

International Price and Earnings Momentum

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Motivation

- Momentum is one of the most puzzling observations in financial time series. Two main strategies:
 - Price momentum: past winning stocks continue to deliver superior returns, past losing stocks continue to disappoint.
 - Earnings momentum refers to the observation of momentum in stock prices following the direction of analyst's earning forecast revision.
- Price and earnings momentum are constantly defying market efficiency around the globe which common research either rationalizes by risk-based or behavioral-based explanations.
- Ample evidence includes:
 - Jegadeesh and Titman (1993): Price momentum.
 - Chan, Jegadeesh, and Lakonishok (1996): Earnings momentum.
 - Rouwenhorst (1998), Griffith, Ji, and Martin (2003,2005): International evidence.

Motivation (con'd)

- In some cases, anomalies might be more apparent than real. A common strategy for robustness checks is to study trading strategies in many countries.
- To safeguard against potential data snooping biases, we examine price and earnings momentum in a comprehensive sample of 17 developed countries.
- Researchers have long been aware of data snooping biases (Lo and MacKinlay, 1990; Sullivan et al., 1999; White, 2000), but common statistical procedures are rarely optimal in terms of power, hence most likely rejecting the anomaly.
- To overcome these problems, we make use of the results in Romano and Wolf (2005, 2007) to test whether price and earnings momentum robust w.r.t. data snooping biases.

Motivation (con'd)

If we find the momentum anomaly to be robust, we may ask the following questions:

- Is price momentum subsumed by earnings momentum, i.e., do investors underreact to fundamental news represented by earnings revision?
- What is the economic rationale for the existence of momentum? In particular:
 - Is there a relation between macroeconomy and momentum, i.e., does momentum proxy macroeconomic risk?
 - Is momentum related to information uncertainty, i.e., do investors underreact when the signal about fundamentals is noisier?
- Why is momentum not arbitrated away?

Data and Sample Selection

Comprehensive sample of 17 developed countries:

- 16 European markets and the U.S., spanning 1987–2007.
- Biggest European markets: The U.K., France, Germany, Switzerland and the Netherlands.
- Survivorship bias avoided by including dead companies.
- Return and I/B/E/S data from Datastream.
- Penny Stocks are excluded, i.e., stock price below \$5.

Cleaning of Return Data:

- Ince and Porter (2006): Handle Datastream Data with Care!
- Issues not resolved by Datastream have been screened and corrected.

Momentum Strategies

Price Momentum: Jegadeesh and Titman (1993)

- Buy winners and sell losers.
- Momentum measured over 6 months, 6 months holding period, monthly rebalancing implies 6 overlapping portfolios.

Earnings Momentum: Chan, Jegadeesh, Lakonishok (1996)

- Buy positive and sell negative revisions.
- Earnings momentum signal is 6 months cumulated revisions:

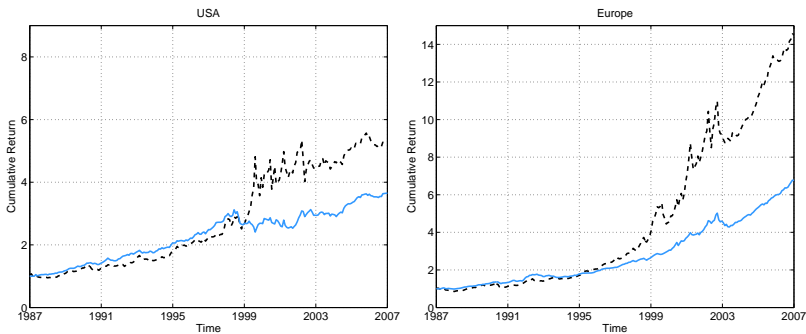
$$REV6_{it} = \sum_{j=0}^6 \frac{f_{it-j} - f_{it-j-1}}{p_{it-j-1}}$$

- 6 months holding period, monthly rebalancing, overlapping portfolios.

