

Equity Market Spillovers in the Americas

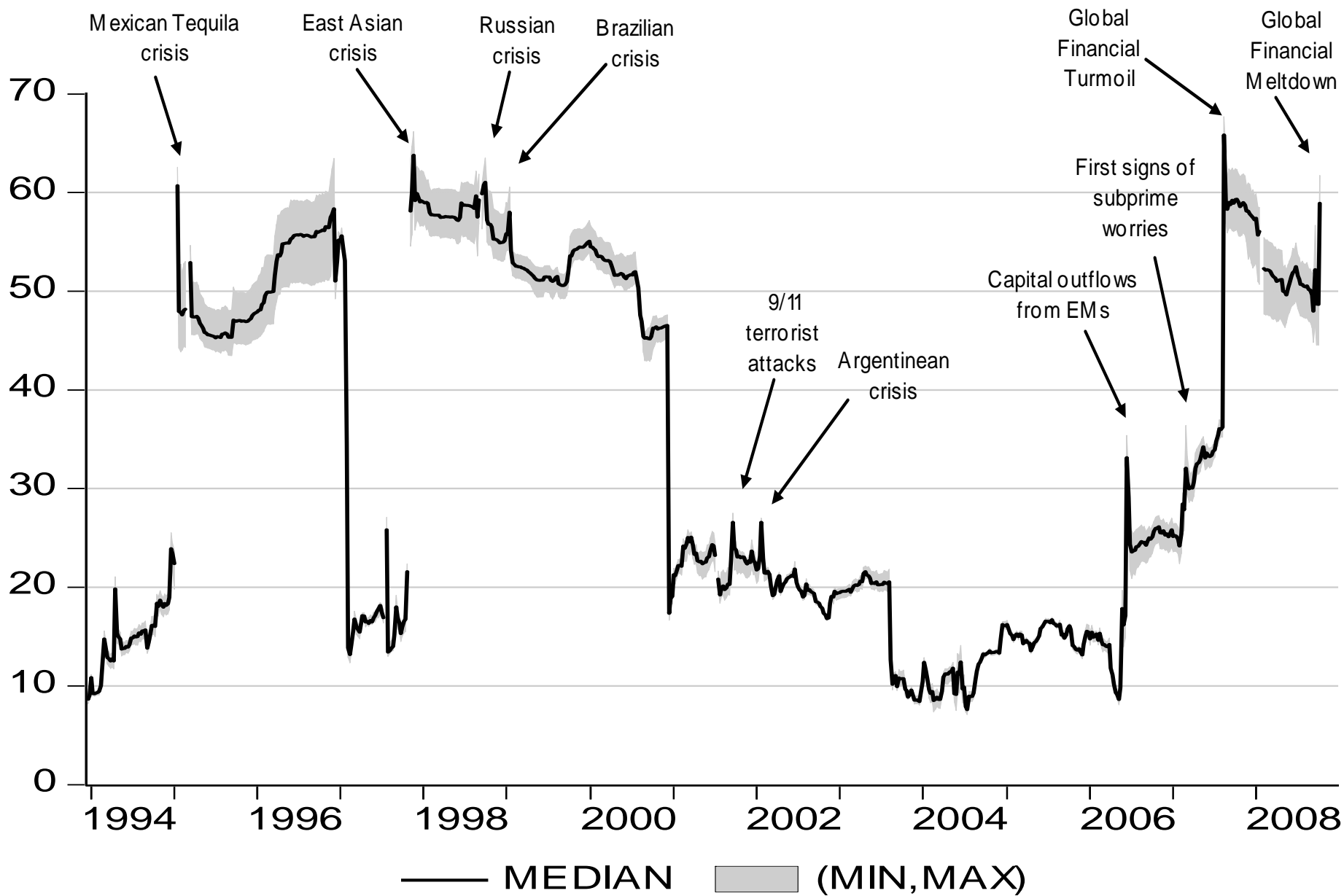
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Spillover Plot, Volatilities



First-Order Two-Variable VAR

$$x_t = \Phi x_{t-1} + \varepsilon_t$$

$$x_t = \Theta(L)\varepsilon_t$$

$$x_t = A(L)u_t$$

$$A(L) = \Theta(L)Q^{-1}, \quad u_t = Q\varepsilon_t, \quad E(u_t u_t') = I$$

$$Q^{-1} = \text{Cholesky}(\text{COV}(\varepsilon_t))$$

Optimal Prediction

$$x_{t+1,t} = \Phi x_t$$

$$e_{t+1,t} = x_{t+1} - x_{t+1,t} = A_0 u_{t+1} = \begin{bmatrix} a_{0,11} & 0 \\ a_{0,21} & a_{0,22} \end{bmatrix} \begin{bmatrix} u_{1,t+1} \\ u_{2,t+1} \end{bmatrix}$$

