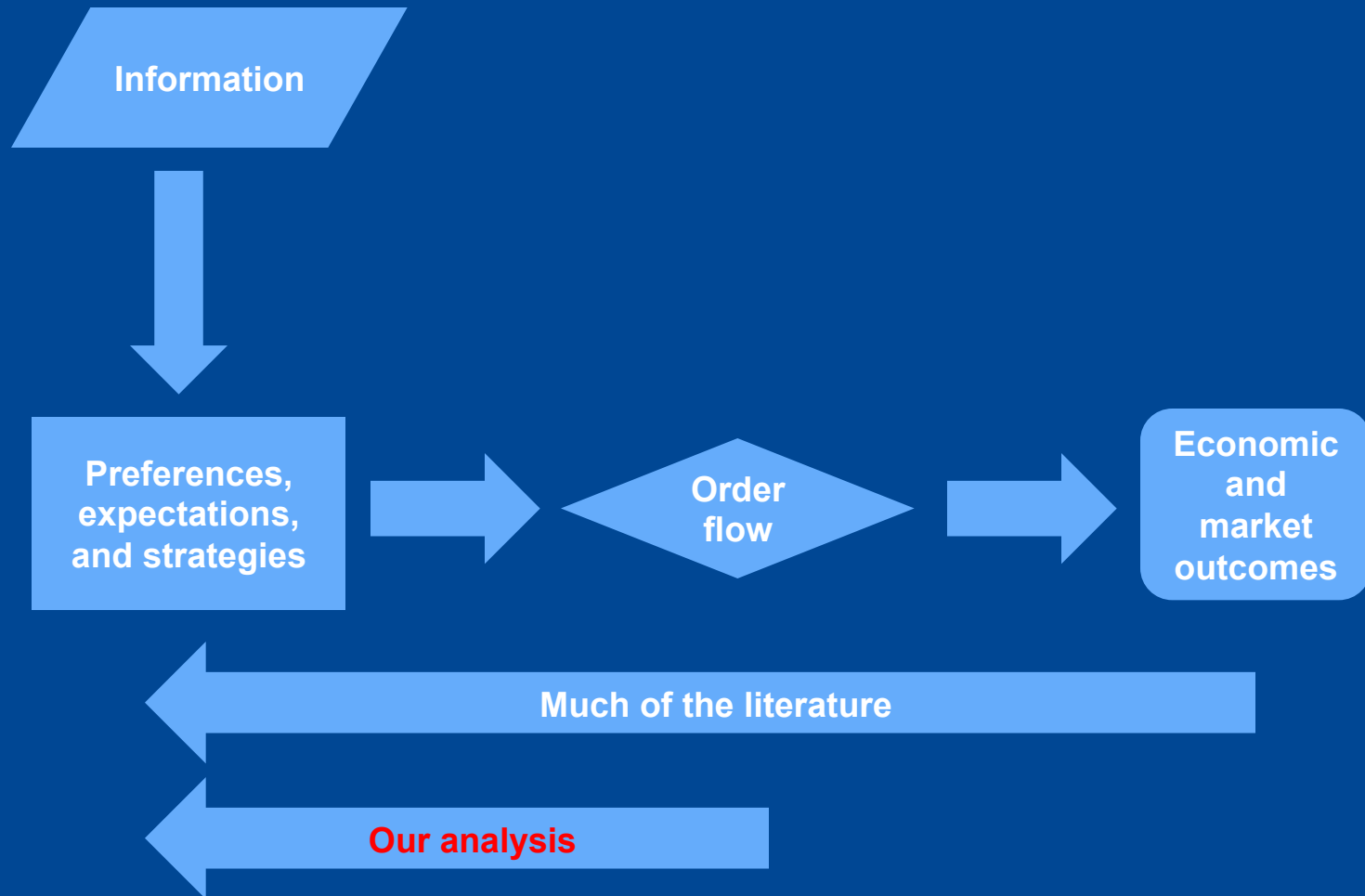


What does equity sector orderflow tell us about the economy?

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Orderflow as a conduit of information



What does orderflow tell us?

- **Broad question**

Is there information in orderflow that is not fully captured by prices or returns and, if so, what is the nature of this information?

- **More specific question**

Is portfolio rebalancing across U.S. equity sectors, as measured through net orderflow in excess of passive market in- and outflows, related to the future performance of the macro economy, equity market, and bond market?

- **We focus on “sector rotation” because it is one of the most basic active investment strategy tied directly to the business cycle**

What does orderflow tell us? (cont)

- **What is the nature of the information in sector level orderflow?**
 - How does it relate to the information contained in sector returns?
 - Is it really capturing fundamental economic forces?
 - Is it tied to observed macroeconomic news?
- **Are our results really linked to sector rotation?**
 - Are we capturing broad sector level portfolio rebalancing?
 - Does sector rotation make sense from an investor's perspective?
 - Do active mutual fund employ sector rotation-like strategies?

