

Systemic Risk and Investor Flows

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Outline

The absorption ratio (AR)

State Street's Institutional flows

Flow calculation and AR calibration

Comparing Flow AR and Return AR

Conjectures from the audience

The absorption ratio

- The absorption ratio equals the fraction of the total variance of a set of assets explained or “absorbed” by a finite number of eigenvectors.
- A high absorption ratio implies that assets are tightly coupled; hence, they are fragile because negative shocks travel more quickly and broadly than when the assets are loosely linked.
- A low absorption ratio implies that risk is distributed broadly; hence, assets are more resilient and less likely to exhibit a unified response to bad news.

The absorption ratio

$$AR = \frac{\sum_{i=1}^n \sigma_{E_i}^2}{\sum_{j=1}^N \sigma_{A_j}^2}$$

AR: Absorption ratio

N: number of assets

n: number of eigenvectors used to calculate AR

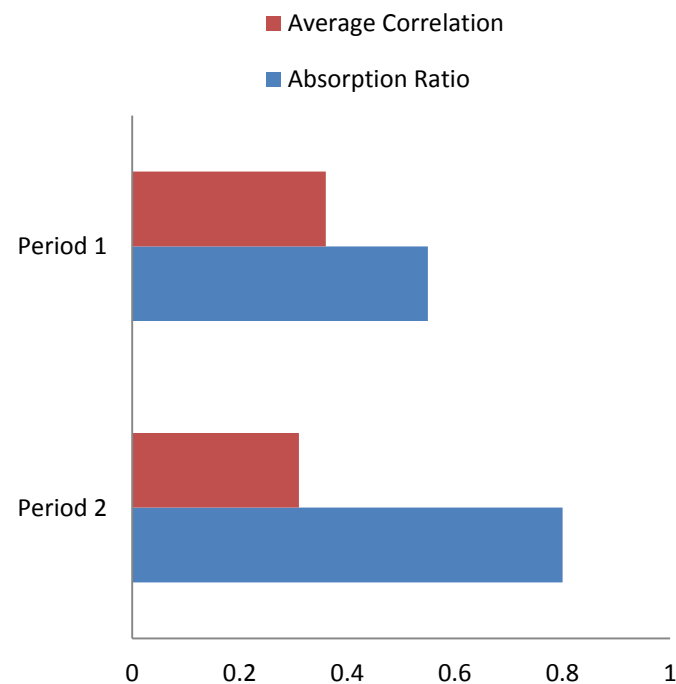
$\sigma_{E_i}^2$: variance of the i-th eigenvector, sometimes called eigenportfolio

$\sigma_{A_j}^2$: variance of the j-th asset

The absorption ratio versus average correlation

Absorption Ratio versus Average Correlation					
Period 1	Correlations				Standard
Assets	1	2	3	4	Deviations
1	1.00	0.12	-0.01	0.01	35.16%
2	0.12	1.00	-0.04	-0.03	35.07%
3	-0.01	-0.04	1.00	0.82	4.95%
4	0.01	-0.03	0.82	1.00	5.02%

Period 2	Correlations				Standard
Assets	1	2	3	4	Deviations
1	1.00	0.64	-0.05	-0.01	34.46%
2	0.64	1.00	-0.05	-0.03	34.04%
3	-0.05	-0.05	1.00	0.03	4.92%
4	-0.01	-0.03	0.03	1.00	4.88%



Source: Windham Capital Management

State Street's Institutional flows

- State Street has \$25.7 trillion under custody and administration and approximately 15% of global assets (as of June 30, 2013)
- Captures a homogenous, distinct group: “real money”
 - Primarily large global institutional investors
 - Includes mutual funds, pensions, foundations, endowments
 - Excludes corporations, hedge funds, central banks, retail investors
- Derived from anonymized security-level transactions that are aggregated to ensure client confidentiality
- Not derived from broker/intermediary flow
 - Intermediated flow data cannot tell if there are other intermediaries
 - involved in the same transaction, what else is changing in the portfolio.

Market fragility reflected in prices...

- Extrinsic fragility captures the extent to which the components of a broad market, such as industries within the equity market, are unified.
- As industries become more unified, the equity market becomes more susceptible to negative news.
- Previous research using equity prices finds that the equity market's absorption ratio informs us about susceptibility to market shocks.

Market fragility reflected in flow...

