Tracing the Impact of Liquidity Infusions by the Central Bank on Financially Constrained Banks after a Sudden Stop

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- **Question 1**: Do central bank's liquidity infusions mitigate financial constraints of banks and have an impact on banks' lending decisions after the unexpected sudden stop of external financing?
- **Question 2**: Do banks that receive aid change their risk-taking behavior?

Literature review

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- Ivashina and Scharfstein (2010), Raddatz (2010) investigate the link between banks' reliance on capital markets financing and their lending policies
- Central Bank of Russia's liquidity auctions resemble the ECB's Long-Term Refinancing Operation (LTRO) launched in December 2010 under which banks can choose to refinance their bond holding for up to three years.

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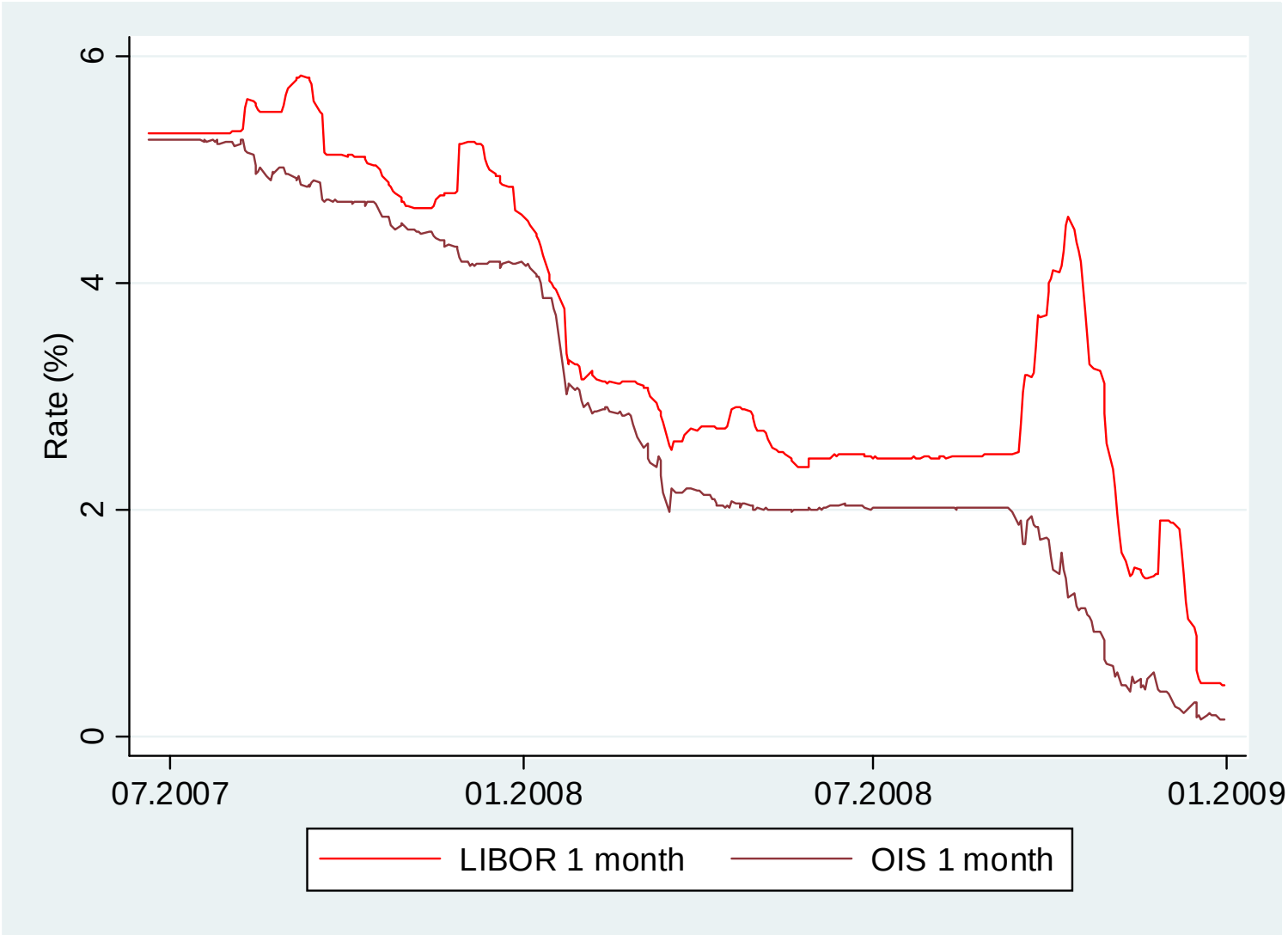
3. Central Bank of Russia was endowed with 3rd largest FX reserves at a time of Lehman Brothers collapse
   - Global squeeze in dollar funding resulted in currency swaps arranged by the US Fed with the ECB, BoE, SNB and other central banks