Two caveats

- We do not

1. Assume a specific information structure, statistical return model, or investor preferences

We let the data speak for itself through predictive correlations

2. Assume that investors have private information about the macro economy, stock market, or bond market

We treat orderflow as a summary statistic of changes in all of the information related to the macro economy

Key results

- **Sector orderflow**
 - predicts the state of the macro economy 3 months ahead
 - predicts bond market and, to a lesser extent, stock market returns at the same horizon
- **Nature of the information**
 - Sector orderflow is predictive even after controlling for returns
 - The linear combination of sector level flows that best predicts the economy (a “flows factor”) is directly linked to NFP news

Key results (cont)

- **Link to sector rotation**
 - Disperse (i.e., market cap weighted) flows into or out of sectors are more informative than concentrated (e.g., single stock) flows
 - A portfolio that mimics the orderflow is defensive with “superior” risk-average return properties relative to the market portfolio
 - Quarterly rebalancing of active mutual funds across sectors is highly correlated with our measures of sector orderflow

Outline

- **Data**
- **Results**
 - Predicting the macro economy, bond, and stock markets
 - Relating orderflow to returns
 - Relating orderflow to NFP news
 - Conditioning on orderflow dispersion within sectors
 - Orderflow mimicking portfolio
 - Mutual fund holdings
- **Conclusion**

Data

Data sources

- All NYSE, AMEX and NASDAQ (NMS) stocks
- Sample period = 1993-2005
- Daily returns from CRSP
- Trade and quote data from TAQ
- Macroeconomic data from the Chicago Fed
- Mutual fund data from CDA/Spectrum and Lipper

Orderflow construction

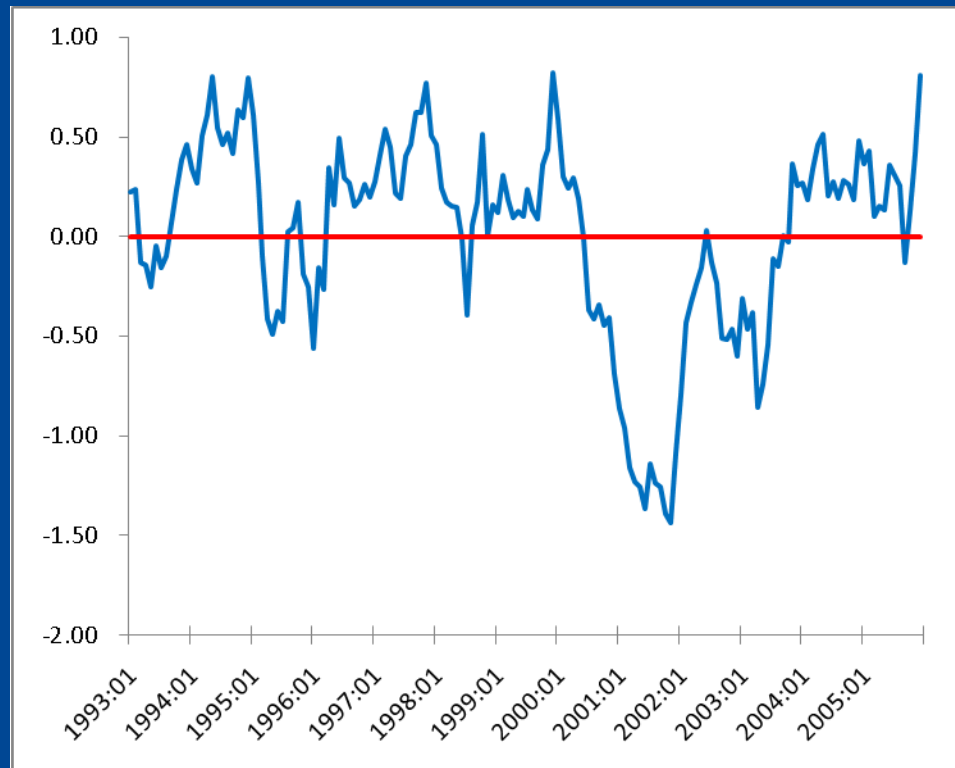
- For each stock, on each day
 - Screen the data for errors
 - Aggregate adjacent trades at one price
 - Match quotes and trades using a 5-second rule
 - Sign trades using Lee and Ready (1991) algorithm
 - Separate orderflow into small, medium and large trade sizes
 - By shares traded
 - Small (<1,000), medium (1,000-10,000), and large (>10,000)
 - By dollars traded
 - Small (<\$25,000), medium (\$25,000 -250,000), large (>\$250,000)
 - Sort stocks into 10 broad sectors based on the current Global Industry Classification Standard (GICS)

10 sectors (GICS)

- [10] Energy
- [15] Materials
- [20] Industrials
- [25] Consumer discretionary
- [30] Consumer staples
- [35] Health care
- [40] Financial
- [45] Information technology
- [50] Telecommunications services
- [55] Utilities

Macro economy and capital markets

- 3-month MA of the Chicago Fed National Activity Index (CFNAI)



- S&P 500 Index and 1-year Fama-Bliss discount bond

Standardized Unexpected Orderflow

- Net Orderflow_j = [Buyer-Initiated Trades – Seller-Initiated Trades]_j
- Mkt Net Orderflow = $\sum_j$ Net Orderflow_j
- **Passive** Net Orderflow_j = Mkt Net Orderflow x Sector Cap Wgt_j
- **Standardized Active** Net Orderflow_j:

$$\frac{\left(\text{Net Orderflow}_{j,t-1} - \text{Passive Net Orderflow}_{j,t-1} \right)}{\text{Capsector}_{j,t-1}}$$

