Market Segmentation and Cross-predictability of Returns

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Backgrounds & Motivation

- A growing body of research relaxes some of the stringent assumptions of the efficient markets hypothesis, and posits that gradual diffusion of information among investors explains the observed predictability of returns.
- But focused mainly on studying the lagged price response of assets to their own past returns and their interaction with variables thought to affect the speed of information diffusion.

➢ A new channel of information flow that is separate from an asset's own past return? Can it explain the observed predictability of returns in supply chains?

Research Problem

- Is there a new channel of information flow?
  - We explore a new channel of information flow that is separate from an asset's own past return.
- How to understand?
  - We provide some of the first direct evidence on the gradual diffusion of information hypothesis, and on market segmentation as an underlying reason.

Contribution

- Our empirical framework provides a novel measure of information flow that can be used to expand existing work on other forms of return predictability.
- We show that investor specialization, and the resulting informational segmentation of markets, has significant effects on the formation of prices, and that gradual diffusion of information from economically related industries is pervasive.

Model Setting

- Hong et al. (2007): A limited-information model
- two markets, three dates
- informed investors: specialize in one of the markets, at intermediate stage, they receive an informative signal
- uninformed investors: don’t receive an informative signal and at least some of them do not process information
- + (i) the two markets have correlated fundamentals, and therefore an informative signal in one market has information content about the eventual payoff in the other market, and (ii) the two markets are informationally segmented.
- → it is fairly straightforward to show that returns exhibit predictability

Model Setting

➢ Model Intuition:

- First, cross-predictability is to be expected across assets with correlated fundamentals, and to be of the same sign as the correlation of fundamentals.
- Second, allowing the number of informed investors to vary , the magnitude of cross-predictability should be lower where there are more informed investors.
- Third, allowing informed investors to exploit the cross-market content of their signals, their trades in fundamentally related markets should be correlated.

Empirical Design

➢ Why do we test for cross-predictability effects along the supply chain?

- Firms close to each other along the supply chain are likely to face correlated cash flow shocks and relatively similar demand or technological shocks

→ (i) the two markets have correlated fundamentals

➢ Why do we focus on economic boundaries defined by industries?

- They are also likely to represent informational boundaries induced by investor specialization.

→ (ii) the two markets are informationally segmented

Empirical Results: Data

- CRSP stock database (for returns data)
- Merged COMPUSTAT-CRSP database (obtain financial statement and other company information)
- I/B/E/S database (for analyst coverage and earnings expectations)
- Thomson Financial's 13F Holdings database (for institutional ownership)
- sample period: July 1963 - June 2005
- use NYSE, Amex, and NASDAQ stocks, exclude closed-end funds, real estate investment trusts, American Depositary Receipts, foreign companies, primes, and scores

