (1998m12) periods, respectively. See Table 1 for definitions

Figure 2. Average marginal effect of NTV probability over time



Notes: Average marginal effect of NTV probability over our observation period. The solid lines indicate 95% confidence intervals. The red vertical lines indicate the beginning of the Default (1998m8) and Recovery (1998m12) periods, respectively. Estimates are from an OLS regression of D(ln(Deposits)) on NTV probability*month dummies, bank characteristics, sociodemographics and region fixed effects.

Table 1. Variable definitions and sources

Panel A. Country-level analysis

Variable	Definition	Unit	Source
Dependent variables			
Financial development	Index summarizing how developed financial institutions and financial markets are in terms of their depth, access, and efficiency, with larger values indicating more development	0-1	Financial Development Index Database, IMF
Depositors	Depositors (or number of deposit accounts, depending on data availability) with commercial banks per 1,000 adults		World Development Indicators, WB
Deposits	Bank deposits as share of GDP	%	Global Financial Development Database, WB
Dollarization	Bank deposits denominated in US dollar / total bank deposits	%	Database used by E. Levy Yeyati (2006)
Banking crisis	Dummy indicating the year in which a banking crisis happens	1/0	Laeven-Valencia Systemic Banking Crises Database
Explanatory variables			
Media freedom	Index of freedom of the press; larger values indicate more freedom	1-3	Freedom House
Log(Inflation)	Log of inflation	%	World Development Indicators, WB
Change terms of trade	Yearly chnage in the terms of trade (i.e., capacity to import less exports of goods and services)	%	World Development Indicators, WB
Rule of law index	Index measuring the degree of law enforcement, with larger values indicating better enforcement	0-1	Worldwide Governance Indicators, WB
Change population	Yearly change in total population	%	World Development Indicators, WB
Change consumption	Yearly change in household and non-profit institutions serving households final consumption	%	World Development Indicators, WB
Change number listed companies	Yearly change in the number of listed domestic firms	%	World Development Indicators, WB
Change number bank branches	Yearly change in number of commercial bank branches / 100,000 adults	%	World Development Indicators, WB
Change government debt/GDP	Yearly change in the ratio of general government gross debt to GDP	%	World Economic Outlook, IMF
Change government expenditure	Yearly change in total government expenditure	%	World Economic Outlook, IMF
Change current account balance	Yearly change in the current account balance	%	World Development Indicators, WB
Change GDP per capita	Yearly change in the GDP per capita	%	World Development Indicators, WB
Change broad money/Total reserves	Yearly change in the ratio of broad money to total reserves	%	World Development Indicators, WB
Real interest rate	Real interest rate	%	World Development Indicators, WB
Change credit to private sector/GDP	Yearly change in domestic credit to the private sector as a share of GDP	%	World Development Indicators, WB

Panel B. Bank-level analysis

Variable	Definition	Unit	Source
Dependent variable			
D ln(Deposits)	One-month change in ln(total household deposits)	%	Mobile
Explanatory variables			
Default	Dummy = 1 during the crisis period (August-November 1998), pre-crisis period iJanuary- July 1998	1/0	
Recovery	Dummy that is 1 during the period December 1998 to March 1999	1/0	
NTV probability	Probability of NTV availability	%	Enikolopov et al. (2011)
Household deposits/Total assets	Total household deposits as a share of total assets	%	Mobile
Equity/Total assets	Equity capital as a share of total assets	%	Mobile
Liquid assets/Total assets	(Required reserves + correspondent account with central bank + correspondent accounts with other banks + loans to banks) / total assets	%	Mobile
NPL/Total assets	Non-performing loans as a share of total assets	%	Mobile
Monthly profit/Total assets	Monthly profit as a share of total assets	%	Mobile
Total assets	Total assets	roubles	Mobile
State	Dummy indicating whether bank is state-owned or private	1/0	Mobile
Government securities/Total assets	National governemnt securities as a share of total assets	%	Mobile
Population polynomial	Fifth-order polynomial of log population in 1998		Rosstat
Wage polynomial	Fifth-order polynomial of log average wage in 1998		Rosstat
Doctors	Doctors per 10,000 in 1998	per 10,000	Rosstat
Nurses	Nurses per 10,000 in 1998	per 10,000	Rosstat
Retired	Retired people % in 1998	%	Rosstat
Unemployed	Unemployed % in 1998	%	Rosstat
Farmers	Population employed in farms % in 1998	%	Rosstat
Migration rate	Migration rate % in 1998	%	Rosstat
Crime rate	Crimes per 10,000 in 1998	per 10,000	Rosstat
Average pension	Average pension in thousands of rubles in 1998	K roubles	Rosstat
Region	Region dummies	1/0	Mobile

