

Contagion Among the GSIBs

The Role of Regulatory Intervention

Jennifer Lai and Paul McNelis

May 2024

Outline

- 1 Introduction
- 2 Data
- 3 Method of Analysis
- 4 Results
 - Range Volatility
 - CDS Premia
 - $\Delta CoVar$
- 5 Conclusion

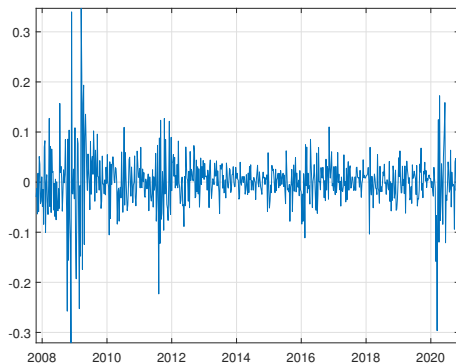
Debates

- Do BIS Bin classifications matter more than bank fines (either frequency or amount) for reducing financial contagion among banks?
- Risk is a latent variable, there is no objective measure of it or its transmission.
- We measure it through econometric methods (Forecast Error Variance Decomposition and $\Delta CoVar$ applied to share-market returns and through CDS swap premia on bank bonds).
- Our results show that BIS Bin classifications matter more than bank fines in response to contagion, as measured by the econometric methods.

GSIB Performance, 2007-2020

<u>Code</u>	<u>Name</u>	<u>Shares</u>			<u>CDS</u>				
		<u>Mean</u>	<u>Median</u>	<u>Max</u>	<u>Min</u>	<u>Mean</u>	<u>Median</u>	<u>Max</u>	<u>Min</u>
BAC	Bank of America	-0.304	-0.280	0.438	-2.378	0.941	0.804	2.571	-0.170
BBVA	Banco Bilbao	-0.651	-0.639	0.034	-1.715	1.205	1.117	2.690	-0.059
BCA	Barclays	-0.605	-0.551	0.022	-2.558	1.087	1.047	2.199	-0.004
C	CitiCorp	-0.604	-0.455	0.000	-3.664	0.983	0.826	2.833	-0.062
CS	Credit Suisse	-0.748	-0.721	0.000	-1.576	0.940	0.918	2.037	-0.002
GS	Goldman Sachs	-0.248	-0.220	0.106	-1.367	0.657	0.537	2.251	-0.256
JPM	JP Morgan Chase	0.328	0.323	1.054	-0.948	0.651	0.616	1.830	-0.239
MS	Morgan Stanley	-0.269	-0.212	0.427	-1.961	0.736	0.568	3.173	-0.301
SAN	Santander	-0.426	-0.409	0.138	-1.458	1.116	1.064	2.638	-0.301
WFC	Wells Fargo	0.481	0.593	1.053	-1.191	0.859	0.769	2.344	0.000

Weighted Average Change in Market Capitalization



Control Variables

	Mean*	Median	Std Dev.	Max	Min
Fed Funds Rate	0.724	0.170	0.955	4.860	0.040
$\Delta Tbill$	-0.001	0.000	0.084	3.000	-0.895
Credit Spread	2.798	2.700	0.771	6.160	1.560
Liquidity Spread	0.114	0.080	0.148	1.320	-0.870
TED Spread	0.429	0.270	0.462	4.580	-0.260
Yield Spread	1.857	1.930	0.988	3.830	-0.520
DJ Corp Ex Ret	0.000	0.000	0.004	0.045	-0.040
DJ Real Estate Ex Ret	0.000	0.000	0.014	0.144	-0.138
VIX	20.157	17.135	9.916	82.690	9.140

GSIB Regulatory Experience

<u>Fine History</u>					<u>BIS</u>
Bank Name:	Maximum Value	Date of Fine	Total Fine Amount	Frequency	Bin
BAC	\$16,650,000,000	21-Aug-14	\$60,130,305,938	143	3
BBVA	\$27,000,000	21-Dec-16	\$38,587,250	6	1
BCA	\$2,000,000,000	29-Mar-18	\$4,101,908,033	24	3
C	\$7,000,000,000	14-Jul-14	\$14,335,859,039	24	4
CS	\$5,280,000,000	18-Jan-17	\$9,021,757,626	20	2
GS	\$5,060,000,000	11-Apr-16	\$9,437,424,794	21	2
JPM	\$13,000,000,000	19-Nov-13	\$26,398,442,855	99	4
MS	\$2,600,000,000	11-Feb-16	\$5,112,697,271	90	2
SAN	\$550,000,000	19-May-20	\$637,058,281	19	1
WFC	\$5,342,200,000	9-Feb-12	\$19,280,766,695	117	2