$$E(e_{t+1,t} e'_{t+1,t}) = A_0 A_0'$$

Error Variances

Variance of 1-step-ahead x_{1t} error: $a_{0,11}^2 + a_{0,12}^2$

Variance of 1-step-ahead x_{2t} error: $a_{0,21}^2 + a_{0,22}^2$

Cross-variance contributions: $a_{0,12}^2, a_{0,21}^2$

“Spillover Index”

$$S = \frac{a_{0,12}^2 + a_{0,21}^2}{a_{0,11}^2 + a_{0,12}^2 + a_{0,21}^2 + a_{0,22}^2}$$

p^{th} -Order N -Variable VAR Case (1-Step Forecasts)

$$S = \frac{\sum_{\substack{i,j=1 \\ i \neq j}}^N a_{0,ij}^2}{\text{trace}(A_0 A_0')}$$

p^{th} -Order N -Variable VAR Case (H -Step Forecasts)

$$S = \frac{\sum_{h=0}^{H-1} \sum_{\substack{i,j=1 \\ i \neq j}}^N a_{h,ij}^2}{\sum_{h=0}^{H-1} \text{trace}(A_h A_h')}$$

Weekly South American Returns and Volatilities

1 January 1992 – 10 October 2008

Argentina (Merval), Brazil (Bovespa)

Chile (IGPA), Mexico (IPC)

Annualized Returns

$$r_{it} = 52 \bullet 100 \bullet (\Delta \ln P_{it})$$

Annualized (Range-Based) Volatilities

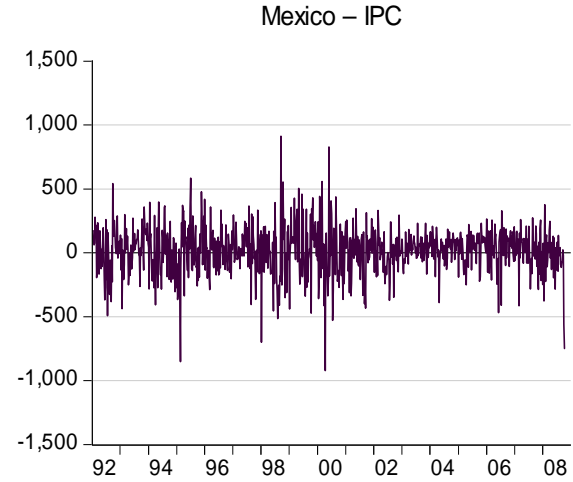
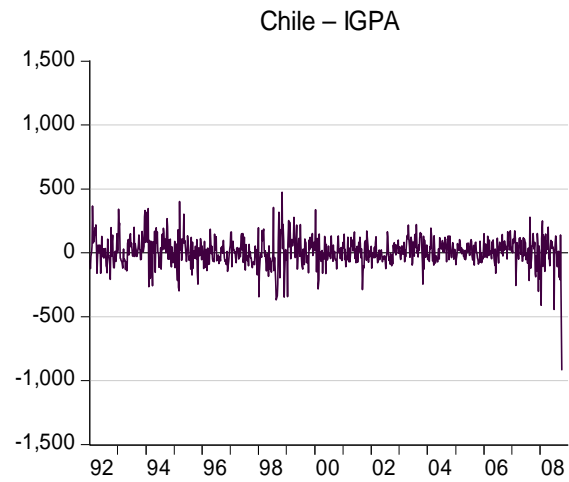
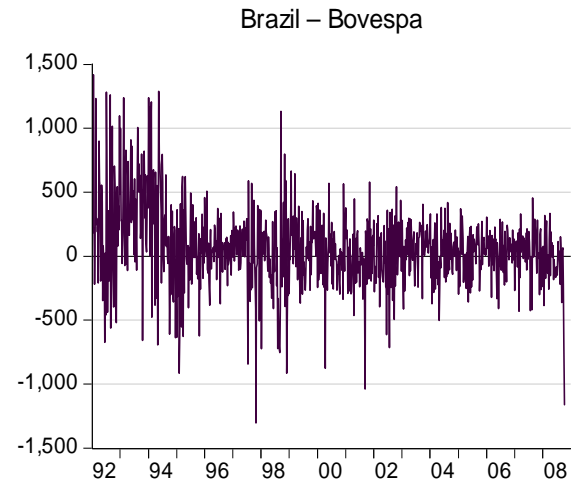
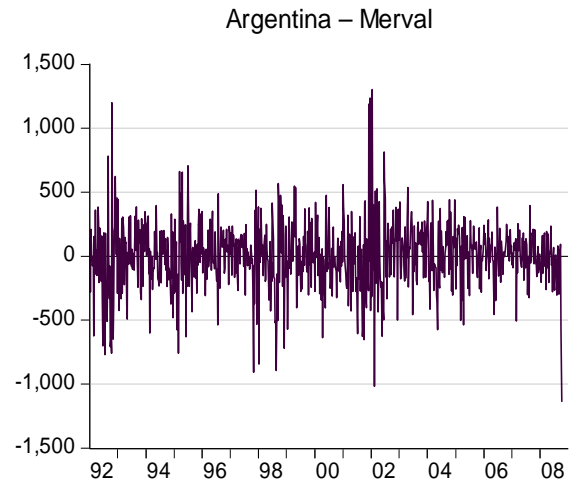
$$\hat{\sigma}_{it} = 100 \sqrt{52 \bullet \tilde{\sigma}_{it}^2}$$

