PRESENTATION SLIDES

Dash for Cash: Monthly Market Impact of Institutional Liquidity Needs*

Erkko Etula, Goldman, Sachs & Co.
Kalle Rinne, Luxembourg School of Finance
Matti Suominen, Aalto University School of Business
Lauri Vaittinen, Mandatum Life

Disclaimer:
The views expressed in this paper are those of the authors and do not reflect the positions of Goldman, Sachs & Co or Mandatum Life.

*Paper is forthcoming in the Review of Financial Studies

Results in a nutshell

- We document a strong market level return reversal four days before month end at *T-4* (in stocks and bonds), the last day of the month which guarantees cash for month-end distributions (e.g. pension payments)

- Evidence that links these return reversals to institutions' month end cash needs and institutions' trading

- Historically, institutions may have lost 30bn a year due to bad timing of their month end liquidity related trades

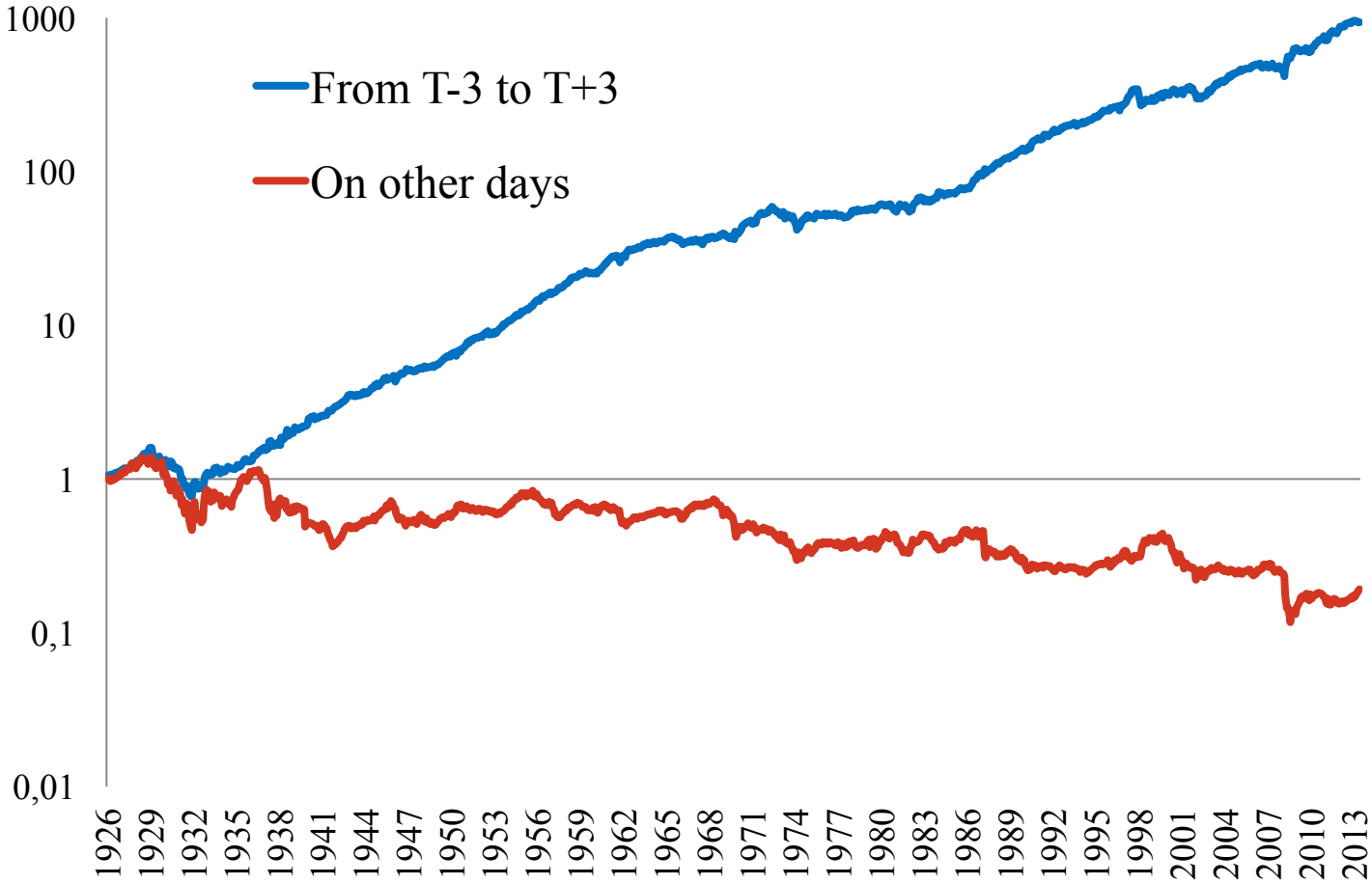
- Return reversals around T-4 have become stronger over time with the growth of institutional asset management industry and are stronger in countries with larger mutual fund industry

- The strength of the reversals around T-4 are related to availability of funding liquidity to hedge funds and affect mutual fund alphas

Outline

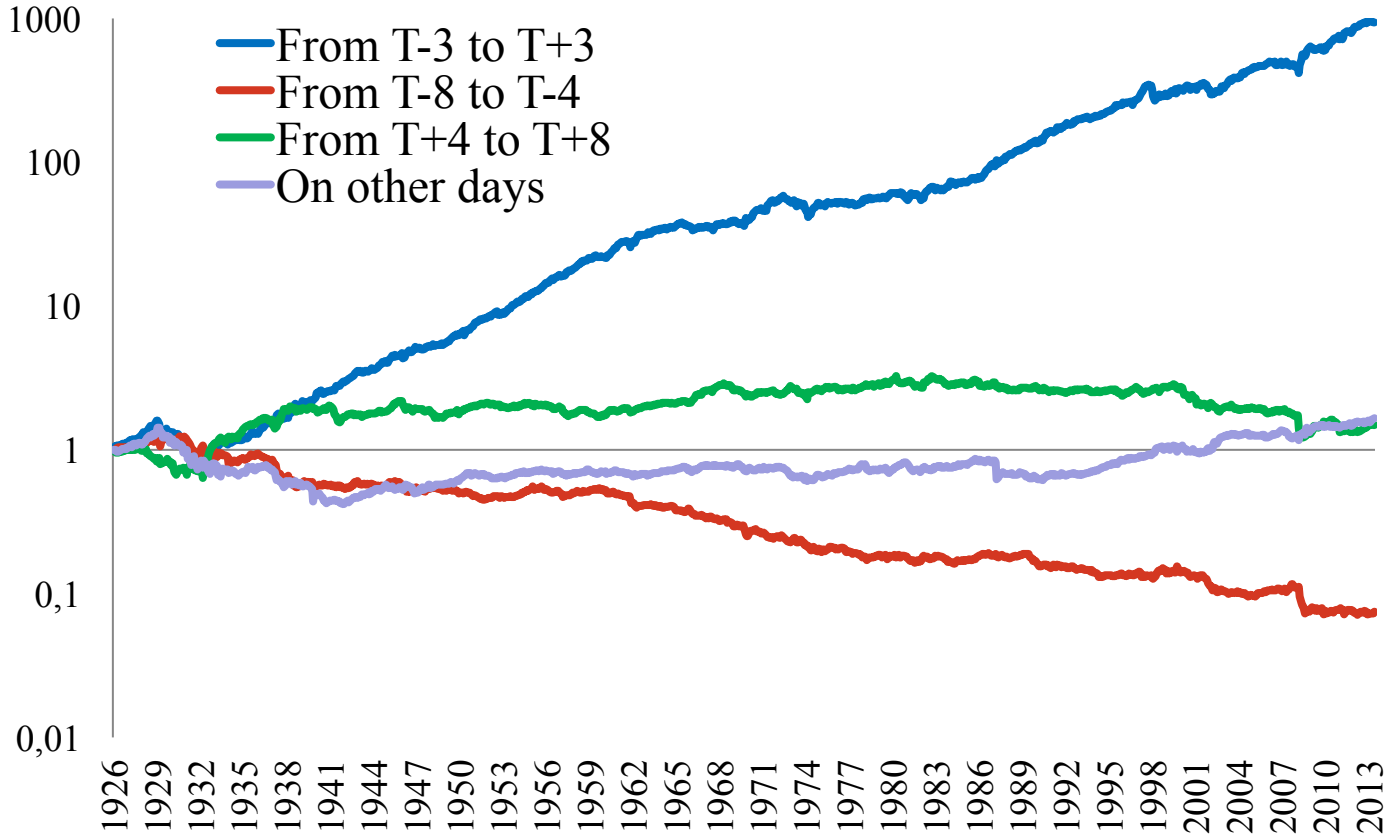
- Introduction
- Direct evidence from institutions' role
- Indirect evidence from institutions' role
- Other results
- Mutual fund alphas
- Conclusions

Turn-of-the-month effect: Excess stock returns



Historically all returns in the US stock market have accrued during just seven days around the turn of the month T. Why?