The Lehman Brothers collapse



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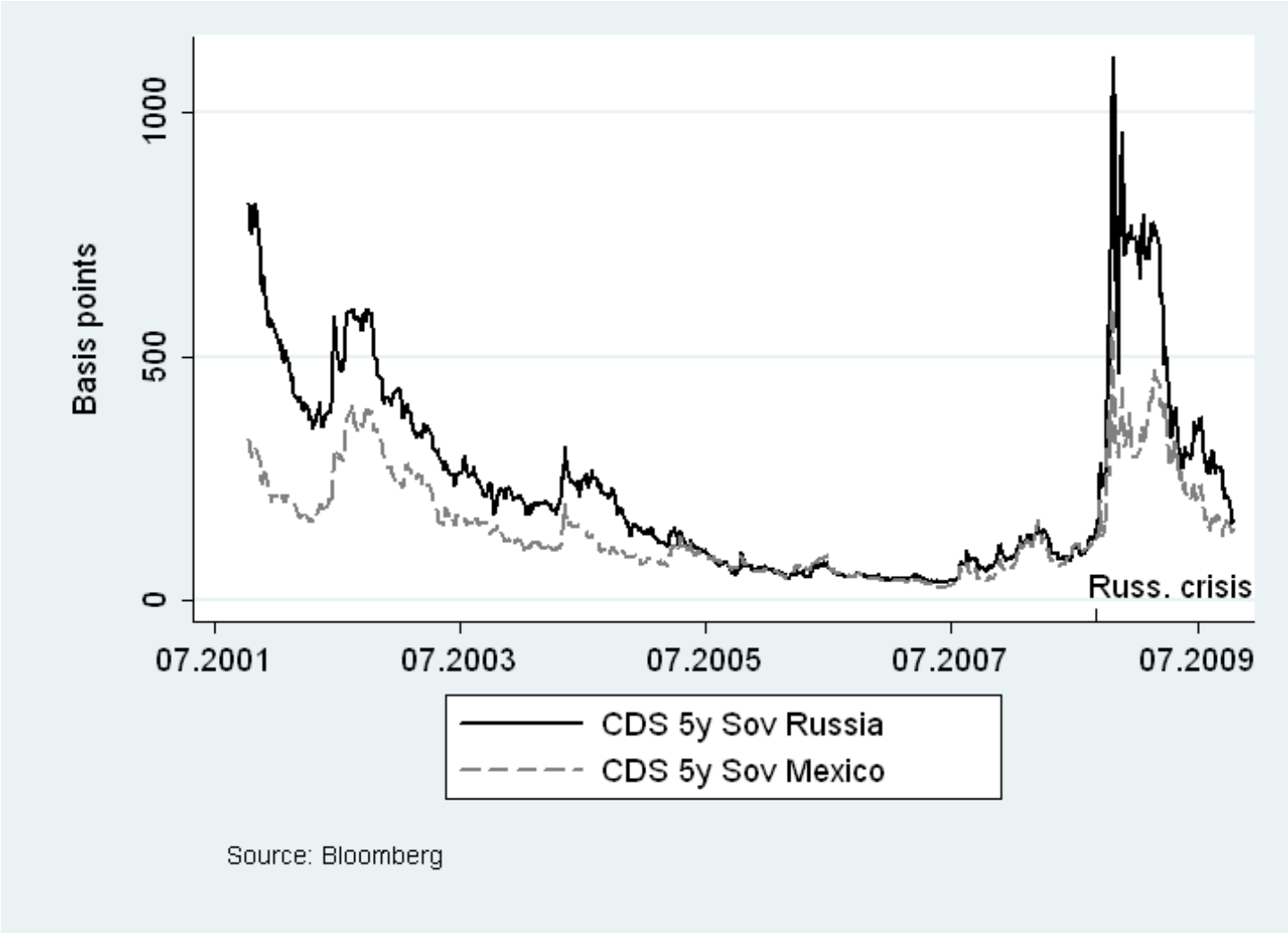
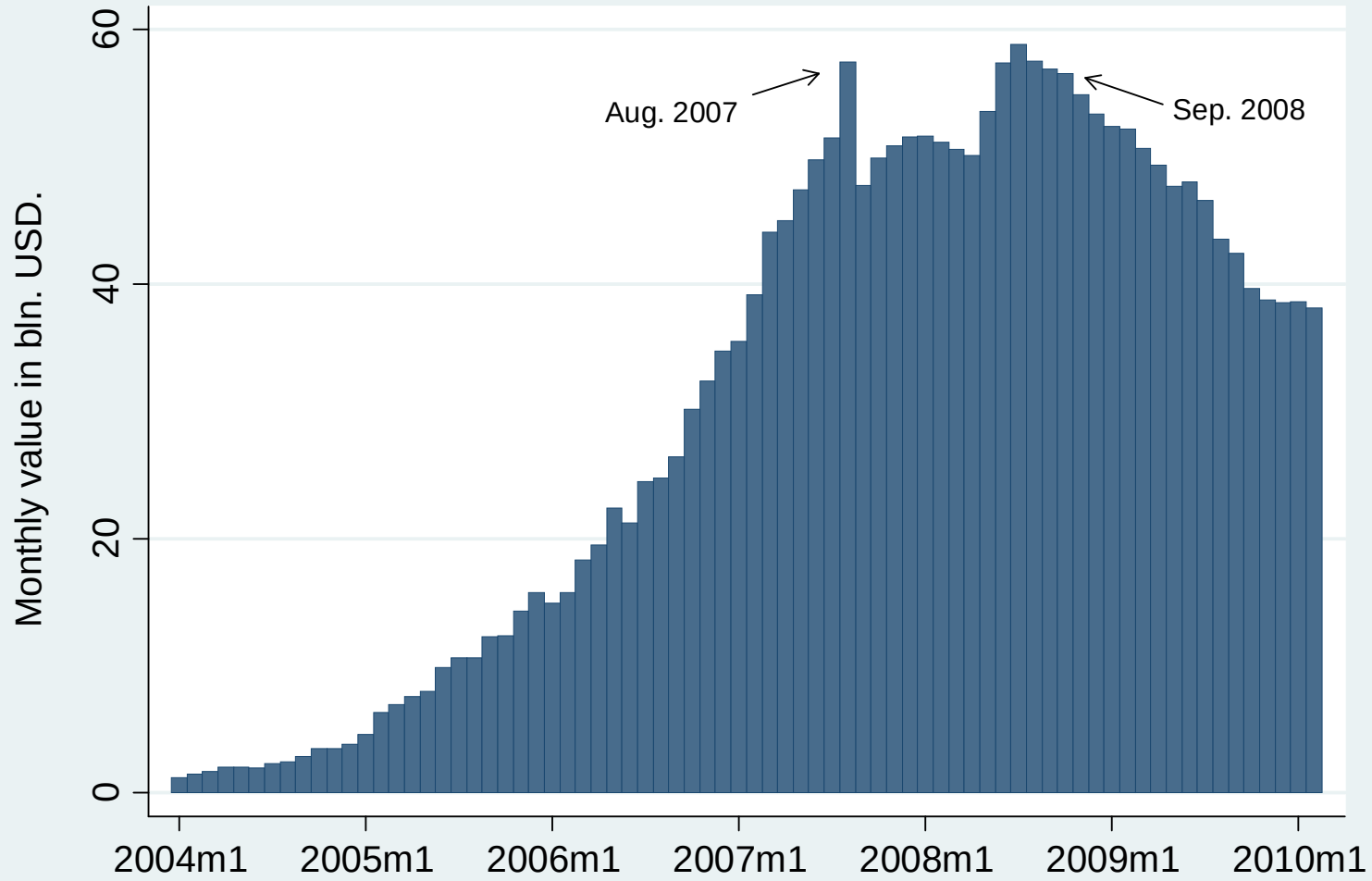