Empirical Results: Identification

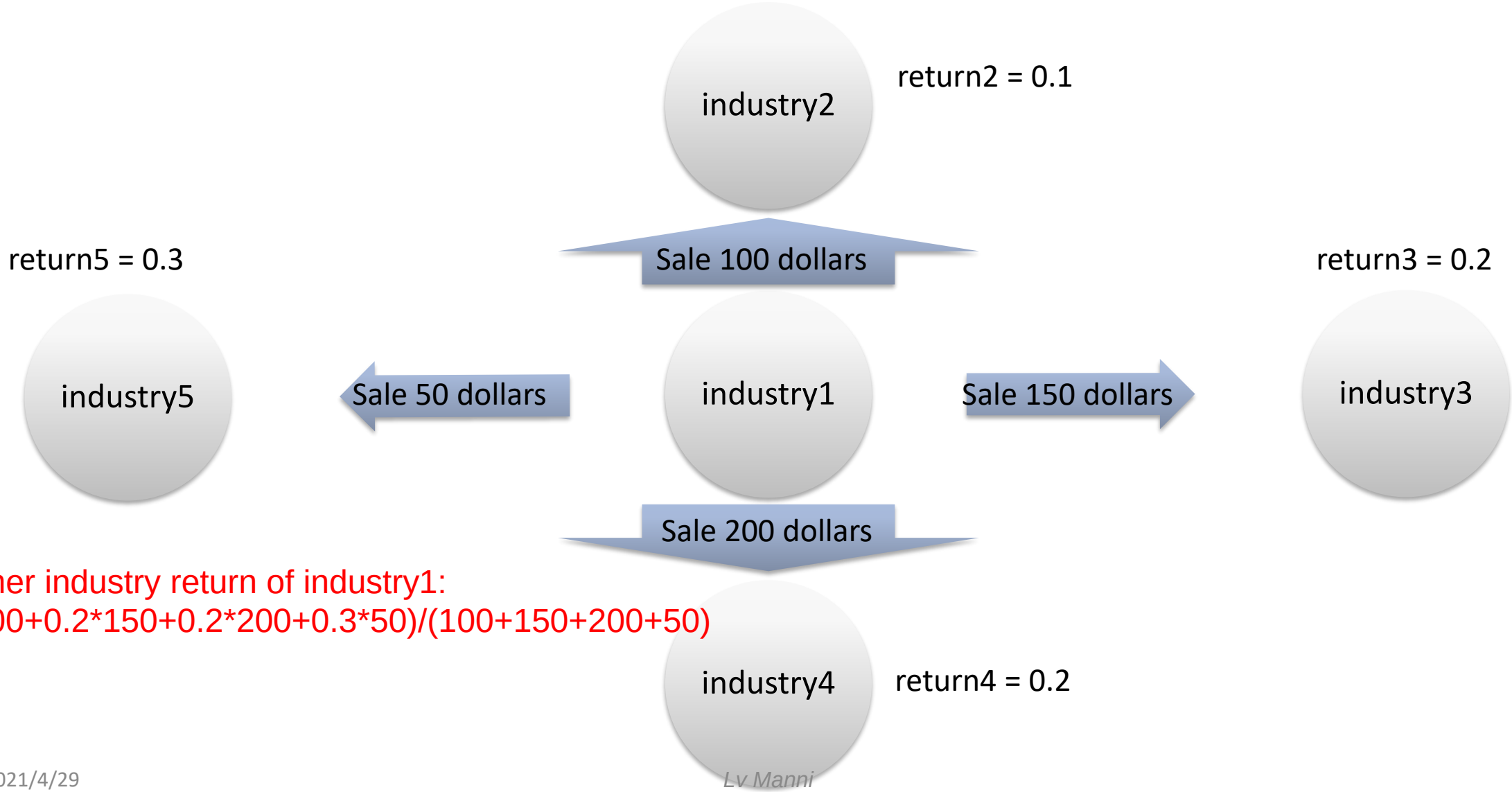
- We use BEA SIC and NAICS code dictionaries to assign each stock to an industry based on the stock's reported SIC or NAICS code in COMPUSTAT.

+ adjustment

- We use a series of Benchmark Input-Output Surveys of the BEA (11 different surveys (2002, 1997, 1992, 1987, 1982, 1977, 1972, 1967, 1963, 1958, and 1947) on a rolling basis) to identify supplier and customer industries for a given stock or industry.

+ adjustment

Empirical Results: Identification



customer industry return of industry1:
(0.1*100+0.2*150+0.2*200+0.3*50)/(100+150+200+50)

Empirical Results: value-weighted monthly returns

- vw monthly industry returns: require there be a market capitalization at the end of June of a given year for a stock to be included in the analysis for the subsequent 12 months.
- we further form two separate portfolios for each industry , one composed of supplier industries and another composed of customer industries:

→ (i) vw monthly supplier industry returns: the share of an industry's total purchases from other industries

→ (ii) vw monthly customer industry returns: the share of the industry's total sales to other industries

Empirical Results: evidence on two important assumptions

- whether firms along the supply chain have correlated fundamentals

$$ROA_{i,t} = \alpha_i + \theta^{\text{market}} ROA_t^{\text{market}} + \theta^{\text{supplier}} ROA_{i,t}^{\text{supplier}} + \theta^{\text{customer}} ROA_{i,t}^{\text{customer}} + e_{i,t},$$