Second-order VARs ($p = 2$)

$H = 10$ -step-ahead forecasts

Ordering: Argentina, Brazil, Chile, Mexico

South American Stock Market Returns

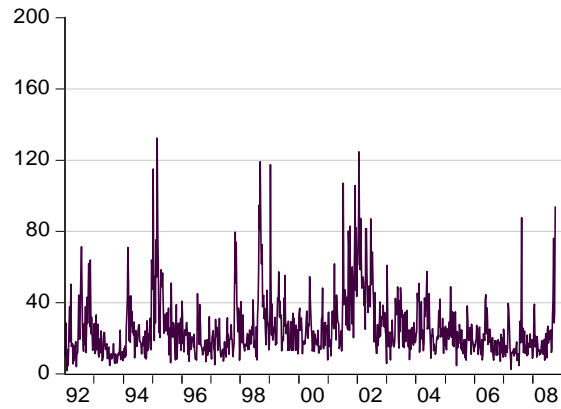


Summary Statistics, South American Stock Market Returns

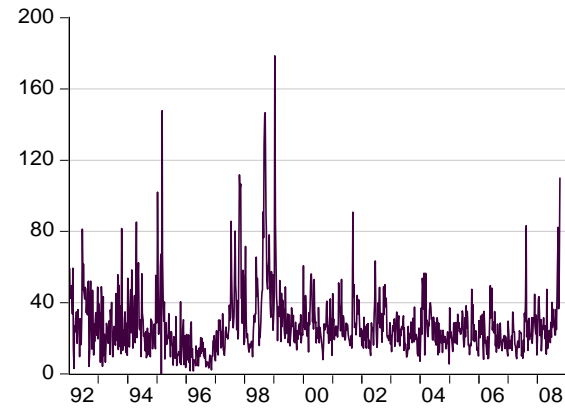
	Argentina	Brazil	Chile	Mexico
Mean	2.485	64.334	8.493	15.751
Median	19.748	55.044	8.739	28.828
Maximum	1301.99	1417.96	473.78	910.16
Minimum	-1135.39	-1303.04	-915.84	-921.24
Std. Dev.	264.78	317.84	111.77	188.51
Skewness	-0.0157	0.3913	-0.7015	-0.3191
Kurtosis	5.788	5.696	9.602	5.360
Jarque-Bera	283.398	287.633	1661.046	217.778
Probability	0.0	0.0	0.0	0.0
Obs	875	875	875	875

South American Stock Market Volatilities

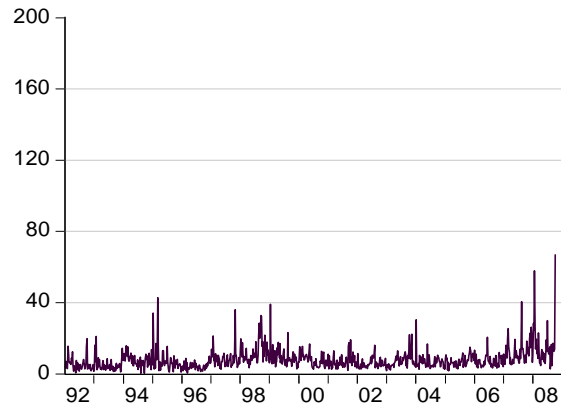
Argentina – Merval



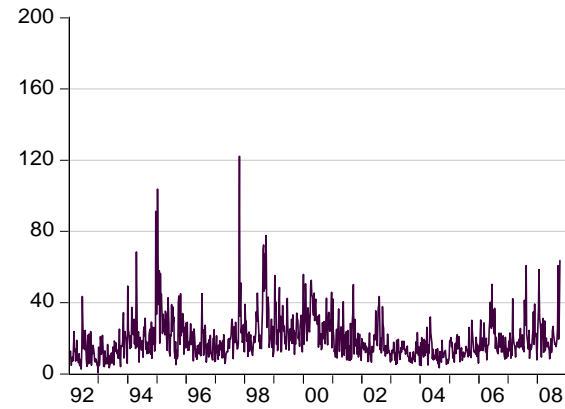
Brazil – Bovespa



Chile – IGPA



Mexico – IPC



Summary Statistics, South American Stock Market Volatilities

	Argentina	Brazil	Chile	Mexico
Mean	25.628	27.758	7.974	19.639
Median	20.939	23.882	6.646	16.705
Maximum	132.40	178.58	66.859	122.174
Minimum	1.826	0.0797	0.3032	0.6110
Std. Dev.	17.425	18.233	5.852	12.232
Skewness	2.249	2.846	3.500	2.426
Kurtosis	10.122	16.886	25.136	13.974
Jarque-Bera	2587.2	8211.4	19651.3	5248.5
Probability	0.0	0.0	0.0	0.0
Obs	875	875	875	875