Source: Bloomberg

Aggregate value of banks' liabilities from Eurobonds and Syndicated loans



Source: Bloomberg, Cbonds

Background of Russian Quantitative Easing

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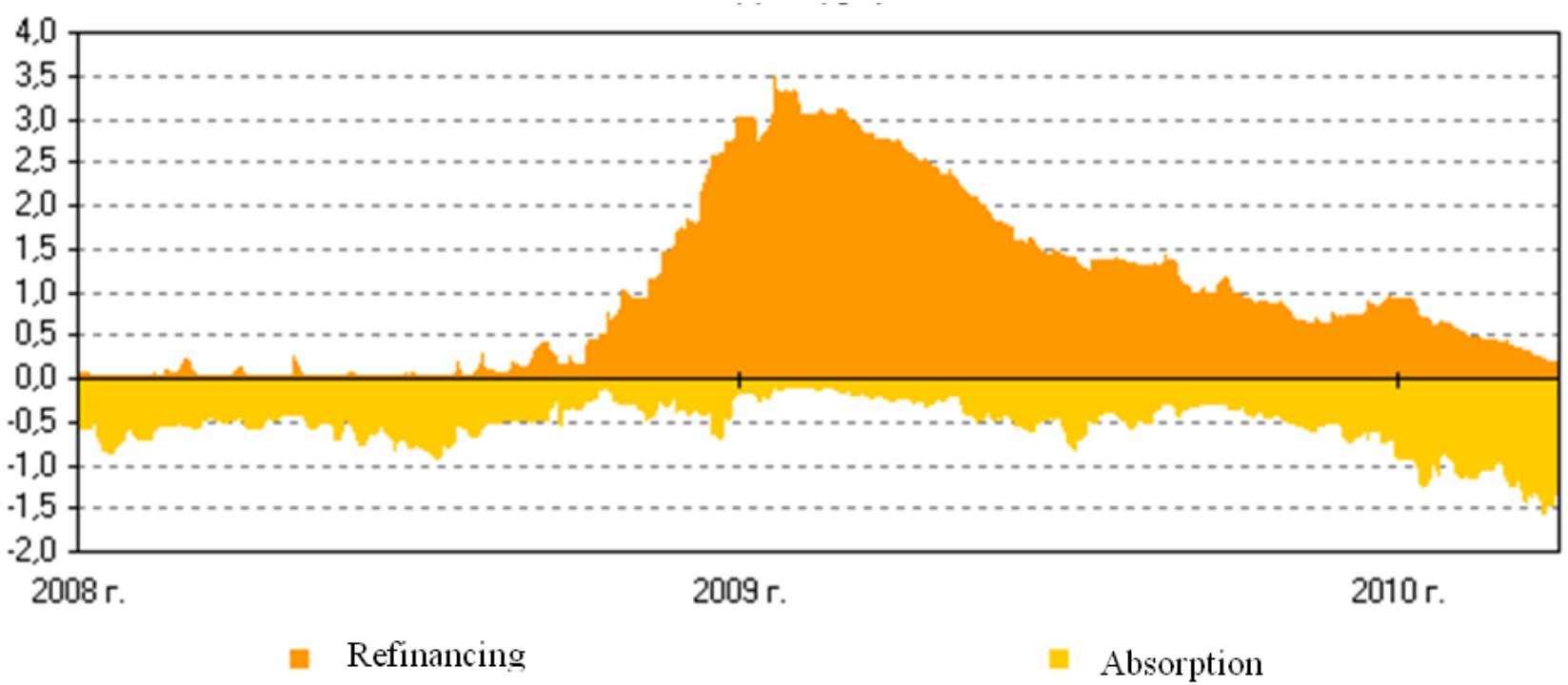
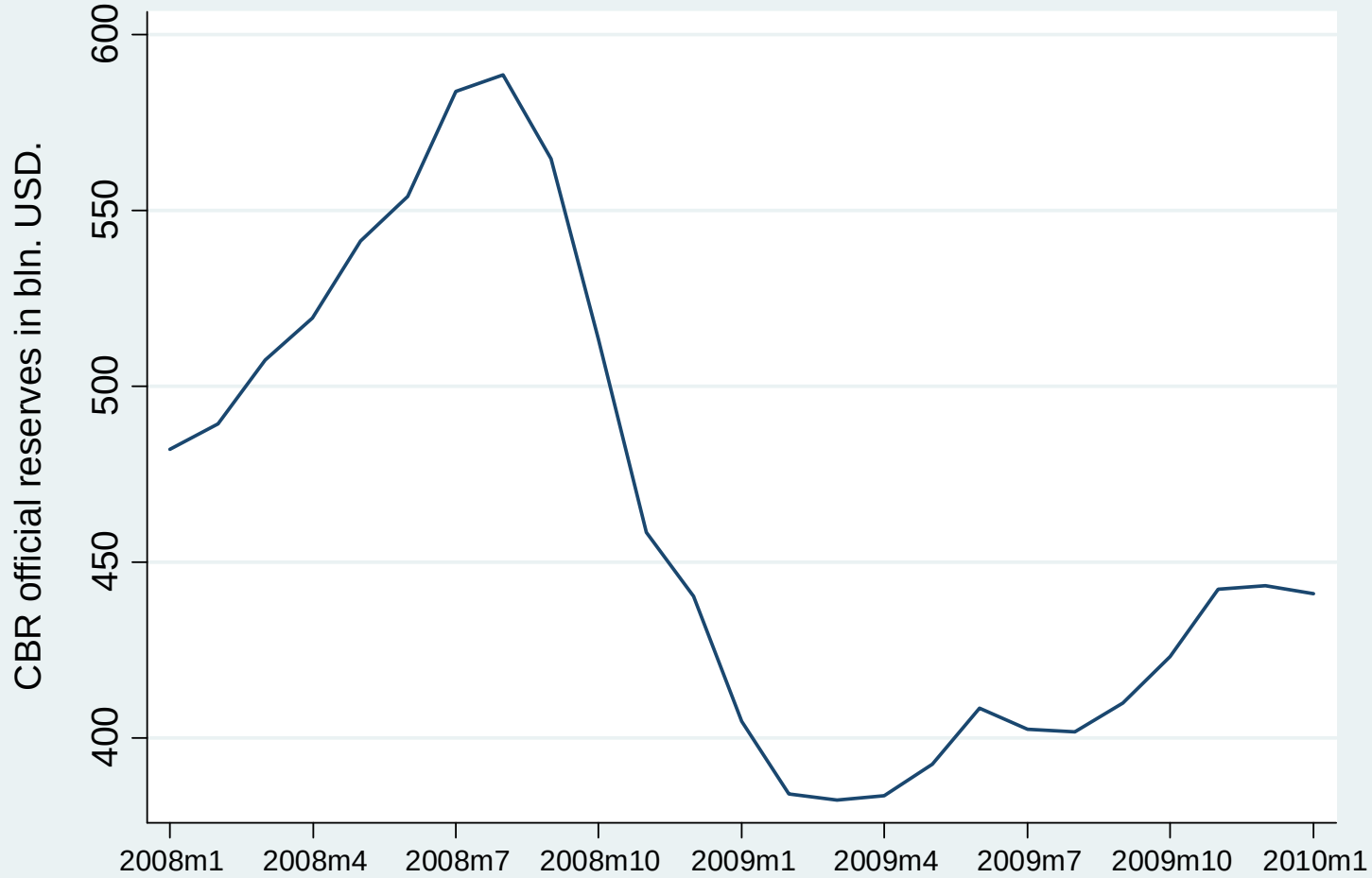
4. In November, 2008 the CB allowed banks that were assigned credit ratings by two domestic Russian agencies to participate in uncollaterized credit auctions with a 5 weeks' term