Predictability results

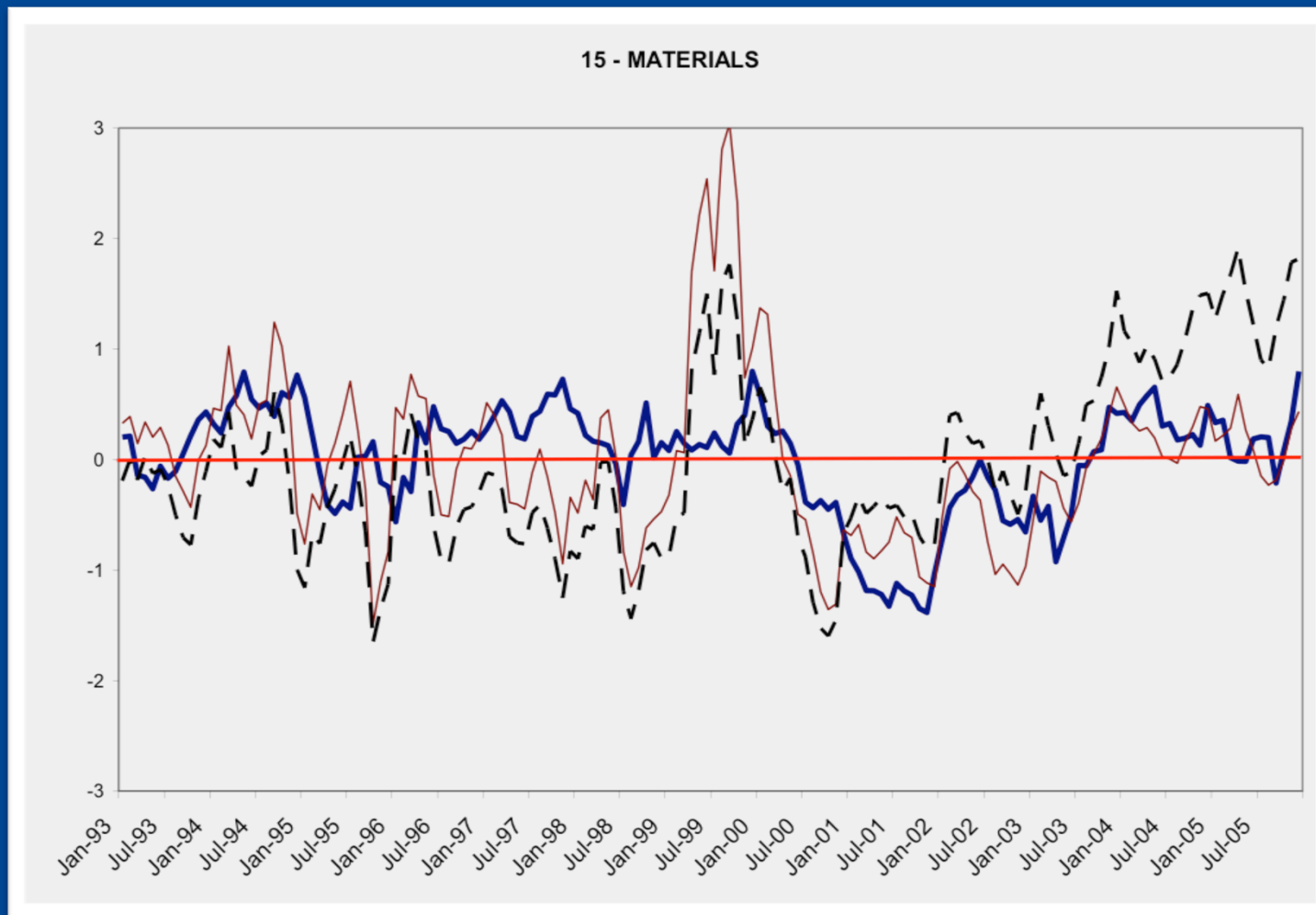
Sector orderflow and the economy

$$CFNAI_t = \alpha + \beta \frac{(\text{Net Orderflow}_{j,t-1} - \text{Passive Net Orderflow}_{j,t-1})}{\text{Capsector}_{j,t-1}} + \varphi CFNAI_{t-1} + \varepsilon_{j,t}$$

3-Month Lead, Large Sized Orderflow		
Sector	β	R^2
Energy	-0.0517	0.2581
Materials	0.1741***	0.3261
Industrials	0.0670*	0.2629
ConsDisc	-0.0837*	0.2675
ConsStap	0.0909*	0.2706
Health	-0.0021	0.2511
Finance	-0.1117***	0.2811
InfoTech	0.0236	0.2525
TeleCom	-0.2112***	0.3484
Utilities	-0.0391	0.2549