Return Spillovers, Full Sample

	ARG	BRA	CHL	MEX	Contribution From Others
ARG	97.63	0.09	0.24	2.04	2.4
BRA	15.84	83.51	0.01	0.63	16.5
CHL	13.61	8.33	75.57	2.50	24.4
MEX	22.38	5.77	3.06	68.79	31.2
Contribution to Others	51.8	14.2	3.3	5.2	74.5
Contribution Including Own	149.5	97.7	78.9	74.0	Index = 18.6%

Volatility Spillovers, Full Sample

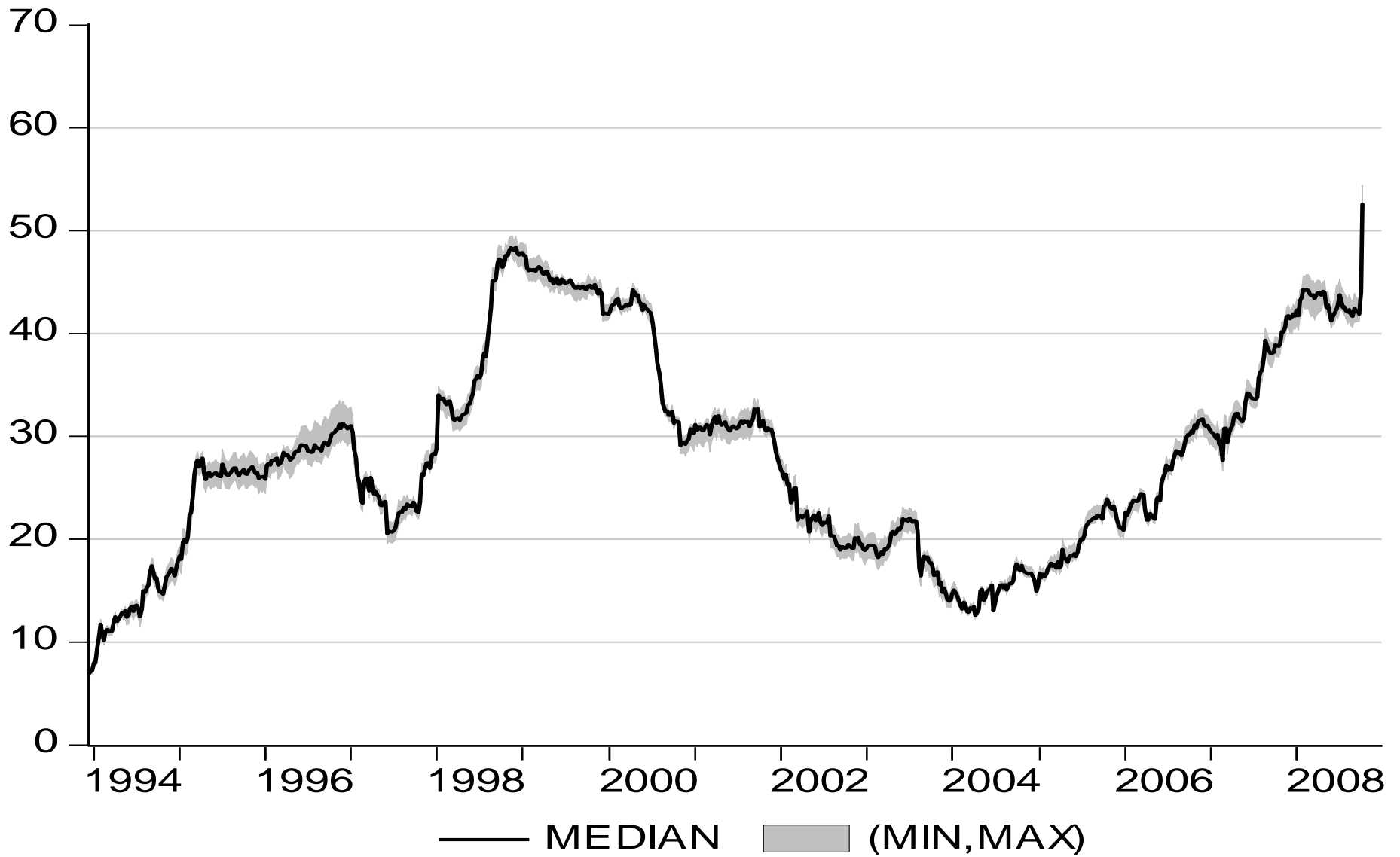
	ARG	BRA	CHL	MEX	Contribution From Others
ARG	96.00	0.69	1.81	1.51	4.0
BRA	28.27	67.59	0.60	3.54	32.4
CHL	14.12	14.86	70.98	0.04	29.0
MEX	18.67	11.36	4.00	65.97	34.0
Contribution to Others	61.1	26.9	6.4	5.1	99.5
Contribution Including Own	157.1	94.5	77.4	71.1	Index = 24.9%