Table 2. Media freedom and financial development

This table shows how Media freedom is related to different characteristics of a country's financial system. It displays the results from OLS regressions where the dependent variable is Financial development in columns (1-3), Depositors in columns (4-6), Deposits in columns (7-9) and Dollarization in columns (10-12). All explanatory variables are 5-year rolling averages. Standard errors clustered at the country level are reported in parentheses. ***, **, * denote significance at the 0.01-, 0.05- and 0.1-level. See Table 1 for definitions and sources of the variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Financial development			Depositors			Deposits			Dollarization		
Media freedom	0.122***	0.115***	0.092***	207.683**	186.111*	152.442	13.999***	11.791***	8.022**	-0.007	-0.023	0.076*
	(0.017)	(0.020)	(0.025)	(85.938)	(105.328)	(159.505)	(2.825)	(3.043)	(3.977)	(0.025)	(0.025)	(0.039)
Log(Inflation)		-0.081***	-0.131***		-122.315*	-179.122		-14.801***	-21.914***		0.068***	-0.006
		(0.014)	(0.022)		(72.429)	(133.007)		(2.662)	(5.324)		(0.018)	(0.037)
Change terms of trade		0.000***	-0.000		-0.000***	-0.020		0.000	-0.000		0.000	-0.000***
		(0.000)	(0.000)		(0.000)	(0.024)		(0.000)	(0.000)		(0.000)	(0.000)
Rule of law index		-0.044	-0.069		209.937	-37.345		-14.593	-19.867*		-0.101	-0.002
		(0.065)	(0.089)		(272.643)	(415.401)		(8.960)	(11.939)		(0.094)	(0.275)
D (population)			1.286			1,822.062			-6.046			0.859
			(0.793)			(6,268.048)			(104.059)			(4.244)
D (consumption)			0.003			-3.052			-0.101			-0.013**
			(0.003)			(14.455)			(0.413)			(0.006)
D (nr. listed companies)			-0.009			-60.053			3.075			-0.022
			(0.009)			(58.372)			(2.132)			(0.022)
D (nr. bank branches)			0.424***			476.103			6.420			0.345
			(0.128)			(1,411.987)			(14.692)			(0.340)
Constant	0.040	0.234***	0.317***	151.674	247.119	504.363	10.263*	49.321***	69.798***	0.238***	0.207**	0.155
	(0.031)	(0.065)	(0.098)	(159.350)	(352.602)	(620.337)	(5.373)	(10.344)	(18.407)	(0.047)	(0.087)	(0.222)
Observations	4,891	2,346	416	950	711	156	4,609	2,309	408	1,254	624	107
$R_{(adjusted)}$	0.231	0.366	0.491	0.074	0.093	0.081	0.121	0.324	0.369	-0.000	0.115	0.224

Table 3. Media freedom and banking crises

This table displays marginal effects from Logit regressions regressions where the dependent variable is Banking crisis. Column (3) includes all explanatory variables as 5-year rolling averages. Standard errors clustered at the country level are reported in parentheses. ***, **, * denote significance at the 0.01-, 0.05- and 0.1-level. See Table 1 for definitions and sources of the variables.