Refinancing by the Central Bank of Russia, in trillions RUB



Source: Central Bank of Russia

Average monthly level of official foreign exchange reserves of the Central Bank of Russia



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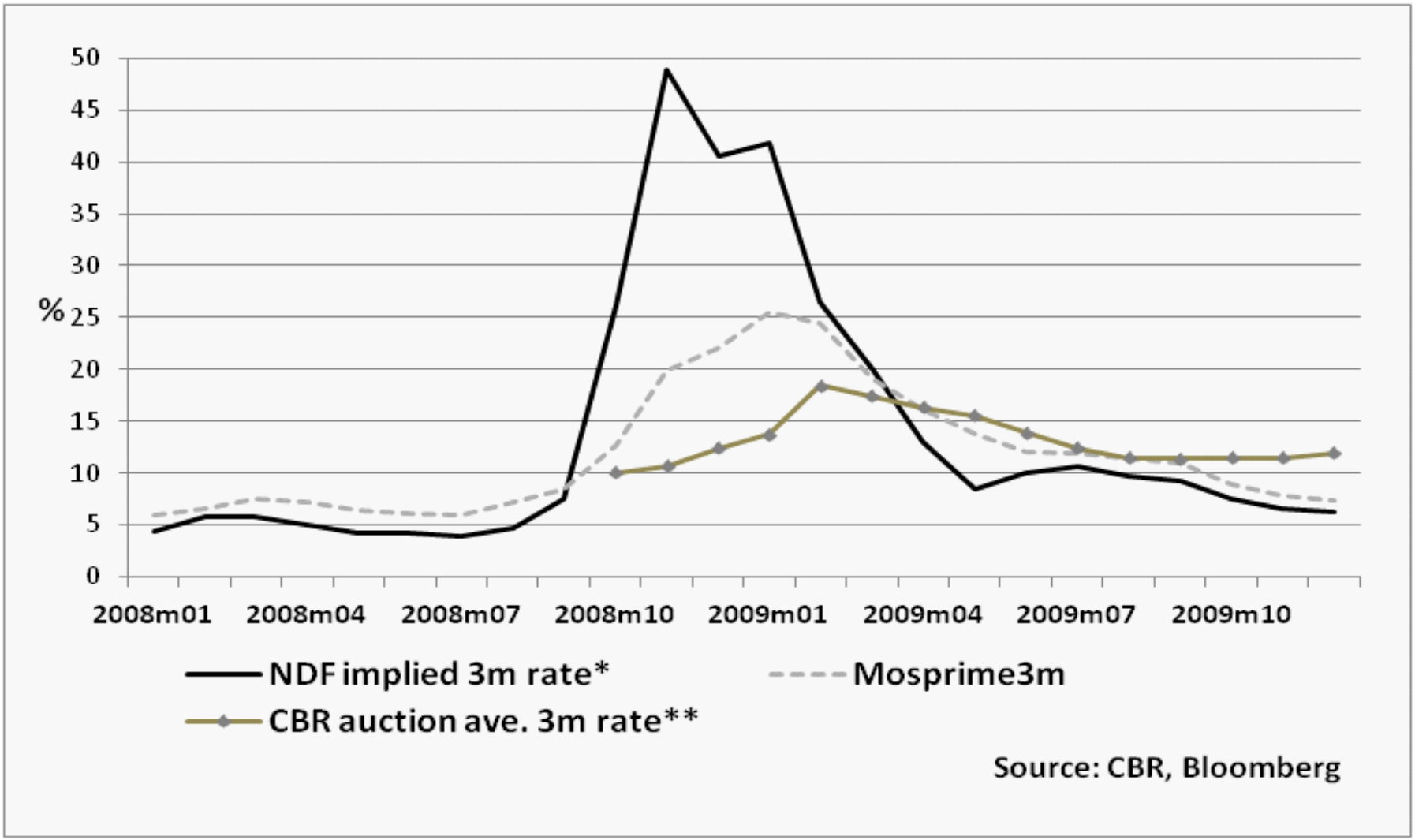
Interest rates dynamics of the domestic interest rates