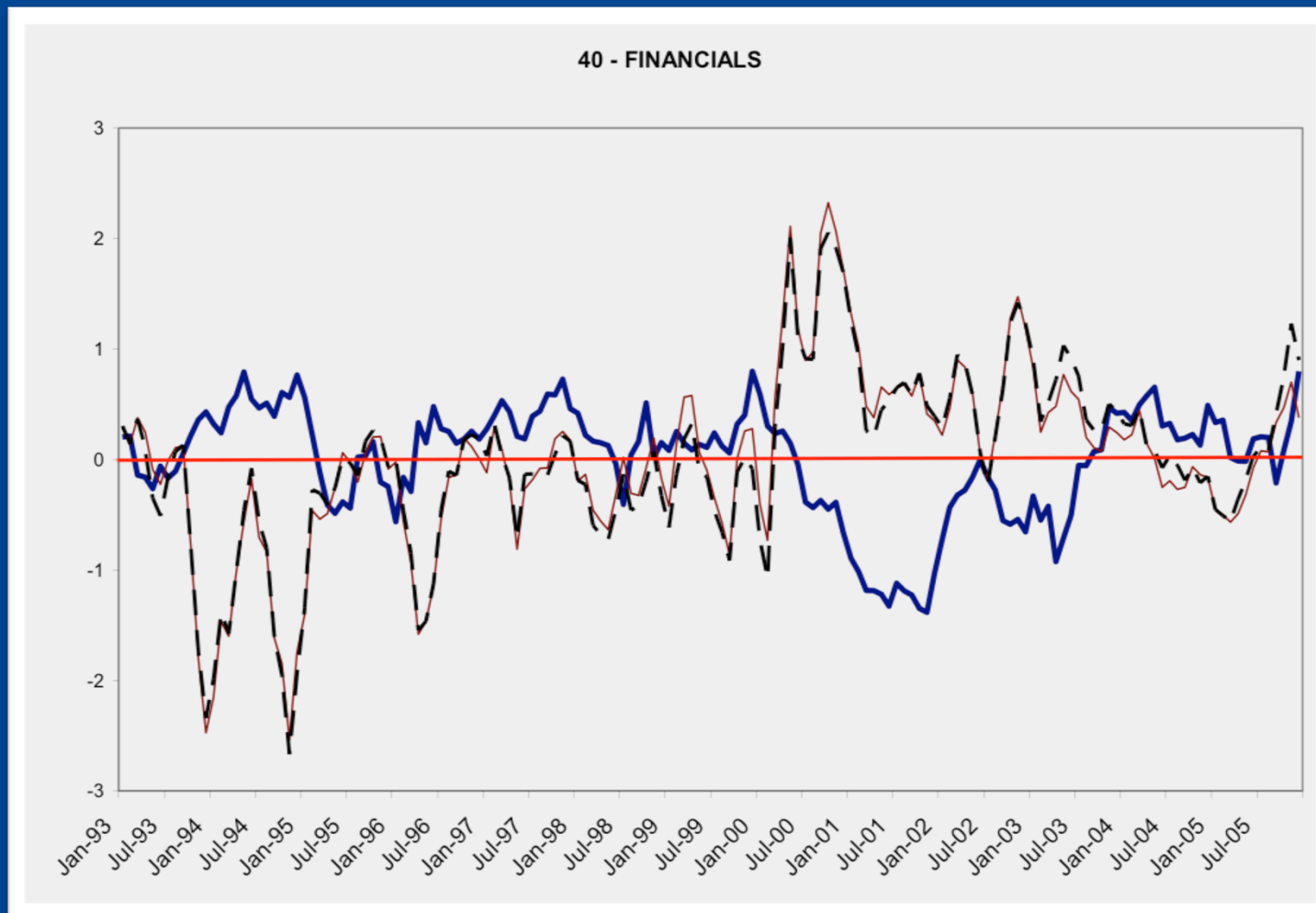
- Flows associated with +Materials, -Financials, and -TeleCom are univariately related to the future state of the macro economy

Sector orderflow and the economy (cont)