Turn-of-the-month effect: Excess stock returns



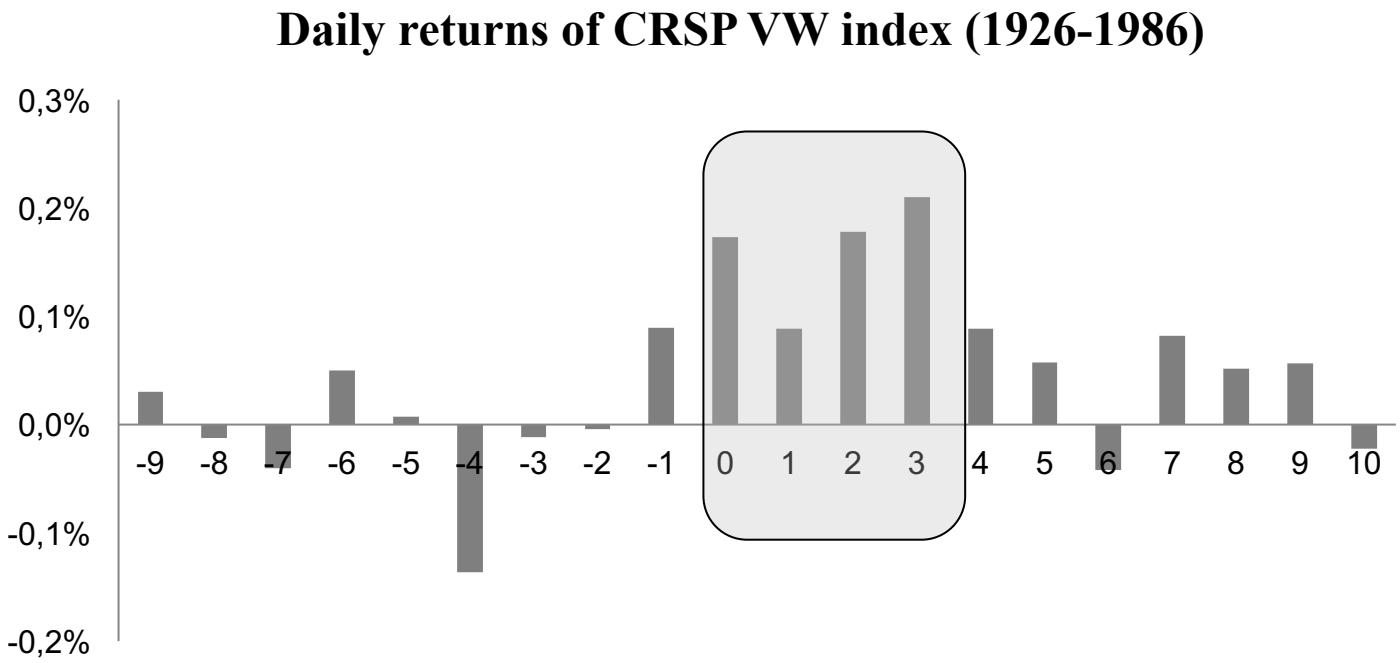
High returns at month end and beginning of the month are preceded by extremely poor returns from T-8 to T-4. Why?

Similar effects all around the world: Annualized returns around the turn of the month international evidence

	Sample starts	Annualized returns T-3 to T+3	Annualized returns T-8 to T-4	Annualized returns T+4 to T+8	Annualized returns other days
Country					
United States SP500	1/1/79	28%	-3%	-1%	18%
United States CRSP	1/1/79	30%	-4%	-1%	15%
Other G10 countries					
Belgium	1/1/90	30%	-13%	-6%	15%
Canada	1/1/86	26%	-5%	-2%	8%
France	1/1/88	37%	-6%	-12%	15%
Germany	1/1/79	33%	-9%	-11%	18%
Italy	1/1/98	25%	-14%	-18%	16%
Japan	1/1/79	24%	2%	-14%	3%
Netherlands	1/1/83	32%	-1%	-6%	19%
Sweden	1/1/86	40%	-8%	-1%	12%
Switzerland	7/1/88	30%	-10%	-2%	14%
United Kingdom	1/1/86	31%	-12%	-1%	19%
Average of other G10 countries		31%	-8%	-7%	14%

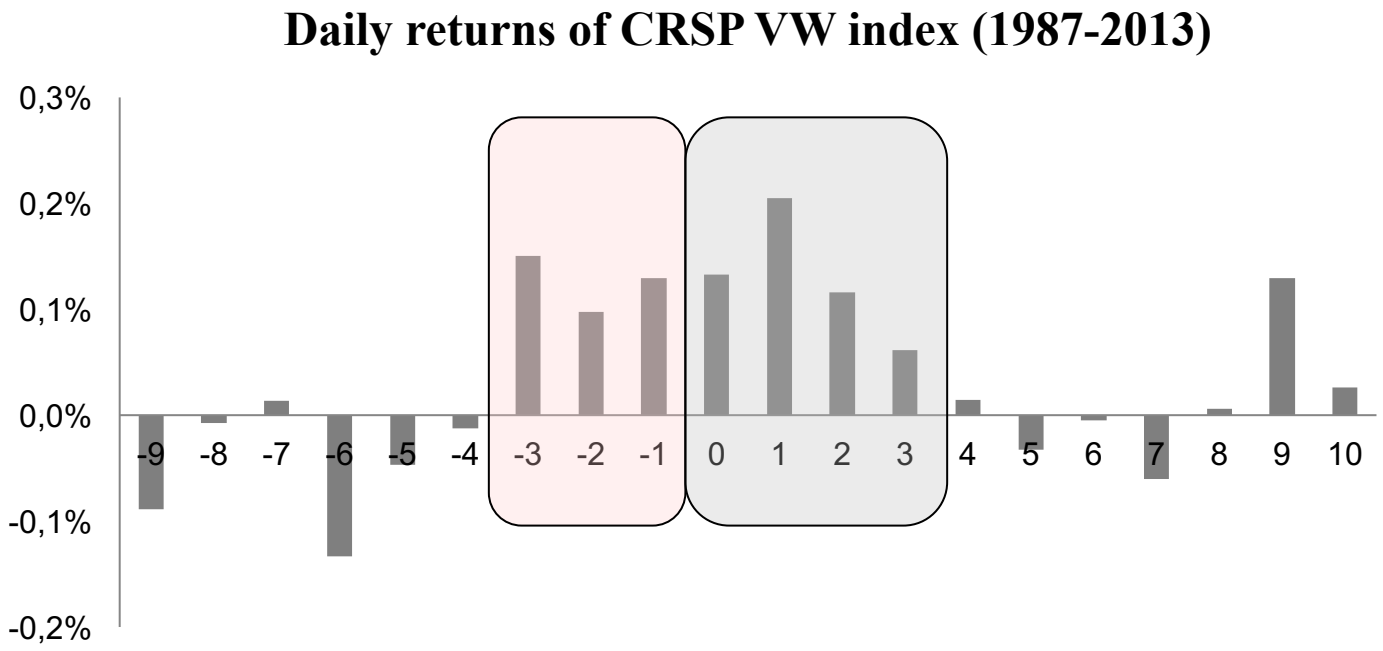
Daily returns around the turn of the month

Ariel (1987) and Lakonishok and Smidt (1988) were first to find that stock market (index) returns are high around turn-of-the-month, from the last day of the month (T=0) to the third day of the month.



Daily returns around the turn of the month

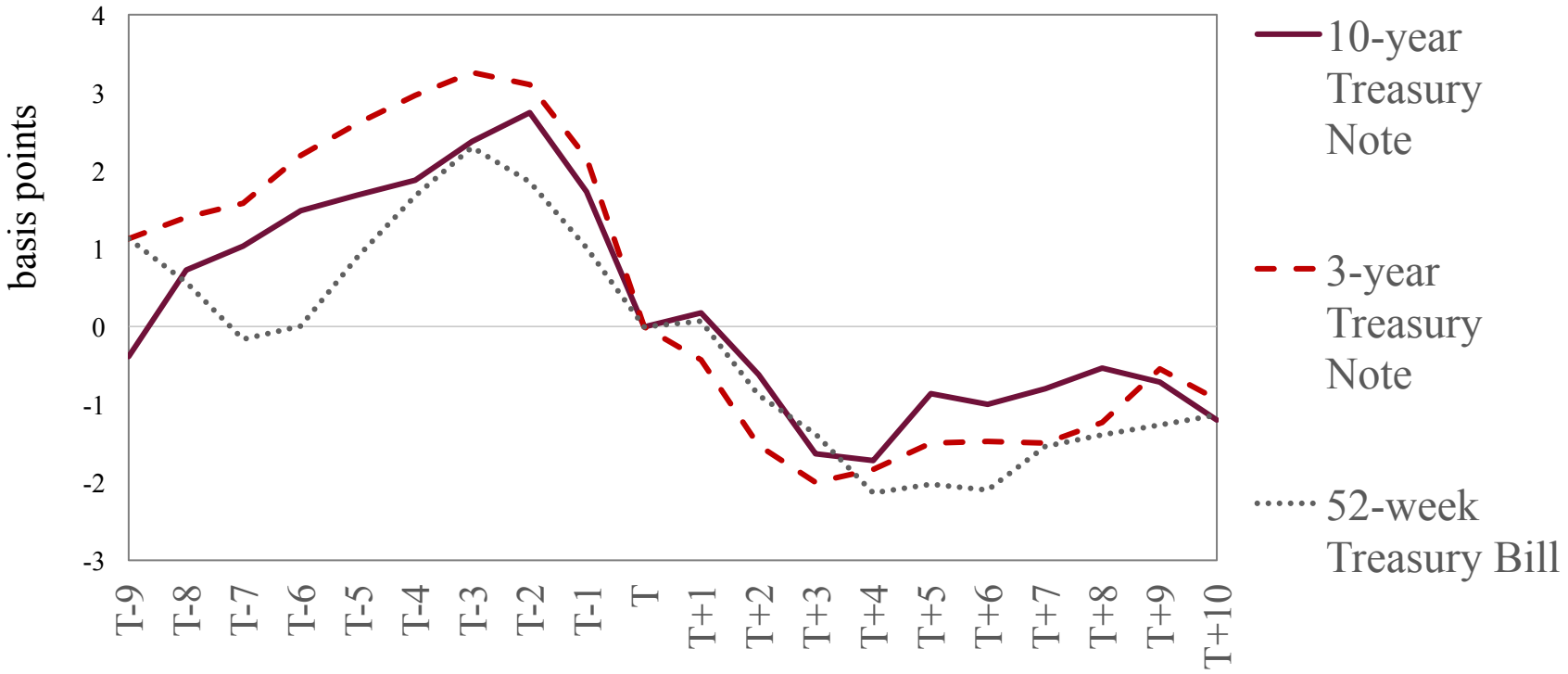
Using more recent sample, McConnell and Xu (2008) found that market returns are also abnormally high on three days before turn-of-the-month period.



Similar patterns in bonds

In addition to dividend yields, we find also bond yields peak few days prior to month end, leading to high bond returns at month-end and beginning of month.

