Relationship lending during a trust crisis on the interbank market: A friend in need is a friend indeed

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ABSTRACT

We exploit uncertainty regarding banks' involvement in money laundering activities as a natural experiment to study the functioning of the interbank market in uncertain times. We show that bank couples with a stronger relationship (i.e., more frequent and reciprocal interactions before the event) are more likely to continue lending to one another, and at lower interest rates. This is in line with a "helping hand" or "flight to friends" hypothesis during crisis.

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1. Introduction

There is growing body of literature on the existence and nature of relationship lending in interbank markets in normal and crisis times (Cocco et al., 2009; Afonso et al., 2011; Affinito, 2012; Craig et al., 2015; Bräuning and Fecht, 2017).[1] The empirical work on the role of relationships during crisis times however faced the challenge that relationships themselves may change due to the fundamentals of banks being affected by the underlying economic conditions. In this paper, we address this challenge by exploiting a natural experiment that generated uncertainty on the Russian interbank market but without being related to the economic fundamentals: the withdrawal of one bank's license on the grounds of money laundering and rumors about a blacklist of banks awaiting license withdrawal for the same reason. Although this shock may have affected each interbank borrower's credit

risk differently, the extent to which a bank is affected was clearly exogenous to the bank's trading behavior in the interbank market. Strong relationships may be a helping hand in such a crisis environment since relationship lenders have private information at their disposal about their counterparties that is non-observable to unrelated transactional lenders.

The closest paper to ours is Bräuning and Fecht (2017). They empirically investigate the effect of relationship lending on the availability and price of interbank liquidity in a panel of unsecured overnight loans between German bank pairs from March 2006 to November 2007. Relationship lenders improve the availability of credit to related borrowers and are more likely to provide liquidity to them, and at cheaper rates during crisis. They also show that relationship lenders already adjust their loan terms in the run-up to the interbank crisis. We contribute to this work by exploiting an exogenous shock to the mutual trust in the Russian interbank market stemming from uncertainty about involvement in money laundering and potential license withdrawal. Using a rich and complete dataset of all Russian individual interbank lending contracts covering a window around the exogenous event, we find that banks after the event have a higher likelihood to still receive loans from other banks with whom they have strong relationships, and at lower interest rates,

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[1] The literature on relationship lending started of in the corporate loan markets. Banks gather information over time and across products about their corporate borrowers. For a review, see Boot (2000), or Kysucky and Norden (2015).

relative to the pre-crisis period and relative to loans from transactional banks. This is consistent with a "helping hand" or "flight to friends" hypothesis.

2. Event and data description

In May 2004, a crisis on the Russian interbank market was triggered. In particular, on May 13 the Central Bank of Russia recalled the license from Sodbiznesbank on accusations of money laundering and sponsorship of terrorism. It was the first bank to be closed on these grounds in Russia. This unexpected closure caused panic on the interbank market since banks suspected other banks would follow suit, but they had no reliable information on who these banks might be. On May 16 the head of Federal Financial Monitoring Service, Viktor Zubkov, announced publicly that his agency suspected another ten banks of similar violations. Because this announcement was not accompanied by the actual list of suspected banks, it just fueled the hysteria on the interbank market. Rumors about the identities of these ten banks started to spread rapidly. Soon several inconsistent blacklists were circulating in the banking community as bankers tried to guess which banks were officially suspected of money laundering. Anecdotal evidence suggests that banks were actively helping to spread the rumor by removing themselves from the list and adding competitors in an attempt to escape the carnage. By consequence, The union of all the blacklists circulating in the banking community expanded in a few days to include dozens of banks, including several market leaders.

In the presence of total uncertainty about the quality of their counterparties, banks began to reduce limits on each other, which reverberated into an acute liquidity drought on the interbank market (Paranyushkin, 2009). The turnover volume on the interbank market dropped spectacularly. Later the original source of the panic, Viktor Zubkov, shockingly announced that "the Federal Financial Monitoring Service has no blacklist". The deputy Minister of Internal Affairs similarly announced that "the Interior Ministry has no such list. We have no plans to persecute any banks".[2] Up till now it remains unclear whether an official list actually existed. Important for our identification strategy, the 2004 meltdown on the Russian interbank market was based on rumors and unrelated to shocks to the fundamentals of Russian banks or the Russian economy at large. This non-fundamental and exogenous mutual trust crisis provides an almost perfect natural experiment to answer the research question whether (stronger) relationships may provide insurance against the impact of such events.