Natural Experiment

- Almeida *et al.* (2011) suggest using the long-term debt maturity for identification of affected and unaffected firms during the crisis. Decisions about long-term borrowing were made *ex ante* before the crisis. Firms with a large fraction of debt maturing during the crisis were more constrained than otherwise similar firms

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- The sudden stop of external financing to Russian banks in late 2008 can be considered exogenous. Variation among banks with respect to proportion of foreign debt maturing immediately after the sudden stop is a *pre-determined* variable

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- The sudden stop of external financing to Russian banks in late 2008 can be considered exogenous. Variation among banks with respect to proportion of foreign debt maturing immediately after the sudden stop is a *pre-determined* variable
- I divide my data in two sub-samples. First, includes LARGE banks that issued Eurobonds or syndicated loans and had them outstanding in August 2008, the second includes MEDIUM banks that only borrowed from foreign banks through the interbank market

Identification problem for banks that issued Eurobonds or syndicated loans

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- Banks with this ratio above the median are allocated to the **TREATMENT** group (17 banks), while all other banks are allocated to a **CONTROL** group (19 banks)

Cumulative maturity flow of Eurobonds & Syndic. loans over 1 year/Assets$_{t_0}$		
	1 Year Before	1 Year After
Treated banks	-0.034 (0.010)	-0.094 (0.011)
Control banks	-0.033 (0.011)	-0.027 (0.010)
Difference in a given period	-0.001 (0.015)	-0.066*** (0.021)
Difference-in-Difference		**-0.065***** **(0.021)**

Identification problem for banks that only borrowed from foreign banks through the interbank market

- Using a sample of 136 banks that borrowed from foreign banks through the interbank money market I calculate an average ratio of **Net interbank loans from Non-resident banks with more than 3 month maturity to assets** in a year before the crisis

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- I use Duchin et al. (2010) identification strategy for MEDIUM banks. Banks representing top 20% of this ratio are allocated to the **TREATMENT** group (26 banks).

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Net long-term borrowing from Non-resident banks/Assets		
	1 Year Before	1 Year After
Treated banks	-0.074 (0.013)	0.001 (0.014)
Control banks	-0.008 (0.013)	0.000 (0.013)
Difference in a given period	-0.067*** (0.018)	0.001 (0.021)
Difference-in-Difference		**0.068***** **(0.026)**

Pre-crisis summary statistics (Sep. 2007-Aug. 2008)

	Banks that issued Eurobonds & Syndicated loans			Banks that borrowed at international interbank market		
	Treated	Control	t-stat	Treated	Control	t-stat
Log assets	18.761	18.743	0.044	16.391	16.217	-0.766
Liability ratios						
Deposit/Assets	-0.177	-0.232	1.300	-0.239	-0.194	1.004
Eurobonds/Assets	-0.116	-0.116	0.012			
Net domestic interbank /Assets	-0.001	-0.012	1.087	-0.026	-0.024	0.090
Net CB credit/ Assets	-0.002	-0.001	0.889	-0.001	-0.001	0.163
Asset ratios						
Total credit to companies/Assets	0.434	0.404	-0.612	0.427	0.499	1.510
Total overdue credit/ Assets	0.012	0.023	1.003	0.015	0.016	0.232
Total holdings of securities /Assets	0.086	0.082	-0.581	0.096	0.099	0.197