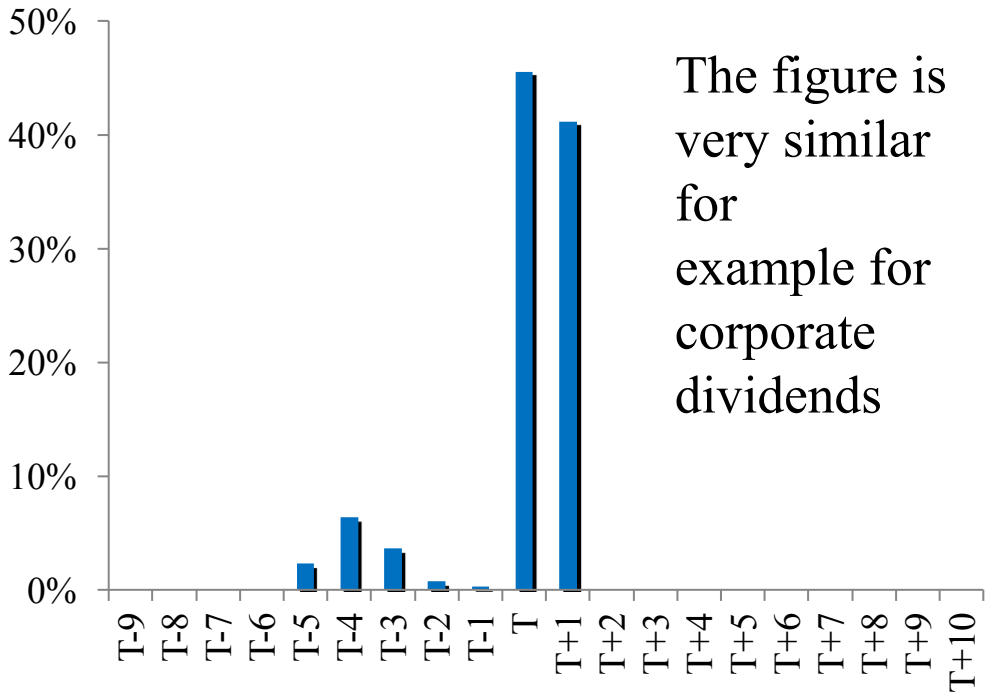
Yields of constant maturity Treasury bonds



Monthly payment cycle

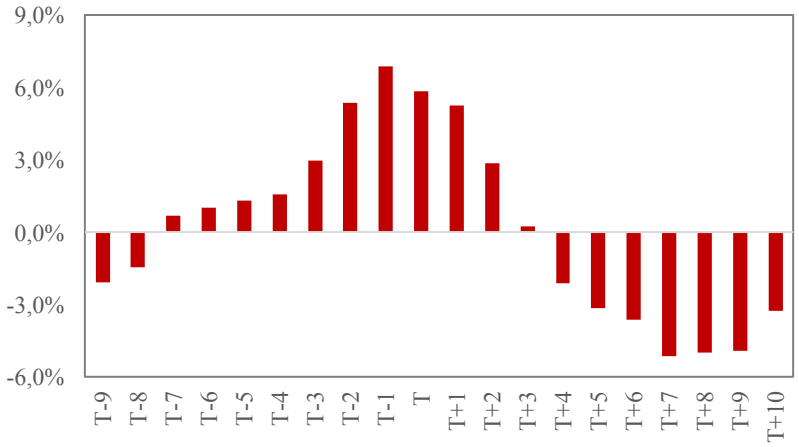
- The origin of these turn of the month return patterns, we believe, lies in the monthly payment cycle, see also Ogden (1990)
- A disproportionate share of monthly payments takes place precisely at the turn of the month

Month-end liquidity needs: pension payment dates

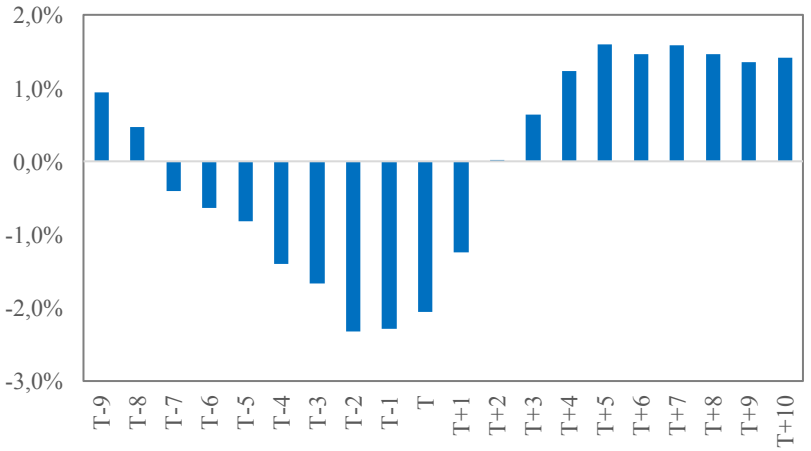


More evidence on importance of month end payment cycle: Bank deposits around the turn of the month

A. Checkable deposits



B. Saving deposits



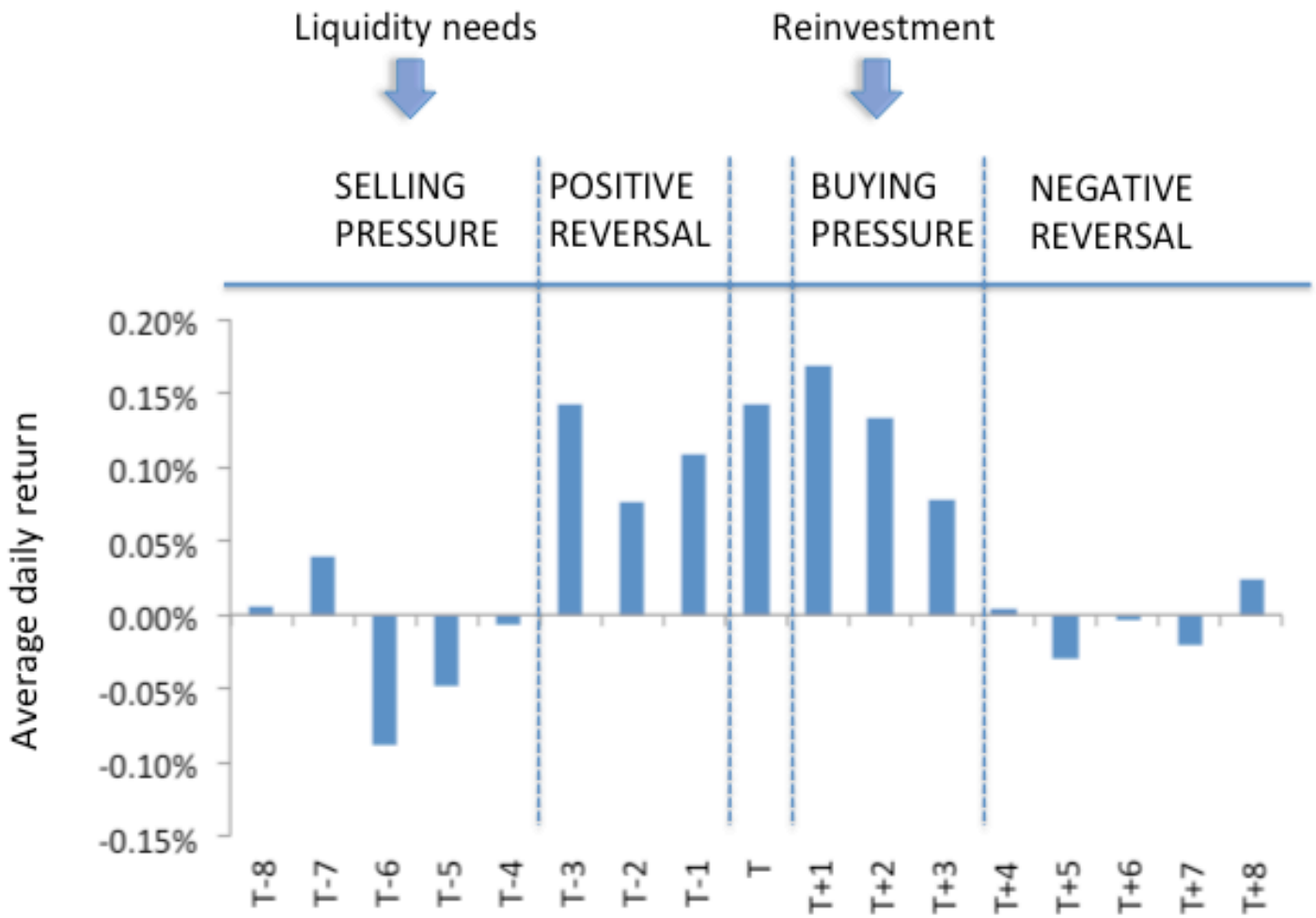
Monthly payment cycle (our explanation to observed return patterns)

- The month end payment cycle for pension funds (and other institutions with month end cash cycle) implies

- At *T-4* or earlier:
  - Pension funds and other institutions liquidate part of their stock holdings to guarantee cash at the end of month

- At T+1 or later:
  - The recipients of cash payments re-invest part of cash (as previously argued in Ogden, 1990)

Our explanation for the turn-of-the-month return patterns (1980 – 2013)



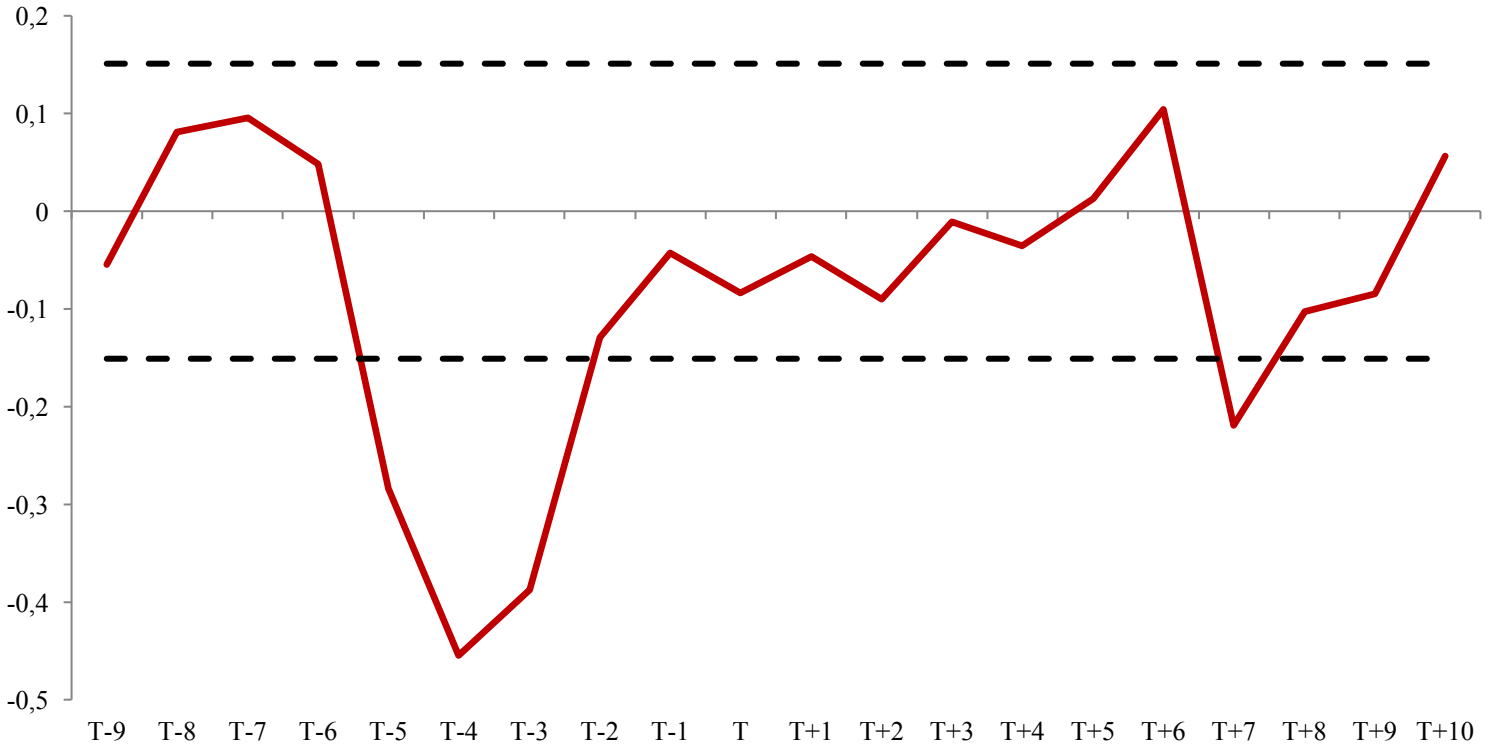
First prediction: We expect return reversals around T-4 and T+3. In US the reversals are high especially after July 1995, the start of the 3-day settlement convention