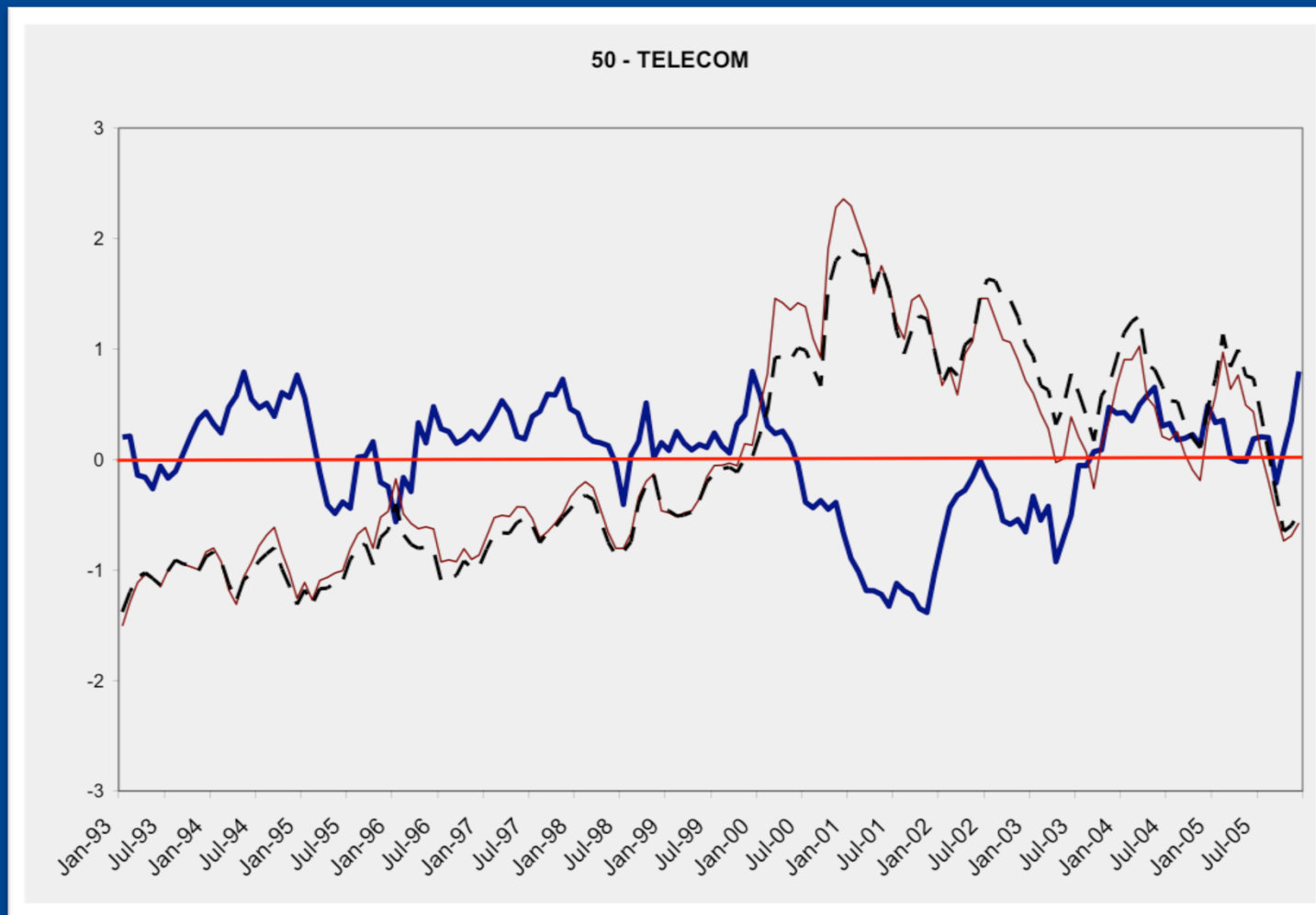
- Blue = CFNAI, red = large trades, black = all trades

Sector orderflow and the economy (cont)



- Blue = CFNAI, red = large trades, black = all trades

Sector orderflow and the economy (cont)



- Blue = CFNAI, red = large trades, black = all trades

Sector orderflow and the economy (cont)

$$\frac{(\text{Net Orderflow}_{j,t-1} - \text{Passive Net Orderflow}_{j,t-1})}{\text{Capsector}_{j,t-1}}$$

3-Month Lead, Pairwise Correlations with Best Linear Combination	
Sector	Correlation
Energy	-0.1777**
Materials	0.6232***
Industrials	0.2417***
ConsDisc	-0.3583***
ConsStap	0.3833***
Health	0.1066
Finance	-0.4274***
InfoTech	0.0974
TeleCom	-0.7255***
Utilities	-0.0584

- Flows associated with +Materials, +Industrials, +Consumer Staples are aggressive sectors while -Energy, -Consumer Discretionary, -Financials, and -Telecomm are defensive

Sector orderflow and the equity market

$$SP500_t = \alpha + \beta \frac{(\text{Net Orderflow}_{j,t-1} - \text{Passive Net Orderflow}_{j,t-1})}{\text{capsector}_{j,t-1}} + \varphi SP500_{t-1} + \varepsilon_{j,t}$$

3-Month Lead, Large Sized Orderflow		
Sector	β	R^2
Energy	-0.0009	0.0055
Materials	-0.0010	0.0056
Industrials	0.0048	0.0188
ConsDisc	-0.0063*	0.0277
ConsStap	0.0063*	0.0282
Health	0.0037	0.0128
Finance	-0.0038	0.0135
InfoTech	0.0007	0.0053
TeleCom	-0.0061*	0.0263
Utilities	0.0026	0.0089

- Flows are only weakly related to future 3-month stock returns (the results are somewhat stronger for 1-month returns)

Sector orderflow and the bond market

$$1yBondRet_t = \alpha + \beta \frac{(\text{Net Orderflow}_{j,t-1} - \text{Passive Net Orderflow}_{j,t-1})}{\text{capsector}_{j,t-1}} + \varphi \text{BondRet}_{t-1} + \varepsilon_{j,t}$$

3-Month Lead, Large Sized Orderflow		
Sector	β	R^2
Energy	0.0003	0.0482
Materials	-0.0008***	0.1277
Industrials	-0.0001	0.0342
ConsDisc	0.0001	0.0324
ConsStap	0.0001	0.0321
Health	-0.0001	0.0324
Finance	0.0006***	0.0860
InfoTech	-0.0002	0.0367
TeleCom	0.0004	0.0542
Utilities	0.0002	0.0386

- Flows associated with -Materials and +Financials are related to future 3-month bond returns

