

Momentum in Imperial Russia

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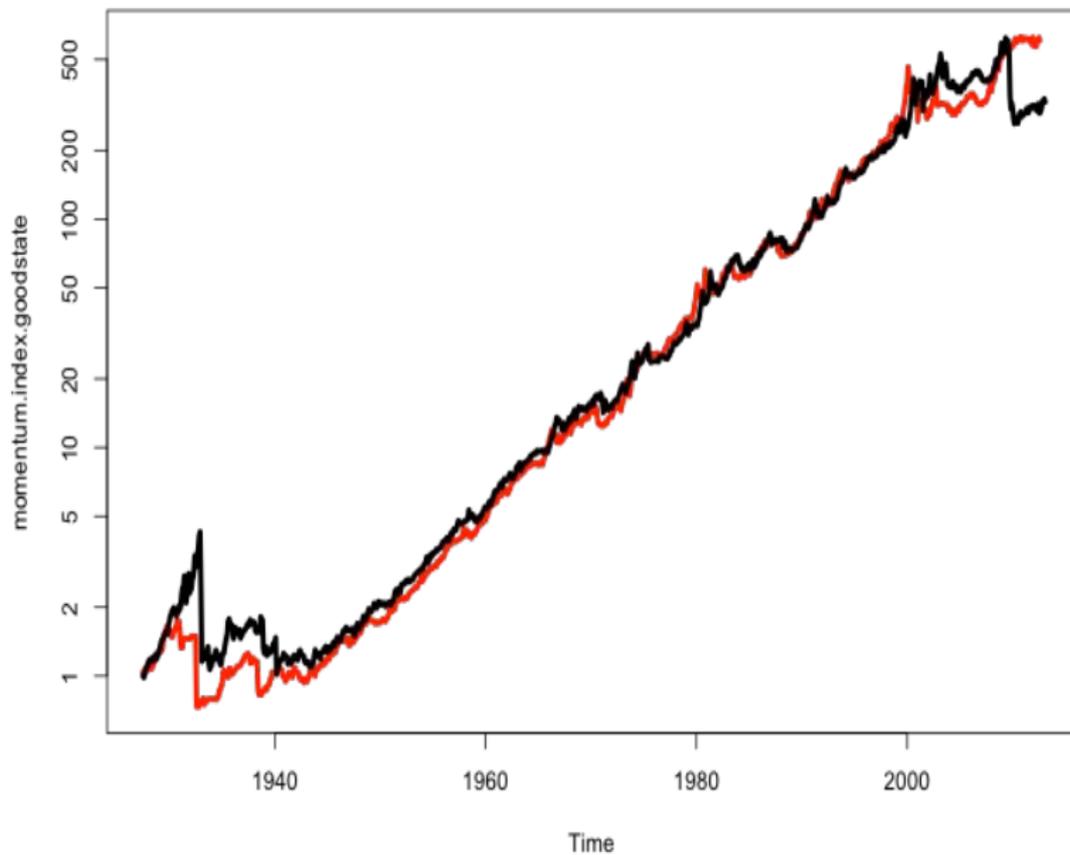
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Momentum: robust puzzle

- Buy last year's winners & short last year's losers. Hold 6 months. Make excess profits. Jegadeesh & Titman (1993) US 1965-1989.
- International evidence (Rouwenhorst, 1998, 1999)
- Historical evidence: US, Geczy & Samonov (2016)
- UK 19th century Chabot et al. (2008)
- Other asset markets (everywhere) Asness & Moskowitz (2013)
 - High Sharpe ratio
 - Signs of reversal after a year
 - Occasional extreme crashes

- Time-varying expected returns
- Compensation for risk
- Prevalent (or salient) behavioral biases
 - Under-reaction
 - Over-reaction
- Institutional and/or informational frictions

Cumulative Momentum Profits: Red = Avoiding Bad State With In-Sample HMM



The St. Petersburg Stock Exchange in 1865-1914

- Un-snooped sample

- No evidence of delegated management

- Financial crises in the sample period

- Regulatory change in 1893 exogenous to momentum changes market participation

Main findings:

- Momentum profits as high as 77 bps per month (t -stat = 6.25)

- Significantly stronger momentum effect after 1893

- No evidence of momentum crashes in this sample of almost 50 years

Reject some theories:

- Data-snooping

- Institutional

- Crash risk correlation

- Under-reaction to information

[Lou \(2012\)](#) and [Vayanos and Woolley \(2013\)](#): flows into and between institutional money managers

=⇒ weak momentum profits in our **entire sample** due to lack of delegated management

On June 8, 1893, PSZ 3-9741 removed all restrictions prohibiting purchases of stock in the absence of cash and with future delivery. A national speculative episode followed. Many people bought stocks for the first time.

[Daniel, Hirshleifer, and Subrahmanyam \(1998\)](#): investor overconfidence about the precision of private information

=⇒ lower momentum profits **pre**-1893 due to (proportionally) more sophisticated investors

[Hong and Stein \(1999\)](#): slow diffusion of information

=⇒ lower momentum profits **post**-1893 due to lower informational frictions

1836 debate & law

I cannot conceal the fact that the dubious successes of several companies founded in our country threaten to dissuade the public from all participation in them, all the more so because a small number of people have already been ruined by stock jobbing [*ot azbiotazba*]. For this reason, the government must exercise more care in the future. In this regard it is better to reject ten companies that fall short of perfection than to allow one to bring harm to the public and to the enterprise itself.³⁹

Any agreement among private persons, whether on the exchange or outside it, regarding the purchase and sale of stocks or notes [*rospisok*] not for cash, and with delivery at a future date and at a certain price, is absolutely forbidden. Furthermore, if such agreements are made known in court, they shall be considered null and void, and those individuals convicted of having made such agreements shall be punished under the law against games of chance [*azartnye igry*]. Brokers or notaries who dare to conclude such agreements shall be dismissed from their posts.⁴²

there was a good deal of destabilizing speculation in Russian shares, as knowing operators pyramided their original gains with more purchases at ever higher prices. They gambled that they could push overpriced shares still higher. This tactic of course made stock prices vulnerable to rapid cumulative declines, especially since margins of less than 25 percent were common.⁶

Speculation in 1893

by playing the stock market. Any citizen of St. Petersburg could easily see, without the aid of any statistics, the rapid growth of stock-market speculation. One only had to pass by the St. Petersburg bourse to see the endless file of carriages which now stood by the entrance during business hours—where at the start of the 1890's no activity at all was noticeable and where the square in front of it was entirely empty—in order to be convinced of the change that had taken place. A passion for playing the market seized wide circles of society. The official stock exchange was no longer able to accommodate all those desiring to participate in the bacchanalia, and some fashionable restaurants hospitably opened their doors to speculators for whom there was no place in the official bourse.

Data (1865 - 1914)