Momentum Portfolios: Risk and Return

Country		<i>Momentum Ranking</i>					<i>Hedge Strategy</i>
		Lowest	2	3	4	Highest	
<i>Price Momentum</i>							
USA	Return	0.93	1.15	1.21	1.27	1.72	0.79
	Volatility	6.48	4.41	3.98	4.17	5.98	4.40
	Beta	1.20	0.82	0.72	0.76	1.07	-0.14
	Size	19.77	20.29	20.46	20.49	20.21	2.80
Europe	Return	0.56	0.88	1.10	1.25	1.75	1.19
	Volatility	5.76	4.24	3.93	4.02	4.77	3.69
	Beta	1.24	0.94	0.87	0.89	1.03	-0.21
	Size	20.32	20.92	21.16	21.29	21.15	5.00
<i>Earnings Momentum</i>							
USA	Return	1.27	1.16	1.10	1.43	1.85	0.58
	Volatility	5.50	4.40	3.82	4.21	4.91	2.17
	Beta	1.15	0.90	0.74	0.81	0.99	-0.04
	Size	19.47	20.17	20.61	20.60	20.04	4.11
Europe	Return	0.91	0.98	1.06	1.28	1.74	0.83
	Volatility	4.82	4.28	3.82	3.74	3.99	1.71
	Beta	1.18	1.05	0.92	0.89	0.96	-0.14
	Size	19.96	21.02	21.43	21.43	20.63	7.52

Cumulative Returns for the U.S. and Europe



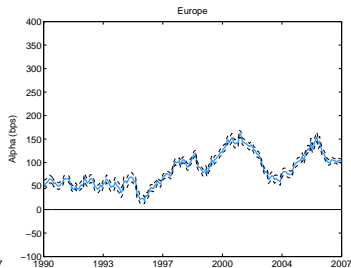
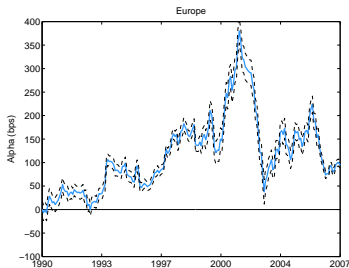
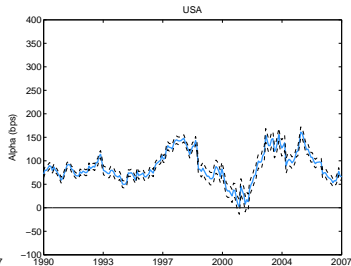
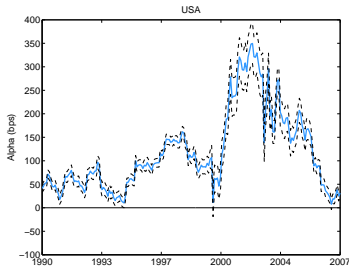
- Price momentum (dashed), earnings momentum (solid).
- Price momentum: Higher returns at a higher volatility.
- Earnings momentum higher risk-adjusted performance.
- Not explained by Fama-French Factors.

Fama-French Time Series Regressions

$$R_{Wt} - R_{Lt} = \alpha + \beta(R_{Mt} - R_{Ft}) + \gamma R_{SMBt} + \delta R_{HMLt} + \varepsilon_t$$

		<i>Fama-French Model</i>								
		α	β	γ	δ	t(α)	t(β)	t(γ)	t(δ)	Adj. R^2
<i>Price Momentum</i>										
USA	1	-0.90	1.00	0.34	0.08	-5.29	19.38	5.43	1.28	84.5
	5	0.11	0.82	0.34	-0.30	0.63	15.64	5.45	-5.06	81.0
	5-1	1.01	-0.18	0.01	-0.38	3.57	-2.07	0.08	-3.88	7.0
Europe	1	-0.41	0.76	0.41	0.21	-2.54	8.23	5.55	2.76	84.6
	5	1.05	0.52	0.45	-0.20	7.82	6.80	7.32	-3.19	84.7
	5-1	1.46	-0.24	0.04	-0.41	5.84	-1.68	0.33	-3.49	9.4
<i>Earnings Momentum</i>										
USA	1	-0.63	1.00	0.22	0.12	-6.10	27.17	5.30	3.38	92.5
	5	0.22	0.75	0.33	-0.01	1.80	17.50	6.85	-0.16	87.3
	5-1	0.85	-0.25	0.11	-0.12	6.15	-5.12	2.01	-2.67	14.5
Europe	1	-0.15	0.72	0.38	0.14	-1.59	12.73	8.56	3.06	92.5
	5	0.89	0.47	0.42	0.03	10.14	9.13	10.25	0.82	90.9
	5-1	1.05	-0.25	0.04	-0.10	9.68	-3.94	0.70	-2.07	24.3