Information content results

Sector orderflow vs. returns

$$Y_t = \alpha + \sum_{j=1}^{10} \beta_j \frac{(\text{Net Orderflow}_{j,t-1} - \text{Passive Net Orderflow}_{j,t-1})}{\text{capsector}_{j,t-1}} + \sum_{j=1}^{10} \delta_j (\text{Ret}_{j,t-1} - \text{Ret}_{mkt,t-1}) + \varphi Y_{t-1} + \varepsilon_{j,t}$$

Comparison of R ² 3-Month Ahead			
Large Order Size	CFNAI	S&P500	1Yr Bond
Unexpected NOF	0.4250	-0.0319	0.1433
Excess Returns	0.2708	0.0178	0.0159
Unexpected NOF + Excess Returns	0.4396	-0.0006	0.1341

Sector orderflow and NFP news

$$F_{t,t+\tau} = \alpha + \beta \frac{(NFP_{ACT,t} - NFP_{EXP,t})}{\sigma_S} + \varepsilon$$

where F is either the best linear combination of sector orderflow to predict CFNAI, equity market return, or bond market return

Relation with Non-Farm Payroll Surprises (Monthly)			
Order Size LARGE	CFNAI	S&P500	1Yr Bond
Flows β	0.0453***	0.0002	-0.0001**
Flows R^2	0.03	0.00	0.01
Returns β	-0.0077	-0.0002	0.0001
Returns R^2	0.00	0.00	0.00

Sector rotation results

Conditioning on orderflow dispersion

- **Sector level orderflow dispersion = standard deviation of unexpected orderflow across stocks within a given sector**
- **Two aggregate measures of dispersion**
 - σ_1 aggregates sector level dispersion by market cap weights
 - σ_2 aggregates sector level dispersion by factor loadings

Conditioning on orderflow dispersion (cont)

- High (low) dispersion corresponds to the aggregate average being above (below) its 12-month median

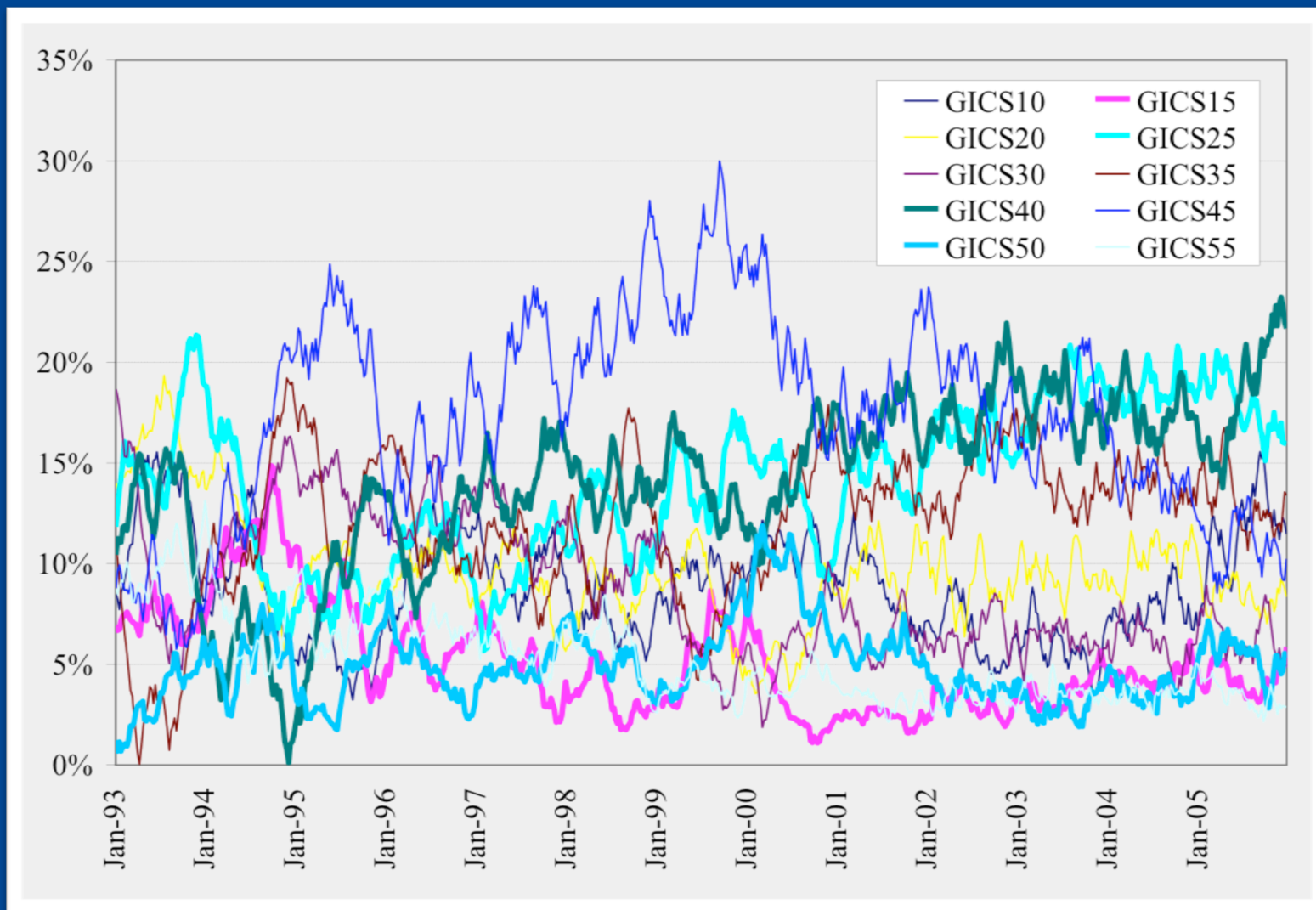
Comparison of R ²			
Dispersion	CFNAI	Stock Market	1y Bond
Low σ_1	0.46	0.07	0.14
High σ_1	0.24	0.00	0.07
Ratio	1.92	35.00	2.00
Low σ_2	0.37	0.04	0.16
High σ_2	0.17	-0.05	0.03
Ratio	2.18		5.33