End-of-month stock prices and annual dividends from various historical archives

543 firms

38,090 monthly returns

Price-weighted SPSE index as market portfolio



II. Виржевые дѣны акций и облигацій главнѣйшихъ

Цѣны частныхъ, промышленныхъ и торговыхъ

Годъ число	Номиналь- ная цѣна	Акція торг. и пром. обществъ:	Январь	Февраль	Мартъ	Апрѣль
1799	150	Россійско-Американской Кооп. С.-Петербургскаго Газов. Общ.	—	—	135	—
1835	57, 14 1/2	Россійской Пушкарноартиллерійск. Общества Спасскаго Оульян.	—	40	—	—
1835	142, 85 1/2	Общества С.-Петерб. Волжск. Парусной Мануфактуры	73	73	72 1/2, 72, 73 1/2	74, 77 1/2
1858	100	Акція страхового общества:	—	72	73	—
1830	75	Отъ сына 1-го Россійскаго	—	—	85 1/2	94 1/2
1835	150	» 2-го	113 1/2	—	—	—
1846	250	» Саламанка	—	—	210	—
1858	200	» С.-Петербургскаго	—	—	102 1/2, 100	100 1/2
1858	200	» Московскаго	—	—	—	—
1835	100	Общ. застр. капитал. в довол. Кооп. Надежда для морск. рыбн. и сухоп. стр. и трансп. вл.	—	115	—	115, 111
1847	50	Акція пароходовъ обществъ:	—	125	—	114
1858	150	Русскаго Общ. Парк. и Тор. (Черноморск.)	340, 350	350	—	365
1847	200	Пароходства по Волгѣ	175	—	—	—
1858	250	Общества Каналъ в Меркурій	—	—	150	114
1854	250	Ежово-Волжскаго	—	—	—	—
1858	50	Пароходства по Днѣпру	—	—	28, 29	—
1858	100	Земледѣльск.	—	—	—	—
1865	118	Пароходства по Дону	—	—	—	—
1836	60	Акція железячныхъ дорогъ:	58	—	—	57
1858	125	Парусно-Дальбургскій	106, 107	110, 111	111 1/2	111 1/2, 111
1859	100	Москво-Рязанскій	65, 64 1/2	—	73, 71	70
1865	100	Волжско-Донской	—	—	—	—

Цѣны частныхъ, промышленныхъ и торговыхъ

Годъ число	Номиналь- ная цѣна	Акція торг. и пром. обществъ:	Январь	Февраль	Мартъ	Апрѣль
1799	150	Россійско-Американской Кооп. С.-Петербургскаго Газов. Общ.	—	117 1/2	115	123
1835	57, 14 1/2	Россійской Пушкарноартиллерійск. Общества Спасскаго Оульян.	—	210, 225	—	—
1835	142, 85 1/2	Общества С.-Петерб. Волжск. Парусной Мануфактуры	99	—	—	101 1/2
1858	93	Общества С.-Петерб. Волжск. Парусной Мануфактуры	—	—	255	255
1858	100	Акція страхового общества:	—	—	—	—
1830	400	Отъ сына 1-го Россійскаго	380	430	—	375
1835	150	» 2-го	—	—	—	—
1846	250	» Саламанка	220, 230 1/2	—	—	—
1858	200	» С.-Петербургскаго	—	—	—	106
1858	200	» Московскаго	115, 117 1/2	—	—	115
1835	100	Общ. застр. капитал. в довол. Кооп. Надежда для морск. рыбн. и сухоп. стр. и трансп. вл.	120	—	—	100
1847	50	Акція пароходовъ обществъ:	—	—	—	—

акціонеры. компаній на С.-Петербургской биржѣ.

