USD Funding Premium of Global Banks

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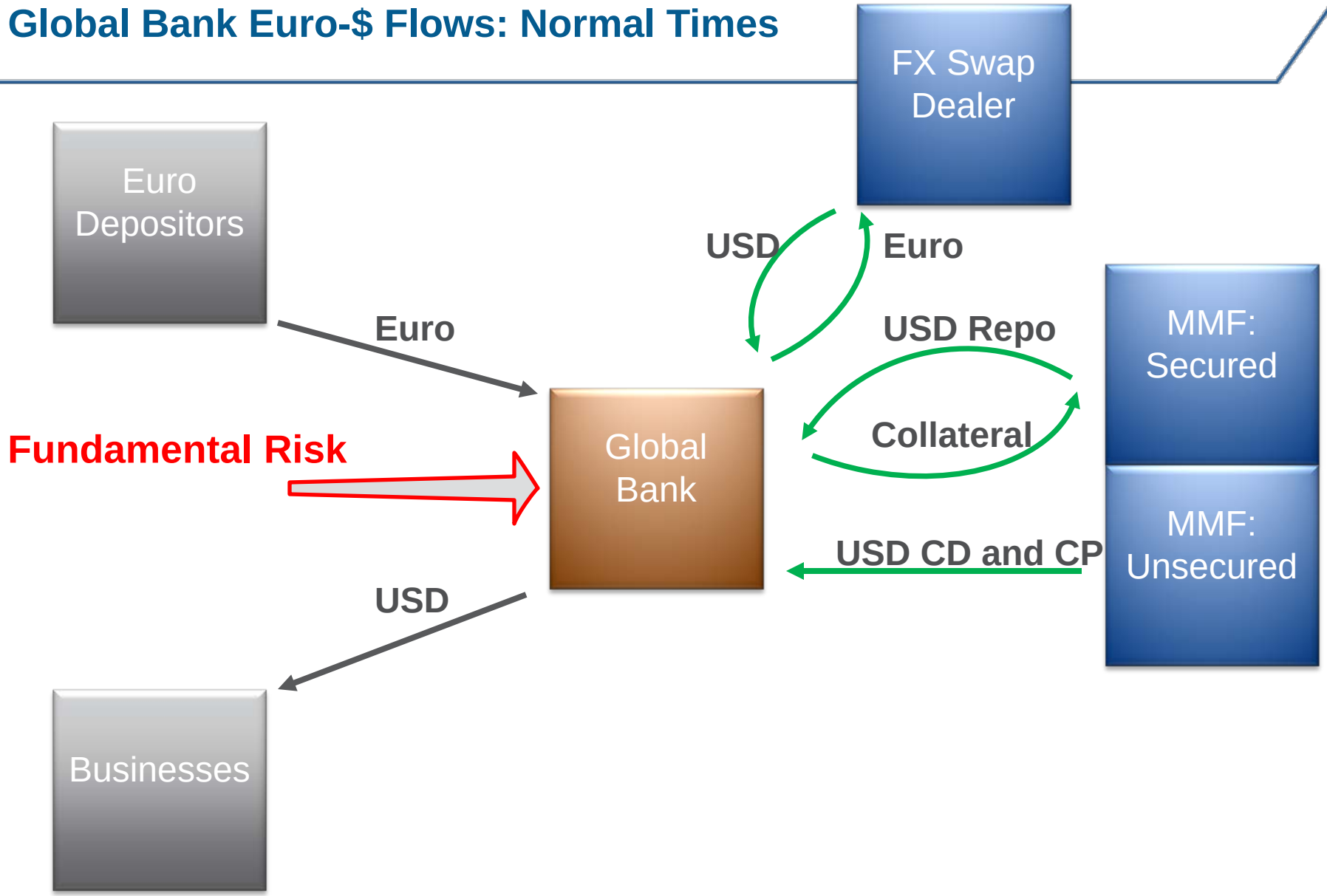
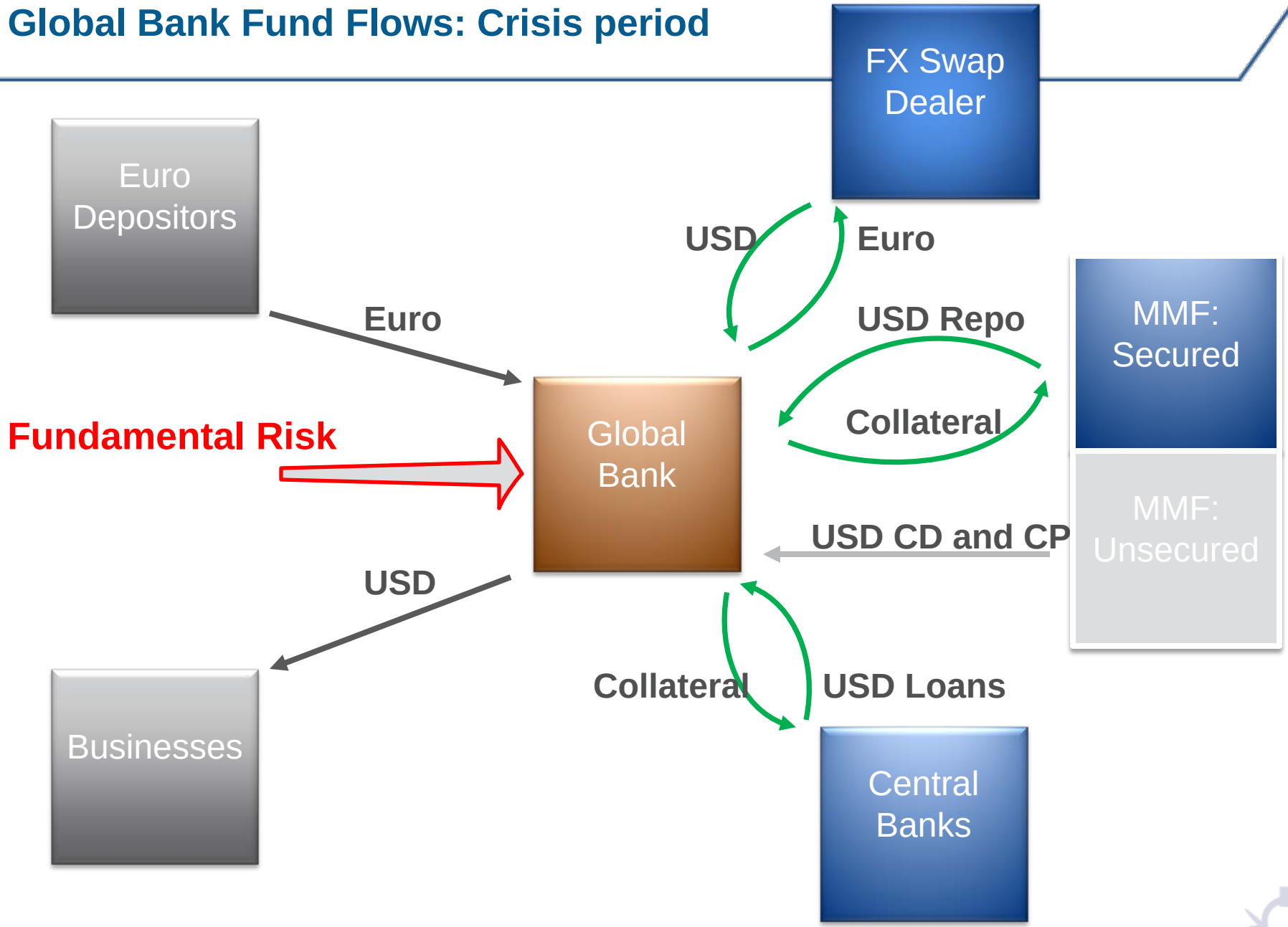
USD Funding Premium During Crisis