Trailing alphas for the U.S. and Europe



Momentum Strategies and Data Snooping

- When testing several strategies some may outperform by chance alone:
 - Extensive re-use of a given database
 - Testing one investment idea in similar markets
- Control for data-snooping is essential:
 - Goal: When assessing several strategies avoid as many false rejections of capital market efficiency
 - Statistically speaking: Seek control of the FWE or FDP
 - $FWE = \text{Probability of rejecting at least one of the true null hypotheses}$
 - $FDP = \# \text{false rejections} / \# \text{rejections.}$
 - Classical methods are too conservative and virtually reject everything.
- We employ more recent framework of Romano, Shaikh and Wolf (2007) (StepM Method).

Accounting for Multiple Testing

- Goal: When assessing S strategies avoid as many false rejections of capital market efficiency.
- Statistically speaking: Seek control of the familywise error rate (FWE), which is the probability of rejecting at least one of the true null hypotheses.
- More liberal measures: k -FWE or FDP, the false discovery proportion: $FDP = \# \text{false rejections} / \# \text{rejections}$.
- Classical methods are too conservative and virtually reject everything.
- Romano et al. (2007)'s methods are more flexible by taking the dependence structure of the test statistics into account.
- Example: When applied to the accrual anomaly, Leippold and Lohre (2007) show that the accrual anomaly is more apparent than real.

Multiple Testing of Alphas

Country	Price Momentum					Earnings Momentum				
	θ_s	StepM		FDP-StepM		θ_s	StepM		FDP-StepM	
		c_I	rej	c_I	rej		c_I	rej	c_I	rej
USA	0.0101	0.0046	1	0.0067	1	0.0085	0.0054	1	0.0067	1
Europe	0.0146	0.0082	1	0.0106	1	0.0105	0.0079	1	0.0090	1
UK	0.0090	0.0037	1	0.0057	1	0.0080	0.0052	1	0.0063	1
Ireland	0.0040	-0.0041	0	-0.0011	0	0.0145	0.0030	1	0.0076	1
Germany	0.0128	0.0060	1	0.0086	1	0.0087	0.0049	1	0.0064	1
Austria	0.0032	-0.0036	0	-0.0010	0	0.0089	0.0030	1	0.0054	1
Switzerland	0.0093	0.0025	1	0.0051	1	0.0081	0.0035	1	0.0054	1
France	0.0116	0.0063	1	0.0083	1	0.0100	0.0063	1	0.0078	1
Italy	0.0119	0.0056	1	0.0080	1	0.0042	-0.0003	0	0.0015	1
Greece	0.0217	0.0120	1	0.0156	1	0.0045	-0.0031	0	0.0000	0
Spain	0.0066	0.0008	1	0.0030	1	0.0103	0.0042	1	0.0067	1
Portugal	0.0102	0.0006	1	0.0042	1	0.0106	0.0031	1	0.0061	1
Netherlands	0.0113	0.0057	1	0.0078	1	0.0108	0.0052	1	0.0074	1
Belgium	0.0118	0.0052	1	0.0077	1	0.0088	0.0045	1	0.0062	1
Sweden	0.0122	0.0055	1	0.0080	1	0.0093	0.0035	1	0.0058	1
Norway	0.0106	0.0025	1	0.0056	1	0.0071	0.0003	1	0.0030	1
Denmark	0.0134	0.0077	1	0.0099	1	0.0123	0.0055	1	0.0082	1
Finland	0.0124	0.0047	1	0.0076	1	0.0140	0.0077	1	0.0103	1
Σ			16		16			16		17

Linking Price and Earnings Momentum

- Both momentum effects cannot be attributed to data snooping biases—raising the need for an economic rationale.
- Time series correlation of price and earnings momentum strategies (hedge returns and Fama-French alpha) suggest a close relationship.
- Price and earnings momentum may be traced back to similar sources.
- Is price momentum just a noisy proxy of earnings momentum?