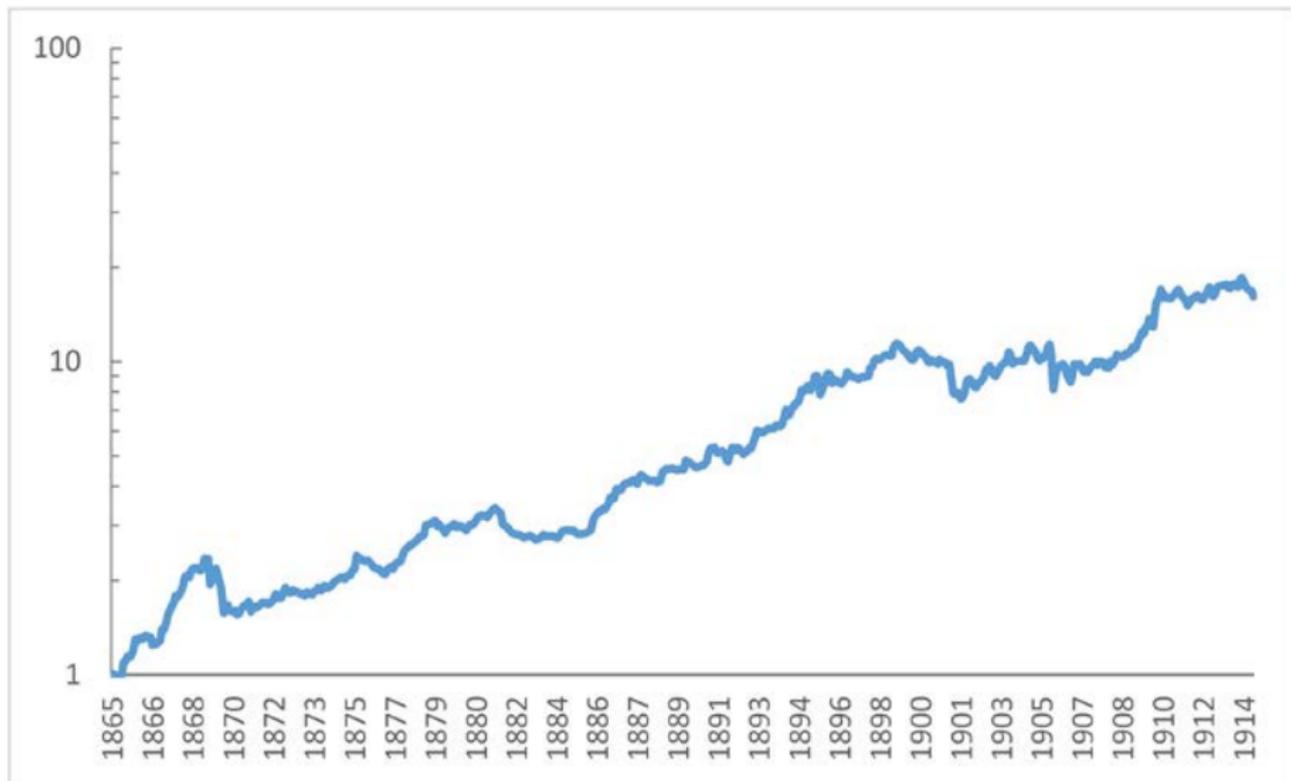
акцій на С.-Петербургской биржѣ въ 1865 году.

Маѣ	Июнь	Июль	Августъ	Сентябрь	Октябрь	Ноябрь	Декабрь
115	—	—	—	—	110, 115	—	115
180	45	—	—	—	—	—	—
—	81 1/2	85 1/4	210	—	—	80, 90	92 1/2
—	—	—	84	84, 85 1/2	—	—	85 1/2
—	60	65	—	—	—	—	—
300	277 1/2	295, 317 1/2	335	—	370	378	378
—	—	100, 102	—	103	110	107	—
—	—	179	—	—	215	220, 217 1/2	—
—	—	—	—	—	160	122	—
—	93	93, 98	—	—	108	120	—
111	—	111	—	—	—	110	—
114	—	117	—	—	117	—	—
332, 350	300, 335	330, 335	—	405	405	334, 365	367
114, 115	—	125, 132	—	—	—	—	—
80	—	—	—	—	—	—	120
—	—	—	—	—	65	—	42
—	—	—	—	35	—	36, 42	44 1/2
69	—	55	—	—	—	—	—
—	109, 109 1/2	111	—	111 1/2	111 1/2, 111 1/2	112, 125	120, 118 1/2
—	—	66, 65 1/2	—	—	—	68	70
—	—	—	70	70	76	77, 78	—

акцій на С.-Петербургской биржѣ въ 1866 году.

Маѣ	Июнь	Июль	Августъ	Сентябрь	Октябрь	Ноябрь	Декабрь
107 1/2	105	—	—	—	—	—	98
70	90	—	—	—	—	77, 77 1/2	—
—	210, 215	212 1/2	—	—	—	—	—
104 1/2	107, 99	98	—	55, 57 1/2	—	52 1/2	98 1/2
87 1/2	—	—	—	—	—	—	—
—	—	—	—	—	—	405	430, 435
—	372 1/2	400	—	—	—	—	110
—	100	104 1/2	107	—	—	218, 220	220, 225
—	—	208	—	—	123	—	—
—	—	—	—	—	—	—	—
—	115	—	120, 130	—	—	—	—
—	—	—	—	—	—	90	—
—	100	—	—	—	—	—	118

The SPSE index



Summary statistics of the SPSE index (Table 1)

