

# **How Do Global Banks Scramble For Liquidity? Evidence from the Asset-Backed Commercial Paper Freeze of 2007**

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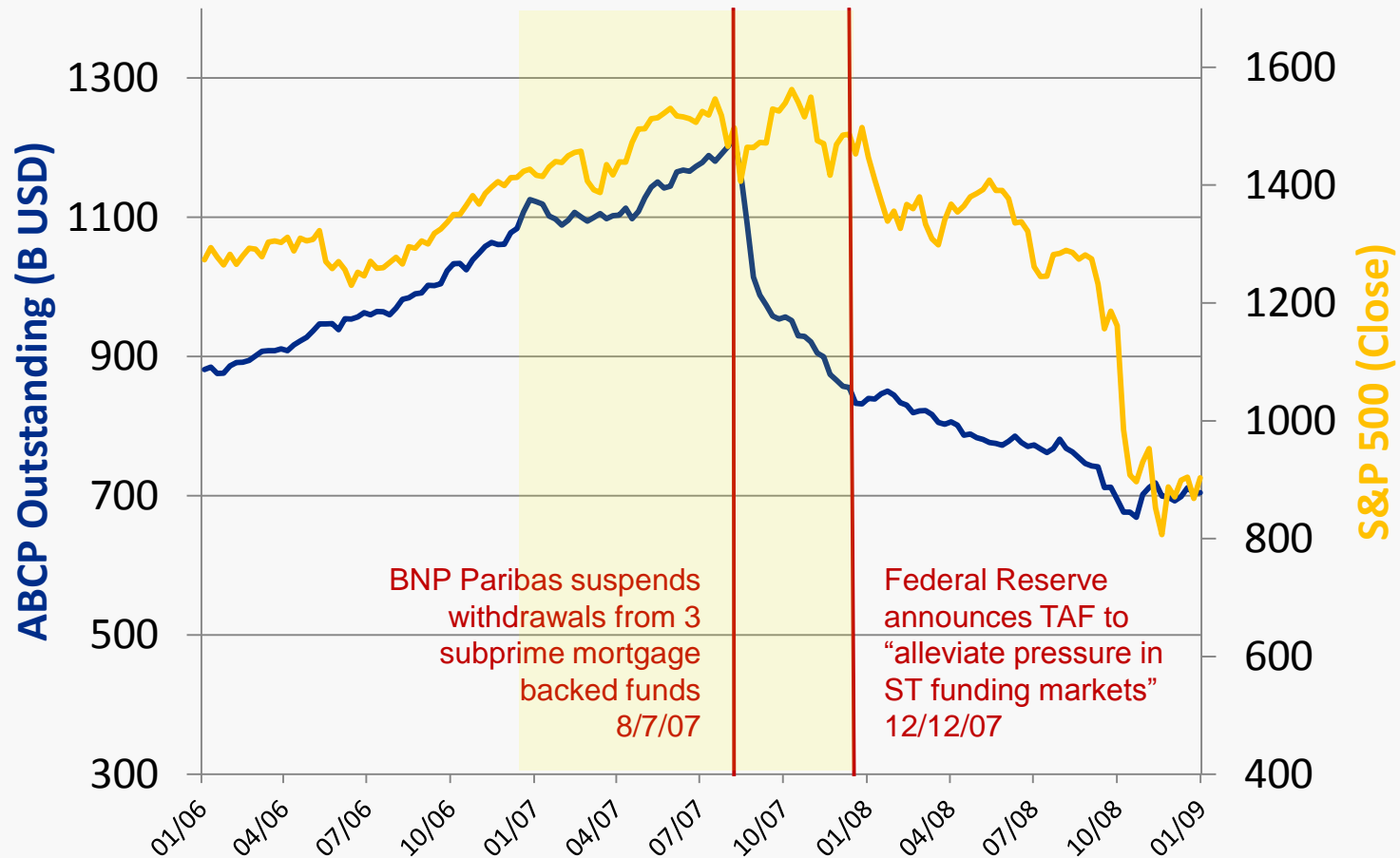
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# ABCP Falls in mid-2007



Source: Acharya, Schnabl and Suarez (2009)