Range Volatility, EN, CV

$$\sigma_t^R = .511(h-l)^2 - .019[(c-l)(h+l-2o) - 2(h-o)(l-o)] - .382(c-o)^2 \quad (1)$$

VARX Model:

$$[(I - \Theta(L)]Y_t = \Gamma X_{t-1} + U_t \quad (2)$$

$$U_t \sim N(0, \Sigma) \quad (3)$$

Elastic Net for Regularization:

$$\beta_{Enet} = \underset{\beta}{Min} \left\{ \sum_{t=1}^T \left(y_t - \sum_i \beta_i x_{it} \right)^2 + \lambda \sum_{i=1}^k [(\alpha |\beta_i|) + (1 - \alpha) \beta_i^2] \right\} \quad (4)$$

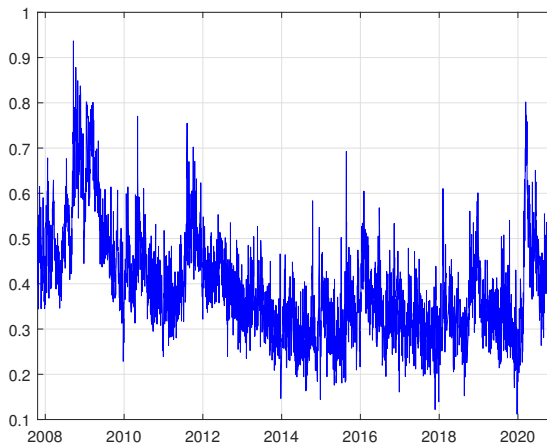
CV (Cross Validation) used to find the optimal λ^*, α^*

$\Delta CoVar$

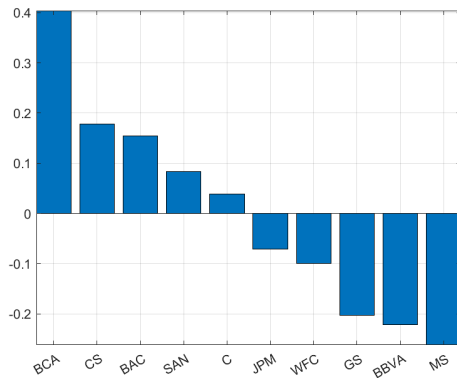
The $\Delta Covar$ method is an application of Quantile regression The method involves the following steps

- ① Take the negative of the weighted returns of the banking, except for bank (i), so that the 95% quantile is the lower 5% quantile for $\tau = .05$.
- ② Do a quantile regression for $\tau = .95$ of the weighted market returns on bank(i) returns and the controls. Obtain $VaR_{\tau=.95}^i$.
- ③ Do a quantile regression for $\tau = .50$ of the market returns on bank(i) returns and the controls. Obtain VaR .
- ④ Calculate $\Delta CoVar(i) = VaR_{\tau=.95}^i - VaR$.
- ⑤ Repeat for all of the banks.
- ⑥ We then have a measure of the relative importance of each bank to the overall weighted market risk of the system as a whole.

Median Range Volatility



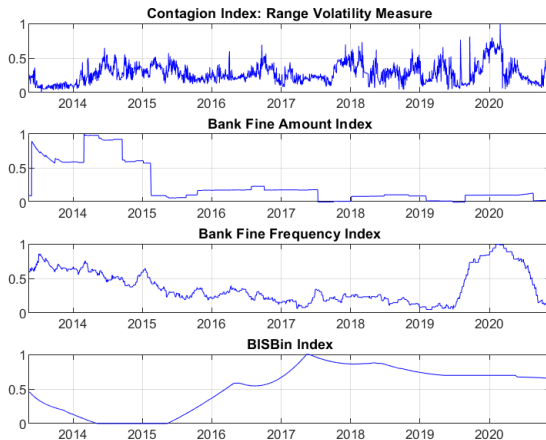
Net Connectedness: Mean of Moving Window



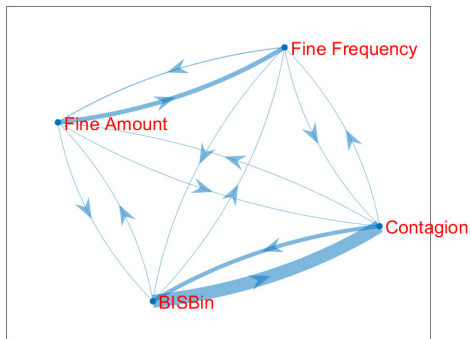
GSIB Connectedness: Maximum Values

Bank	Max Val	Date
BBVA	7.549	9/29/2014
C	7.250	1/16/2015
SAN	7.190	5/17/2010
MS	6.050	11/23/2018
BAC	5.756	6/15/2018
JPM	5.526	3/2/2015
BCA	5.453	11/19/2020
CS	4.983	1/6/2011
WFC	4.605	7/29/2011
GS	4.596	12/23/2014