- Flows fragility captures the extent to which institutional investor equity flows across countries are unified.
- As country equity flows become more unified they express stronger sentiment.

Absorption ratio, draw downs, and returns

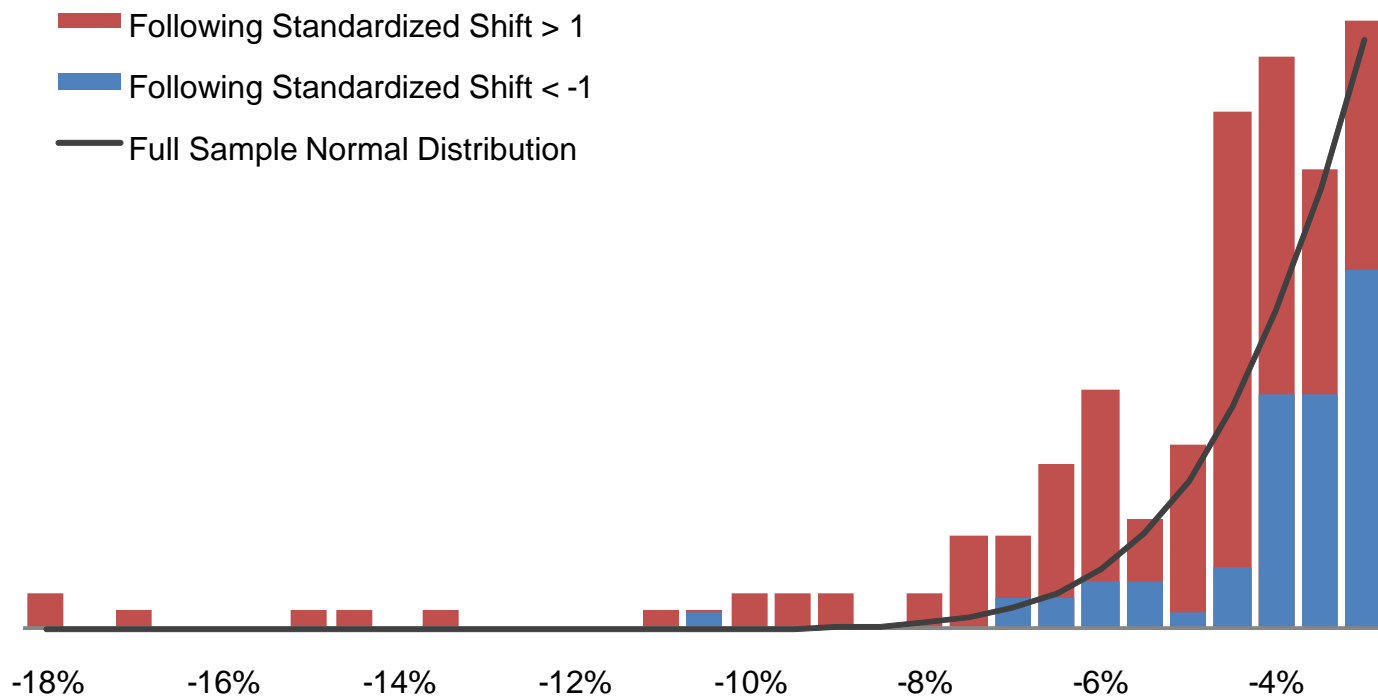
Fraction of drawdowns preceded by a spike in AR

	<u>1% Worst</u>	<u>2% Worst</u>	<u>5% Worst</u>
1 Day	70%	70%	62%
1 Week	73%	73%	67%
1 Month	92%	90%	75%

Annualized return after extreme AR

	<u>1 Sigma Increase</u>	<u>1 Sigma Decrease</u>	<u>Difference</u>
1 Day	-6.1%	7.5%	-13.6%
1 Week	-6.1%	7.5%	-13.5%
1 Month	-4.9%	5.7%	-10.6%