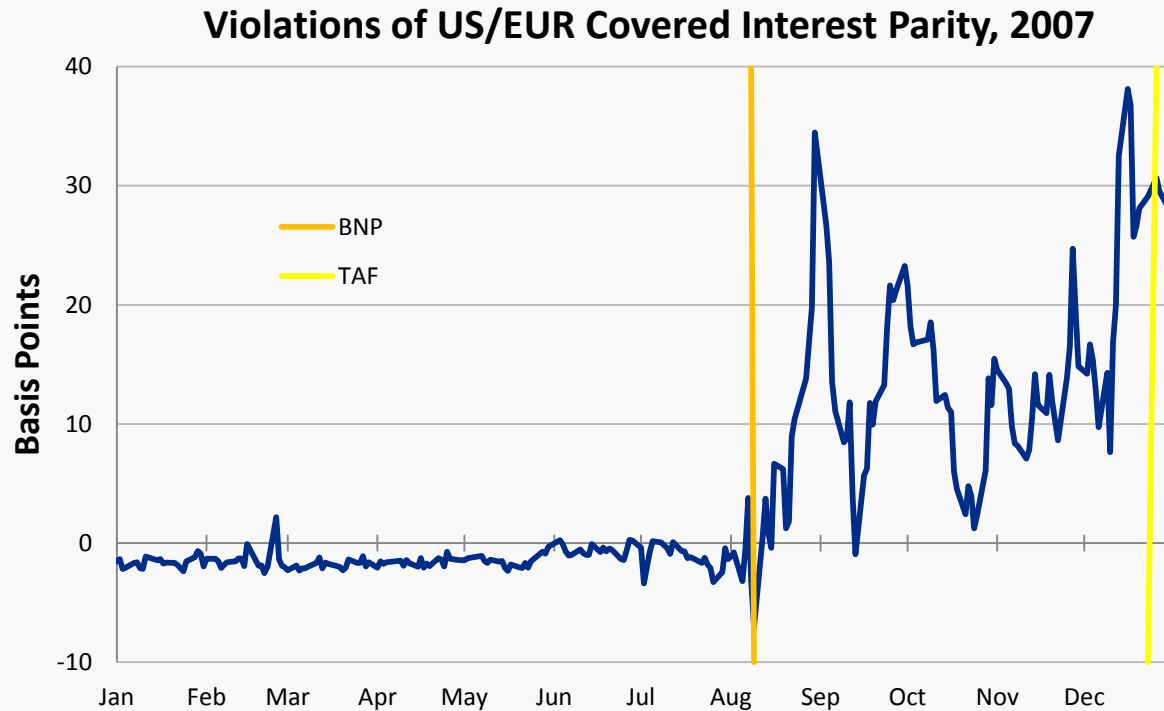
# Significant exposure of non-US banks to funding squeeze

Sponsor	ABCP (US \$ bn)	ABCP/Tier1 (%)
Citigroup (US)	92.7	102.0%
ABN Amro (NL)	68.6	219.5%
Bank of America (US)	45.7	50.2%
HBOS Plc (UK)	43.9	99.7%
JP Morgan (US)	42.7	52.7%
HSBC (UK)	39.4	44.9%
Deutsche Bank (GE)	38.7	125.0%
Société Générale (FR)	38.6	87.1%
Barclays Plc (UK)	33.1	73.2%
Rabobank (NL)	30.7	88.3%

◇ Foreign exposure almost 3 times as large as US exposure in aggregate (Acharya and Schnabl, 2010)

Source: Moody's rating reports, Acharya and Schnabl (2010)

# Demand for USD evident in CIP violations



Source: Hrungr and Sarkar (2012)