Country	Sample starts	Correlation of T-8 to T-4 and T-3 to T-1 returns	Correlation of T to T+3 and T+4 to T+8 returns	Daily return auto-correlation	Weekly return auto-correlation
US, CRSP VW Index	Jul-95	-0.39	-0.06	-0.04	-0.06
US, CRSP VW Index	Jan-80	-0.32	-0.03	0.01	-0.02
Other industrialized countries (average)		-0.24	-0.12	0.03	-0.02

Correlation of T-8 to T-4 and T-3 to T-1 returns is negative in all countries and significant in 22 countries out of 25

Correlation of T to T+3 and T+4 to T+8 returns is significantly negative in 12 countries out of 25 and insignificant in other countries

Placebo test for 5d/3d correlation



The 5d past return and 3d forward return correlation is most negative around T-4. This implies that short-term market price pressure is highest around T-4, consistent with our month end liquidity need hypothesis.

Second prediction: **In our international sample in 2014 several countries changed simultaneously to T-2 settlement. In those countries correlation of T-3 and T-2 returns became more negative compared to other countries**

	Autocorrelation at T-2	
Treatment group * After change	**-0.776**	**-0.776**
	(-3.70)	(-3.24)
Treatment group	0.194	
	(1.46)	
After Change	0.336	0.336
	(1.81)	(1.51)
Intercept	**-0.313**	
	(-2.85)	
Country fixed effects	No	Yes
N	42	42
R^2	0.395	0.789

Third prediction: **Reversals at T-4 are larger if last day of the month is Friday (as then cycles for pension and salary payments coinside). We find support for this prediction as well.**

Related literature

- Turn-of-the-month literature, see e.g. Ariel (1987) and Lakonishok and Smidt (1988), Ogden (1990)

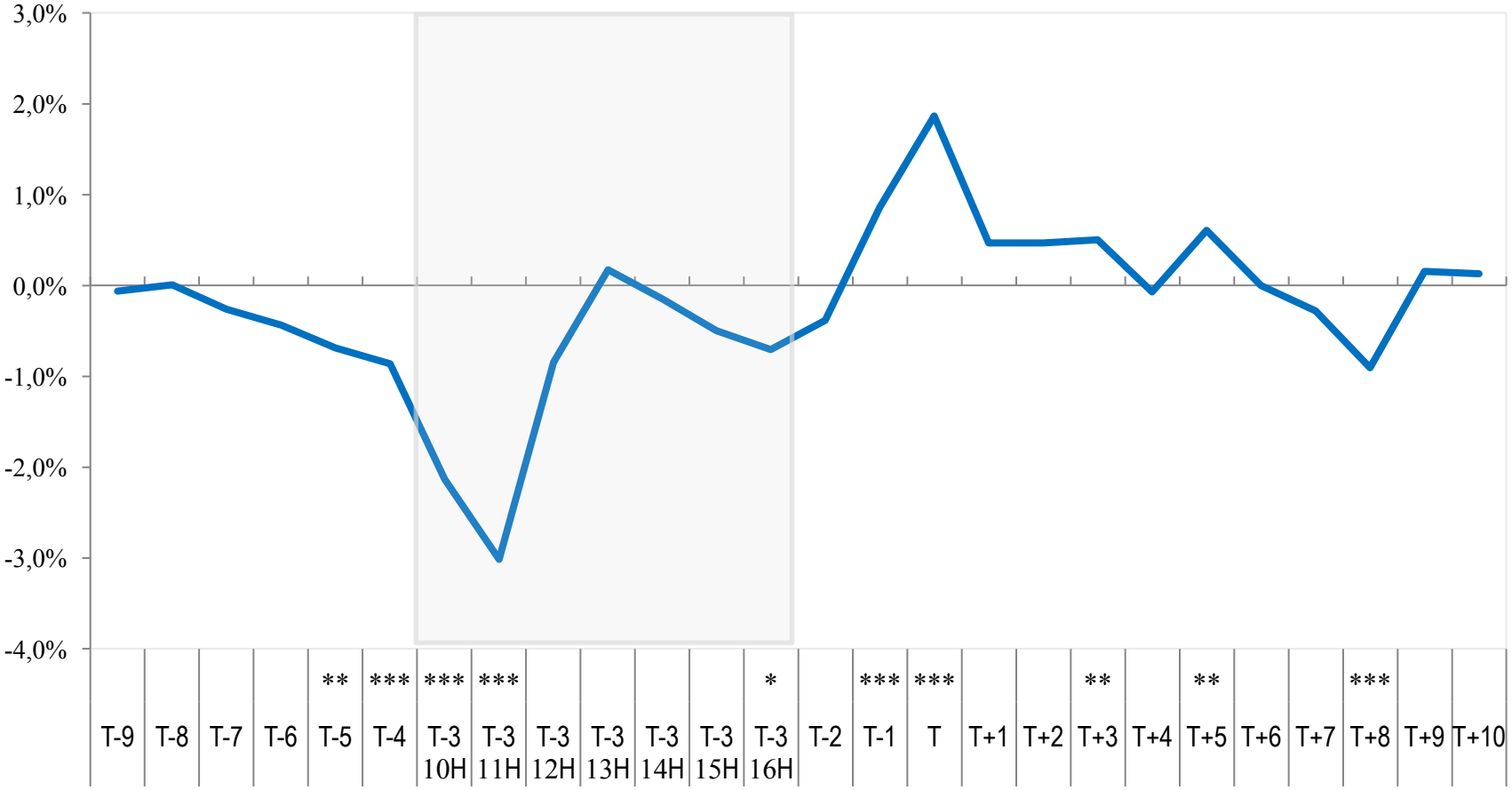
- Literature on short-term reversals associated with costs of immediacy, see e.g. Grossman and Miller (1988) and Campbell, Grossman and Wang (1993)

- Our contributions:
  - Link the two literatures
  - Show reversals in market return around T-4 (and T+3)
  - Link the end of the month reversals and returns to institutional trading

Outline

- Introduction
- Direct evidence from institutions' role
- Indirect evidence from institutions' role
- Other results
- Mutual fund alphas
- Conclusions

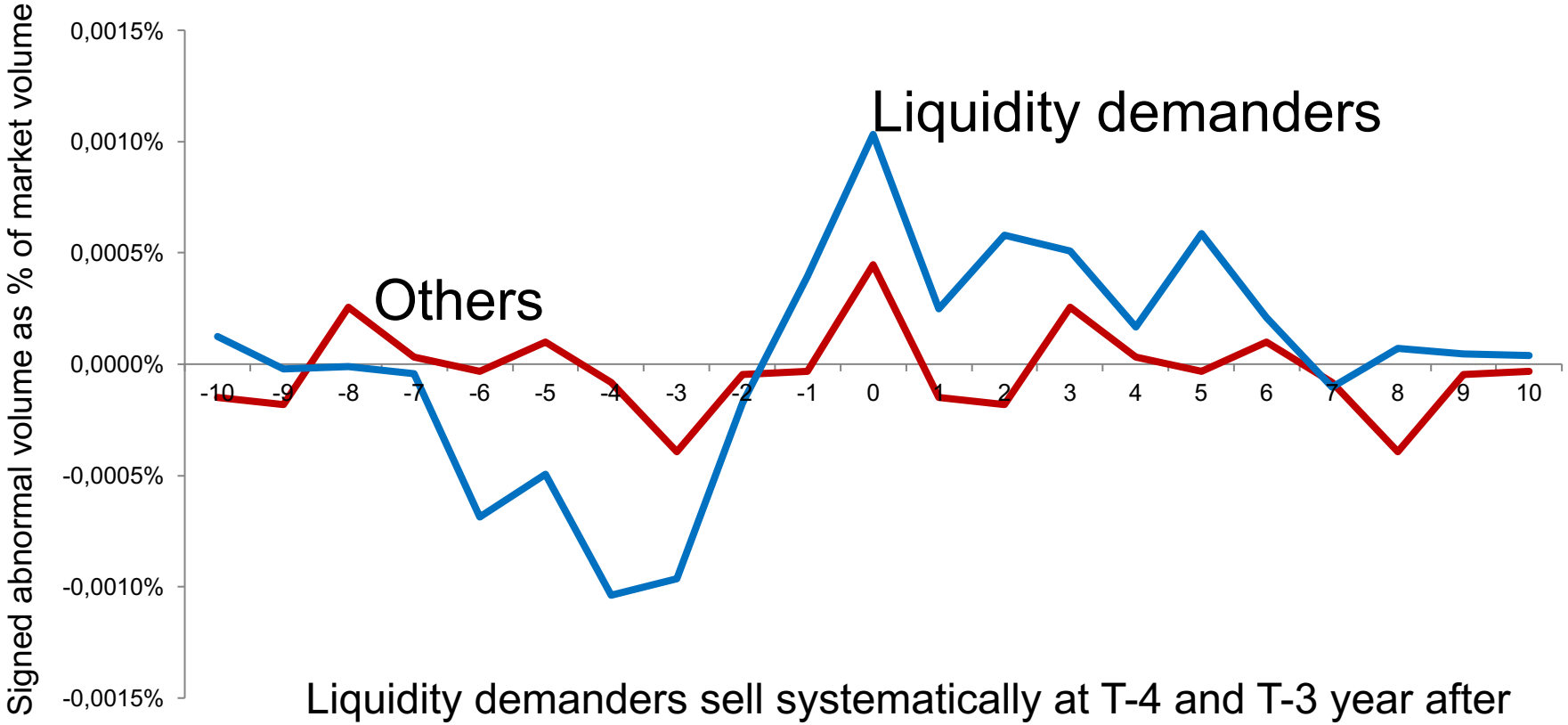
Direct evidence from a subset of the market: Institutions buy ratios around the turn of the month (ANcerno sample)



Ancerno institutions' highest selling at T-4 and morning of T-3. These are the two times when we expect highest selling. Institutions with payments at T (T+1) must sell at T-4 (T-3) to get liquidity for the payments.