- Global banks need USD to fund USD assets and business
  - Typical source: USD wholesale debt issued to US MMFs
- Difficulties in obtaining USD during crisis
  - Unsecured wholesale investors “ran”
- Responses:
  - Borrow USD from central banks (e.g. via Currency Swap Lines)
  - Swap local currency into USD in FX swaps markets
- *Aggregate* cost of swapping foreign currency into USD increased (Coffey et al 2009; Griffoli and Ranaldo 2011)
- This paper: Cross-sectional dispersion of *bank-level* costs
  - Link to bank level fund flows
  - Endogeneity

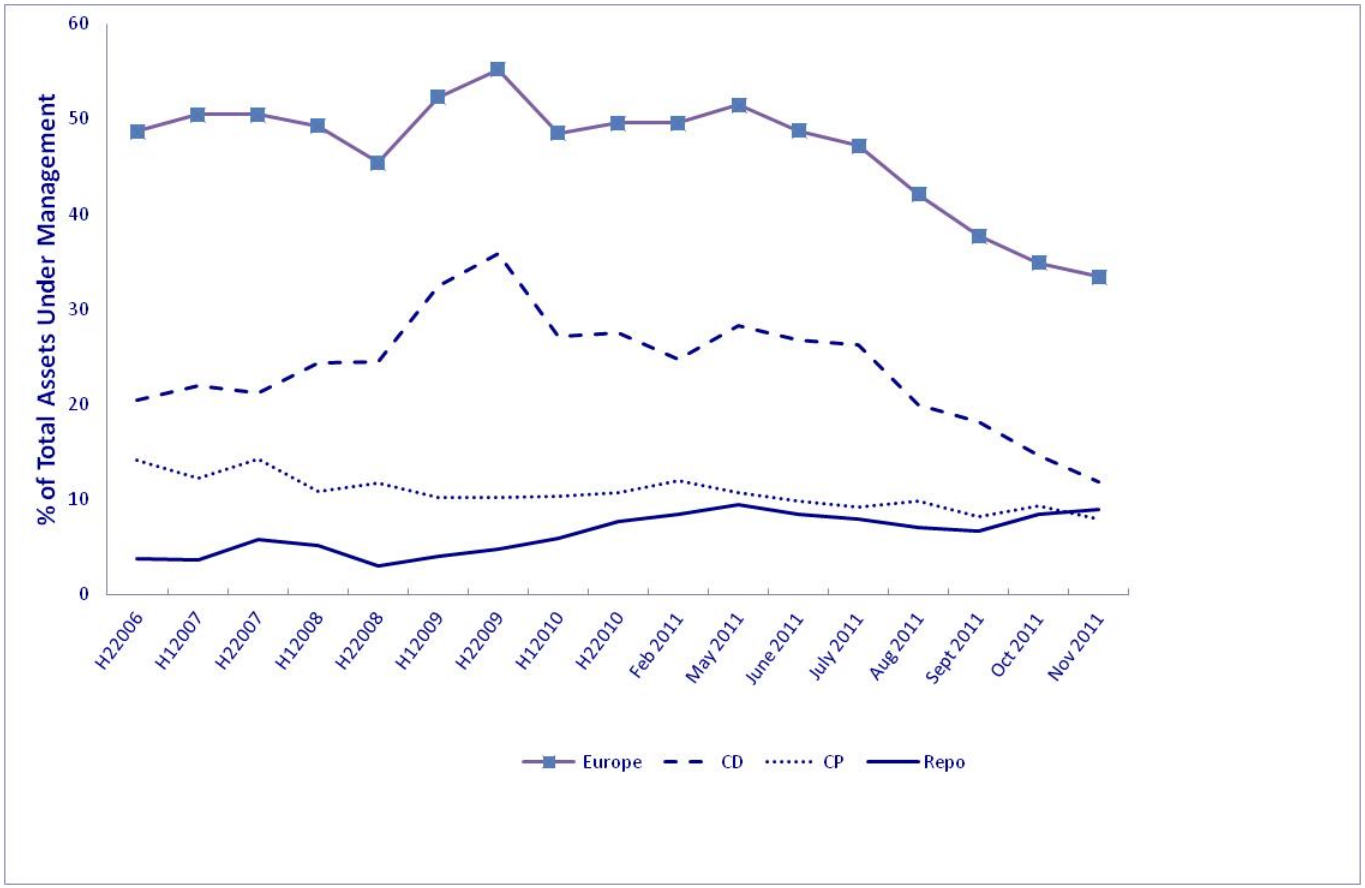
Global Bank Euro-$ Flows: Normal Times



Global Bank Fund Flows: Crisis period



US MMF Exposure to European Banks: 2006-2011



The figure shows the share of CD, CP and repo issued by European banks, as a percent of total assets under management, of the 10 largest US money market mutual funds. Source: "U.S. Money Funds and European Banks: Risk Aversion Persists," by Fitch Ratings, December 21 2011.

Outline

- Estimate of bank level USD funding premium (“basis”)
- Fundamental risk and USD basis in cross-section
- Funding shocks and USD basis, controlling for fundamental risk, in cross-section
- Common (time-series) component of panel of bank basis
  - Relation to crisis events and government/CB actions
- Robustness

Estimating USD Basis for Banks

- Covered Interest Parity relation for bank i
  - Borrow dollars D vs. borrow foreign currency F and swap into dollars, hedging FX risk:

$$1+r_{it}^{D}=\frac{f_t}{s_t}\left(1+r_{it}^{F}\right)$$

- If D=US, USD basis is:

$$Basis_{it}^{D}=\frac{f_t}{s_t}\left(1+r_{it}^{F}\right)-\left(1+r_{it}^{D}\right)$$

$$LBAS_{it}^{D}=\frac{euro\$\ forward\ \text{rate}_t}{euro\$\ spot\ \text{rate}_t}\left(1+euroLIBOR_{it}\right)-\left(1+\$LIBOR_{it}\right)$$