Does Earnings Momentum Subsume Price Momentum?

4-Factor Model:

$$R_{WMLt} = \alpha + \beta(R_{Mt} - R_{Ft}) + \gamma R_{SMBt} + \delta R_{HMLt} + \zeta R_{PMNt} + \varepsilon_t$$

		<i>Fama-French Model</i>			<i>4-Factor Model</i>				
		α	$t(\alpha)$	Adj. R^2	α	ζ	$t(\alpha)$	$t(\zeta)$	Adj. R^2
USA	1	-0.90	-5.29	84.5	-0.80	-0.17	-4.20	-2.02	83.7
	2	-0.24	-2.10	84.8	-0.30	0.16	-2.38	2.83	83.7
	3	-0.07	-0.63	80.3	-0.17	0.27	-1.43	5.10	80.5
	4	-0.04	-0.34	81.0	-0.15	0.32	-1.33	6.38	83.0
	5	0.11	0.63	81.0	0.01	0.30	0.04	3.74	80.9
	5-1	1.01	3.57	7.0	0.80	0.47	2.65	3.51	14.5
Europe	1	-0.41	-2.54	84.6	0.36	-0.81	2.22	-9.71	88.6
	2	0.15	1.74	92.3	0.35	-0.19	3.50	-3.66	91.7
	3	0.47	6.01	92.4	0.40	0.11	4.41	2.31	91.7
	4	0.64	7.64	91.7	0.41	0.27	4.51	5.84	91.9
	5	1.05	7.82	84.7	0.52	0.56	3.60	7.55	85.6
	5-1	1.46	5.84	9.4	0.16	1.37	0.66	11.13	42.9

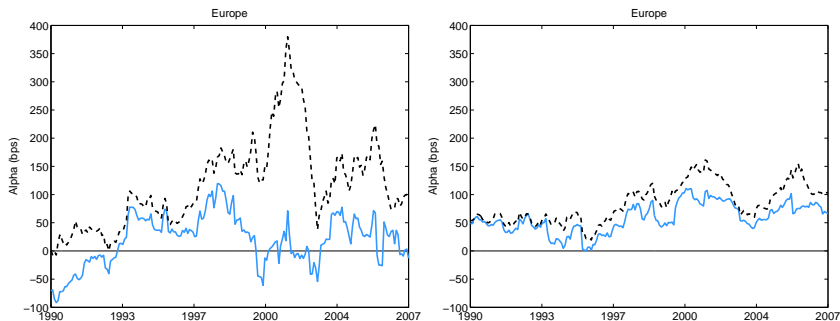
Does Price Momentum Subsume Earnings Momentum?

4-Factor Model:

$$R_{PMNt} = \alpha + \beta(R_{Mt} - R_{Ft}) + \gamma R_{SMBt} + \delta R_{HMLt} + \eta R_{WMLt} + \varepsilon_t$$

		<i>Fama-French Model</i>			<i>4-Factor Model</i>				
		α	$t(\alpha)$	Adj. R^2	α	η	$t(\alpha)$	$t(\eta)$	Adj. R^2
USA	1	-0.63	-6.10	92.5	-0.57	-0.05	-5.35	-2.18	92.6
	2	-0.37	-3.88	89.9	-0.30	-0.06	-3.02	-2.95	90.3
	3	-0.18	-1.60	82.2	-0.11	-0.06	-0.97	-2.23	82.5
	4	0.06	0.46	82.4	0.09	-0.03	0.69	-0.92	82.4
	5	0.22	1.80	87.3	0.15	0.06	1.20	2.08	87.5
	5-1	0.85	6.15	14.5	0.72	0.11	5.14	3.51	18.5
Europe	1	-0.15	-1.59	92.5	0.10	-0.16	1.08	-6.98	93.7
	2	0.13	1.77	94.3	0.28	-0.09	3.60	-4.89	94.8
	3	0.34	4.57	92.8	0.42	-0.04	5.12	-2.23	92.9
	4	0.57	6.97	91.0	0.49	0.05	5.58	2.39	91.2
	5	0.89	10.14	90.9	0.74	0.09	8.06	4.21	91.5
	5-1	1.05	9.68	24.3	0.64	0.26	6.76	11.13	50.6