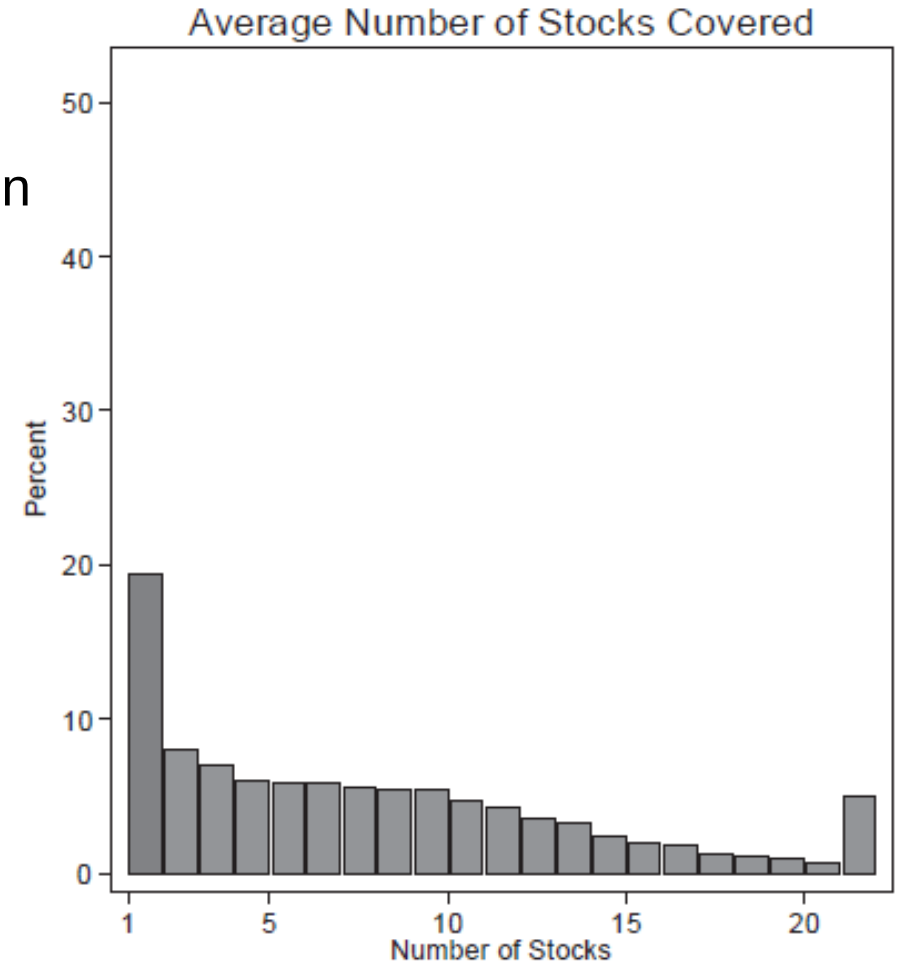
Dependent Variable: ROA	(1)	(2)
ROA_{market}	0.725***	0.172***
	(5.16)	(2.60)
ROA_{supplier}	0.471***	0.398***
	(2.68)	(4.53)
ROA_{customer}	0.465***	0.164*
	(2.98)	(1.90)
Fixed Effects	Yes	Yes
Clustered Standard Errors	Yes	Yes
R^2	0.592	0.394
N obs	275,291	3,002

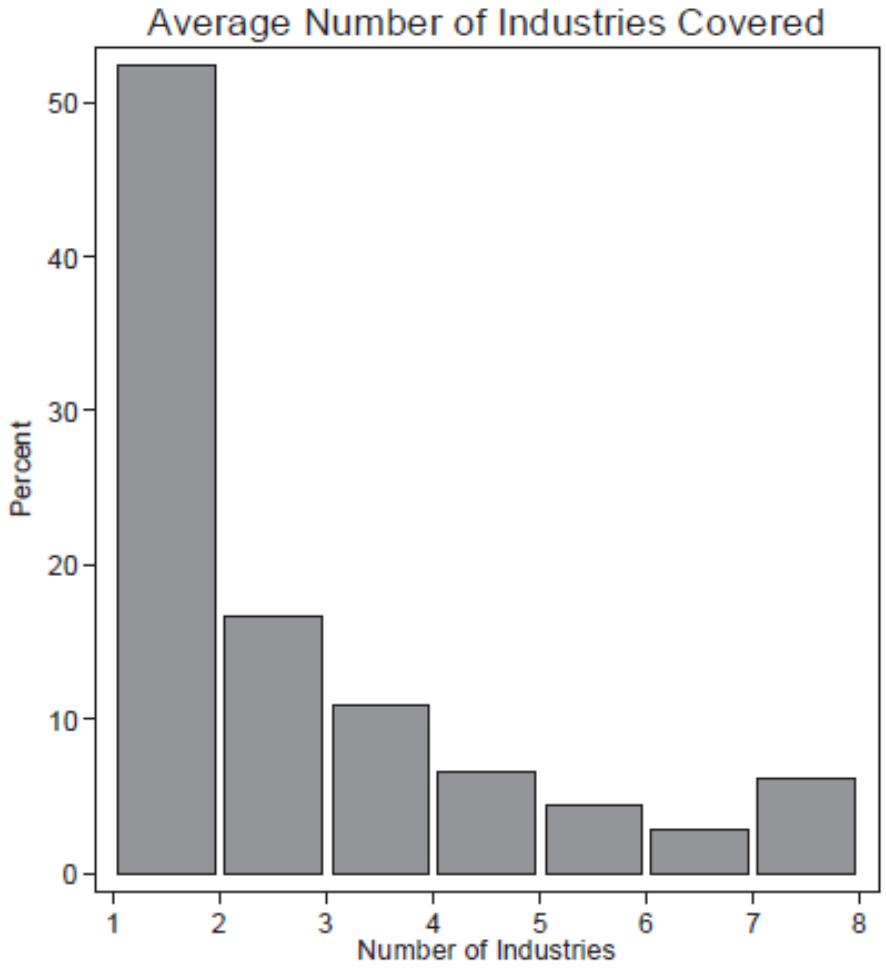
Empirical Results: evidence on two important assumptions