“Spillover plots” (100-week rolling estimation window)

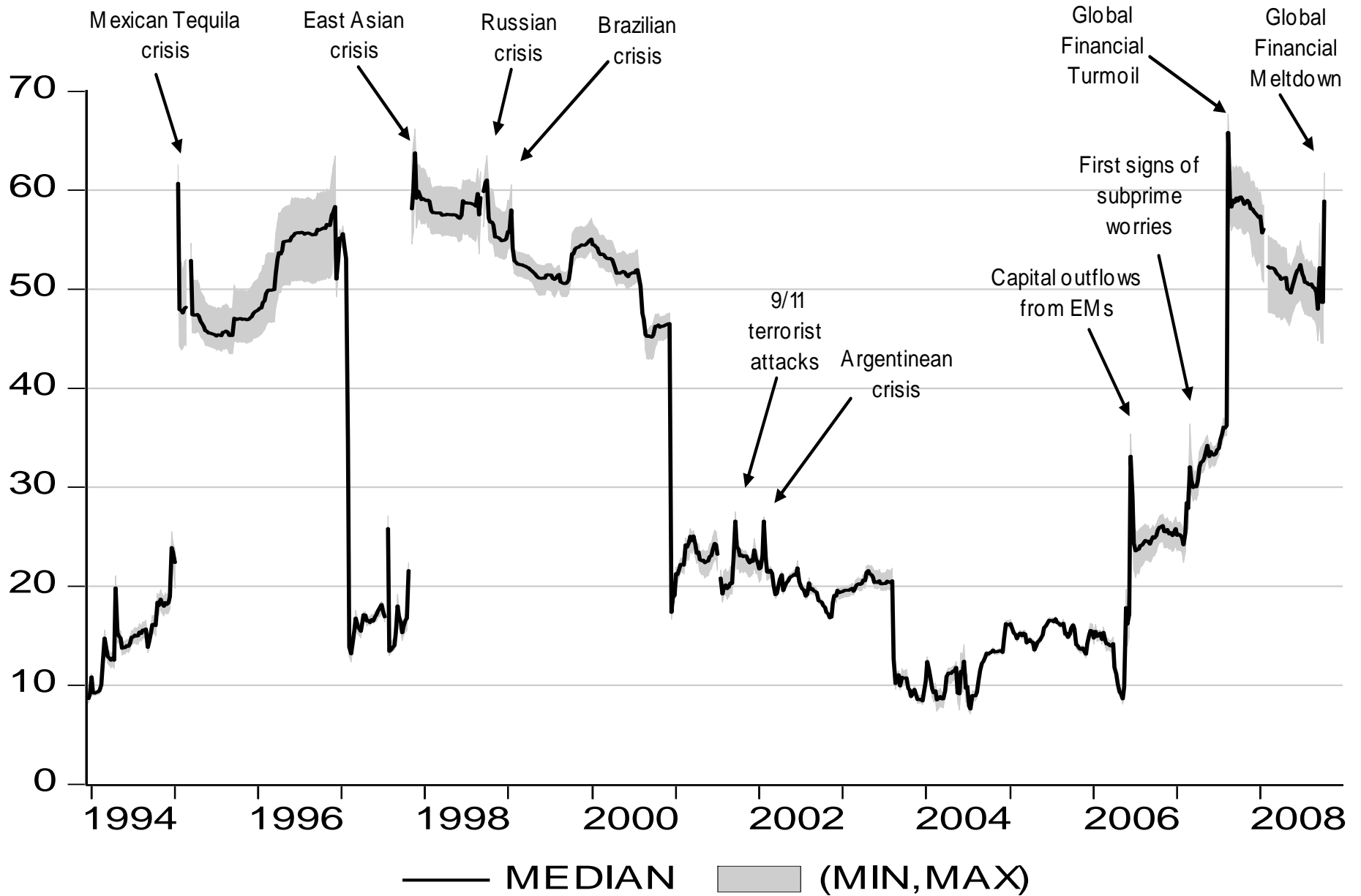
Compute the spillover index only when the parameters of the estimated VAR imply covariance stationarity