# Underwriters of USD synd. loans in 2007

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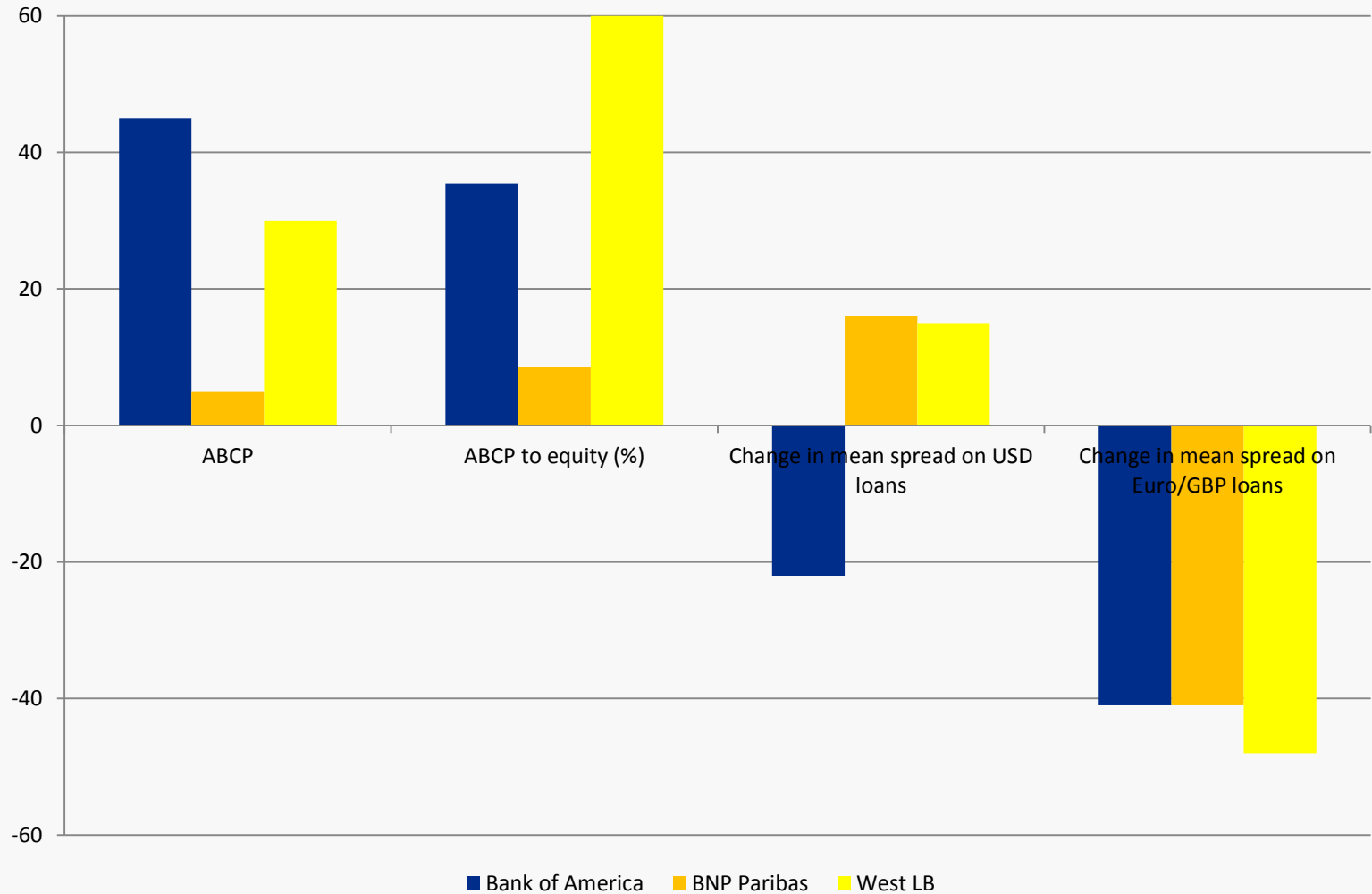
name	Total \$		
	Facilities	Foreign	Exposed
JPMORGAN CHASE & CO	824.6	0	1
CITIGROUP	784.6	0	1
BANK OF AMER CORP	680.3	0	1
WACHOVIA CORP	459.4	0	1
<b>DEUTSCHE BK AG</b>	<b>417.1</b>	<b>1</b>	<b>1</b>
<b>BNP PARIBAS</b>	<b>360.2</b>	<b>1</b>	<b>1</b>
<b>ROYAL BK OF SCOTLAND</b>	<b>353.3</b>	<b>1</b>	<b>1</b>
<b>BARCLAYS BK</b>	<b>320.6</b>	<b>1</b>	<b>1</b>
<b>CREDIT SUISSE</b>	<b>316.6</b>	<b>1</b>	<b>1</b>
Lehman Brothers Holdings Inc.	307.5	0	1
WELLS FARGO BK	302.9	0	0
<b>MIZUHO CORP BK</b>	<b>287.7</b>	<b>1</b>	<b>1</b>
<b>BANK TOK-MIT UFJ</b>	<b>287.1</b>	<b>1</b>	<b>1</b>
<b>BANK NOVA SCOTIA</b>	<b>235.3</b>	<b>1</b>	<b>1</b>
SUNTRUST BK	225.6	0	1
MORGAN STANLEY BK	225.2	0	0
<b>HSBC</b>	<b>224.6</b>	<b>1</b>	<b>1</b>
Bank of New York Mellon	211.4	0	1
U S BC	204.9	0	0
<b>ABN-AMRO BK NV</b>	<b>186.4</b>	<b>1</b>	<b>1</b>