Date	Arithmetic Mean	Geometric Mean	Standard Deviation
2/1865-7/1914	6.41	5.78	11.03
2/1865-12/1869	11.24	9.70	17.06
1/1870-12/1879	7.07	6.76	7.59
1/1880-12/1889	5.02	4.77	6.98
1/1890-12/1899	8.80	8.32	9.47
1/1900-12/1909	2.85	1.85	14.26
1/1910-7/1914	5.70	4.98	11.71

Returns of momentum portfolios (Table 2)

<i>J</i>	Panel A					Panel B				
	<i>K</i> =	3	6	9	12	<i>K</i> =	3	6	9	12
3 Buy		0.0060	0.0070	0.0071	0.0074		0.0064	0.0072	0.0073	0.0073
		(3.99)	(4.89)	(5.21)	(5.40)		(4.30)	(4.99)	(5.30)	(5.33)
	Sell	0.0045	0.0041	0.0041	0.0033	0.0037	0.0040	0.0042	0.0038	0.0038
		(3.13)	(3.05)	(3.02)	(2.51)		(2.56)	(2.88)	(3.08)	(2.89)
Buy minus sell	0.0014	0.0029	0.0029	0.0041	0.0023	0.0031	0.0031	0.0036	0.0036	0.0036
		(1.18)	(2.93)	(3.40)	(5.31)		(2.08)	(3.32)	(4.03)	(5.15)
6 Buy		0.0067	0.0074	0.0080	0.0079		0.0075	0.0075	0.0081	0.0079
		(4.44)	(5.12)	(5.67)	(5.59)		(4.90)	(5.22)	(5.68)	(5.50)
	Sell	0.0036	0.0036	0.0028	0.0027	0.0030	0.0034	0.0027	0.0029	0.0029
		(2.60)	(2.56)	(2.06)	(2.03)		(2.17)	(2.37)	(1.97)	(2.15)
Buy minus sell	0.0031	0.0038	0.0052	0.0053	0.0040	0.0039	0.0051	0.0048	0.0048	0.0048
		(2.44)	(3.29)	(5.04)	(5.66)		(3.29)	(3.54)	(5.29)	(5.53)

There is a one-month gap between the formation period and the holding period in Panel B

Returns of momentum portfolios (Table 2), cont'd

<i>J</i>	Panel A				Panel B					
	<i>K</i> =	3	6	9	12	<i>K</i> =	3	6	9	12
9 Buy		0.0072	0.0082	0.0082	0.0079		0.0076	0.0081	0.0081	0.0077
		(4.83)	(5.67)	(5.69)	(5.48)		(5.00)	(5.54)	(5.53)	(5.26)
	Sell	0.0034	0.0025	0.0025	0.0027		0.0028	0.0023	0.0025	0.0030
		(2.32)	(1.72)	(1.80)	(2.00)		(1.96)	(1.65)	(1.81)	(2.28)
Buy minus sell		0.0037	0.0057	0.0057	0.0053		0.0045	0.0060	0.0056	0.0048
		(2.83)	(4.80)	(5.04)	(4.94)		(3.62)	(5.11)	(5.13)	(4.63)
12 Buy		0.0085	0.0085	0.0082	0.0079		0.0087	0.0083	0.0080	0.0075
		(5.71)	(5.81)	(5.66)	(5.45)		(5.66)	(5.52)	(5.40)	(5.09)
	Sell	0.0021	0.0023	0.0025	0.0030		0.0014	0.0021	0.0025	0.0032
		(1.47)	(1.64)	(1.86)	(2.19)		(0.99)	(1.49)	(1.79)	(2.36)
Buy minus sell		0.0065	0.0064	0.0058	0.0052		0.0074	0.0063	0.0057	0.0046
		(5.11)	(5.17)	(4.88)	(4.55)		(5.83)	(5.03)	(4.79)	(4.08)

There is a one-month gap between the formation period and the holding period in Panel B