Difference-in-Difference test for Total Non-performing loans Before and After the sudden stop

Δ**Total non-performing loans/Assets**$_{t_0}$		
Panel A. Sample of banks that issued Eurobonds or syndicated loans		
	1 Year Before	1 Year after
Treated banks	-0.002 (0.007)	0.031 (0.010)
Control banks	-0.011 (0.016)	0.029 (0.016)
Difference in a given period	0.009 (0.012)	0.002 (0.012)
Difference-in-Difference		**-0.006** **(0.015)**
Panel B. Sample of banks that borrowed from interbank market		
	1 Year Before	1 Year After
Treated banks	-0.008 (0.007)	0.018 (0.005)
Control banks	-0.003 (0.003)	0.023 (0.007)
Difference in a given period	-0.005 (0.006)	-0.004 (0.007)
Difference-in-Difference		**0.001** **(0.008)**

Empirical specification

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- $X_{i\tau}$ - represents a set of control variables: dummies for state banks, deposits-to-assets ratio and assets-to-Sberbank (largest state bank) ratio. All these variables are motivated by Gan (2007), Ivashina and Scharfstein (2010)

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- $Y_{i\tau}$ - represents outcome variables in the period before and after the sudden stop (Ex. ΔNet Long-term borrowing from the CB/Assets$_{t_0}$)

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3. Is there difference across experimental groups in terms of investment into market securities?
4. Is there difference across experimental groups in terms of net borrowing at the interbank money market?

Difference-in-Difference test for Net Long-term borrowing from the Central Bank Before and After the sudden stop

Δ**Net long-term borrowing from the CB/Assets**$_{t_0}$		
Panel A. Sample of banks that issued Eurobonds or syndicated loans		
	1 Year Before	1 Year After
Treated banks	-0.015 (0.013)	-0.120 (0.019)
Control banks	-0.021 (0.019)	-0.079 (0.022)
Difference in a given period	0.006 (0.019)	-0.039** (0.019)
Difference-in-Difference		**-0.045*** **(0.026)**
Panel B. Sample of banks that borrowed from interbank market		
	1 Year Before	1 Year After
Treated banks	-0.001 (0.008)	-0.036 (0.012)
Control banks	0.001 (0.006)	-0.049 (0.015)
Difference in a given period	-0.002 (0.004)	0.014 (0.016)
Difference-in-Difference		**0.016** **(0.016)**

Difference-in-Difference test for Total bank lending to non-financial corporate borrowers Before and After the sudden stop

Δ**Total lending to companies/Assets**$_{t_0}$		
Panel A. Sample of banks that issued Eurobonds or syndicated loans		
	1 Year Before	1 Year after
Treated banks	0.125 (0.029)	-0.016 (0.052)
Control banks	0.131 (0.029)	-0.026 (0.035)
Difference in a given period	-0.005 (0.042)	0.010 (0.040)
Difference-in-Difference		**0.015** **(0.061)**
Panel B. Sample of banks that borrowed from interbank market		
	1 Year Before	1 Year After
Treated banks	0.198 (0.120)	-0.042 (0.061)
Control banks	0.114 (0.042)	-0.019 (0.044)
Difference at a point of time	0.085 (0.118)	-0.023 (0.058)
Difference-in-Difference		**-0.107** **(0.124)**

Difference-in-Difference test for Total lending to private entrepreneurs Before and After the sudden stop

Δ**Total lending to entrepreneurs/Assets**$_{t_0}$		
Panel A. Sample of banks that issued Eurobonds or syndicated loans		
	1 Year Before	1 Year after
Treated banks	0.013 (0.004)	-0.007 (0.003)
Control banks	0.005 (0.005)	0.001 (0.004)
Difference in a given period	0.008 (0.005)	-0.008** (0.004)
Difference-in-Difference		**-0.015***** **(0.005)**
Panel B. Sample of banks that borrowed from interbank market		
	1 Year Before	1 Year after
Treated banks	0.014 (0.005)	-0.009 (0.004)
Control banks	0.005 (0.004)	-0.004 (0.003)
Difference at a point of time	0.009 (0.006)	-0.006 (0.004)
Difference-in-Difference		**-0.015***** **(0.007)**

Difference-in-Difference test for Total lending to individuals Before and After the sudden stop