- Low dispersion, or more uniform orderflow within sectors, signals a stronger prediction about future states of the economy, stock market returns, and bond market returns

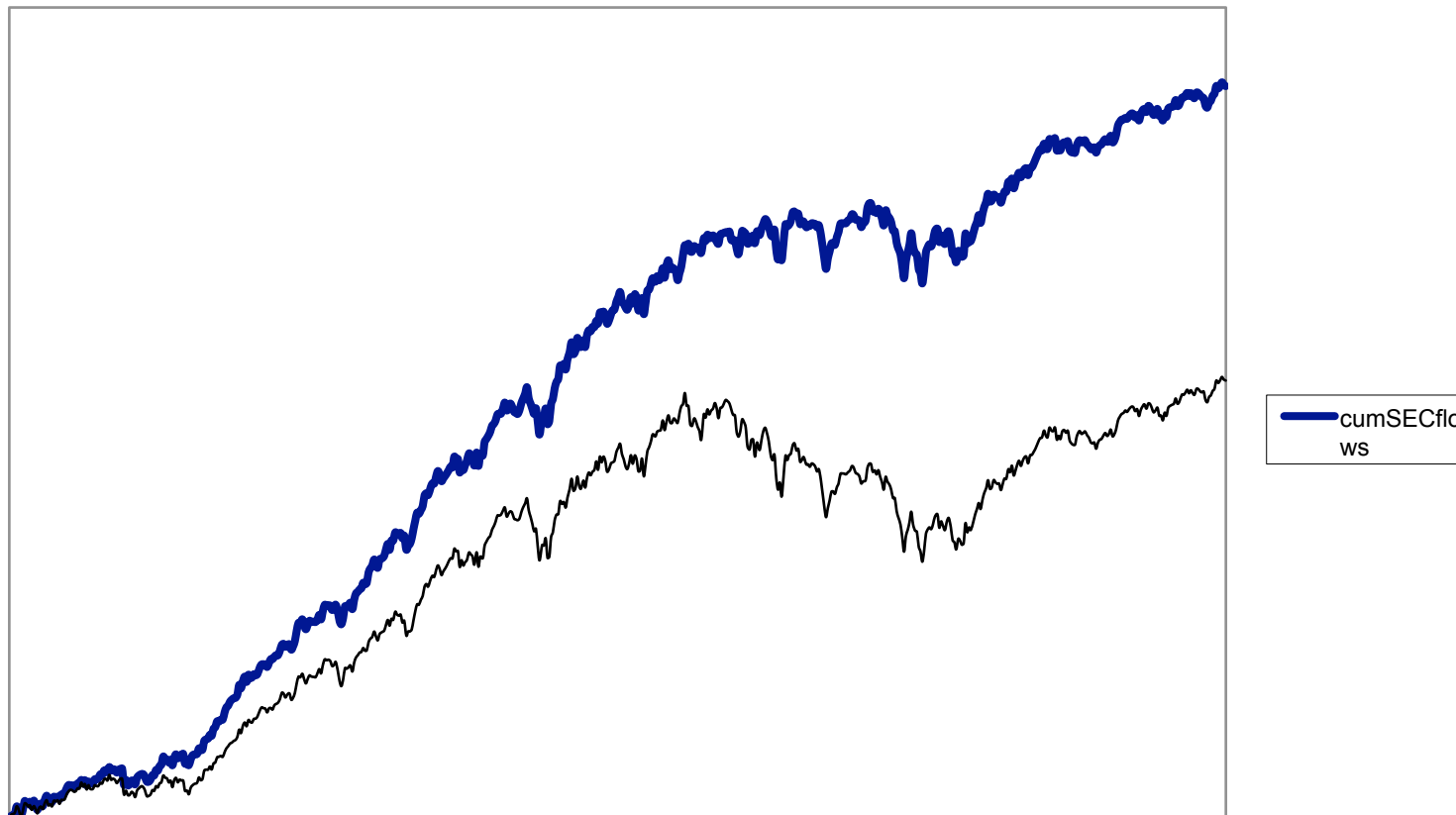
Orderflow mimicking portfolio

- Construct a long-only portfolio that mimics the observed sector reallocations corresponding to large trades
- Start with the market portfolio (in 1993) and tilt the portfolio weights based on the net excess orderflow across sectors
 - Calculate net excess orderflow of large orders
 - Translate dollar flows into percentage weight changes
 - Impose a 1% maximum weekly sector reallocation