Systematic patterns in institutions' trading

Identify as "liquidity demanders" those of Ancerno institutions that in the previous year were statistically significant sellers on days T-5 to T-3



Liquidity demanders sell systematically at T-4 and T-3 year after year. Same institutions buy at the beginning of the month.

Institutions' trade imbalance and returns from T-3 to T-1

This table shows the results from a regression in which the US equity market index returns from *T-3* to *T-1* are regressed on the *T-8* to *T-4* returns to the same index, and on the Ancerno institutional investors' cumulative net selling from *T-5* to *T-4*. Sample from January 1999 to December 2013.

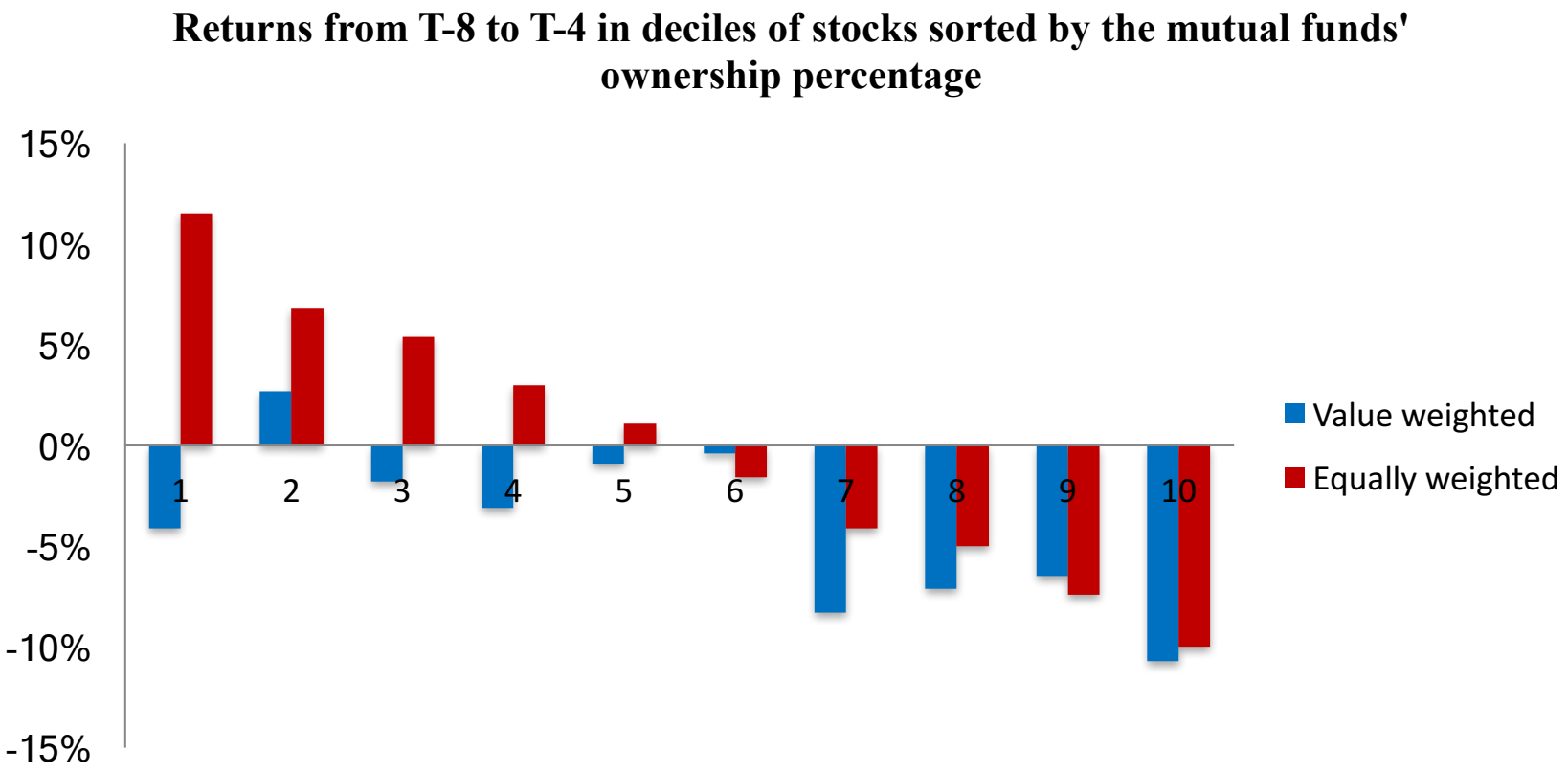
y = returns T-3 to T-1			
Market return T-8 to T-4	-0.352		-0.344
	(-2.51)		(-2.71)
Institutional investors'		117.25	111.09
selling T-5 to T-4		(2.53)	(3.49)
Intercept	0.003	0.000	-0.001
	(2.39)	(-0.09)	(-0.52)
R^2	0.184	0.084	0.259

Outline

- Introduction
- Direct evidence from institutions' role
- Indirect evidence from institutions' role
- Other results on reversals
- Mutual fund alphas
- Conclusions

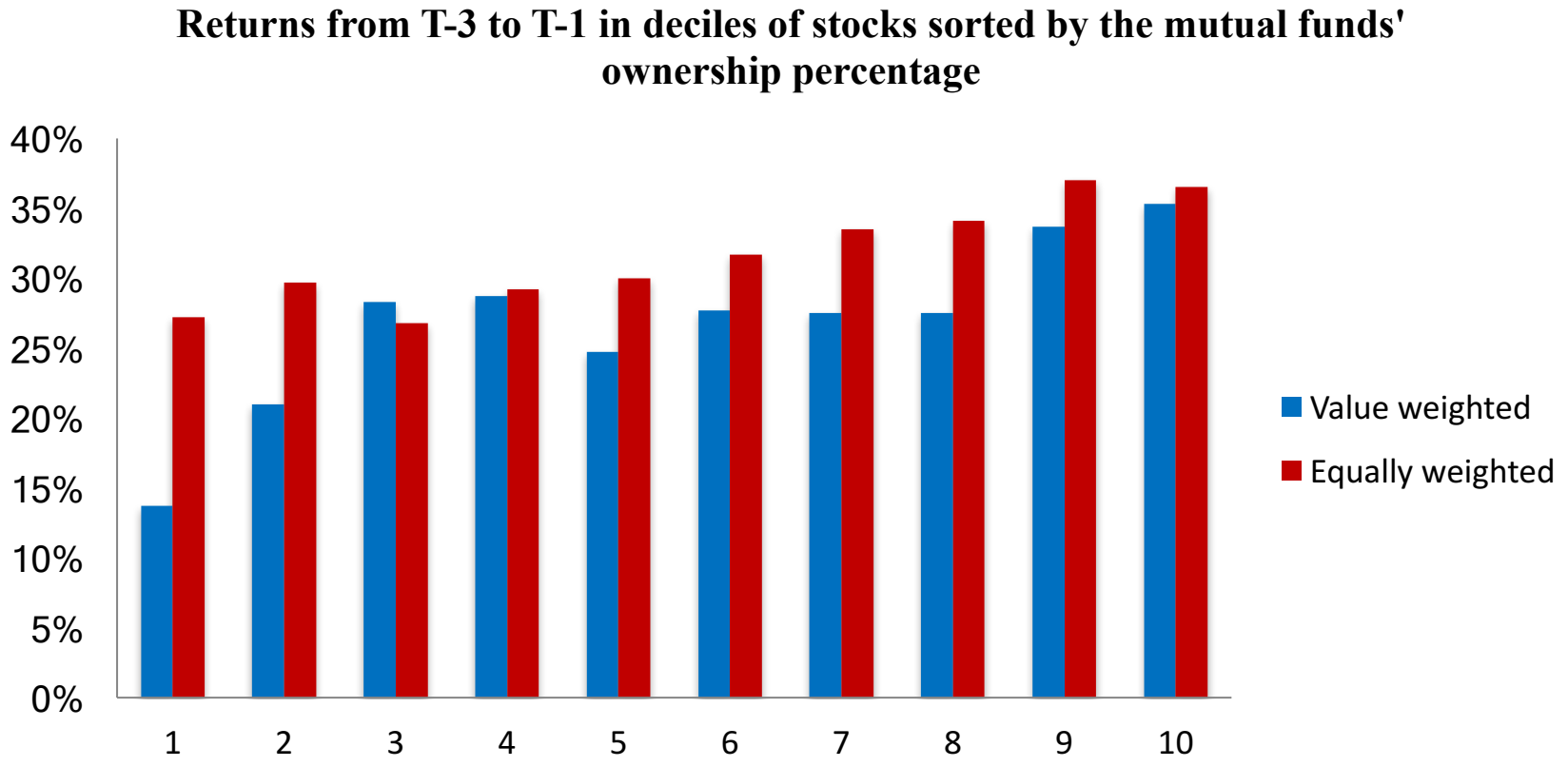
The effect of mutual fund holdings on the turn of the month patterns

This figure shows value- and equal-weighted returns from T-8 until T-4 in deciles of stocks sorted by our estimates of the mutual funds' total ownership percentages of stocks in the previous month. Our sample consists of all CRSP stocks owned by at least one mutual fund (in Thomson Reuters Mutual Fund Holdings database). Sample period is from January 1980 until December 2013. 10 = highest ownership decile.