All possible VAR orderings

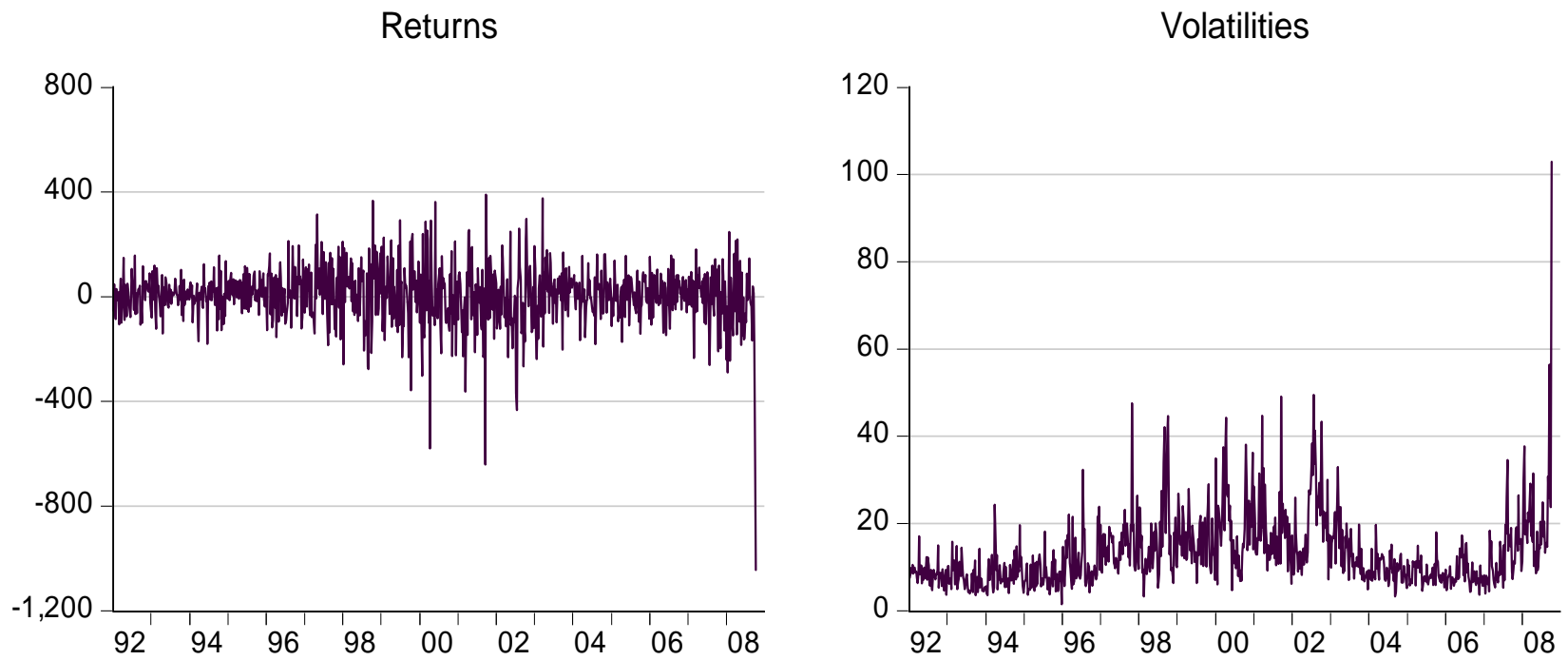
Spillover Plot, Returns



Spillover Plot, Volatilities



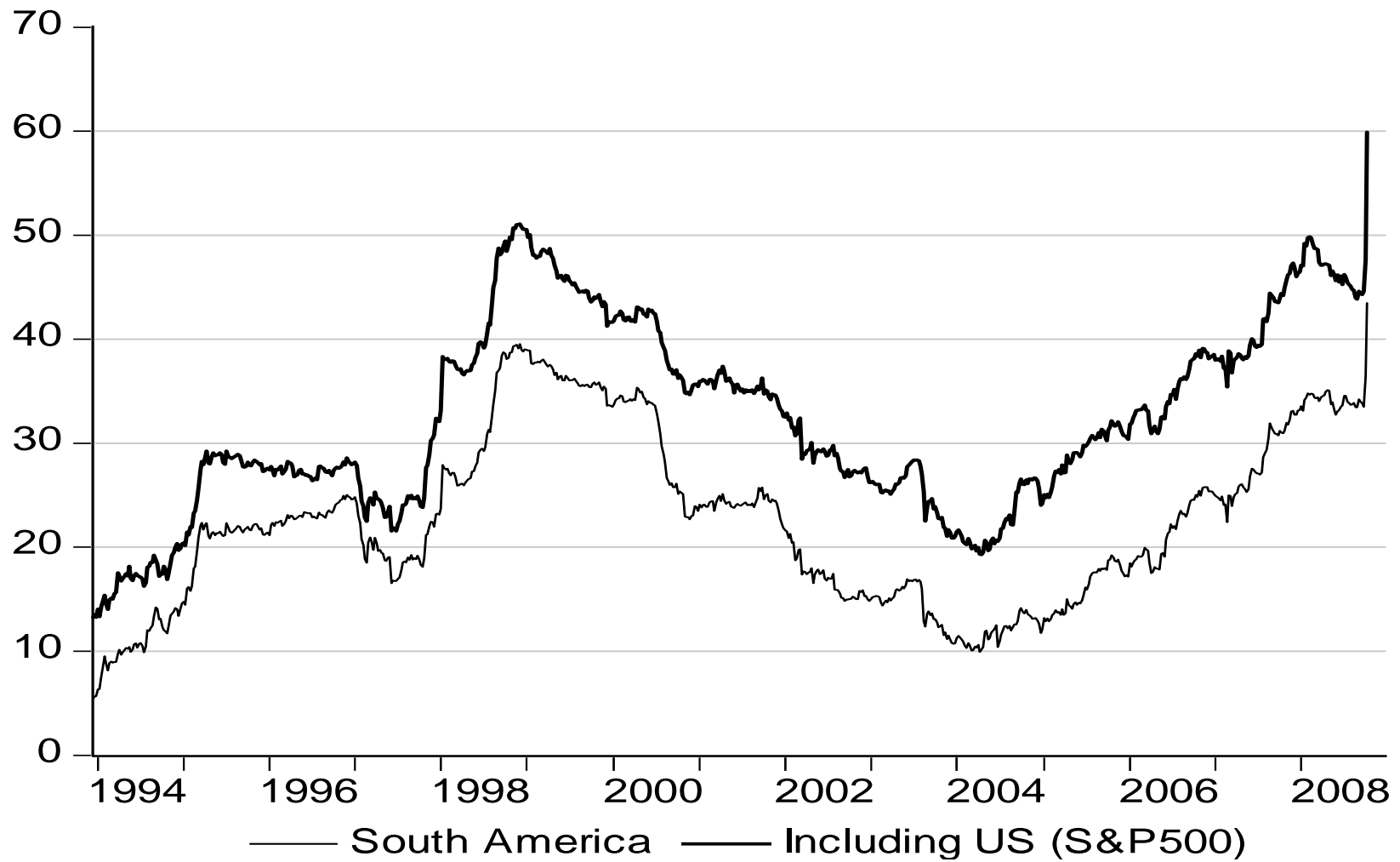
U.S. Stock Market Returns and Volatilities