- whether informed investors specialize in their information-gathering activities

What's more, the mid-analyst produces information in supplier industries that in total provide only 8.64% of the covered firm's inputs.

The corresponding statistic is 8.73% for customer industries that buy the covered firm's output.





Empirical Results: Stock-Level Cross-predictability Effects

- whether stock-level returns are cross-predictable based on lagged returns in supplier and customer industries

$$r_{i,t} = \alpha_t + \lambda_t^{\text{supplier}} r_{i,t-1}^{\text{supplier}} + \lambda_t^{\text{customer}} r_{i,t-1}^{\text{customer}} + \Lambda_t Z_{i,t-1} + e_{i,t}$$

	(1)	(2)	(3)	(4)
Constant	0.005**	0.006**	0.006**	0.006**
	(2.01)	(2.33)	(2.45)	(2.35)
$r_{\text{supplier},t-1}$	0.114***	0.105***	0.117***	0.113***
	(5.03)	(4.37)	(5.04)	(4.88)
$r_{\text{customer},t-1}$	0.071***	0.058***	0.059***	0.075***
	(4.11)	(3.26)	(3.46)	(4.27)
$r_{\text{stock},t-1}$	−0.062***	−0.047***	−0.067***	
	(14.44)	(10.41)	(13.84)	
$r_{\text{stock},t-2:t-12} \times \frac{1}{11}$	0.072***	0.099***	0.099***	
	(4.07)	(5.01)	(5.37)	
$r_{\text{industry},t-1}$	0.134***	0.117***	0.137***	0.032***
	(15.52)	(12.33)	(15.29)	(2.83)
R^2	0.028	0.051	0.034	0.091
T	492	492	492	503
Sample excludes observations:	–	<20th NYSE percentile	No closing price at end of month $t-1$	

Empirical Results: Industry-Level Cross-predictability Effects

- whether the stock-level cross-predictability also hold at the industry level

$$r_{i,t} = \alpha_t + \lambda_t^{\text{supplier}} r_{i,t-1}^{\text{supplier}} + \lambda_t^{\text{customer}} r_{i,t-1}^{\text{customer}} + \Lambda_t Z_{i,t-1} + e_{i,t}$$

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Empirical Results: The Effect of Informed Investors

- should the magnitude of cross-predictability be lower where there're more informed investors?
- two proxies of informed investors:

→ (i) the amount of analyst coverage

✓ require an analyst have made a forecast for the stock within the last 12 months

✓ require an analyst to have made a forecast for the stock during a given month

→ (ii) the presence of institutional investors as owners in the stock

Empirical Results: The Effect of Informed Investors

- should the magnitude of cross-predictability be lower where there're more analyst coverage?

$$r_{i,t} = \alpha_t + \sum_{j=1}^{5} \lambda_t^j A_{t-1}^j r_{i,t-1}^{\text{related}} + e_{i,t}$$