Orderflow mimicking portfolio – Port weights



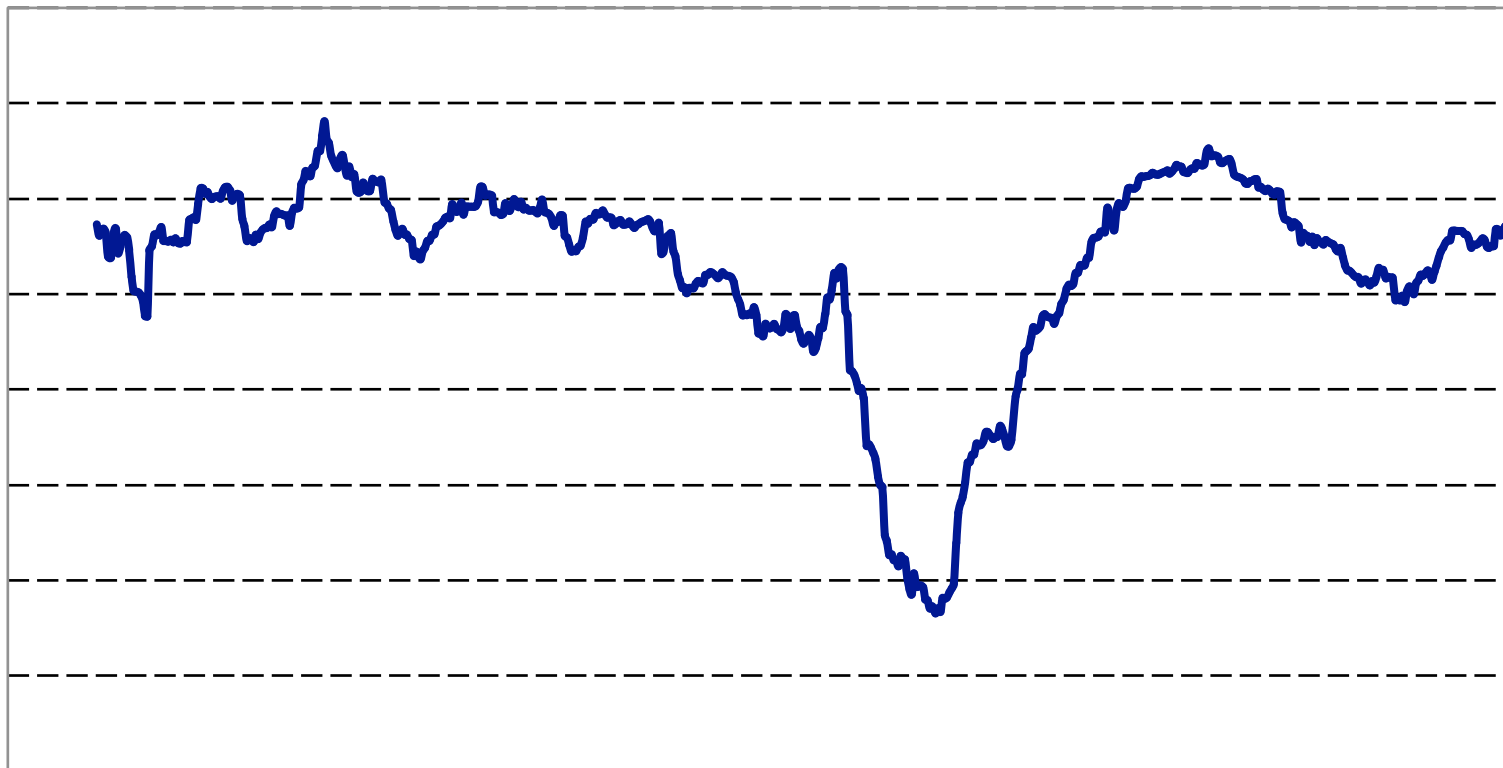
Orderflow mimicking portfolio – Cum returns



Orderflow mimicking portfolio – Summary stats

	Market	Orderflow portfolio
Mean return	11.8%	19.7%
Std. Deviation	15.7%	14.5%
Sharpe Ratio	0.75	1.36

Orderflow mimicking portfolio – Rolling β s



Sector orderflow and mutual fund rebalancing

- Construct standardized active sector level rebalancing for all mutual funds aggregated by Lipper style classification

Pairwise Correlation between Sector Orderflow and Mutual Fund Rebalancing		
Sector	Core Funds	Index Funds
Energy	0.27	-0.07
Materials	0.18	0.04
Industrials	0.06	0.10
ConsDisc	0.25	-0.03
ConsStap	0.30	0.19
Health	0.30	0.15
Finance	0.03	0.05
InfoTech	0.16	0.24
TeleCom	0.04	-0.19
Utilities	0.14	-0.36
Median	0.17	0.04

Conclusion

Conclusion

- **Portfolio rebalancing across equity sectors predicts changes in the macro economy and, at a minimum, future bond returns**
- **Sector orderflow contains more and, more importantly, different information than sector returns**
- **Results are stronger when flows are uniform within a sector**
- **Sector orderflow information is related to macroeconomic news**
- **Sector orderflow can be translated into a portfolio tilt with superior risk-average return characteristics**
- **Sector orderflow is consistent with active mutual fund rebalancing**