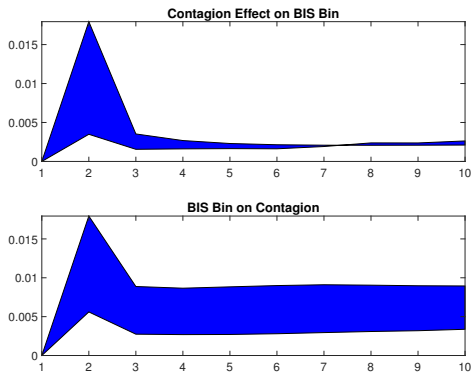
Range Volatility Contagion and Policy Intervention Indices



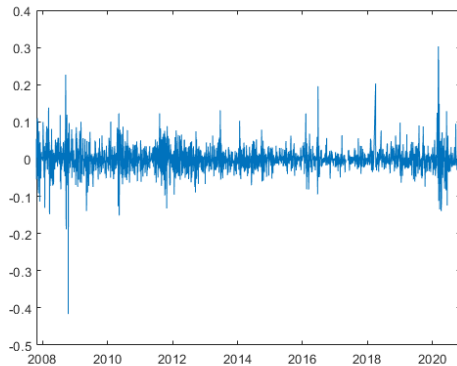
Network Map of RV Contagion Index and Policy Intervention Indices



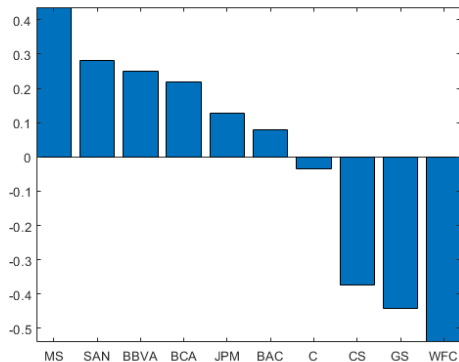
Contagion and BIS Bin Intervention Index



Median Rate of Change of CDS Premia



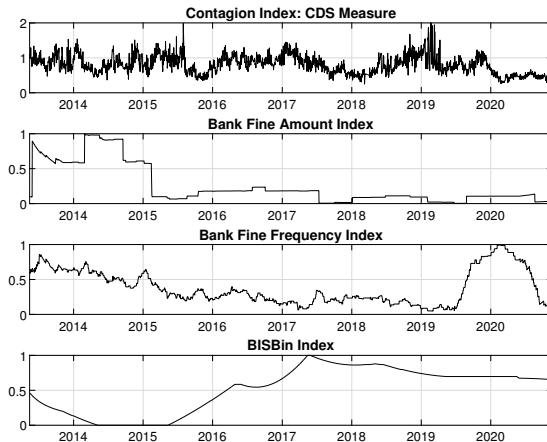
CDS Net Connectedness: Mean of Moving Window



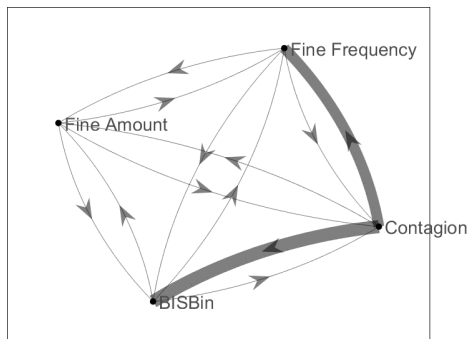
CDS Connectedness: Maximum Values

Name	Value	Date
BBVA	7.549	9/29/2014
C	7.250	1/16/2015
SAN	7.196	7/17/2019
MS	6.050	11/23/2018
JPM	5.526	3/2/2015
CS	4.983	1/6/2011
BAC	4.626	7/4/2018
WFC	4.605	7/29/2011
GS	4.596	12/23/2014
BCA	4.313	5/24/2013

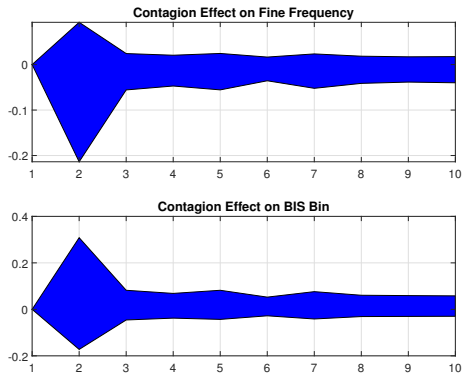
CDS Contagion Index and Regulatory Interventions