Performance of 6-month/6-month momentum



Risk-adjusted returns: CAPM alphas

J	$K=$	3	6	9	12
3		0.0023 (2.08)	0.0031 (3.32)	0.0031 (4.03)	0.0036 (5.16)
6		0.0040 (3.33)	0.0039 (3.55)	0.0051 (5.32)	0.0048 (5.59)
9		0.0045 (3.63)	0.0060 (5.12)	0.0056 (5.14)	0.0047 (4.65)
12		0.0074 (5.92)	0.0063 (5.07)	0.0057 (4.83)	0.0046 (4.14)

Market dependent risk-adjusted returns (Table 3)

Adjust returns by running regressions of the form

$$r_t = \alpha + \beta^+ U_t r_{M,t} + \beta^-(1 - U_t) r_{M,t} + E_t$$

<i>J</i>	<i>K</i> =	3	6	9	12
3		0.0021 (1.39)	0.0030 (2.39)	0.0026 (2.47)	0.0032 (3.40)
6		0.0036 (2.21)	0.0040 (2.69)	0.0045 (3.48)	0.0047 (4.01)
9		0.0048 (2.84)	0.0053 (3.38)	0.0050 (3.38)	0.0048 (3.48)
12		0.0061 (3.60)	0.0049 (2.93)	0.0047 (2.96)	0.0042 (2.80)

The effects of *PSZ* 3-9741 on momentum

[Daniel, Hirshleifer, and Subrahmanyam \(1998\):](#)

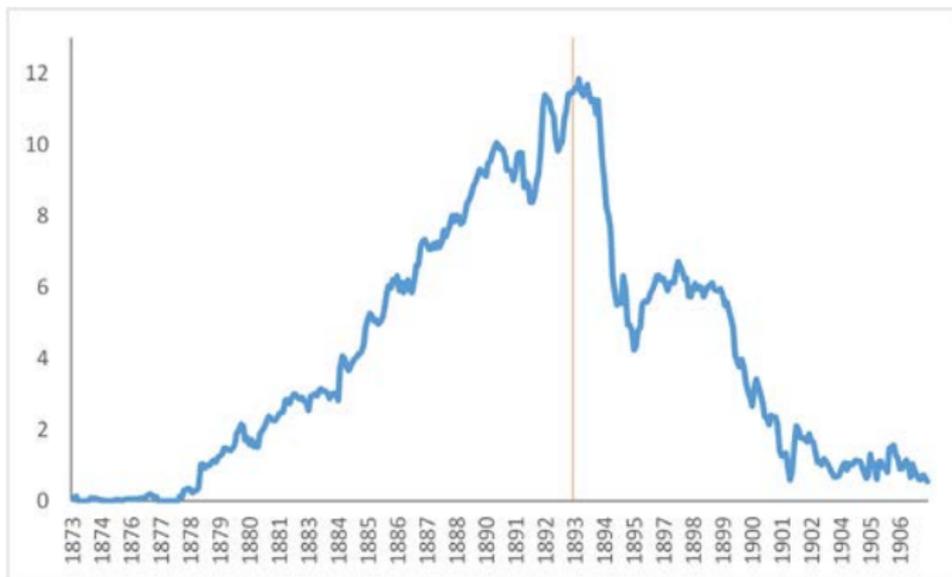
lower momentum profits pre-1893

[Hong and Stein \(1999\):](#)

lower momentum profits post-1893

	Winners (W)	Losers (L)	W-L
Pre-1893: 2/1865-5/1893	0.0065 (3.87)	0.0056 (3.30)	0.0005 (0.33)
Post-1893: 6/1893-7/1914	0.0089 (3.56)	0.0006 (0.26)	0.0083 (5.41)
Post-1893 minus pre-1893	0.0025 (0.84)	-0.0049 (-1.70)	0.0078 (3.51)
Post-1893 minus pre-1893 controlling for trend	0.0114 (2.01)	-0.0033 (-0.57)	0.0139 (3.22)

Test for structural change on momentum profits



$supF$ -statistic = 11.85 ($p = 0.01$)

Did composition of market participants change?