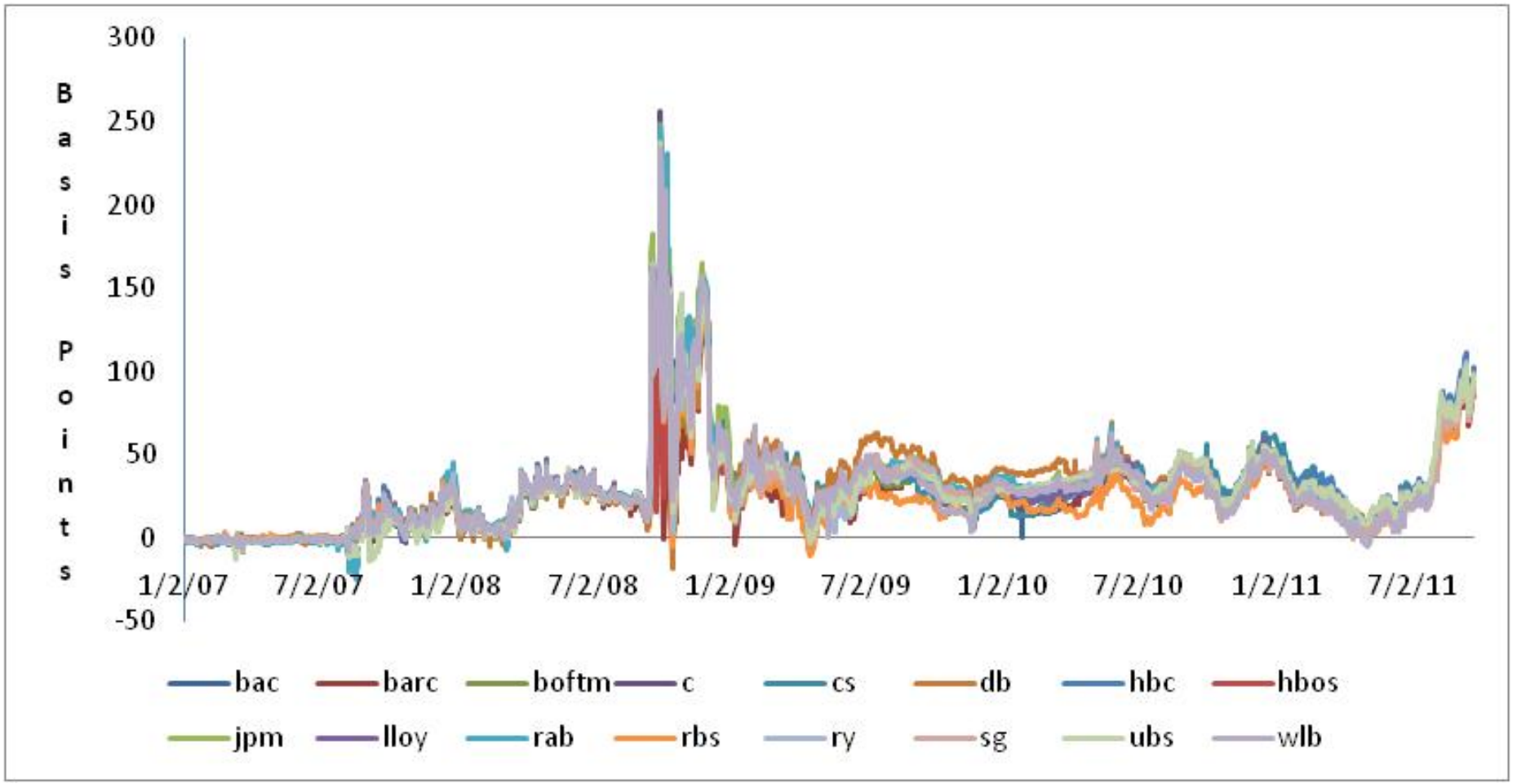
$$EBAS_{it}^{D}=\frac{euro\$\ forward\ \text{rate}_t}{euro\$\ spot\ \text{rate}_t}\left(1+Euribor_{it}\right)-\left(1+\$LIBOR_{it}\right)$$