Fama-French vs. Four-Factor Alphas: Europe



- Left figure: Earnings Momentum subsumes price momentum consistently throughout sample period.
- Right figure: Price momentum does not subsume earnings momentum.

Risk or Behavioral Bias?

- Price Momentum is mostly subsumed by earnings momentum in European equity markets.
- The market frenzy at the end of the nineties caused a temporary decoupling of this relationship in the U.S.
- Nevertheless, given this close relation suggests that both momentum phenomena may be traced back to similar sources.
- Two strands of research:
 - Risk-Based Explanation, see Chordia and Shivakumar (2002, 2006): Momentum may reflect future economic activity or mispricing of certain macroeconomic variables.
 - Behavioral-based explanation, see Zhang (2006): Investors tend to underreact to fundamental news.

Momentum and the Macroeconomy

Conjecture:

- Momentum may reflect future economic activity or mispricing of certain macroeconomic variables.

Test Procedure:

- Regression of future GDP growth (etc.) on lagged values of Fama-French factors and one momentum factor.

Results:

- Market factor tends to be a leading factor.
- Negative relation: small cap or value stocks suffer(thrive) prior to periods of economic growth(slowdown).
- Rather weak link between future GDP growth and both momentum factors.

Price Momentum and Macroeconomy: GDP

	<i>Coefficients</i>					Adj. R^2
	<i>ICPT</i>	<i>MOM</i>	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	
USA	0.037	-0.045	-0.014	0.020	-0.036	11.01
Europe	0.014	0.023	0.051	-0.032	-0.030	45.40
UK	0.019	0.031	0.003	0.023	0.021	14.29
Ireland	0.071	-0.034	0.062	-0.082	-0.030	21.53
Germany	0.013	0.000	0.041	-0.025	0.003	10.03
Austria	0.021	-0.005	-0.002	0.019	0.005	13.74
Switzerland	0.014	-0.003	0.103	-0.076	-0.014	25.03
France	0.018	0.006	-0.013	0.033	-0.008	10.51
Italy	0.013	0.010	0.098	-0.084	0.009	18.00
Greece	0.047	-0.009	0.011	-0.010	-0.026	15.48
Spain	0.070	-0.017	-0.009	0.019	0.015	11.32
Portugal	0.024	-0.019	-0.022	0.037	-0.024	25.50
Netherlands	0.021	0.023	0.085	-0.062	0.008	30.35
Belgium	0.010	0.026	0.036	-0.010	0.040	52.03
Sweden	0.029	0.006	-0.014	0.034	-0.001	8.62
Norway	0.030	-0.023	0.039	-0.045	-0.006	21.69
Denmark	0.025	-0.018	0.017	-0.009	-0.006	-1.06
Finland	0.018	0.035	-0.021	0.064	-0.029	38.95

Momentum and Information Uncertainty

Conjecture:

- Theoretical models suggest investors' underreaction to cause the momentum effects, see Hong and Stein (1999).
- If momentum is due to investors' underreaction, momentum should be stronger in more opaque information environments for which information diffusion is slowest.

Test Procedure:

- Analyze winner and loser portfolios limited to different degrees of information uncertainty as measured by:
 - Analyst coverage.
 - Dispersion in analysts' earnings forecasts.
 - Volatility.
 - Idiosyncratic Volatility.