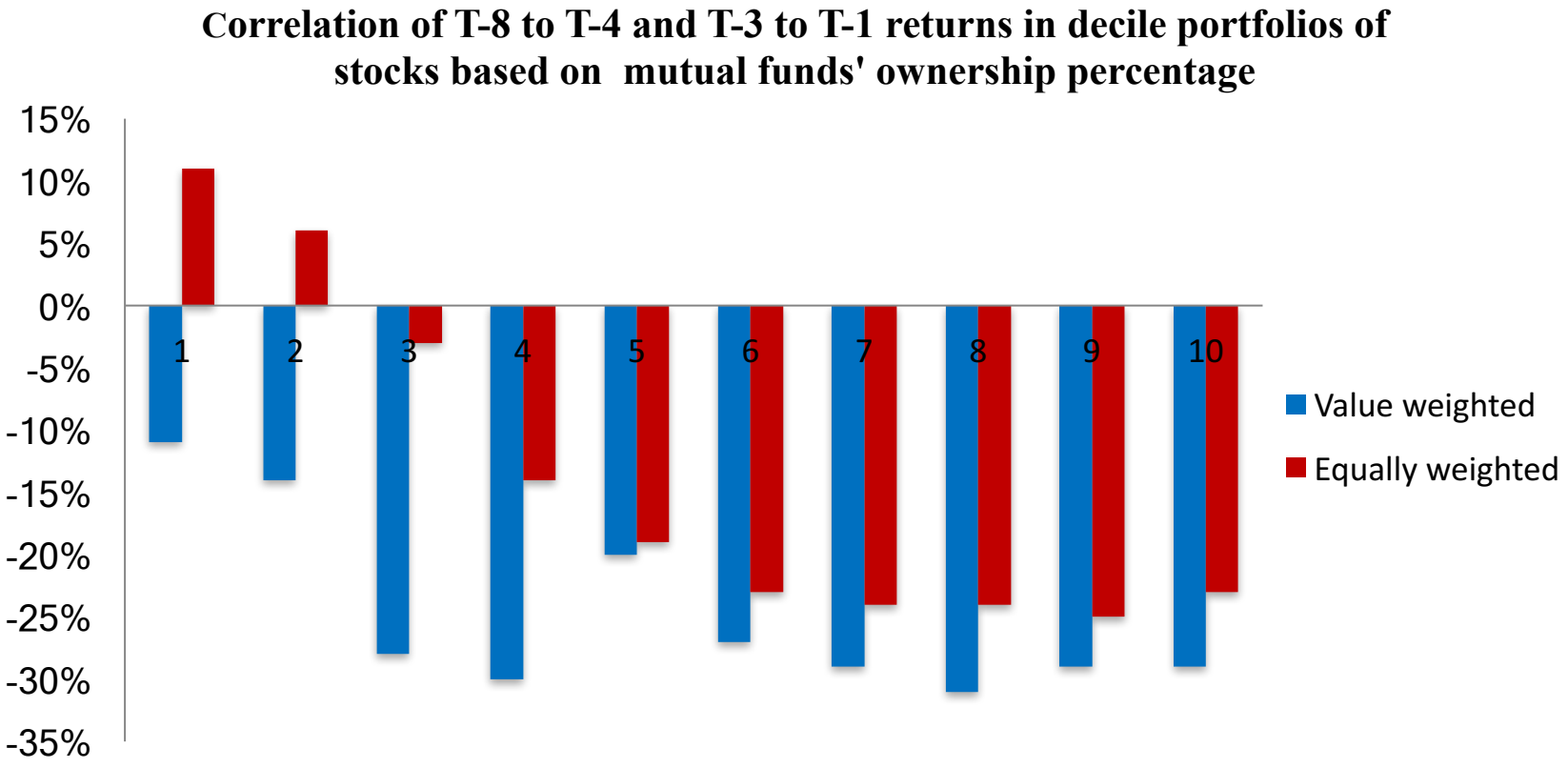
The effect of mutual fund holdings on the turn of the month patterns

This figure shows value- and equal-weighted returns from T-3 to T-1 in deciles of stocks sorted by our estimates of the mutual funds' total ownership percentages of stocks in the previous month. Our sample consists of all CRSP stocks owned by at least one mutual fund (in Thomson Reuters Mutual Fund Holdings database). Sample period is from January 1980 until December 2013. 10 = highest ownership decile.



The effect of mutual fund holdings on the turn of the month patterns

This figure shows the correlation of T-8 to T-4 and T-3 to T-1 returns in deciles of stocks sorted by our estimates of the mutual funds' total ownership percentages of stocks in the previous month. Our sample consists of all CRSP stocks owned by at least one mutual fund (in Thomson Reuters Mutual Fund Holdings database). Sample period is from January 1980 until December 2013. 10 = highest ownership decile.



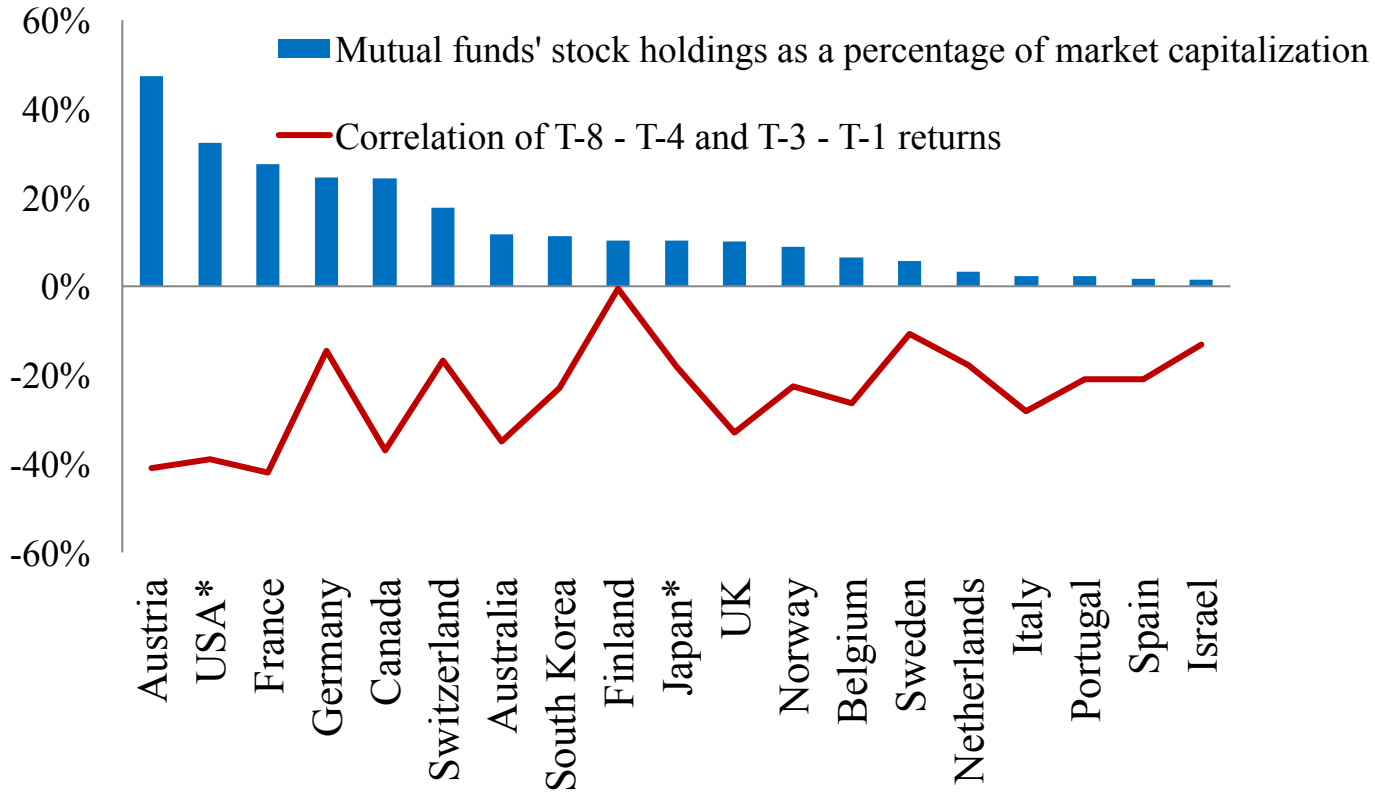
Mutual funds and the correlation of *T-8* to *T-4* and *T-3* to *T-1* returns

This table shows the results from a regression in which the US equity market index returns from T-3 to T-1 are regressed on the T-8 to T-4 returns to the same index, and on the mutual fund industry's assets under management, and its interaction with the T-8 to T-4 index returns. Mutual fund industry's assets under management is the sum of all equity mutual funds' assets under management normalized by the US total stock market capitalization. The sample period is from 1991 to 2013.

y = returns T-3 - T-1	
Market return T-8 - T-4	0.535
	(1.99)
Mutual fund industry AUM	-0.002
	(-0.17)
Interaction of mutual fund industry AUM and market return T-8 - T-4	-3.289
	(-2.43)
Intercept	0.004
	(1.38)
R^2	0.184

Mutual funds and the correlation of *T-8* to *T-4* and *T-3* to *T-1* returns across countries

This figure shows the mutual funds' domestic stock holdings as a percentage of total market capitalization of the country and the correlation of *T-8* to *T-4* and *T-3* to *T-1* returns. Our sample includes countries for which the relevant data are available from OECD's Institutional Investor assets dataset. Total market capitalization data are from World Bank. * denotes countries in which OECD data includes also stocks issued by non-residents.



Impact of past mutual fund outflow on returns around the turn of the month (T-8 to T-4)

T-8 to *T-4* returns

y = returns *T-8* to *T-4*		
Mutual funds' aggregate outflow	**-190.00**	**-176.34**
	(-2.87)	(-2.55)
Past 20 day returns		0.052
		(0.53)
Intercept	0.001	0.000
	(0.28)	(0.10)
R^2	0.189	0.193

Impact of past mutual fund outflow on returns around the turn of the month (T-3 to T-1)

T-3 to *T-1* returns

y = returns *T-3* to *T-1*		
Mutual funds' aggregate outflow	**187.19**	**119.27**
	(4.10)	(3.18)
T-8 to *T-4* return		**-0.357**
		(-3.19)
Intercept	0.002	0.002
	(0.99)	(1.20)
R^2	0.276	0.432

Outline

- Introduction
- Direct evidence from institutions' role
- Indirect evidence from institutions' role
- Other results
- Mutual fund alphas
- Conclusions

Why not enough supply of liquidity around the turn of the month

- Hedge funds and mutual funds are less willing to supply liquidity near the month end (prior to reporting of their monthly returns).