Effects of Libor Manipulation

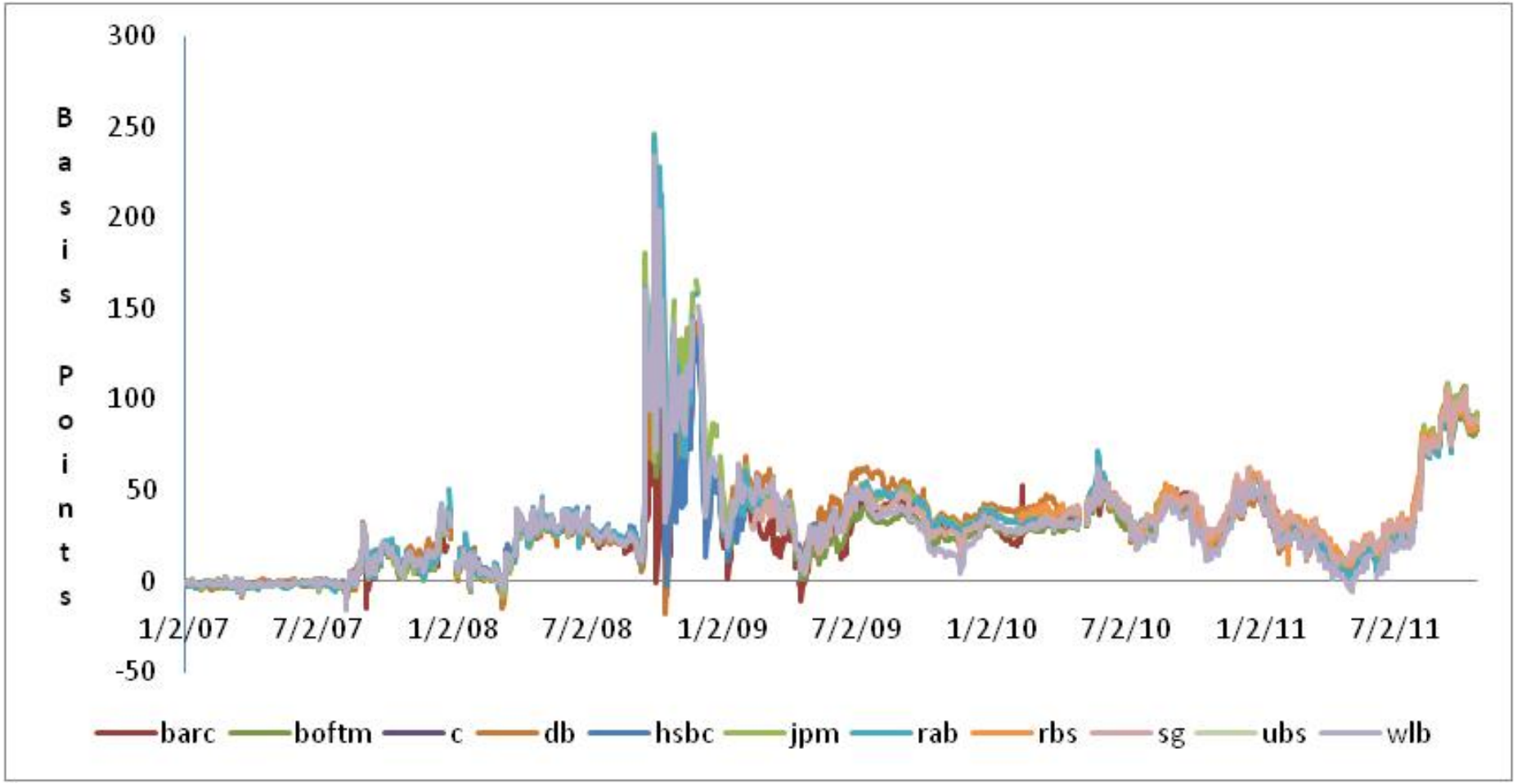
$$LBAS_{it}^{D} = \frac{euro\$\ forward\ \text{rate}_t}{euro\$\ spot\ \text{rate}_t}\left(1+euroLIBOR_{it}\right)-\left(1+\$LIBOR_{it}\right)$$

- Suppose euro Libor accurate but $ Libor understated
  - LBAS >0 even if there is no USD funding premium
  - More distressed and illiquid banks under-state more: correlation between LBAS, distress and funding
- We use change in LBAS + time fixed effects
  - If relative change in USD Libor manipulation is not systematically related to CS, then results unaffected
- Robustness for different panels of banks
- Exclude Barclays for 2007 – early 2009

Cross-Section of Libor-Based Basis, 2007-2011



Cross-Section of Euribor-Based Basis, 2007-2011



Methodology: Dynamic Panel Regressions

$$Basis_{it} = \alpha + \delta_i + \gamma_t + \rho Basis_{it-1} + \beta_1 X_{it-1} + \beta_2 F_{it-1} + \varepsilon_{it}$$