Momentum and Information Uncertainty

Country	<i>Analyst Coverage</i>			<i>Dispersion</i>			<i>Idiosyncratic Volatility</i>		
	Low	Mid	High	Low	Mid	High	Low	Mid	High
<i>Price Momentum</i>									
USA	1.36	1.07	0.86	1.00	1.02	1.28	0.97	0.98	1.41
	5.86	4.18	2.67	4.03	3.93	4.62	3.01	3.79	5.49
Europe	1.67	1.66	1.18	1.44	1.47	1.60	1.47	1.22	1.71
	6.77	7.12	4.91	6.59	6.39	6.25	5.50	5.23	6.74
# max ranking	7	4	3	2	3	10	5	0	10
	1.67	1.80	2.53	2.27	2.20	1.53	1.87	2.73	1.40
<i>Earnings Momentum</i>									
USA	1.02	0.61	0.19	0.71	0.52	0.68	0.50	0.63	0.70
	7.37	3.78	0.93	4.98	3.87	4.62	3.56	4.28	4.26
Europe	0.99	0.96	0.58	0.75	0.68	0.88	0.87	0.89	0.89
	7.66	7.50	3.46	6.87	6.73	7.07	7.62	7.97	5.99
# max ranking	6	7	3	4	5	7	4	3	9
	1.87	1.80	2.27	1.87	2.27	1.80	2.27	2.07	1.60

Momentum and Information Uncertainty

Results

- U.S. Price Momentum is more pronounced when limited to stocks with low analyst coverage, high dispersion in analysts' earnings forecasts, high volatility.
- These findings translate to most of the European countries.
- The results for earnings momentum are quite similar, albeit somewhat muted.
- Momentum is also most pronounced when limited to high idiosyncratic risk stocks
- Hence, high arbitrage costs may deter investors from exploiting the momentum anomalies.

Momentum and Liquidity

- Lesmond, Schill, and Zhou (2004) and Korajczyk and Sadka (2004) evidence that exploiting U.S. price momentum is costly.
- The trading costs basically derive from frequent trading in mostly illiquid stocks.
- Consequently, Sadka (2006) documents a close relation between liquidity risk and U.S. momentum strategies.
- Liu (2006)'s liquidity-augmented two-factor asset pricing model almost completely subsumes the U.S. price momentum alpha.
- Hence, we expect liquidity to also play a crucial role in inhibiting profitable execution of the European momentum strategies.

Liquidity Measures and Test Procedure

- We analyze the momentum strategies when restricting to winner and loser stocks characterized by different degrees of liquidity.
- For 'liquidity', we compute four different metrics:
 1. Quantity dimension: volume and turnover.
 2. Price impact dimension: Amihud's (2002) *ILLIQ* measure.
 3. Both dimensions as in Liu (2006):

$$\text{Liu Measure} = \# \text{ No-Trading Days} + \frac{1/\text{Turnover}}{1,000,000}.$$

- Stocks are sorted into five quintiles based on past returns or earnings revisions.
- For each quintile the stocks are further sorted into three terciles based on one of the liquidity measures.
- We exclude the six smallest countries from the analysis, i.e., Austria, Finland, Greece, Ireland, Norway, and Portugal.