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# Main Findings

- ◇ Funding risk in global banking – Currency shortages for foreign banks active in US
  - ◇ Segmentation of funding arising from differential access to government liquidity
- ◇ Bank's funding risk is transmitted to large US corporate borrowers
  - ◇ Overall effect small, strongest for borrowers that do not have public equity
- ◇ ABCP-exposed foreign banks charged higher interest rates on syndicated loans in USD
  - ◇ No strong within bank effect on amounts
  - ◇ Clean identification strategy

# Example



# Literature

- ◇ Empirical work on crisis of 2007-2008
  - ◇ ABCP freeze: Acharya, Schnabl and Suarez (2009), Acharya and Schnabl (2010), Krishnamurthy, Nagel and Orlov (2012)
  - ◇ Real effects of ABCP liquidity shock: Bord and Santos (2011), Irani (2011)
  - ◇ Real effects of bank solvency shocks on clients: Ivashina and Scharfstein (2010), Cornett, McNutt, Strahan and Tehranian (2010), Gozzi and Goetz (2010), Carvalho et al (2011)
- ◇ Transmission of shocks by global banks
  - ◇ Cross-country: Cetorelli and Goldberg (2012), Liu (2011), Giannetti and Laeven (2012)
  - ◇ Cross-sectional: Schnabl (2011), Aiyar (2012)
  - ◇ Examination of global banks in European crisis (Ivashina, Scharfstein and Stein (2012))
  - ◇ Dollar Funding: Bottazi, Luque, Pascoa and Sundaresan (2012), Hrung and Sarkar (2012)
- ◇ Transmission of shocks from banks to the real economy
  - ◇ Small firms, constrained firms most affected: Rajan, Detragiache, Dell’Aricca (2005), Kroszner, Laeven, Klingbiel (2006)



# Sample

- ◇ 59 banks with ABCP exposure from conduits
- ◇ Comparable non-ABCP exposed banks
  - ◇ 427 BHCs with more than \$500M in assets
  - ◇ 82 foreign banks with US regulatory filings

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		Full Sample		ABCP Exposed	
	units	n	Mean	n	Mean
Foreign Lender dummy	--	567	0.2	53	0.8
US ABCP Outstanding	\$million	567	1237.3	53	13,236.7
US ABCP / Tier 1 Capital	%	567	4.9	53	52.6
Total Assets, 2006q4	\$billion	567	103.9	53	739.2
Total US Assets, 2006q4	\$billion	567	22.9	53	166.8
Tier 1 Capital/Assets (2006q4)	%	534	9.4	47	7.6