ρ:Account for high persistence of basis during crisis

X: Fundamental risk characteristics

- Default risk
- Asymmetric information
- Balance sheet factors

- F: Funding shocks
  - Unanticipated change in Tri Party Repo (TPR) amounts
  - Borrowings from Fed liquidity facilities

- OLS is inefficient, use Phillips-Sul (2007) to bias-correct estimates
  - Dependent variable becomes $Basis_{it}$-$\rho_{ADJ}Basis_{it-1}$

Fundamental Risk and Libor-Based Basis

	Full Sample	Pre-Crisis	Crisis, All banks	Crisis, Euro Banks
Lag CDS	0.17***	0.28	0.17**	0.45***
	(2.61)	(0.16)	(2.45)	(4.13)
Lag LEV	-0.00*	0.09	-0.00	-0.00
	(-1.71)	(0.82)	(-1.61)	(-1.60)
Lag PSPD	0.21***	0.00	0.27***	0.30***
	(2.80)	(0.06)	(3.03)	(2.75)
Lag TURN	-0.16***	-0.11	-0.17**	-0.17*
	(-2.84)	(-0.79)	(-2.54)	(-1.92)
Lag MV	0.00	-0.02	0.00	-0.00
	(0.85)	(-1.53)	(0.73)	(-0.30)
Lag EVOL	-0.01	5.34***	-0.03	0.03
	(-0.10)	(2.63)	(-0.33)	(0.25)
Lag ERET	0.15	6.90	0.08	1.09
	(0.16)	(1.14)	(0.08)	(0.75)
Intercept	-4.72***	3.76	-5.55***	-5.88***
	(-15.71)	(1.52)	(-15.83)	(-14.07)
Adj. R^2	0.93	0.74	0.92	0.91
No. of banks	13	10	13	9
OBS	13,233	1,373	11,860	7,980

Euribor-Based Basis: PSPD & TURN significant; CDS is not

Sample Bank Participation in Fed Liquidity Facilities

	TAF	TSLF	PDCF	DW	CPFF
Number of participating sample banks	15	9	8	11	11
Number of times Participated	365	358	479	56	138
Average number of times participated per bank	24	40	60	5	13
Average amount borrowed per bank ($ billion)	76.95	154.56	541.70	2.89	19.43
Max amount borrowed ($ billion)	15.00	15.00	47.94	4.00	14.93
Min amount borrowed ($ billion)	0.01	0.03	0.01	0.00	0.00
Share of total borrowing (%)	30.30	71.60	48.40	0.30	28.90

Facilities Borrowing and Libor-Based Basis

	Amount borrowed: Tot	Amount borrowed: Sur	Whether borrowed	Whether borrowed: Sur
TAF Settle	-0.29*	-0.34*	-0.12	-0.47
	(-1.86)	(-1.77)	(-0.33)	(-0.75)
TAF Notify	0.06	-0.00	0.45	0.66
	(0.38)	(-0.02)	(1.20)	(1.04)
TAF Bid	-0.25	-0.37**	0.18	0.11
	(-1.60)	(-1.94)	(0.48)	(0.18)
TSLF Settle	0.12	0.14	-0.19	-0.70
	(0.58)	(0.47)	(-0.50)	(-0.92)
TSLF Bid/ Notify	0.15	-0.24	0.41	-0.05
	(0.72)	(-0.13)	(1.09)	(-0.01)
PDCF Notify/Settle	-0.01*	-0.01**	-0.35	-0.89*
	(-1.70)	(-2.02)	(-1.11)	(-1.65)
DW Notify/Settle	0.03	0.03	-0.48	-0.62
	(0.34)	(0.39)	(-0.63)	(-0.72)
CPFF Notify/Trade	-0.04***	-0.05***	-0.04	-0.28
	(-3.12)	(-3.36)	(-0.09)	(-0.48)
Adj. R^2	0.92	0.92	0.92	0.92
No. of banks	13	13	13	13
OBS	6,200	6,001	6,200	6,001

EBAS: All results hold except for TAF; CPFF significant for all 4 cases

Repo Funding of Sample Banks

	Mean	SD_TS	SD_CS
Repo ($ billion)	89.47	29.48	89.49
Market share (%)	6.86	1.95	6.82
Repo/TLiability	4.76	1.57	4.58
Repo/STBorrowing	24.22	13.35	20.16

In aggregate, sample banks have 90% share of TPR funding amounts.