We use contract data on the Russian interbank market. This data is a part of monthly bank disclosure requirements, and was provided to us by a private financial information agency Mobile (www.mobile.ru) for the period from July 1998 to October 2004. Each contract identifies the issuer of the loan, the receiver, the reporting month, the beginning and end of month balances, the debit and credit turnovers, the interest rate, the maturity date, and the maturity bucket. The data is further described in Vandermarliere et al. (2015), who use it to analyze network characteristics of the Russian interbank market.

In what follows, we focus on 1-day loans. These are the only loans for which we can reconstruct the unreported loan issuance date, as Issue Date = Maturity Date − 1. The latter is needed to know whether the loan was issued before or after the event. In addition, we drop loans from/to foreign banks.[3] For these
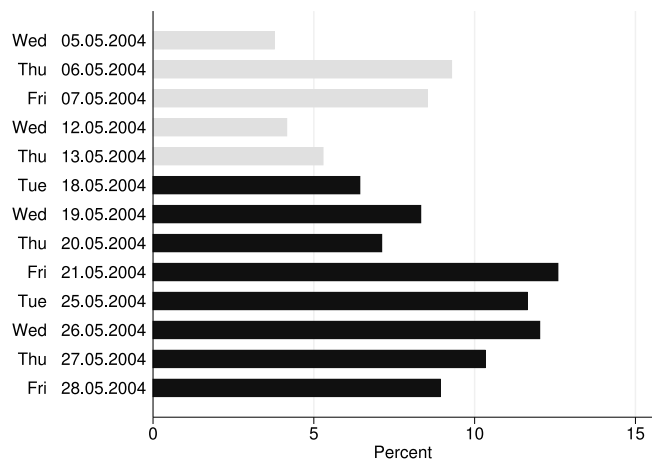

Fig. 1. Average 1-day interbank rate in May 2004.

banks, we cannot construct relationship measures, because they lack consistent identifiers in our database.[4] Finally, we limit the sample to banks with an active banking license as of May 1, 2004.

Fig. 1 shows the average 1-day interbank interest rate in May 2004. Gray (resp. black) bars represent the period before (resp. after) the start of the crisis. The date on the vertical axis is the loan maturity date. Because 1-day loans do not mature in the weekend, on a holiday, or on the first day thereafter, these days are missing from the figure. In addition, we drop loans maturing on May 14: these loans were issued on May 13, but we do not know whether they were issued before or after the Sodbiznesbank's closure announcement. We clearly observe that rates went up considerably in the first weeks after the event.

3. Methodology

To study whether relationships help during crises, we estimate the following difference-in-difference equations on daily bank pair data for May 2004:

$$D_{ijt} = \beta_0 + \beta_1 R_{ij} + \beta_2 R_{ij} C + FE + e_{ijt} \quad (1)$$

$$i_{lijt} = \beta_0 + \beta_1 R_{ij} + \beta_2 R_{ij} C + FE + e_{lijt} \quad (2)$$

D_{ijt} equals 1 if banks i and j have at least one outstanding 1-day loan between them on day t and 0 otherwise. i_{lijt} is the interest rate on 1-day interbank loan l from bank i to bank j maturing on day t. We add the index l because bank couples ij can issue multiple 1-day loans on the same day.

R_{ij} stands for one of the two measures of relationship intensity between banks i and j.

The first measure is interaction frequency, R^f. It is defined as the natural logarithm of 1 plus the number of 1-day loans issued between banks i and j during the year 2003. This indicator stems from the relationship lending literature which argues that banks gather more private information about each other by transacting more frequently. We take the log to make the distribution less skewed.