	(1)	(2)	(3)
Media freedom	0.052	1.233***	1.056***
	(0.093)	(0.371)	(0.282)
Change government debt/GDP		0.025***	0.015**
		(0.007)	(0.007)
Change government expenditure		-0.019	-0.032
		(0.013)	(0.035)
Change current account balance		-0.001**	-0.001
		(0.000)	(0.001)
Change GDP per capita		0.121**	0.151**
		(0.051)	(0.072)
Change broad money/Total reserves		0.010**	0.013
		(0.004)	(0.010)
Log(Inflation)		1.297***	0.961**
		(0.376)	(0.453)
Real interest rate		-0.002	-0.015
		(0.019)	(0.040)
Change consumption		0.002	-0.091
		(0.013)	(0.060)
Change credit to private sector/GDP		0.004	0.035***
		(0.009)	(0.009)
Constant	-3.853***	-9.619***	-8.416***
	(0.203)	(1.445)	(1.077)
All explanatory variables as 5-year rolling averages	no	no	yes
Observations	5,162	1,405	1,741
$R_{(pseudo)}$	0.000	0.206	0.110

Table 4. Deposits, media freedom and banking crises

This table displays the results from OLS regressions regressions where the dependent variable is Change deposits, which is the yearly change in bank deposits as a share of GDP. All control variables are averages over the respective time periods (pre-crisis period, banking crisis period, post-crisis period). Column (1) defines the pre-crisis period as the five years preceding a banking crisis, the banking crisis period as the year in which the crisis happens and the post-crisis period as the four years after the banking crisis. Column (2) defines the pre-crisis period as the five years preceding a banking crisis and the banking crisis period as the year in which the crisis happens and the following year. Column (2) defines the pre-crisis period as the five years preceding a banking crisis and the banking crisis period as the year in which the crisis happens. Standard errors clustered at the country level are reported in parentheses. ***, **, * denote significance at the 0.01-, 0.05- and 0.1-level. See Table 1 for definitions and sources of the variables.

	(1)	(2)	(3)
Banking crisis*Media freedom	5.318**	4.178	4.684*
	(2.376)	(2.541)	(2.567)
Post crisis*Media freedom	1.651		
	(2.795)		
Banking crisis	-13.163**	-12.291*	-12.752*
	(6.174)	(6.728)	(6.896)
Post crisis	-5.208		
	(6.717)		
Media freedom	-2.549	-3.448	-2.734
	(2.200)	(2.504)	(3.110)
Change government debt/GDP	0.012	0.004	0.027
	(0.019)	(0.027)	(0.020)
Change government expenditure	0.168**	0.002	0.071
	(0.066)	(0.066)	(0.060)
Change current account balance	0.006**	-0.003	0.009**
	(0.003)	(0.005)	(0.003)
Change GDP per capita	0.249	-0.072	-0.065
	(0.260)	(0.232)	(0.382)
Change broad money/Total reserves	0.026	-0.039	0.014
	(0.026)	(0.045)	(0.032)
Log(Inflation)	-2.468***	-2.109**	-0.892
	(0.618)	(0.951)	(1.792)
Real interest rate	0.204**	0.329***	0.230**
	(0.085)	(0.068)	(0.093)
Change consumption	0.502*	0.768*	0.605*
	(0.292)	(0.415)	(0.331)
Change credit to private sector/GDP	0.131*	0.113***	0.043
	(0.073)	(0.035)	(0.099)
Constant	9.737	14.583*	10.332
	(5.989)	(8.094)	(10.342)
Observations	69	40	35
$R_{(pseudo)}$	0.312	0.351	0.273

Table 5. Summary statistics individual banks

This table provides summary statistics of all bank variables used in the regression analyses. We additionally provide the statistics for the variables Household deposits/Total assets and Total assets. Panel A reports statistics for all banks over the full observation period, while Panel B uses data from January 1998, splits the sample in banks located in areas with high vs. low NTV probability and provides the difference in means. Banks with low (high) NTV probability have an NTV probability below (at or higher than) the median NTV probability. ***, **, * denote significance at the 0.01-, 0.05- and 0.1-level from a t-test on the equality of means in the two subsamples. See Table 1 for definitions and sources of the variables.