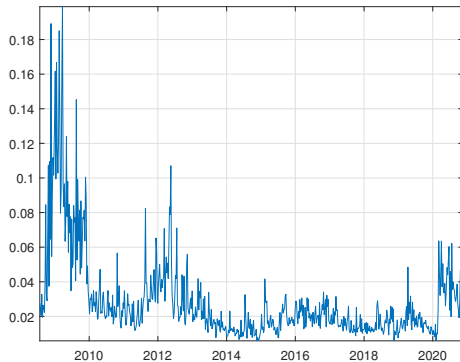
Network Map of Contagion Index and Interventions: CDS Measures



IRF: Contagion Effects on CDS Measures



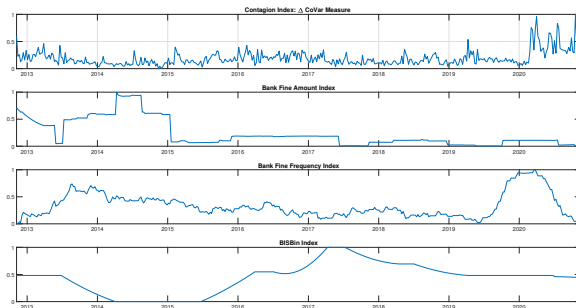
Maximum Values of ΔCoVar with Rolling Regression



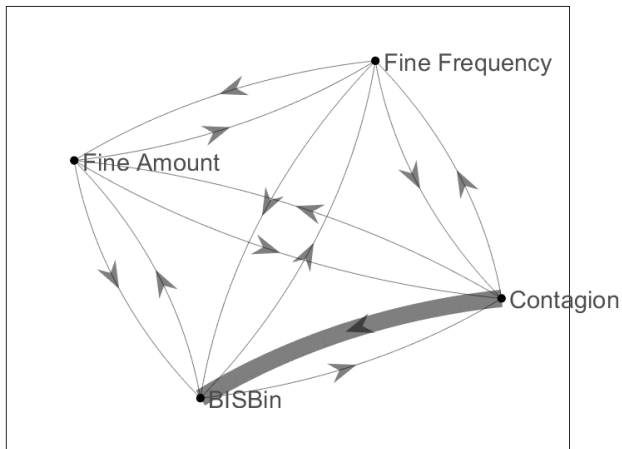
ΔCoVar : Maximum Values

Name	Max Value	Date
SAN	0.217	23-Mar-09
BBVA	0.175	19-Jan-09
CS	0.157	16-Feb-09
WFC	0.141	09-Feb-09
GS	0.136	18-May-09
JPM	0.118	26-Jan-09
BCA	0.099	18-May-09
MS	0.093	23-Nov-09
BAC	0.083	20-Jul-09
C	0.060	04-May-12

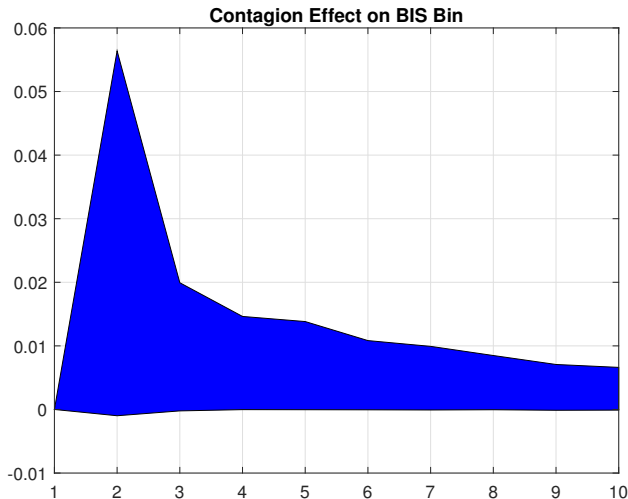
ΔCoVar and Regulatory Intervention Indices



Network Map of Contagion Index and Policy Interventions: ΔCoVar Measure



IRF of Contagion Index on Policy Interventions: ΔCoVar Measure



Takeaways

- $\Delta CoVar$ contagion measure has stronger and more persistent positive relation to the BIS Bins
- This is followed by the Range Volatility index, σ_R .
- The weak relationship of the contagion measures with banking fine variables may be because fines are aimed at consumer protection, fraud, money laundering, and LIBOR manipulations.
- BIS BIN classifications are indicators of changes in underlying financial stability.
- In turbulent times, such as the Global Financial Crisis after 2008, we see that many banks became major transmitters of systemic risk, even when their average measures of connectivity would suggest otherwise.