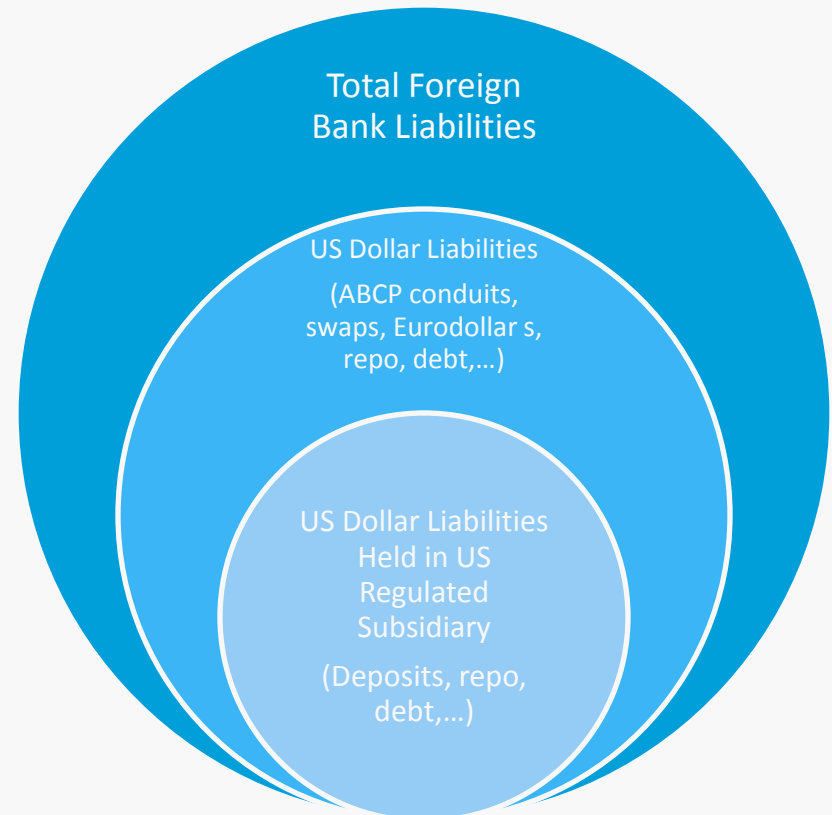
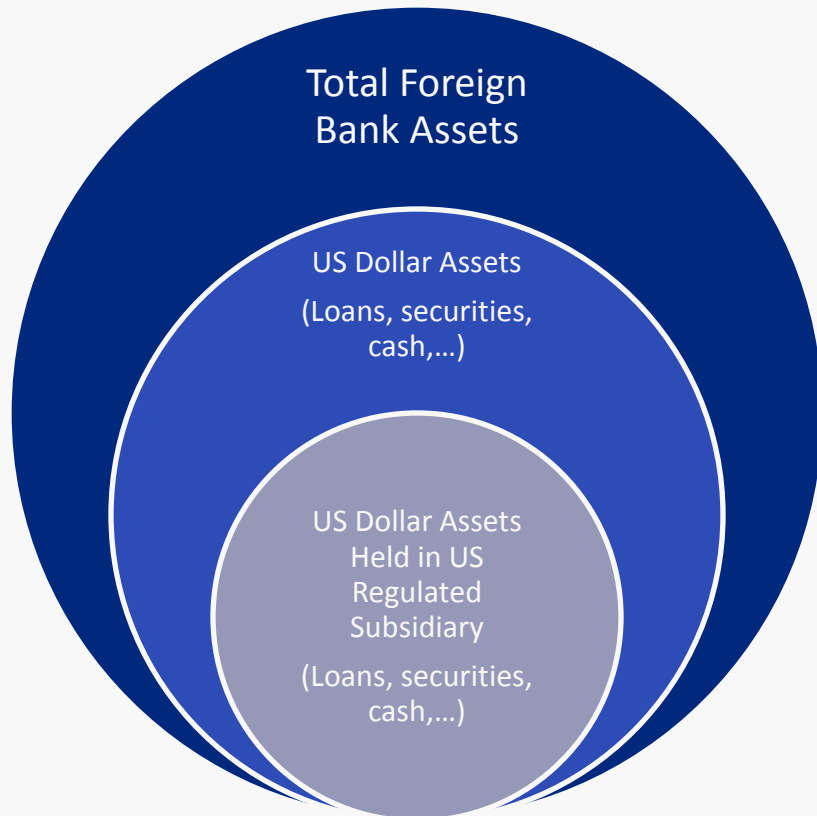
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# Data on foreign banks' US operations

- ◇ Comprehensiveness of data varies with category and by the nature of bank's US activities
- ◇ Foreign banks may operate in US as:
  - ◇ Representative offices, branches, agencies, subsidiary banks, Edge Act and Agreement international banking corporations, and international banking facilities (IBFs)
  - ◇ Each type has different regulatory data
- ◇ Of foreign banks with ABCP exposure, 63% file a US regulatory report