Conditional distribution of one-week U.S. equity returns



Source: State Street Associates

Flow calculation and calibration

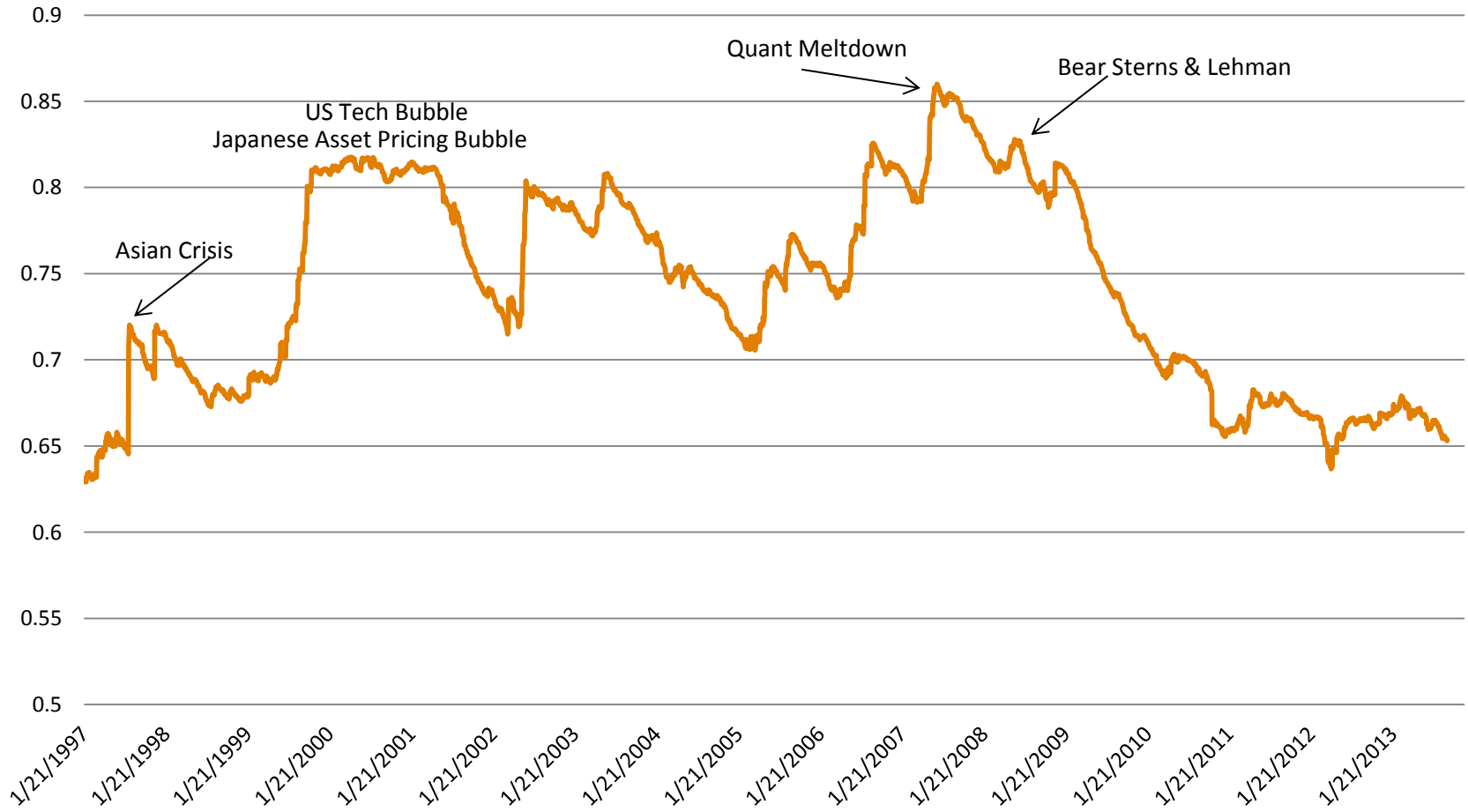
1. Create net flows as the difference in the dollar value of buys minus sells normalized by market capitalization for each country i at time t to allow for time series and cross-sectional comparisons.
2. Include 42 of the 44 MSCI ACWI countries where trading is robust throughout the sample from January 22, 1997 through September 20, 2013 (Russia and Turkey excluded).
3. Adjust for differences in the cross-sectional volatility of small and large countries by multiplying flows by a market capitalization volatility adjustment factor (MC_VA).