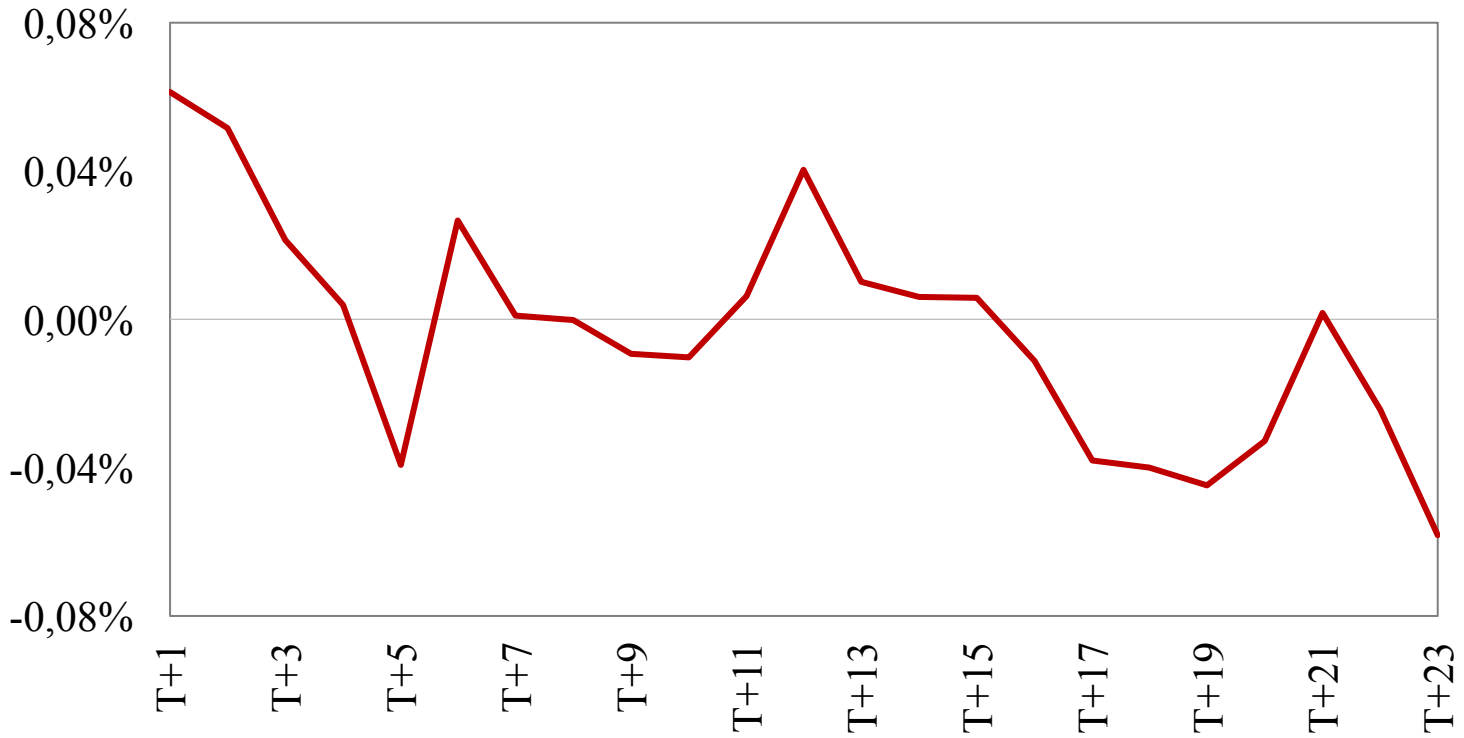
- Hedge Funds redemption dates also at month end.

Mutual funds' market betas around the turn of the month

This table shows mutual funds' market betas on various days around the turn of the month relative to their market betas on all other days. The betas are averages from regressions where mutual funds' daily returns are regressed on daily S&P 500 index returns, dummies for days corresponding to their location relative to the turn of the month, and their interactions.

		Coefficient	t-stat
Interactions of time period dummies and daily S&P500 returns	T-5	-0.024	(-15.67)
	T-4	-0.017	(-10.16)
	T-3	-0.053	(-31.50)
	T-2	0.016	(10.62)
	T-1	-0.021	(-16.40)
	T	-0.075	(-43.62)
	T+1	0.012	(10.03)
	T+2	0.052	(22.61)
	T+3	0.033	(17.64)
	T+4	-0.001	(-0.74)
	T+5	-0.012	(-8.10)
Daily S&P500 return		0.978	(220.10)
Intercept		0.000	(-8.74)
Time period dummies		Yes	
Number of funds		3619	

Some additional support for funds' risk reduction near month end: Mutual funds' cross-sectional return volatility relative to the funds' average daily cross-sectional return volatility on different trading days of the month



Hedge funds' market betas around the turn of the month

Market betas of most hedge funds follow the same turn-of-the-month pattern as mutual funds (also lowest beta at T-3). These patterns are stronger for funds with less frequent redemption cycles

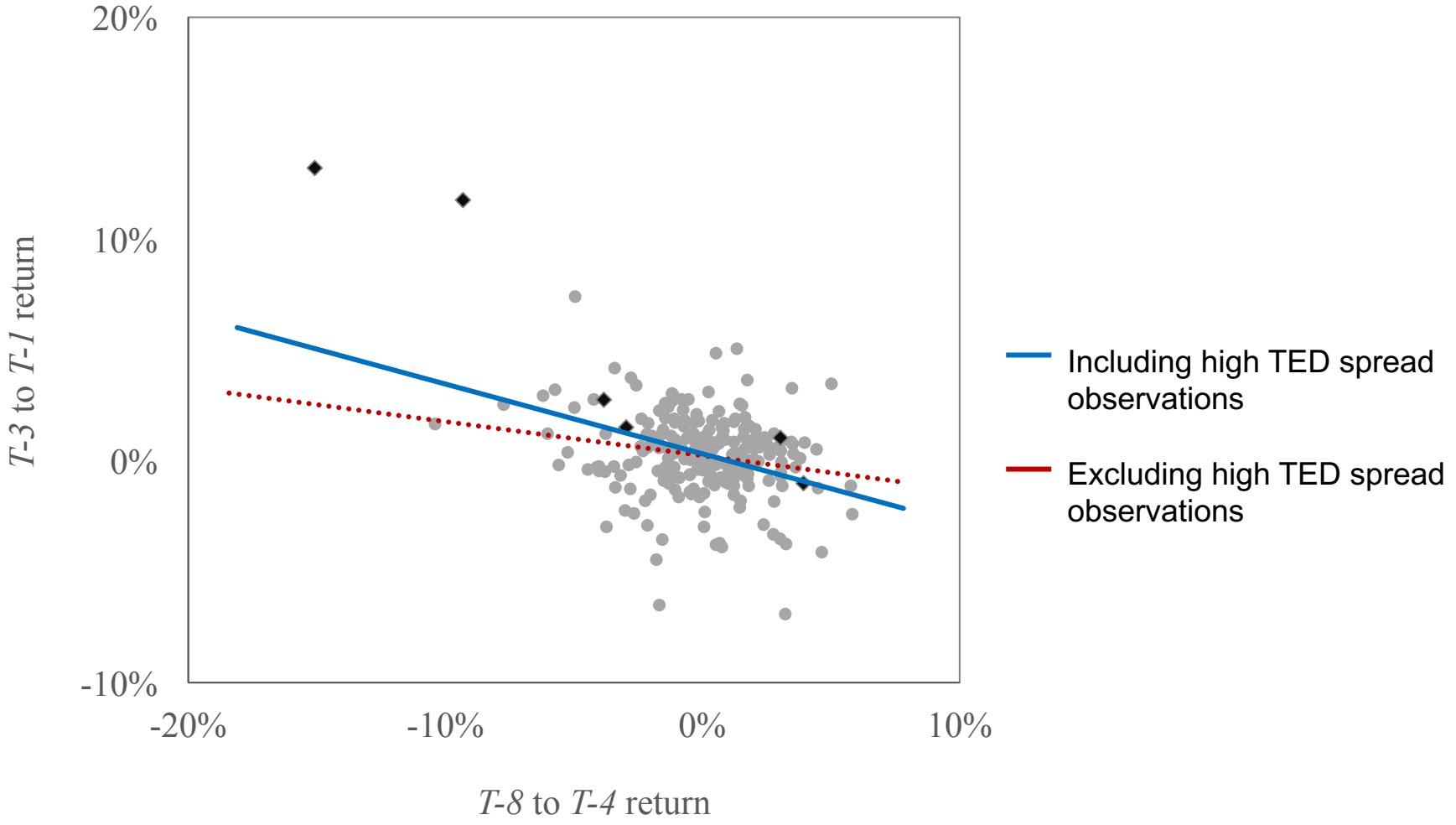
- So, on average most hedge funds are plagued by month-end cash (and agency) concerns as mutual funds and instead of supplying liquidity at T-4, they demand liquidity at T-4
- Hedge funds do however on average provide liquidity at times when funding liquidity is good TED spread is low. They demand liquidity only when TED spread is high
- Managed futures and global macro hedge funds systematically supply liquidity at T-4