Δ**Total medium term lending to individuals/Assets**$_{t_0}$		
Panel A. Sample of banks that issued Eurobonds or syndicated loans		
	1 Year Before	1 Year After
Treated banks	0.031 (0.019)	-0.035 (0.021)
Control banks	0.071 (0.033)	-0.045 (0.030)
Difference in a given period	-0.040 (0.030)	0.009 (0.019)
Difference-in-Difference		**0.050** **(0.035)**
Panel B. Sample of banks that borrowed from interbank market		
	1 Year Before	1 Year After
Treated banks	0.057 (0.027)	-0.015 (0.021)
Control banks	0.012 (0.016)	-0.013 (0.017)
Difference in a given period	0.045* (0.024)	-0.002 (0.012)
Difference-in-Difference		**-0.046*** **(0.025)**

Difference-in-Difference test for Total investment into government securities Before and After the sudden stop

Δ**Total investment into govt. securities/Assets**$_{t_0}$		
Panel A. Sample of banks that issued Eurobonds or syndicated loans		
	1 Year Before	1 Year after
Treated banks	-0.011 (0.008)	0.015 (0.007)
Control banks	0.002 (0.006)	0.008 (0.005)
Difference in a given period	-0.013 (0.011)	0.007 (0.007)
Difference-in-Difference		**0.021*** **(0.012)**
Panel B. Sample of banks that borrowed from interbank market		
	1 Year Before	1 Year After
Treated banks	-0.007 (0.005)	0.006 (0.009)
Control banks	0.006 (0.011)	-0.008 (0.006)
Difference at a point of time	-0.013 (0.012)	0.015 (0.010)
Difference-in-Difference		**0.027**** **(0.032)**

Difference-in-Difference test for Total investment into non-governmnet securities

Before and After the sudden stop

Δ**Total investment into non-govt. securities/Assets**$_{t_0}$		
Panel A. Sample of banks that issued Eurobonds or syndicated loans		
	1 Year Before	1 Year after
Treated banks	0.009 (0.017)	0.057 (0.019)
Control banks	0.031 (0.015)	0.029 (0.014)
Difference in a given period	-0.023 (0.019)	0.028 (0.020)
Difference-in-Difference		**0.050**** **(0.025)**
Panel B. Sample of banks that borrowed from interbank market		
	1 Year Before	1 Year After
Treated banks	0.010 (0.020)	-0.006 (0.018)
Control banks	0.014 (0.022)	0.027 (0.021)
Difference at a point of time	-0.004 (0.021)	-0.033 (0.022)
Difference-in-Difference		**-0.029** **(0.029)**

Difference-in-Difference test for Net lending(+)/borrowing (-) at interbank market with Non-resident banks Before and After the sudden stop

ΔNet total non-resid. interbank money market position/Assets$_{t_0}$		
Panel A. Sample of banks that issued Eurobonds or syndicated loans		
	1 Year Before	1 Year After
Treated banks	-0.044 (0.030)	0.080 (0.034)
Control banks	-0.037 (0.028)	0.040 (0.025)
Difference in a given period	-0.007 (0.033)	0.040* (0.024)
Difference-in-Difference		**0.047** **(0.041)**
Panel B. Sample of banks that borrowed from interbank market		
Average Cumulative Lending during Six months		
	1 Year Before	1 Year After
Treated banks	-0.088 (0.033)	0.007 (0.019)
Control banks	-0.014 (0.015)	-0.005 (0.013)
Difference in a given period	-0.074** (0.029)	0.013 (0.015)
Difference-in-Difference		**0.087***** **(0.033)**

Conclusions

- Using difference-in-difference framework I find that the value of Eurobonds & Syndicated loans that LARGE financially constrained banks were scheduled to repay over 1 year after a sudden stop was 9.4 % of their assets and it was 6.5% higher relative to the unconstrained banks

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- The value of long-term credit that financially constrained LARGE banks received from the CB during 1 year period after a sudden stop was 12% of their assets, which was 4.5% higher relative to unconstrained banks

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- The value of long-term credit that financially constrained LARGE banks received from the CB during 1 year period after a sudden stop was 12% of their assets, which was 4.5% higher relative to unconstrained banks
- The treatment group of MEDIUM banks that borrowed through the interbank money market didn't bid significantly more for the CB funding relative to the control group

Conclusions (cont.)

- Total lending to corporate borrowers is not significantly different across treatment and control group of banks for both sub-samples

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- Both types of financially constrained banks cut their lending to private entrepreneurs significantly more relative to unconstrained banks. The value of relative decline is 1.5% of banks' assets

Conclusions (cont.)

- Total lending to corporate borrowers is not significantly different across treatment and control group of banks for both sub-samples
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- Total lending to individuals didn't change across groups for LARGE banks. It fell significantly more for treated MEDIUM banks in the short-term and medium-term maturity sectors

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- The results for the sub-sample of MEDIUM banks indicate that they repaid their initial foreign debt