The second measure is reciprocity, R^r. We define R^{f1} (resp. R^{f2}) as the number of 1-day loans from bank i to bank j (resp. from j

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[2] For further descriptions (in Russian) of this episode in Russian history see Simonov (2009) andBoyarskiy (2018).

[3] In April 2004, 1-day loans received from foreign banks represented 2.5% of all received 1-day loans (13% in terms of volume). Numbers are comparable throughout the rest of 2004.

[4] Specifically, the spelling of foreign bank names varies wildly across counterparties and over time.

to i) issued in the year 2003. We then take twice the minimum of R^{f1} and R^{f2}, and divide by their sum:

$$R^r = 2\frac{\min(R^{f1}, R^{f2})}{R^{f1} + R^{f2}}$$

R^r varies from 0 to 1; it equals 0 for an entirely one-way relationship in which either $R^{f1} = 0$ or $R^{f2} = 0$; it equals 1 for a perfectly symmetric relationship where $R^{f1} = R^{f2}$. Reciprocity is specific to the interbank market as banks can both be borrowing from and lending to each other. A higher reciprocity may reflect greater mutual trust between banks.

FE stands for various combinations of time and bank fixed effects. The post-crisis dummy C equals 1 from May 18, 2004 onward, which is the first day on which contracts issued after the event mature. Our "flight to friends" hypothesis predicts that during crises banks have a higher likelihood to receive loans from relationship banks, and at lower interest rates, relative to the pre-crisis period and relative to loans from transactional banks. In line with this hypothesis, we expect β_2 to be positive in Eq. (1) and negative in Eq. (2).

4. Results

Table 1 reports the results of estimating Eq. (1), which predicts whether bank pairs are active on the 1-day loan market on day t. In these regressions, we only include bank pairs which had at least one outstanding 1-day loan between January 1, 2003 and May 31, 2004. We report specifications with day (columns 1, 3 and 5), and with day, lender and borrower (columns 2, 4 and 6) fixed effects. As a relationship indicator, we use interaction frequency R^f (columns 1 and 2), reciprocity R^r (columns 3 and 4), or both (columns 5 and 6). Table 1 reveals that bank couples with a stronger relationship in 2003 have a higher likelihood to have an outstanding interbank loan in May 2004. For example, using estimates in column 2 (4), we find that a one standard deviation increase in R^f (R^r) raises the likelihood of having a bank pair active on any particular day by 2.4 (1.3) percentage points. Importantly, this effect is stronger during the crisis (i.e., when $C = 1$). Across all six specifications, the interactions of our relationship measures with the post-crisis dummy C are positive and significant. That is, strong past relationships increase the likelihood of banks teaming up during the crisis, in line with a "helping hand" effect.

Table 2 reports the results of estimating Eq. (2). Although stronger relationships do not influence interest rates in normal times, bank couples with stronger relationships do charge each other lower rates in the period of interbank market uncertainty (i.e., when $C = 1$). Using estimates in column 2 (4), we find that a one standard deviation increase in R^f (R^r) leads to a 28 (27) basis points lower interest rate during the crisis compared to the normal period. Our results hold controlling for several sets of fixed effects. Columns 5 and 6 report the results when including both relationship variables. While somewhat weaker, our main findings continue to hold. In sum, our findings are consistent with a "helping hand" or "flight to friends" effect in times of uncertainty on the interbank market.[5]

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[5] In unreported results, we further include heterogeneous borrower fixed effects in the pre-crisis and crisis periods to control for the possibility that the perceived probability that a particular bank would lose its license differed across banks. Our findings are qualitatively similar: the difference is that in Table 1 $R^r C$ (marginally) loses its statistical significance, while in Table 2 $R^f C$ becomes statistically significant whereas $R^r C$ loses it.