Panel A. Bank characteristics in January 1998, Full Sample

	mean	**sd**	**min**	**max**	**N**
D ln(Deposits)	-0.06	0.22	-1.55	1.51	6,452
Household deposits/Total assets	0.12	0.09	0.00	0.51	6,452
Equity/Total assets	0.26	0.18	-0.33	0.91	6,452
Liquid assets/Total assets	0.15	0.13	0.00	0.82	6,452
NPL/Total assets	0.04	0.05	0.00	0.26	6,452
Monthly profit/Total assets	0.00	0.01	-0.07	0.08	6,452
Log(Total assets)	3.44	1.47	-1.27	8.23	6,452
Total assets	95.15	223.38	0.28	3762.27	6,452
State	0.05	0.22	0.00	1.00	6,452
Government securities/Total assets	0.04	0.08	0.00	0.58	6,452
NTV probability	0.70	0.10	0.37	0.83	6,452

Panel B. Banks with high π_i^{NTV} vs. banks with low π_i^{NTV}

	Low π_i^{NTV}	**High π_i^{NTV}**	**Difference**
D ln(Deposits)	-0.01	0.01	-0.01
Household deposits/Total assets	0.11	0.11	0.00
Equity/Total assets	0.26	0.26	-0.00
Liquid assets/Total assets	0.16	0.17	-0.01
NPL/Total assets	0.05	0.04	0.01**
Monthly profit/Total assets	0.00	0.00	-0.00
Log(Total assets)	3.30	3.87	-0.57***
Total assets	82.91	132.14	-49.23**
State	0.02	0.07	-0.05***
Government securities/Total assets	0.04	0.05	-0.01

Table 6. Effect of NTV availability on depositor behavior during the Russian crisis

This table displays the results from OLS (columns (1)-(4)) and fixed effects (column (5)) regressions where the dependent variable is D ln(Deposits). Columns (2) to (4) contain fifth-order polynomials of log population and log wage and report results from F-statistics on their joint significance in brackets Column (4) additionally controls for interactions between all bank characteristics and NTV probability. Standard errors clustered at the bank level in parentheses. ***, **, * denote significance at the 0.01-, 0.05- and 0.1-level. See Table 1 for definitions and sources of the variables.

	(1) baseline	(2) Population and wage controls	(3) All socio-demographic controls	(4) Bank chars × NTV prob	(5) Bank FE
Default*NTV probability	0.037	0.036	-0.004	-0.002	0.015
	(0.069)	(0.072)	(0.075)	(0.074)	(0.068)
Recovery*NTV probability	0.188***	0.171***	0.167***	0.166**	0.176***
	(0.057)	(0.058)	(0.063)	(0.065)	(0.061)
Default	-0.204***	-0.202***	-0.172***	-0.173***	-0.222***
	(0.048)	(0.050)	(0.052)	(0.051)	(0.047)
Recovery	-0.156***	-0.146***	-0.143***	-0.141***	-0.206***
	(0.039)	(0.040)	(0.044)	(0.045)	(0.043)
NTV probability	-0.027	0.050	0.030	-0.285	
	(0.045)	(0.051)	(0.056)	(0.189)	
Equity/Total assets	0.031	0.028	0.041*	-0.183	-0.082
	(0.021)	(0.021)	(0.022)	(0.204)	(0.052)
Liquid assets/Total assets	0.091***	0.091***	0.089***	-0.096	0.150***
	(0.024)	(0.025)	(0.025)	(0.177)	(0.048)
NPL/Total assets	-0.301***	-0.279***	-0.267***	-0.849	-0.459***
	(0.070)	(0.073)	(0.076)	(0.539)	(0.162)
Monthly profit/ Total assets	0.528**	0.585**	0.681***	-0.060	0.341
	(0.222)	(0.238)	(0.247)	(1.235)	(0.230)
Log(Total assets)	0.006**	0.006**	0.007**	-0.031	-0.100***
	(0.002)	(0.003)	(0.003)	(0.025)	(0.021)
State	0.010	0.009	0.007	0.089	
	(0.010)	(0.011)	(0.011)	(0.060)	
Government securities/Total assets	-0.057	-0.033	-0.026	-0.008	0.044
	(0.041)	(0.042)	(0.044)	(0.325)	(0.090)
Population polynomial		yes	yes	yes	
Wage polynomial		yes	yes	yes	
Doctors			0.000	0.000	
			(0.000)	(0.000)	
Nurses			-0.000	-0.000	
			(0.000)	(0.000)	
Retired			-0.001	-0.001	
			(0.001)	(0.001)	
Unemployed			0.001	0.001	
			(0.008)	(0.008)	
Farmers			0.828	0.824	
			(1.005)	(1.010)	
Migration rate			0.022**	0.022**	
			(0.010)	(0.010)	
Crime rate			-0.000	-0.000	
			(0.000)	(0.000)	
Average pension			0.031	0.063	
			(0.260)	(0.253)	
Constant	-0.060	0.076	-0.077	0.116	0.374***
	(0.048)	(0.186)	(0.237)	(0.267)	(0.081)
Region FE	yes	yes	yes	yes	no
Bank FE	no	no	no	no	yes
bank chars × NTV probability	no	no	no	yes	no
Observations	6,452	5,963	5,492	5,492	6,452
$R_{(adjusted/within)}$	0.140	0.141	0.137	0.137	0.152