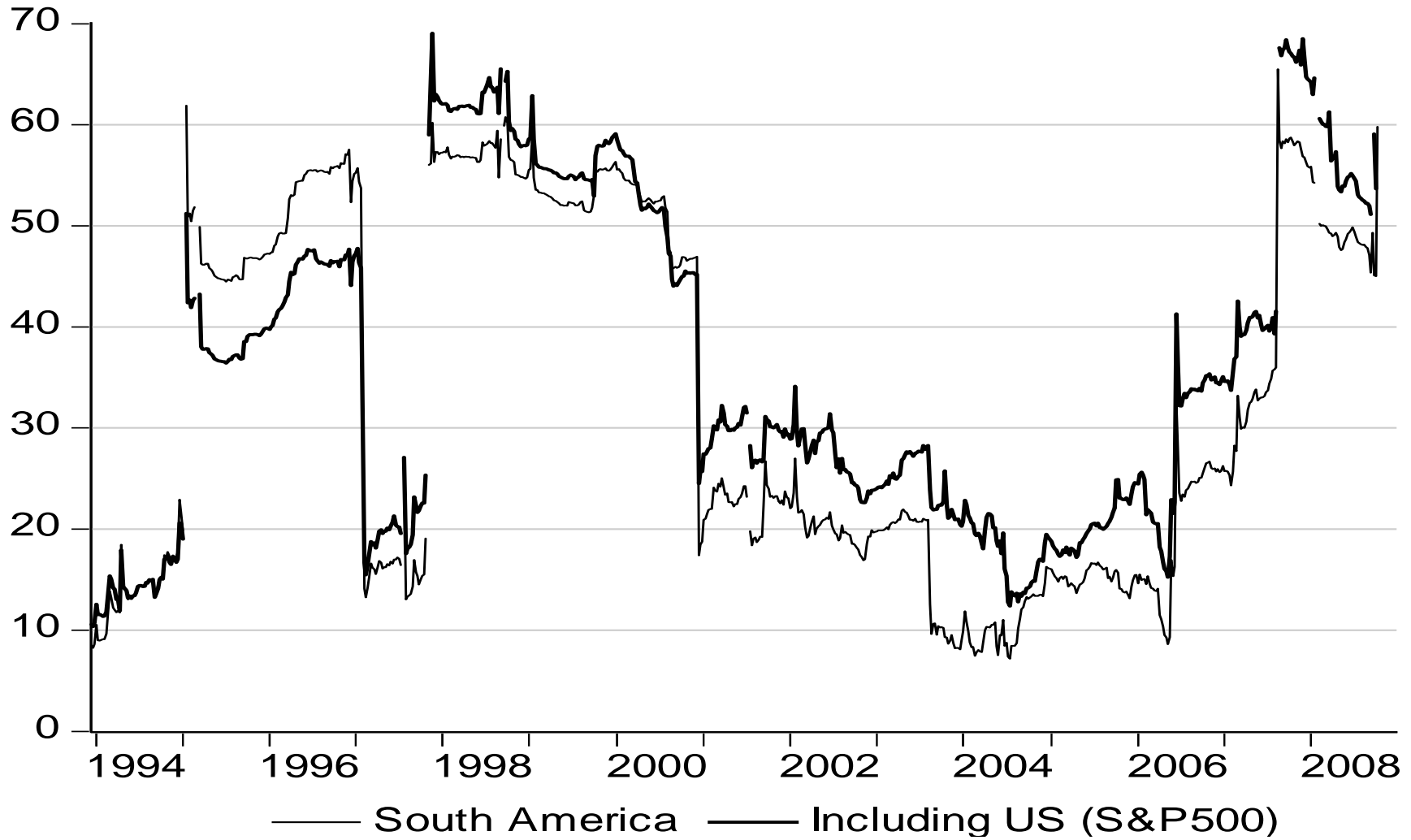
Summary Statistics, U.S. Returns and Volatilities