Price Momentum and Liquidity

Country	<i>Dollar Volume</i>			<i>Share Turnover</i>			<i>ILLIQ</i>			<i>Liu Measure</i>		
	High	Mid	Low	High	Mid	Low	Low	Mid	High	Low	Mid	High
USA	0.72	0.92	1.15	1.08	0.70	0.76	0.63	0.97	1.29	0.94	0.56	1.34
	2.06	3.42	5.61	3.55	2.80	3.57	1.81	3.56	5.66	3.21	2.08	5.96
Europe	1.23	1.51	1.45	1.63	1.18	1.19	1.20	1.50	1.50	1.41	1.33	1.49
	4.76	5.66	7.08	6.00	5.14	6.02	4.65	5.56	6.85	5.18	5.40	7.47
UK	0.91	1.19	1.29	1.18	1.00	1.19	0.88	1.16	1.33	1.02	1.02	1.29
	3.12	4.23	4.59	4.15	3.66	4.22	3.04	3.98	4.85	3.70	3.60	4.58
Germany	1.14	1.15	1.06	1.21	1.03	0.87	1.08	1.07	1.16	1.07	1.17	1.11
	3.33	3.82	4.29	3.74	3.61	3.79	3.50	3.16	4.17	3.23	4.04	4.51
Switzerland	1.51	0.85	1.15	1.34	0.97	1.17	1.33	1.01	1.18	1.29	1.17	1.19
	4.20	2.75	3.82	3.78	3.29	4.56	3.79	3.07	3.99	3.78	3.67	4.11
France	0.66	1.36	1.22	1.08	1.25	0.95	0.71	1.38	1.14	1.06	1.22	1.06
	1.94	4.52	4.42	3.30	4.25	3.50	2.09	4.37	4.29	3.26	3.98	3.71
Italy	1.39	1.30	0.65	1.16	0.82	0.61	1.16	1.17	0.88	1.34	1.34	0.72
	3.18	3.09	1.65	2.56	2.15	1.57	2.79	2.76	2.29	2.80	3.84	1.53
Spain	0.35	0.33	0.98	0.78	0.54	0.16	0.23	0.34	0.93	0.69	0.08	0.51
	0.87	0.87	1.80	1.87	1.31	0.43	0.54	0.86	2.02	1.72	0.21	1.09
Netherlands	0.67	0.79	1.24	0.75	0.89	1.15	0.73	0.95	0.89	0.80	1.23	0.60
	1.69	2.14	3.70	1.98	2.85	3.43	1.80	2.78	2.87	2.09	3.52	1.97
Sweden	1.02	1.52	0.27	1.47	0.92	-0.18	1.10	0.92	0.40	1.25	0.84	0.58
	2.50	3.25	0.58	3.42	2.26	-0.45	2.63	2.06	0.94	2.94	2.03	1.44
Denmark	1.16	0.95	0.92	1.08	0.76	1.34	1.32	0.97	0.72	1.26	1.18	0.79
	3.57	3.06	2.42	3.12	2.44	3.61	4.14	3.14	2.09	3.60	3.71	1.97
# max ranking	3	4	4	7	1	3	3	4	5	5	4	3
	2.18	1.82	2.00	1.45	2.36	2.18	2.27	1.82	1.82	1.64	2.00	2.09

Liquidity and Price Momentum – Results

Across most countries and liquidity metrics, the least momentum profits occur for the most liquid stocks. Profitability is increasing with illiquidity.

- U.S. Market:
 - For lowest *ILLIQ* values, significance only at the 10%-level.
 - For low volume stocks, significance is smaller than the one for the whole sample.
- European Markets:
 - Hedge returns above 120 basis points per month with large *t*-statistics (> 4). 'Decreasing effect' is less pronounced.
 - In U.K., Germany and Switzerland, momentum is rather strong among liquid securities.
 - No momentum for the least liquid stocks in Italy, Sweden, and Denmark.

Liquidity and Price Momentum – Results (con'd)

Liquidity and Attention

- Using share turnover sometimes reverses the direction of the liquidity-momentum profitability relationship.
- U.S. and European aggregate price momentum strategy seem to be most profitable in the most liquid securities.
- This puzzling result is in line with Hou, Peng, and Xiong (2006), who argue that trading volume as measured by turnover is a proxy for investor attention.
- When price momentum is mainly an overreaction-driven phenomenon it should be relatively stronger among high turnover stocks.
- Earnings momentum, more likely to be more related to underreaction, should be relatively stronger among low turnover stocks, since investor attention is presumably lower.