Table 7. Summary statistics of matched sample (January 1998

This table reports summary statistics (means) of the bank variables used in the regression analyses at the beginning of our observation period (January 1998) for the matched sample. Results are derived after propensity score matching with three nearest neighbors. In the matched sample banks with low NTV probability are matched with their three nearest-neighbor banks with high NTV probability based on the propensity score. Banks with low (high) NTV probability have an NTV probability below (at or higher than) the median NTV probability. ***, **, * denote significance at the 0.01-, 0.05- and 0.1-level from a t-test on the equality of means in the two subsamples. See Table 1 for definitions and sources of the variables.

	Low NTV probability	**High NTV probability**	**t-test**
Mean propensity score	0.59	0.59	0.08
Equity/Total assets	0.26	0.25	0.83
Liquid assets/Total assets	0.17	0.17	0.13
NPL/Total assets	0.04	0.04	0.16
Monthly profit/Total assets	0.01	0.00	1.19
Log(Total assets)	3.79	4.01	-1.44
State	0.04	0.06	-0.70
Government securities/Total assets	0.05	0.05	-0.38

Table 8. Effect of NTV availability on depositor behavior, matched sample

This table displays the results from OLS (columns (1)-(4)) and fixed effects (column (5)) regressions where the dependent variable is D ln(Deposits). Results are derived after propensity score matching with three nearest neighbors. The sample only contains observations that are on the common support. Columns (2) to (4) contain fifth-order polynomials of log population and log wage and report results from F-statistics on their joint significance in brackets Columns (3) and (4) also control for the sociodemographics Doctors, Nurses, Retired, Umenployed, Farmers, Migration rate, Crime rate and Average pension, while Column (4) addionally controls for interactions between all bank characteristics and NTV probability. Standard errors clustered at the bank level are reported in parentheses. ***, **, * denote significance at the 0.01-, 0.05- and 0.1-level. See Table 1 for definitions and sources of the variables.

	(1) baseline	(2) Population and wage controls	(3) All sociodemographics	(4) Bank chars × NTV prob	(5) Bank FE
Default*NTV probability	-0.011	-0.003	-0.040	-0.022	-0.003
	(0.080)	(0.086)	(0.086)	(0.087)	(0.083)
Recovery*NTV probability	0.207***	0.200**	0.208**	0.219**	0.203**
	(0.074)	(0.077)	(0.082)	(0.086)	(0.079)
Default	-0.163***	-0.167***	-0.139**	-0.152**	-0.198***
	(0.056)	(0.059)	(0.059)	(0.060)	(0.058)
Recovery	-0.161***	-0.157***	-0.162***	-0.171***	-0.207***
	(0.050)	(0.053)	(0.056)	(0.059)	(0.055)
NTV probability	-0.069	0.041	-0.001	-0.261	
	(0.050)	(0.058)	(0.061)	(0.213)	
Equity/Total assets	0.043*	0.044*	0.065***	0.058	-0.090
	(0.024)	(0.024)	(0.024)	(0.179)	(0.058)
Liquid assets/Total assets	0.087***	0.080***	0.081***	-0.157	0.130**
	(0.028)	(0.030)	(0.030)	(0.218)	(0.057)
NPL/Total assets	-0.346***	-0.328***	-0.315***	-0.421	-0.354*
	(0.083)	(0.086)	(0.092)	(0.613)	(0.200)
Monthly profit/ Total assets	0.620**	0.687**	0.728**	-0.743	0.491*
	(0.268)	(0.292)	(0.301)	(1.331)	(0.276)
Log(Total assets)	0.007**	0.009***	0.010***	-0.039	-0.082***
	(0.003)	(0.003)	(0.003)	(0.031)	(0.023)
State	0.004	-0.005	-0.006	0.107*	
	(0.012)	(0.013)	(0.012)	(0.058)	
Government securities/Total assets	-0.070	-0.042	-0.025	0.064	0.087
	(0.048)	(0.048)	(0.048)	(0.439)	(0.104)
Constant	-0.037	0.103	-0.022	0.107	0.298***
	(0.050)	(0.244)	(0.281)	(0.312)	(0.086)
Region FE	yes	yes	yes	yes	no
Bank FE	no	no	no	no	yes
Population and wage polynomials	no	yes	yes	yes	no
Sociodemographics	no	no	yes	yes	no
bank chars NTV probability	no	no	no	yes	no
Observations	4,840	4,401	4,047	4,047	4,840
$R_{(adjusted/within)}$	0.130	0.133	0.130	0.131	0.138