	(1)	(2)	(3)
Constant	0.008*	0.008*	0.008**
	(1.95)	(1.89)	(1.97)
$r_{\text{composite},t-1} \times Rank_{t-1}(1^{\text{st}}\,Quintile - Low)$	0.293***	0.300***	0.380***
	(4.98)	(4.95)	(5.89)
$r_{\text{composite},t-1} \times Rank_{t-1}(2^{\text{nd}}\,Quintile)$	0.299***	0.259***	0.317***
	(5.12)	(4.65)	(5.55)
$r_{\text{composite},t-1} \times Rank_{t-1}(3^{\text{rd}}\,Quintile)$	0.185***	0.201***	0.244***
	(3.27)	(3.71)	(4.50)
$r_{\text{composite},t-1} \times Rank_{t-1}(4^{\text{th}}\,Quintile)$	0.143**	0.157**	0.177***
	(2.37)	(2.61)	(3.16)
$r_{\text{composite},t-1} \times Rank_{t-1}(5^{\text{th}}\,Quintile - High)$	0.027	0.034	0.067
	(0.43)	(0.55)	(1.12)
R^2	0.014	0.012	0.012
T	281	281	303

Empirical Results: The Effect of Informed Investors

- should the magnitude of cross-predictability be lower where there're more institutional owners?

$$r_{i,t} = \alpha_t + \sum_{j=1}^{5} \lambda_t^j A_{t-1}^j r_{i,t-1}^{\text{related}} + e_{i,t}$$

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Empirical Results: Evidence on Institutional Trading

- Informed investors trade simultaneously in fundamentally related markets to exploit the cross-market content of their signals.

$$\Delta IO_{i,q} = \alpha_i + \gamma_q + \beta^{\text{related}} \Delta IO^{\text{related}}_{i,q} + e_{i,q}$$

	(1)	(2)	(3)	(4)
$\Delta IO_{\text{supplier},q}$	0.073***			
	(2.78)			
$\Delta IO_{\text{customer},q}$		0.055***		
		(2.77)		
$r_{\text{supplier},q}$			0.009***	
			(2.80)	
$r_{\text{customer},q}$				0.007**
				(2.28)
R^2	0.052	0.052	0.052	0.052
N obs	500,250	500,250	500,250	500,250

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$r_{\text{customer},q}$				0.007**
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R^2	0.052	0.052	0.052	0.052
N obs	500,250	500,250	500,250	500,250

Empirical Results: Self-financing Trading Strategies

- the profitability of self-financing trading strategies

	Low (1)	(2)	(3)	(4)	High (5)	H − L
Panel A: Industries Sorted on $r_{\text{supplier},t-1}$						
Mean return	0.028	0.054	0.056	0.072	0.100	0.073
Standard deviation	0.159	0.175	0.178	0.178	0.162	0.110
Sharpe ratio	0.173	0.306	0.313	0.406	0.617	0.660
Panel B: Industries Sorted on $r_{\text{customer},t-1}$						
Mean return	0.016	0.060	0.052	0.065	0.085	0.070
Standard deviation	0.176	0.166	0.157	0.165	0.184	0.134
Sharpe ratio	0.090	0.361	0.333	0.395	0.463	0.520
Panel C: Industries Sorted on $r_{\text{composite},t-1}$						
Mean return	0.013	0.036	0.074	0.071	0.100	0.087
Standard deviation	0.169	0.165	0.172	0.174	0.172	0.132
Sharpe ratio	0.077	0.220	0.430	0.409	0.582	0.658