Earnings Momentum and Liquidity

Country	<i>Dollar Volume</i>			<i>Share Turnover</i>			<i>ILLIQ</i>			<i>Liu Measure</i>		
	High	Mid	Low	High	Mid	Low	Low	Mid	High	Low	Mid	High
USA	0.27	0.45	0.97	0.31	0.57	0.79	0.23	0.54	1.01	0.4	0.42	1.02
	1.38	2.62	6.96	1.55	3.66	5.94	1.19	3.16	6.97	2.11	2.58	8.18
Europe	0.78	0.81	0.98	0.91	0.74	0.91	0.81	0.79	0.95	0.89	0.83	0.95
	5.07	6.41	8.63	6.14	5.56	8.59	5.41	6.35	8.04	5.67	6.73	9.68
UK	0.89	0.87	1	1.07	0.65	0.97	0.88	0.98	0.92	0.88	0.78	1.03
	5.11	5.18	5.51	6.38	4.08	5.14	5.42	5.7	5.04	5.38	4.7	5.61
Germany	0.56	0.83	0.98	0.8	0.68	0.91	0.54	0.8	0.82	0.6	0.79	0.8
	2.78	4.76	4.05	3.75	4.07	4.57	2.87	4.52	3.39	3.11	4.76	3.25
Switzerland	0.71	0.48	0.64	0.78	0.43	0.66	0.85	0.23	0.54	0.72	0.47	0.73
	2.42	1.76	2.38	2.59	1.67	2.65	2.95	0.75	2.07	2.41	1.82	2.76
France	0.38	0.93	0.49	0.65	0.78	0.73	0.69	0.74	0.53	0.7	1.01	0.39
	1.32	4.3	2.11	2.48	3.42	3.32	2.69	3.16	2.38	2.58	4.83	1.75
Italy	0.86	0.25	-0.05	0.93	0.07	0.13	0.8	0.21	-0.08	0.62	0.13	0.13
	3.09	0.87	-0.15	2.62	0.25	0.46	3.02	0.76	-0.24	2.02	0.47	0.45
Spain	1	0.88	0.92	1.11	0.78	0.88	0.85	0.89	1.05	0.85	0.9	0.99
	1.96	2.05	2.34	2.37	1.91	2.38	2.06	2.17	2.7	1.88	2.37	2.47
Netherlands	0.4	0.77	1.37	0.42	0.5	1.42	0.56	1.07	0.99	0.57	0.97	1.04
	0.99	2.15	5.22	1.23	1.68	4.89	1.35	3.35	3.69	1.64	2.69	4.03
Sweden	0.39	0.65	0.97	0.64	0.94	0.84	0.54	0.63	1.15	0.59	1.01	0.87
	0.91	1.92	2.6	1.56	2.43	2.4	1.28	1.87	3.12	1.33	3.34	2.33
Denmark	0.97	1.66	2.36	1.15	1.25	2.26	1.25	1.46	1.85	1.43	1.65	1.77
	2.13	3.76	2.58	2.62	2.26	2.75	2.56	2.91	2.84	2.2	4.07	2.47
# max ranking	3	1	7	5	2	5	2	3	6	1	2	8
	2.36	2.18	1.45	2.00	2.36	1.55	2.45	1.91	1.64	2.45	2.09	1.36

Liquidity and Momentum (con'd)

- U.S. Market:
 - Indeed – regardless of the liquidity measure – earnings momentum seems to be related to underreaction: strong effect among low turnover (low attention) stocks.
 - Most pronounced for *ILLIQ* measure. Monthly return spread of 23 basis points and insignificant!
 - Our result complements Chordia et al. (2007), who show the post-earnings announcement drift to be equally useless among illiquid stocks as measured by *ILLIQ*.
- European Markets:
 - Across all liquidity measures the strategy earns at least 74 basis points with *t*-statistics in excess of 5.
 - The country-level results are more in line with the persuasive U.S. story (Germany, France, Netherlands, Sweden and Denmark).
- Our results suggest that liquidity appears to be a more severe impediment to implementing earnings momentum strategies as opposed to price momentum strategies.

Conclusion

- International momentum effects are robust when controlling for data snooping biases.
- Price momentum is mostly earnings momentum in disguise, with some decoupling in the U.S. after burst of the tech bubble.
- The evidence of momentum is due to investors' underreaction to fundamental news, not macroeconomic risk.
- Liquidity turns out to be a crucial driver in governing the momentum effects.
- The U.S. momentum effects are clearly most pronounced among illiquid winner and loser stocks.
- However, some European markets exhibit very profitable price momentum strategies even for highly liquid stocks.