# US dollar assets and liabilities not restricted to US regulated entities

- ◇ Ratio of total US regulated assets to underwritten revolvers in LPC was 256x for US banks compared to only 7x for foreign banks



# US banks increase short-term funding

- ◇ Banks with US regulated assets grow funding from 2Q2007 to 3Q2007, but exposed foreign banks do not increase funding

Change in:	Total US Deposits	Total Private Funding
US Exposure	4,920.9 (3,729.4)	9,209.4 (6,175.7)
Foreign dummy	754.2 (525.3)	1,282.5 (834.9)
US Exposure*Foreign	-4,245.7 (3,710.1)	-8,425.3 (6,103.7)
US Assets (2006q4)	337.3** (138.8)	480.7** (242.2)
Total Assets (2006q4)	42.7 (116.9)	-94.6 (191.1)
Constant	-2,741.5*** (753.6)	-2,773.3*** (1,022.4)
Observations	567	567
Adjusted R-squared	0.12	0.11

No statistically significant difference in funding, but there should be

# US banks increase funding from FHLBs

- ◇ Fewer foreign banks have US commercial bank subsidiaries with FHLB access

Dependent Variable	(1) FHLB Advances	(2) Discount Window
Foreign Lender dummy	-89.2 (228.2)	-1.8 (59.2)
US ABCP Exposure	2,665.9* (1,449.3)	304.5 (205.7)
Foreign Lender* US ABCP Exposure	-2,781.9** (1,385.3)	-279.6 (191.9)
US Total Assets, 2006q4	105.6** (50.7)	20.7** (8.5)
Total Assets, 2006q4	32.8 (58.7)	4.1 (14.6)
Observations	567	567
Adjusted R <sup>2</sup>	0.24	0.08

Exposed  
US banks  
access  
FHLB

# Latent demand for USD liquidity

- Foreign banks (even non-exposed ones) borrow a lot at TAF, but still less than US banks are getting from FHLBs

	(3)	(4)
Dependent Variable	TAF	TAF+FHLB Advances
Foreign Lender dummy	115.1*** (36.5)	25.9 (225.9)
US ABCP Exposure	-49.3 (52.0)	2,616.6* (1,437.1)
Foreign Lender* US ABCP Exposure	135.9 (84.5)	-2,646.0* (1,372.5)
US Total Assets, 2006q4	19.4*** (6.7)	125.0** (49.9)
Total Assets, 2006q4	7.2 (7.9)	40.1 (58.0)
Observations	567	567
Adjusted R <sup>2</sup>	0.14	0.26

# Real effects of funding shortage

- ◇ Does it matter that foreign ABCP-exposed banks have a shortage of USD liquidity or that the liquidity is more expensive?
- ◇ Daily data on new syndicated loans from LPC Dealscan with information on underwriting syndicate
- ◇ Difference-in-difference in 2007 before TAF, before decline in macro-environment:
  - ◇ Before and after ABCP shock
  - ◇ USD vs. GBP and Euro
  - ◇ Relative to US banks exposed to ABCP shock
  - ◇ Relative to other foreign banks

# US dollar syndicated loans

$$\begin{aligned} \text{LPC Term}_{b,l,f} = & \alpha + \beta_1(\text{Post}) + \beta_2(\text{Post})(\text{USD}) \\ & + \gamma_1(\text{Foreign})(\text{Post}) + \gamma_2(\text{Foreign})(\text{Post})(\text{USD}) \\ & + \delta_1(\text{ABCP Exp})(\text{Post}) + \delta_2(\text{ABCP Exp})(\text{Post})(\text{USD}) \\ & + \varepsilon_1(\text{Foreign})(\text{ABCP Exp})(\text{Post}) + \varepsilon_2(\text{Foreign})(\text{ABCP Exp})(\text{Post})(\text{USD}) \\ & + \eta(X_b) + \theta(Y_l) + \lambda(Z_f) \end{aligned}$$

where:

$\text{LPC Term}_{b,l,f} \equiv$  Maturity, All-in drawn spread or Log Amount

$\text{Foreign} \equiv$  Dummy variable for foreign banks

$\text{USD} \equiv$  Dummy variable for US dollar loan

$\text{ABCP Exp} \equiv$  Dummy variable for USD ABCP exposure

$\text{Post} \equiv$  date is after August 9, 2007 (and before TAF December 11, 2007)

*We include fixed effects for banks, and controls for loan and borrower characteristics including rating and sales/amount*



# Pricing of USD loans increases

- Large statistically significant coefficient on USD x Exposure x Foreign x Post (80 bps) controlling for bank fixed effects and loan and borrower characteristics

	(1)	(2)	(3)	(4)
	No Fixed Effects		Fixed Effects	
Post	-22.50 (30.24)	-40.43 (32.14)	-18.04 (19.91)	-38.48 (27.39)
Post * USD	25.31 (30.43)	46.44 (32.04)	26.41 (20.25)	47.80* (27.70)
Post * Exposed	15.34 (10.70)	91.54** (43.54)	14.29 (13.26)	82.47** (33.47)
Post * Exposed * USD	-10.37 (11.34)	-85.74** (43.63)	-13.65 (13.26)	-79.08** (33.77)
Post * Foreign		18.13 (31.82)		23.69 (33.87)
Post * Foreign * Exposed		-84.10* (49.67)		-79.05** (36.99)
Post * Foreign * USD		-27.76 (33.85)		-26.67 (35.13)
Post * Foreign * Exposed * USD		85.03* (50.47)		74.09** (37.32)
Observations	15,654	15,654	15,654	15,654
Adjusted R <sup>2</sup>	0.529	0.530	0.547	0.547

Table 7: Loan and bank controls not shown.

# Strongest for private firms

- ◇ Estimated coefficient largest for firms without publicly traded equity
- ◇ Consistent with research on borrowers who may be more bank-dependent
- ◇ Limited results from borrower financial characteristics, but those only available for public firms

	(7)	(8)
	Public	Private
Post	-43.48 (39.77)	-45.10 (49.11)
Post * USD	48.21 (39.58)	71.24 (50.20)
Post * Exposed	65.53*** (24.59)	100.3* (57.82)
Post * Exposed * USD	-56.06** (24.94)	-111.8* (58.98)
Post * Foreign	80.60** (34.76)	33.65 (53.30)
Post * Foreign * Exposed	-29.42 (32.92)	-129.8** (61.22)
Post * Foreign * USD	-76.09** (35.55)	-30.15 (56.48)
Post * Foreign * Exposed * USD	20.79 (33.67)	122.3** (62.17)
Observations	15,654	15,654
Adjusted R <sup>2</sup>	0.529	0.529

Table 7: Loan and bank controls not shown.

# Effects are not strong on other loan dimensions

- ◇ Lack of effect on amounts consistent with Kahle and Stulz (2011)

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)
	Amount		Maturity		Rating	
Post	0.248 (0.27)	0.745* (0.39)	1.308 (8.95)	-13.84* (7.26)	-1.726 (2.49)	-5.441 (3.63)
USD Dummy * Post	-0.134 (0.27)	-0.591 (0.39)	-3.647 (9.00)	11.1 (7.27)	1.197 (2.53)	4.823 (3.65)
US ABCP Exposure * Post	-0.117 (0.18)	-0.36 (0.28)	1.832 (4.35)	16.57* (8.62)	1.368 (1.68)	1.177 (2.80)
USD Dummy * US ABCP Exposure * Post	0.144 (0.18)	0.412 (0.28)	-1.108 (4.36)	-16.08* (8.65)	-0.987 (1.69)	-0.701 (2.82)
Foreign * Post		-0.606 (0.40)		15.83 (10.43)		5.261* (3.01)
Foreign * US ABCP Exposure * Post		0.287 (0.28)		-14.61* (8.28)		-1.275 (2.87)
USD Dummy * Foreign * Post		0.468 (0.41)		-14.03 (10.35)		-5.111 (3.14)
USD Dummy * US ABCP Exposure * Foreign * Post		-0.285 (0.30)		14.04* (8.32)		1.164 (2.94)
USD Dummy * Foreign		-0.551** (0.28)		-0.754 (7.54)		-2.843* (1.73)
USD Dummy * US ABCP Exposure		-0.341 (0.21)		6.7 (6.08)		-1.193 (1.71)
USD Dummy * Foreign * US ABCP Exposure		0.434* (0.24)		-3.2 (5.82)		-0.178 (1.77)
Observations	15,654	15,654	15,654	15,654	15,654	15,654
Adjusted R <sup>2</sup>	0.474	0.474	0.339	0.34	0.248	0.253