Appendix 1. Robustness tests

This table displays the results from OLS (columns (1), (3), (5), (7) and (9)) and fixed effects (column (2), (4), (6), (8) and (10)) regressions where the dependent variable is D ln(Deposits). In columns (1-2) bank variables are lagged by one month, in columns (3-4) by two months and columns (5-6) include bank variables measured in January 1998. In columns (7-8) banks with very few deposits, i.e. those with deposits as a share of total assets in the bottom quartile, are dropped from the analysis. In columns (9-10) all variables are averaged over the three time periods (pre-crisis, default, recovery) to account for pontial serial correlation in the monthly data (Bertrand et al. 2004). Standard errors clustered at the bank level are reported in parentheses. ***, **, * denote significance at the 0.01-, 0.05- and 0.1-level. See Table 1 for definitions and sources of the variables.

VARIABLES	(1) Bank variables lagged one month	(2)	(3) Bank variables lagged two months	(4)	(5) Beginning-of-1998 bank variables	(6)	(7) Without banks with beginning-of-1998 deposits as share of liabilities in bottom quartile	(8)	(9) All variables averaged over time periods	(10)
Default*NTV probability	-0.007	0.013	0.021	0.041	0.004	0.026	-0.059	-0.046	-0.013	0.027
	(0.076)	(0.065)	(0.080)	(0.069)	(0.075)	(0.067)	(0.070)	(0.064)	(0.082)	(0.073)
Recovery*NTV probability	0.192***	0.203***	0.177**	0.193***	0.166***	0.168***	0.161***	0.146**	0.179**	0.162**
	(0.068)	(0.062)	(0.071)	(0.064)	(0.064)	(0.058)	(0.061)	(0.061)	(0.073)	(0.064)
Default	-0.170***	-0.208***	-0.181***	-0.212***	-0.181***	-0.204***	-0.134***	-0.179***	-0.167***	-0.192***
	(0.053)	(0.045)	(0.055)	(0.047)	(0.052)	(0.046)	(0.049)	(0.046)	(0.055)	(0.049)
Recovery	-0.156***	-0.213***	-0.136***	-0.189***	-0.142***	-0.150***	-0.134***	-0.181***	-0.156***	-0.130***
	(0.047)	(0.043)	(0.050)	(0.046)	(0.045)	(0.039)	(0.043)	(0.044)	(0.050)	(0.044)
NTV probability	0.013		0.010		0.044		-0.081		0.016	
	(0.055)		(0.057)		(0.058)		(0.062)		(0.065)	
Constant	-0.054	0.349***	-0.146	0.273***	-0.071	-0.007**	-0.288	0.392***	0.135	-0.110
	(0.261)	(0.073)	(0.291)	(0.090)	(0.247)	(0.003)	(0.300)	(0.091)	(0.268)	(0.118)
Region FE	yes	no	yes	no	yes	no	yes	no	yes	no
Bank characteristics	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Bank FE	no	yes	no	yes	no	yes	no	yes	no	yes
Population & wage polynomials	yes	no	yes	no	yes	no	yes	no	yes	no
Sociodemographics	yes	no	yes	no	yes	no	yes	no	yes	no
Observations	4,964	5,838	4,546	5,348	5,492	6,452	4,488	5,215	1,156	1,356
$R_{(adjusted/within)}$	0.144	0.155	0.135	0.147	0.129	0.142	0.184	0.199	0.286	0.416