TPR Funding and Bank Basis: Fed-Eligible Collateral

	Agency CMO			Agency Debenture		
Lag Rshock	-0.05	0.02	0.03	-0.01	0.06***	0.06***
	(-1.11)	(0.35)	(0.51)	(-0.96)	(3.18)	(3.29)
Lag Rshock	---	-0.19**	-0.23**	---	-0.08***	-0.08***
*Europe	---	(-2.08)	(-2.42)	---	(-3.70)	(-3.78)
RISK	NO	NO	YES	NO	NO	YES
Adj. R^2	0.92	0.92	0.93	0.93	0.93	0.93
No. of banks	13	13	11	12	12	11
OBS	7,967	7,967	7,501	7,998	7,998	7,642

	Agency MBS			Treasury		
Lag Rshock	-0.00	0.01	0.01	0.00	0.01	0.01
	(-1.42)	(1.63)	(1.59)	(0.72)	(0.76)	(1.05)
Lag Rshock	---	-0.02***	-0.02***	---	0.00	-0.01
•Europe	---	(-3.14)	(-3.03)	---	(-0.49)	(-0.82)
RISK	NO	NO	YES	NO	NO	YES
Adj R-squared	0.93	0.93	0.93	0.93	0.93	0.93
No. of Banks	12	12	11	13	13	11
OBS	8,017	8,017	7,642	8,018	8,018	7,642

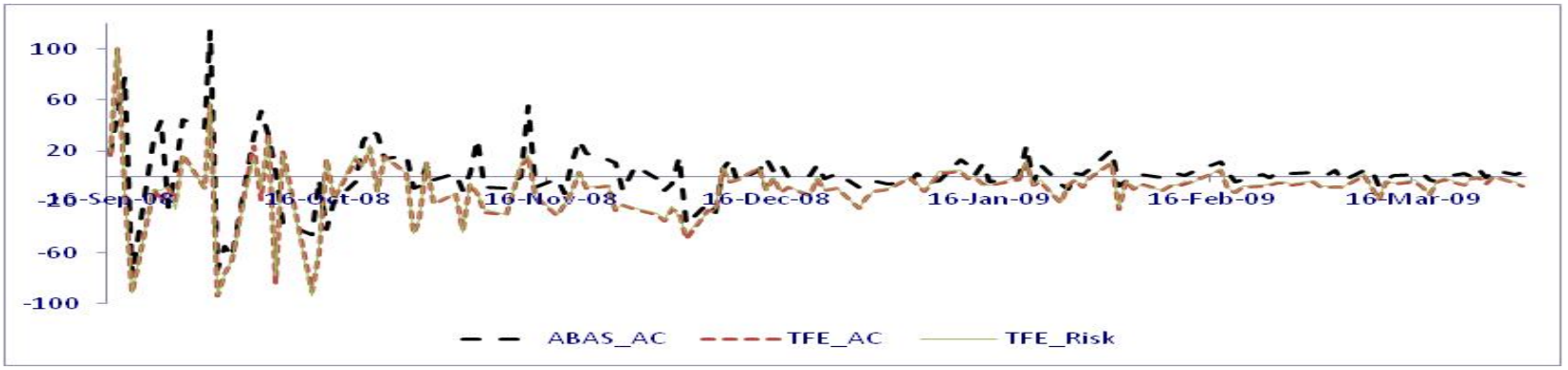
TPR Funding and Bank Basis: Fed-Ineligible Collateral

	ABS			Corporate Bonds		
Lag Rshock	-0.18*	-0.02	-0.01	0.05	-0.06	-0.04
	(-1.91)	(-0.14)	(-0.06)	(1.42)	(-0.60)	(-0.44)
Lag Rshock	---	-0.35*	-0.34*	---	0.12	0.11
*Europe	---	(-1.83)	(-1.76)	---	(1.18)	(1.06)
RISK	NO	NO	YES	NO	NO	YES
Adj. R^2	0.93	0.93	0.93	0.93	0.93	0.93
No. of banks	10	10	10	11	11	10
OBS	7,153	7,153	7,022	7,535	7,535	7,174