$$MC_VA_{it} = \text{sqrt} \left(\frac{MC_{it}}{\text{Sum}_i(MC_{it})} \right)$$

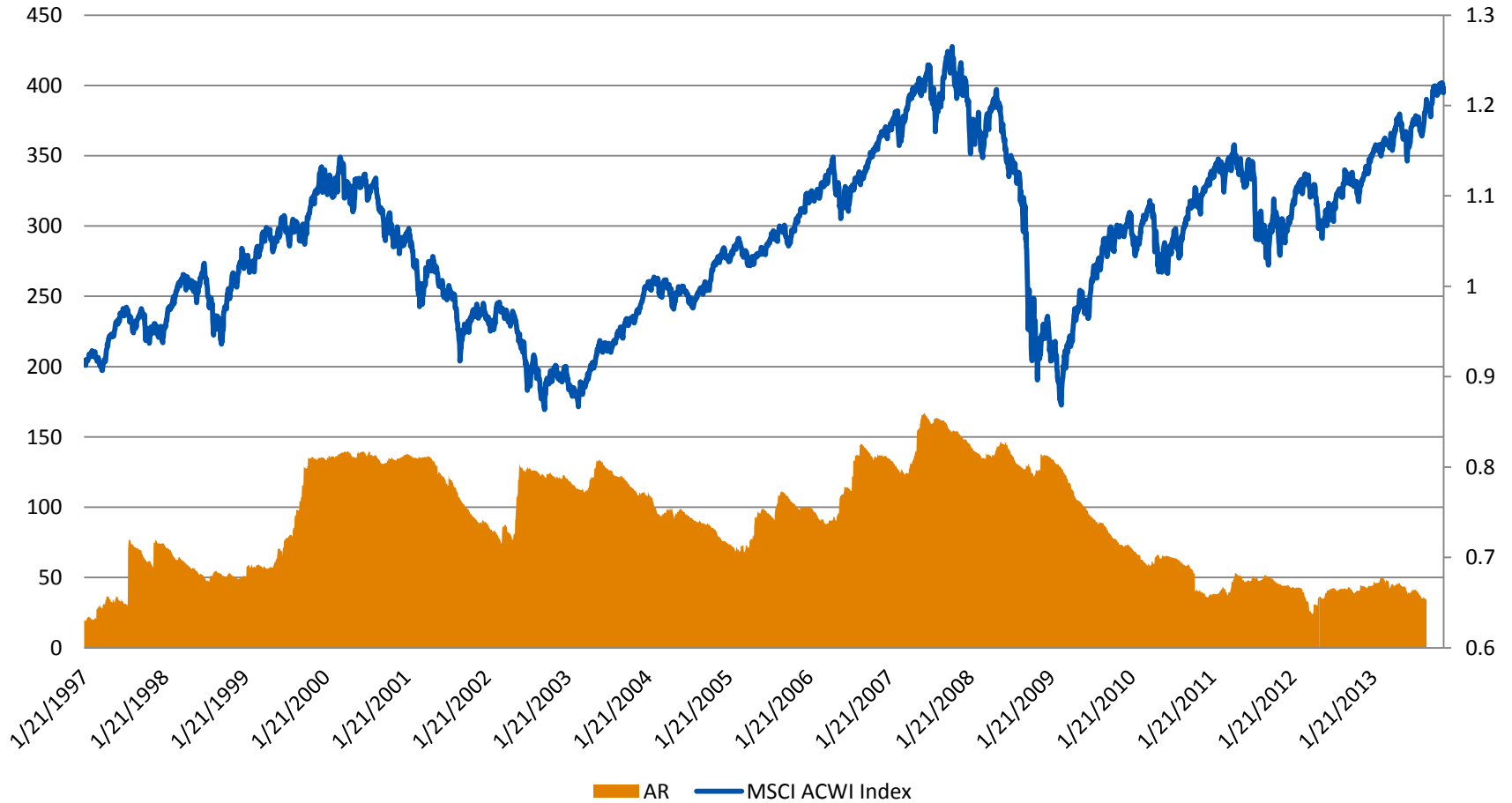
Flow calculation and calibration

1. Estimate the covariance matrix of the 42 countries using a rolling two-year window of exponentially decayed flows (normalized and adjusted) with a one-year half-life.
2. Conduct a principal components analysis and measure the fraction of the total variance absorbed by the first 8 eigenvectors (approximately 20%).
3. Calculate a standardized shift of the absorption ratio by first calculating the most recent absorption ratio, subtracting it from the average absorption over the preceding year, and dividing the difference by the standard deviation of the absorption ratio from the preceding year.

Global Country Flow Absorption Ratio



Global Country Flow Absorption Ratio and MSCI ACWI



Sources: State Street Associates, MSCI

Flow Absorption Ratio and Global Return Absorption Ratio

Flow Absorption Ratio and Global Absorption Ratio