Table 8: Loan and bank controls not shown

# Extensive Margin

- ◇ Are USD borrowers with loans outstanding as of August 9, 2007 with foreign ABCP-exposed banks in their loan syndicate less likely to refinance?

$$\begin{aligned} \text{Refinance}_{b,l,f} = & \alpha + \beta_1(\text{Foreign}) + \beta_2(\text{Foreign})(\text{USD}) \\ & + \delta_1(\text{ABCP Exp}) + \delta_2(\text{ABCP Exp})(\text{USD}) \\ & + \varepsilon_1(\text{Foreign})(\text{ABCP Exp}) + \varepsilon_2(\text{Foreign})(\text{ABCP Exp})(\text{USD}) \\ & + \eta(X_b) + \theta(Y_l) + \lambda(Z_f) \end{aligned}$$

where we estimate a Cox hazard model of:

*Refinance*<sub>b,l,f</sub> ≡ Dummy =1 if loan is refinanced 8/9/07 to 12/11/07

*Foreign* ≡ Dummy variable for foreign banks

*USD* ≡ Dummy variable for USD loan

*ABCP Exp* ≡ Dummy variable for USD exposure

*We include controls for characteristics of the initial loan (spread, duration, time to maturity, price of risk at issuance)*

# Refinancing may be reduced

- ◇ No statistically significant difference in probability of refinancing for most loans by bank characteristics
- ◇ Negative coefficient for foreign exposed banks in USD when initial loan was riskier (higher spread)

Obs. Level	(1)	(2)	(3)	(4)
	Package - Lender		Facility - Lender	
<b>Sample</b>	All	Risky	All	Risky
<b>USD * Exposed</b>	0.106 (0.938)	2.711** (1.339)	0.199 (0.545)	1.070*** (0.408)
<b>USD * Foreign</b>	1.073 (1.000)	5.419** (2.245)	1.200 (0.819)	3.091*** (1.150)
<b>USD * Exposed * Foreign</b>	0.252 (0.947)	-3.352** (1.559)	-0.182 (0.658)	-1.742** (0.727)
<b>Exposed</b>	-0.071 (0.934)	-2.637** (1.331)	-0.168 (0.544)	-0.953** (0.404)
<b>Foreign</b>	-0.992 (0.999)	-5.341** (2.243)	-1.081 (0.822)	-2.982** (1.159)
<b>Exposed * Foreign</b>	-0.269 (0.946)	3.352** (1.545)	0.109 (0.659)	1.647** (0.720)
<b>Maturity</b>	-0.004 (0.003)	-0.006 (0.005)	-0.003 (0.003)	-0.004 (0.005)
<b>BAA-AAA Spread</b>	-0.116 (0.262)	-0.370 (0.428)	0.180 (0.283)	-0.191 (0.519)
<b>USD Dummy</b>	0.132 (1.028)	-1.250 (1.076)	0.123 (0.574)	-0.463 (0.629)
<b>Loan Level Controls</b>	Yes	Yes	Yes	Yes
<b>Loan Ratings Controls</b>	Yes	Yes	Yes	Yes
<b>Sales/Amount Control</b>	Yes	Yes	Yes	Yes
<b>Lender Fixed Effects</b>	No	No	No	No
<b>Observations</b>	59,512	22,611	90,888	40,373

# Conclusions

- ◇ After ABCP funding shock in fall of 2007, foreign banks in particular lack access to funding that requires US regulated assets (deposits and FHLB)
- ◇ Costs of financial fragility spill over to real economy through higher prices for large US dollar borrowers
- ◇ Clean identification but a time period and borrowers that may be least likely to be affected (largest borrowers, no housing, US is a key market for banks)