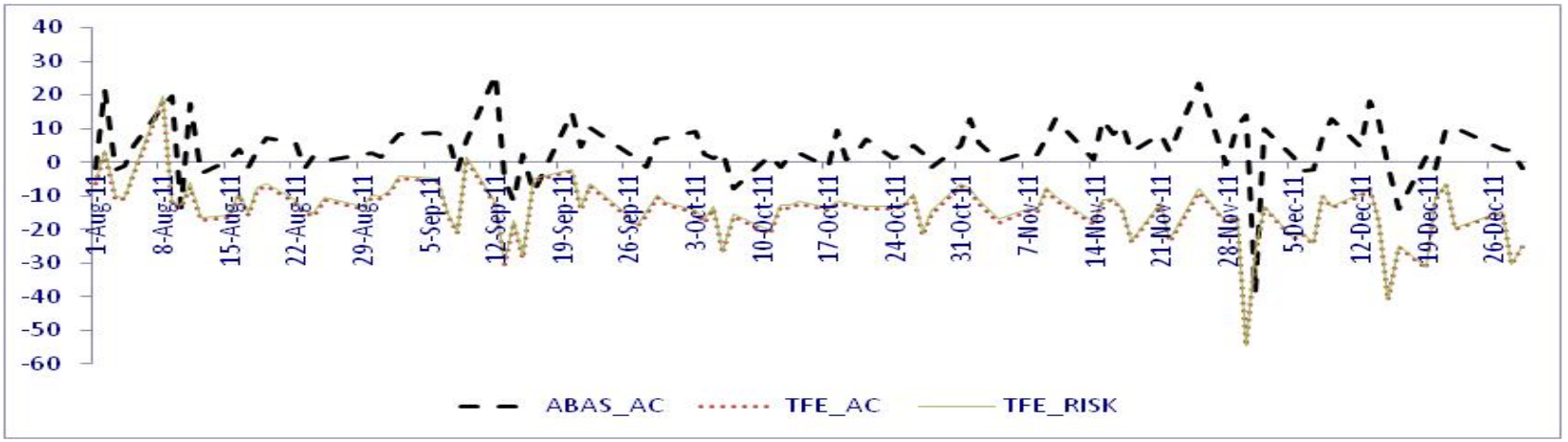
	Equity			Private Label CMO		
Lag Rshock	-0.39***	-0.16	-0.19	0.12	-0.06	-0.05
	(-3.19)	(-0.70)	(-0.81)	(1.42)	(-0.52)	(-0.45)
Lag Rshock	---	-0.30	-0.34	---	0.36**	0.38**
•Europe	---	(-1.12)	(-1.23)	---	(2.12)	(2.19)
RISK	NO	NO	YES	NO	NO	YES
Adj. R-squared	0.91	0.91	0.91	0.93	0.93	0.93
No. of banks	8	8	8	10	10	10
OBS	4,027	4,027	3,925	7,141	7,141	7,009

Aggregate Basis Changes and Time Fixed Effects

September 16 2008 to March 2009



August 11 2011 to December 2011



Common Component of Basis, Crisis Events & Responses

Y: Change in Agg Basis			Libor-Based ABAS_AC		
ABCP &	0.81	---	---	---	0.83
MMF crisis events	(0.61)	---	---	---	(0.62)
European crisis	---	1.11	---	---	1.15
Debt	---	(1.39)	---	---	(1.45)
Central Bank Responses	---	---	3.73	---	4.49
	---	---	(0.71)	---	(0.77)
Eur. Govt Responses	---	---	---	-0.77**	-0.66*
	---	---	---	(-1.97)	(-1.73)
Adj. R^2	0.00	0.00	0.00	0.00	0.00

Y: Time FE			Libor-Based TFE_RISK		
ABCP &	5.45***	---	---	---	5.14***
MMF crisis events	(3.48)	---	---	---	(3.30)
European Debt	---	0.06	---	---	-0.36
Crisis Events	---	(0.06)	---	---	(-0.38)
Central Bank	---	---	-16.02**	---	-16.92**
Responses	---	---	(-2.47)	---	(-2.34)
Eur. Govt Responses	---	---	---	-3.89**	-4.07**
	---	---	---	(-2.32)	(-2.43)
Adj. R^2	0.00	0.00	0.03	0.00	0.04
OBS	1,192	1,192	1,192	1,192	1,192

Different Libor Panel Banks

- Alternative measures: Libor and Euribor-based basis; CDS and EDF
- Alternative Libor bank panels: banks added and excluded
  - Societe Generale replaced HBOS in $ Libor panel Feb 6 2009
  - Bank of America exited euro Libor panel June10 2010
  - 3 sub-periods: Subprime, European crisis I and II (more severe)
- Repo and Fed facilities as funding sources diminish over time
  - Fed facilities terminated during second sub-period
  - Significant in first and second sub-periods
- Asymmetric information proxies are robust determinants of basis
  - Leverage is significant in subprime but not later

Conclusions

- Useful information in cross-section of bank basis
- Banks with higher CDS and asymmetric information have higher basis the following day
- Banks with lower unanticipated repo funding have higher basis the following day, controlling for fundamental risk
  - Effect significant for European banks
- Banks who obtain funds at Fed liquidity facilities have lower basis the following day, controlling for fundamental risk
- Combination of poor fundamentals and funding shocks explain cross-sectional variation of USD funding premium during crisis
  - Caveat: Fed and repo are diminishing funding sources over time