This 1893 regulatory change removed constraints that were presumably more binding for small, less sophisticated investors

=⇒ did it increase market participation by these investors?

We investigate its effects on liquidity to test this argument

[Glosten and Milgrom \(1985\)](#): risk-neutral market maker sets bid-ask spread allowing expected noise-trading profits to offset expected informed-trading losses

=⇒ liquidity should improve when there are more noise traders

The effects of *PSZ* 3-9741 on liquidity (Table 4)

Following [Bekaert, Harvey, and Lundblad \(2007\)](#), our (inverse) liquidity measure is the price-weighted proportion of zero monthly returns

	All Stocks	Low-Price	High-Price
Full sample	0.1200 (21.30)	0.1451 (21.30)	0.1131 (21.85)
Pre-1893: 2/1865-5/1893	0.1494 (18.54)	0.1871 (18.54)	0.1390 (19.32)
Post-1893: 6/1893-7/1914	0.0819 (11.77)	0.0908 (11.77)	0.0796 (12.27)
Post-1893 minus pre-1893	-0.0675 (-6.12)	-0.0963 (-6.12)	-0.0593 (-7.53)
Post-1893 minus pre-1893 controlling for trend	-0.1369 (-6.44)	-0.2070 (-6.44)	-0.1183 (-8.48)

[Daniel and Moskowitz \(2016\)](#) document momentum crashes in the U.S. from 1927 to 2010

Skewness = -6.32

Ten worst monthly returns range from -28% to -79%

Could momentum profits be compensating for bearing crash risk?

Important to know more about their frequency and magnitude

Skewness (Table 6)

J	$K=$	3	6	9	12
3		-0.10	-0.35	-0.35	-0.18
6		-0.30	-0.75	-0.20	-0.23
9		-0.62	-0.51	-0.44	-0.42
12		-0.29	-0.65	-0.58	-0.52

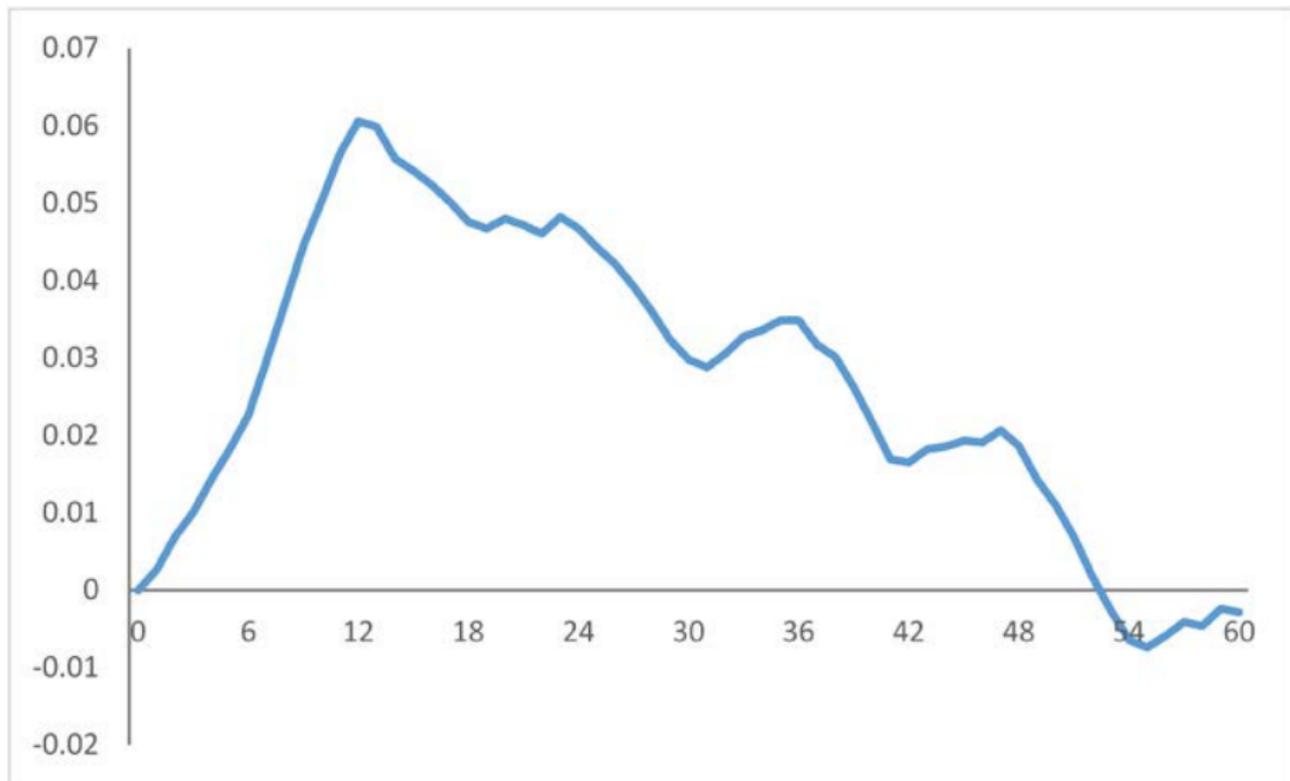
Minimum & maximum (Table 6)