Table 1

Estimation results for Eq. (1)

$$D_{ijt} = \beta_0 + \beta_1 R_{ij} + \beta_2 R_{ij}C + FE + e_{ijt}$$

D_{ijt} is defined for banks i and j that had at least one outstanding 1-day loan during 1 Jan 2003–31 May 2004:

$$D_{ijt} = \begin{cases} 1 & \text{if banks } i \text{ and } j \text{ have an outstanding 1-day loan on day } t; \\ 0 & \text{otherwise.} \end{cases}$$

R_{ij} is a measure of a relationship between banks i and j. Post-crisis dummy C equals 1 from May 18, 2004 onward. *FE* stands for various combinations of time and bank fixed effects reported in the table. Standard errors are two-way clustered at the level of both banks i and j (Correia, 2016). *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	D	D	D	D	D	D
R^f	0.02*** (0.002)	0.02*** (0.001)			0.02*** (0.002)	0.02*** (0.001)
$R^f C$	0.009*** (0.001)	0.009*** (0.001)			0.008*** (0.002)	0.008*** (0.002)
R^r			0.03*** (0.004)	0.04*** (0.004)	−0.02*** (0.004)	0.005 (0.003)
$R^r C$			0.02*** (0.004)	0.02*** (0.004)	0.008** (0.004)	0.008** (0.004)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FE		Yes		Yes		Yes
Lender FE		Yes		Yes		Yes
Observations	351,117	351,117	351,117	351,117	351,117	351,117
R^2	0.027	0.087	0.012	0.080	0.027	0.087

Table 2

Estimation results for Eq. (2)

$$i_{lijt} = \beta_0 + \beta_1 R_{ij} + \beta_2 R_{ij}C + FE + e_{lijt}$$

i_{lijt} is the interest rate on a 1-day interbank loan l from bank i to j maturing on day t. R_{ij} is a measure of a relationship between banks i and j. Post-crisis dummy C equals 1 from May 18, 2004 onward. *FE* stands for various combinations of time and bank fixed effects reported in the table. Standard errors are two-way clustered at the level of both banks i and j (Correia, 2016). *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	i	i	i	i	i	i
R^f	0.007 (0.10)	−0.04 (0.05)			0.07 (0.1)	−0.08 (0.07)
$R^f C$	−0.2*** (0.08)	−0.2*** (0.06)			−0.2* (0.09)	−0.09 (0.07)
R^r			−0.6 (0.4)	0.2 (0.2)	−0.7 (0.5)	0.4 (0.3)
$R^r C$			−1.1*** (0.4)	−0.8*** (0.3)	−0.8** (0.4)	−0.6** (0.3)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FE		Yes		Yes		Yes
Lender FE		Yes		Yes		Yes
Observations	13,397	13,213	13,397	13,213	13,397	13,213
R^2	0.197	0.621	0.201	0.621	0.202	0.621

5. Conclusion

We exploit uncertainty created by one bank losing its license on accusations of money laundering and rumors of more banks to follow, as a natural experiment: in response to this money laundering related uncertainty the level of mutual bank trust dropped abruptly, without any preceding change in bank fundamentals. We show that bank couples with an ex-ante stronger relationship, as measured by the frequency and reciprocity of their daily interactions, exhibit an increased likelihood of lending to one another in times of crisis and at lower interest rates, relative to these banks' contracts with other non-related banks and to non-crisis periods. In sum, "a friend in need is a friend indeed".

Acknowledgment

Table A.1
Summary statistics for Eq. (1).

Variables	(1) N	(2) mean	(3) sd	(4) min	(5) p1	(6) p25	(7) p50	(8) p75	(9) p99	(10) max
D_{ijt}	351,117	0.070	0.26	0	0	0	0	0	1	1
R^f	351,117	1.93	1.21	0	0	0.69	1.95	2.83	4.51	5.99
R^r	351,117	0.23	0.33	0	0	0	0	0.48	1	1

Table A.2
Summary statistics for Eq. (2).

Variables	(1) N	(2) mean	(3) sd	(4) min	(5) p1	(6) p25	(7) p50	(8) p75	(9) p99	(10) max
i_{lijt}	13,397	8.93	5.70	0	0	5	8.76	13	25	55
R^f	13,397	2.56	1.41	0	0	1.79	2.83	3.61	5.29	5.99
R^r	13,397	0.30	0.34	0	0	0	0.13	0.59	1	1

Appendix. Summary statistics

See Tables A.1 and A.2.

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