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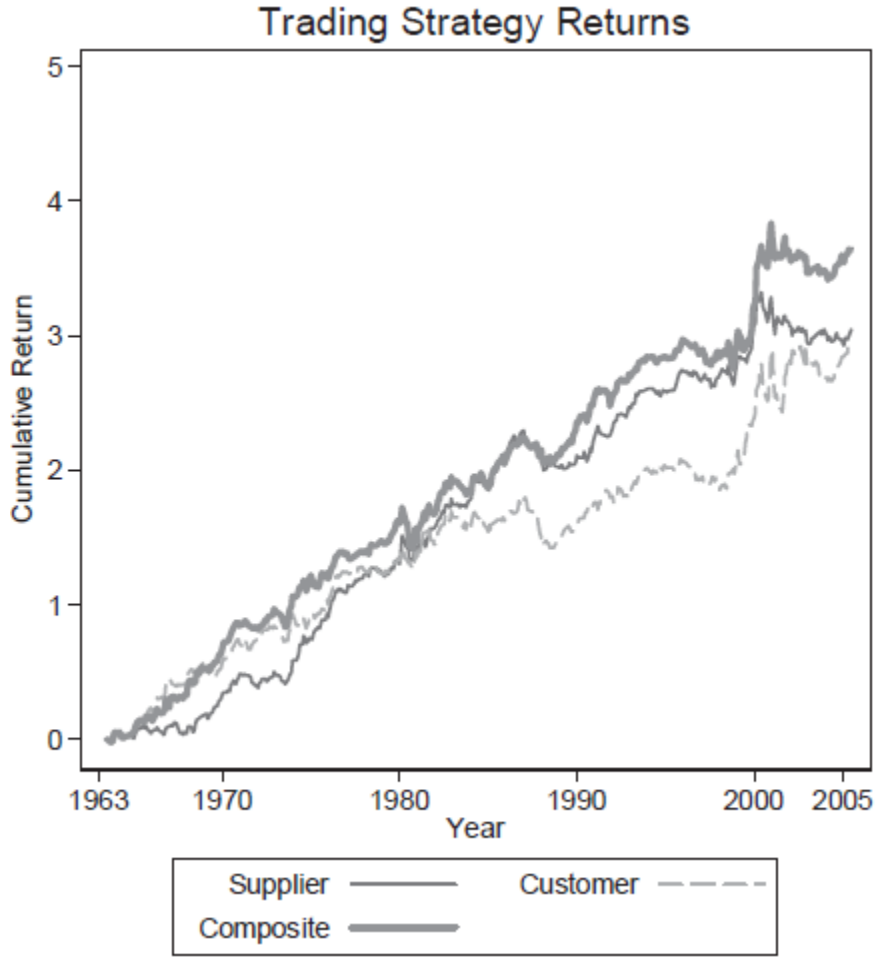
Empirical Results: Self-financing Trading Strategies

- whether the returns from these trading strategies are exposed to well-known return factors

Trading Strategy Based on	$r_{\text{supplier},t-1}$	$r_{\text{customer},t-1}$	$r_{\text{composite},t-1}$
Alpha	0.005***	0.005***	0.006***
	(3.42)	(2.61)	(3.22)
$R_{\text{market}} - R_f$	0.017	0.051	0.038
	(0.48)	(1.08)	(0.89)
SMB	0.016	−0.065	0.004
	(0.35)	(1.15)	(0.07)
HML	−0.013	0.054	0.015
	(0.24)	(0.82)	(0.23)
MOM	0.102***	0.068	0.144***
	(2.89)	(1.59)	(3.41)
R^2	0.019	0.012	0.024
N obs	503	503	503

Empirical Results: Self-financing Trading Strategies

- Cumulative returns (July 1963 to June 2005)



Empirical Results: Evidence from Long/Short Hedge Funds

- whether the return series of long/short equity hedge funds are correlated with the return series from the three trading strategies analyzed above

- Use Credit Suisse / Tremont Long / Short Equity Hedge Fund Index to measure the returns of long/short equity hedge funds

	(1)	(2)	(3)	(4)
Alpha	0.001	0.001	0.001	0.001
	(1.17)	(1.01)	(0.78)	(0.92)
$R_{\text{market}} - R_f$	0.488***	0.489***	0.497***	0.487***
	(15.26)	(15.59)	(15.96)	(15.99)
SMB	0.216***	0.216***	0.220***	0.215***
	(6.62)	(6.74)	(6.95)	(6.89)
HML	−0.027	−0.014	−0.021	−0.019
	(0.64)	(0.33)	(0.52)	(0.48)
MOM	0.219***	0.212***	0.222***	0.205***
	(9.71)	(9.52)	(10.14)	(9.40)
Supplier Strategy		0.071**		
		(2.52)		
Customer Strategy			0.060***	
			(3.08)	
Composite Strategy				0.080***
				(3.78)
R^2	0.806	0.815	0.819	0.825
N obs	138	138	138	138

Conclusion

- We find evidence that firm- and industry-level returns are cross-predictable based on lagged returns in supplier and customer industries. The effects appear to be economically significant.
- We find evidence that cross-predictability effects are weaker for stocks with high levels of analyst coverage and institutional ownership.
- We also document that the trading behavior of institutional investors mimics that of an informed investor profiting from cross-predictable returns.
- All of these findings are consistent with limited-information models.

Extension

- investigate the extent of cross-predictability between the equity market and the corporate bond market
- The BEA Survey is a common type of census analysis that is carried out in most OECD countries. In addition to exploring cross-predictability internationally, a cross-country study can shed light on the relation between financial development and the speed with which related industry information is priced.