J	$K=$	3	6	9	12
Panel C: Minimum					
3		-0.12	-0.10	-0.09	-0.08
6		-0.14	-0.16	-0.11	-0.10
9		-0.12	-0.12	-0.11	-0.11
12		-0.12	-0.16	-0.16	-0.16
Panel D: Maximum					
3		0.14	0.10	0.09	0.08
6		0.13	0.13	0.11	0.11

In search of momentum crashes

State Variable (S)	$S \leq 0$	$S > 0$	Lowest	2	3	Highest
Financial crisis	0.0036 (3.04)	0.0067 (2.18)				
GDP growth	0.0070 (3.59)	0.0031 (2.37)	0.0066 (3.29)	0.0020 (0.75)	0.0034 (1.66)	0.0049 (2.48)
Market return	0.0066 (2.24)	0.0033 (2.77)	0.0047 (2.00)	0.0050 (2.72)	0.0005 (0.30)	0.0055 (1.90)
Market volatility			0.0005 (0.21)	0.0032 (2.04)	0.0055 (2.51)	0.0069 (2.58)

Over-reaction or under-reaction?



Big stocks vs. small stocks

J	Panel A: Low-Price					Panel B: High-Price				
	$K=$	3	6	9	12	$K=$	3	6	9	12
3 Buy		0.0081	0.0083	0.0085	0.0084		0.0044	0.0050	0.0053	0.0053
		(4.79)	(4.95)	(5.28)	(5.23)		(2.92)	(3.43)	(3.93)	(3.99)
	Sell	0.0038	0.0047	0.0047	0.0042	0.0030	0.0035	0.0037	0.0032	
		(2.01)	(2.59)	(2.70)	(2.57)		(2.02)	(2.68)	(2.90)	(2.53)
Buy minus sell	0.0044	0.0036	0.0037	0.0042	0.0015	0.0013	0.0017	0.0020		
		(2.79)	(2.82)	(3.38)	(4.41)		(1.18)	(1.31)	(1.99)	(2.68)
6 Buy		0.0074	0.0081	0.0091	0.0088		0.0055	0.0061	0.0063	0.0061
		(4.13)	(4.77)	(5.45)	(5.24)		(3.33)	(3.93)	(4.38)	(4.30)
	Sell	0.0024	0.0032	0.0025	0.0021	0.0030	0.0029	0.0027	0.0029	
		(1.32)	(1.70)	(1.46)	(1.33)		(2.25)	(2.22)	(2.11)	(2.18)
Buy minus sell	0.0047	0.0044	0.0060	0.0060	0.0025	0.0030	0.0035	0.0030		
		(2.72)	(2.82)	(4.34)	(4.84)		(1.77)	(2.43)	(3.52)	(3.29)

Eliminates data-snooping theory

Eliminates institutional theory

Weakens crash risk theory

Weakens under-reaction theory