	Returns	Volatility
Mean	4.533	13.146
Median	11.966	10.645
Maximum	389.60	102.959
Minimum	-1044.36	1.539
Std. Dev.	115.60	8.220
Skewness	-1.322	2.870
Kurtosis	12.924	21.627
Jarque-Bera	3845.7	13850.8
Probability	0.0	0.0
Observations	875	875

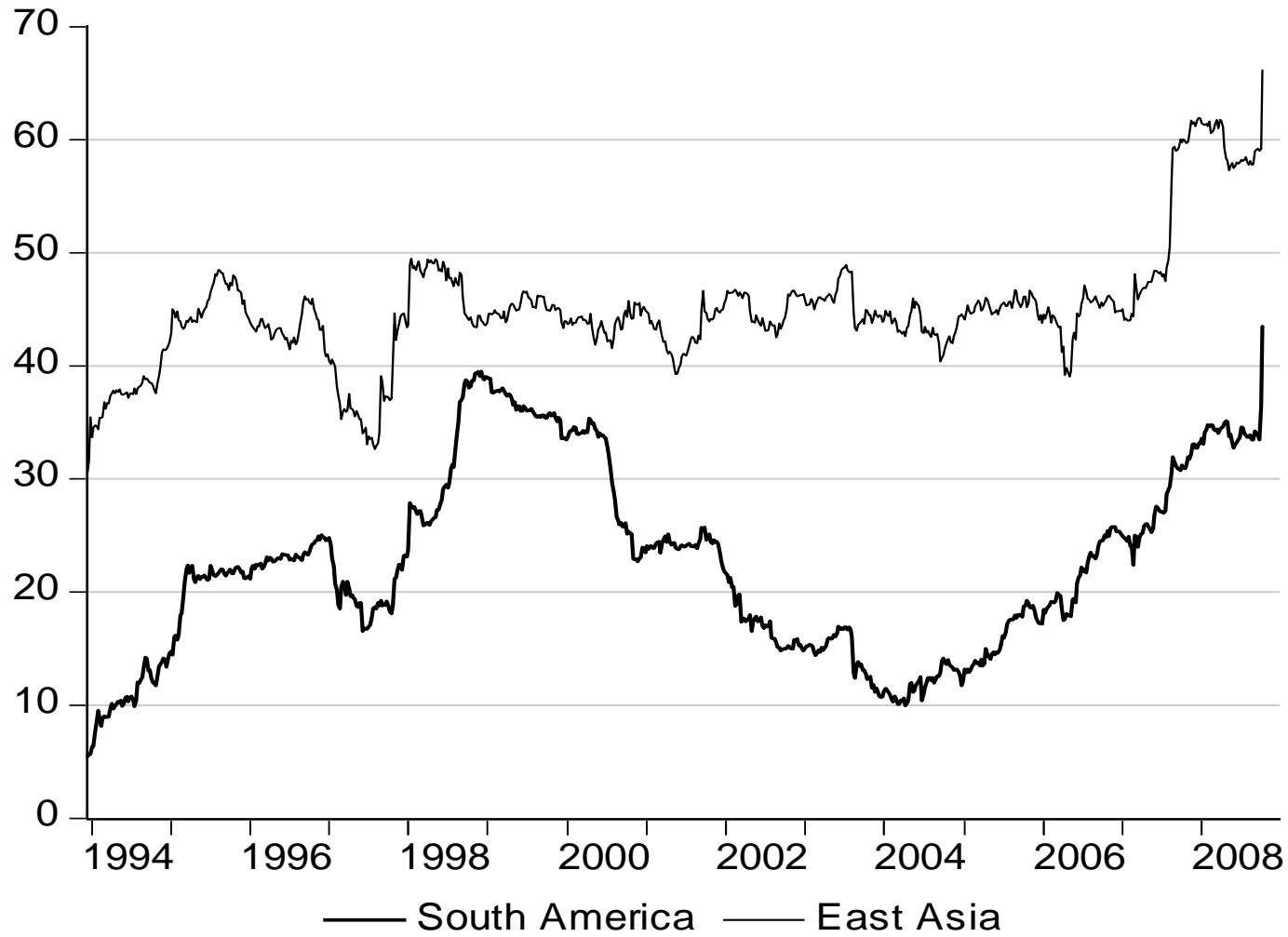
Return Spillovers, With and Without U.S.



Volatility Spillovers, With and Without U.S.



Comparative South American and East Asian Return Spillovers



Comparative South American and East Asian Volatility Spillovers