Effect of the cost of leverage (arbitrage capital) on turn of the month reversal

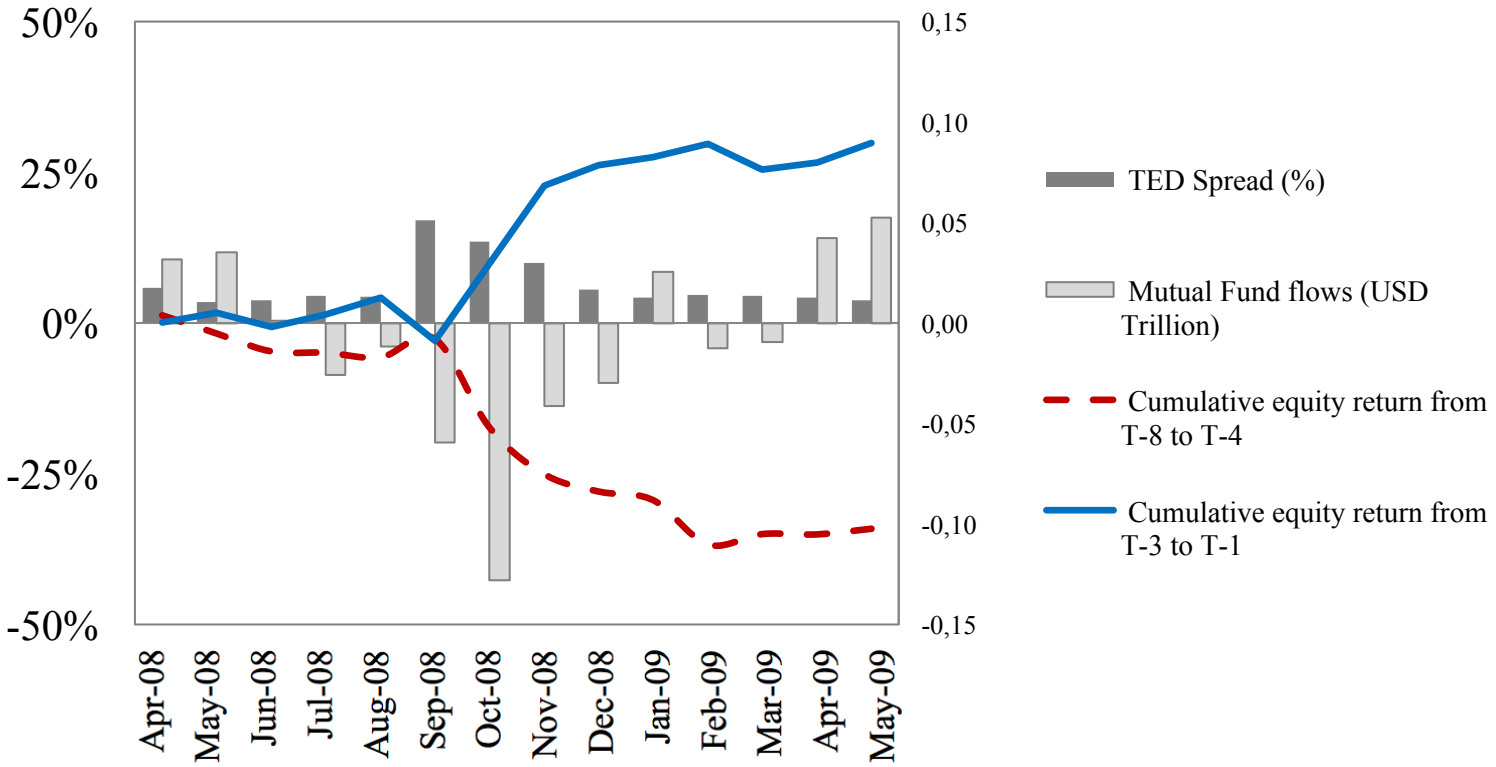
This table shows the results from a regression in which the *T-3* to *T-1* stock market returns are regressed on the *T-8* to *T-4* market returns, a measure of cost of leverage (TED spread), and its interaction with the *T-8* to *T-4* returns. The sample period is from 1991 to 2013.

y = Return T-3 - T-1	
Return T-8 - T-4	-0.068
	(-1.17)
TED spread	0.004
	(1.37)
Interaction of TED spread and the T-8 - T-4 return	-0.148
	(-5.79)
Intercept	0.002
	(1.15)
R^2	0.273

Relation between *T-8* to *T-4* and *T-3* to *T-1* returns (black dots high TED spread)



Example: Lehman crisis



- During the Lehman crisis, large outflows from mutual funds. Little arbitrage capital: High TED Spread.
- Cumulative returns exceptionally low T-8 to T-4: -35%.
- Cumulative returns exceptionally high T-3 to T: +30%

Stock characteristics, funding liquidity and return reversals around the turn of the month

- Sophisticated investors try to minimize the effect of their liquidity needs

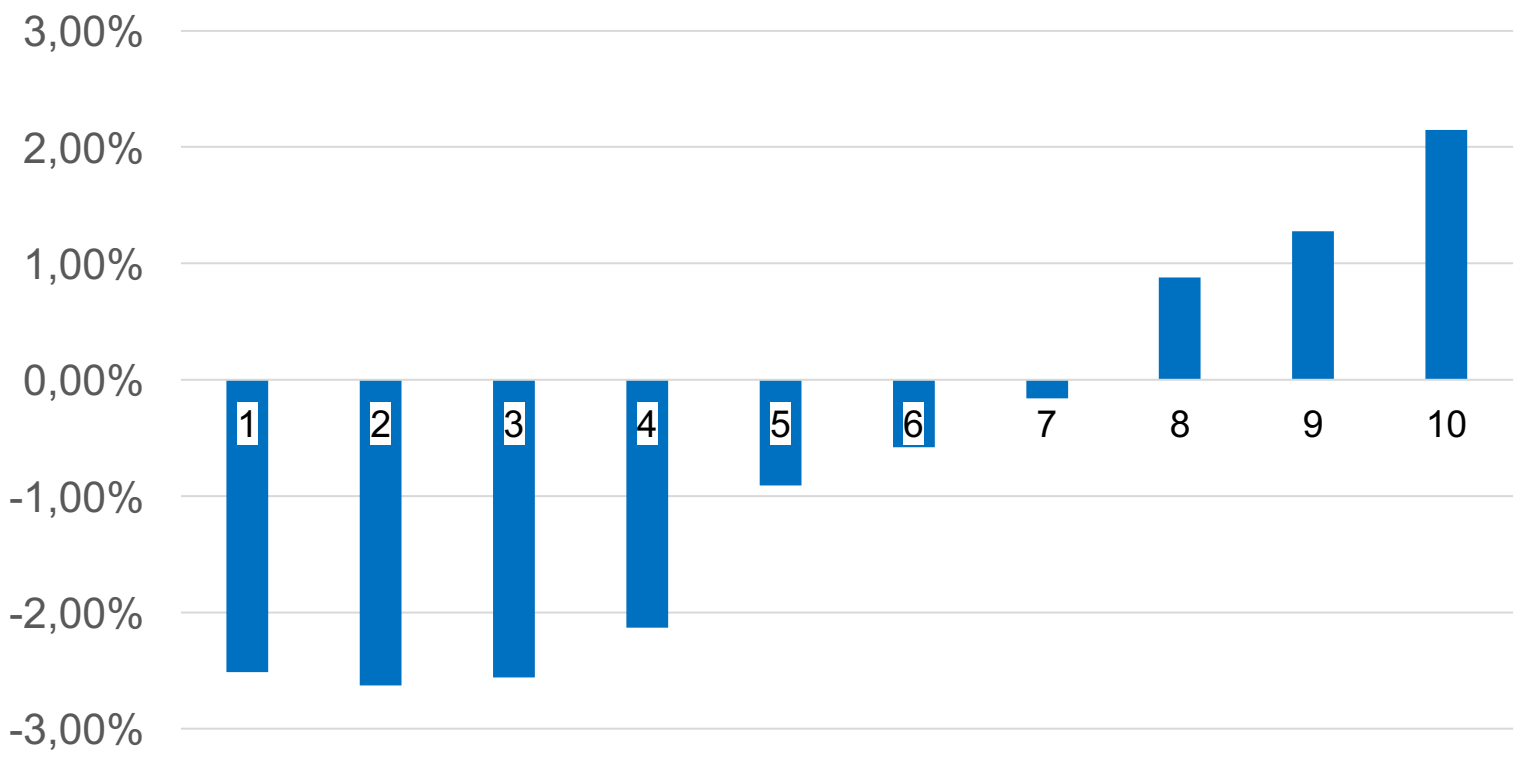
⇨ We find that correlation around T-3 is the most negative for liquid large-cap stocks

Outline

- Introduction
- Direct evidence from institutions' role
- Indirect evidence from institutions' role
- Other results on reversals
- Mutual fund alphas
- Conclusions

Exposure to month-end return reversals predicts mutual fund performance

This figure shows mutual funds' four factor alphas conditional on fund-specific trailing two-year correlations between the funds' *T-8* to *T-4* and *T-3* to *T-1* returns. Funds' whose investors demand turn of the month liquidity suffer from poor returns.



Mutual fund deciles based on correlation of *T-8* to *T-4* and *T-3* to *T-1* returns											
	1	2	3	4	5	6	7	8	9	10	10-1
Trailing 2-year correlation of *T-8* - *T-4* and *T-3* - *T-1* returns											
Correlation	-0.45	-0.37	-0.34	-0.31	-0.29	-0.26	-0.23	-0.19	-0.14	-0.02	0.43
Annualized mutual fund return in excess of the risk-free rate											
T-8 through *T-4*	-4.51%	-5.25%	-5.01%	-4.79%	-4.44%	-4.04%	-3.87%	-3.32%	-3.09%	-1.99%	2.52%
T-3 through *T-1*	5.29%	5.25%	5.30%	5.62%	6.16%	6.13%	6.63%	7.06%	7.13%	6.91%	1.61%
Other days	0.87%	1.39%	1.43%	1.58%	2.30%	2.61%	2.72%	3.28%	3.76%	3.32%	2.45%
All days	1.35%	1.10%	1.38%	2.07%	3.65%	4.30%	5.07%	6.61%	7.32%	7.72%	6.37%
Mutual fund portfolio composition during the ranking month											
Cash-%	3.47%	3.03%	3.26%	3.28%	3.28%	3.19%	3.24%	3.53%	4.02%	6.57%	3.09%
Equity-%	91.77%	93.03%	93.11%	92.79%	93.42%	93.15%	93.26%	92.58%	91.77%	87.60%	-4.16%
Bond-%	0.62%	0.57%	0.54%	0.55%	0.57%	0.58%	0.65%	0.67%	0.66%	1.38%	0.76%
Other mutual fund characteristics											
Size	1,346	1,625	1,421	1,316	1,241	1,272	1,146	1,156	1,129	884	-462
Median size	251	293	275	259	252	242	239	232	212	193	-58
Active share	78.6%	74.7%	73.9%	73.9%	74.9%	76.0%	79.0%	81.2%	83.5%	87.9%	9.3%
Institutional fund	20.5%	25.3%	26.8%	27.7%	27.5%	27.2%	26.1%	24.4%	22.8%	18.3%	-2.2%
Turnover	113.7%	94.3%	92.0%	91.3%	93.3%	93.8%	93.4%	94.6%	98.2%	134.0%	20.3%
Expense ratio	1.37%	1.26%	1.24%	1.24%	1.26%	1.26%	1.29%	1.31%	1.35%	1.51%	0.14%

Outline

- Introduction
- Direct evidence from institutions' role
- Indirect evidence from institutions' role
- Other results on reversals
- Mutual fund alphas
- Conclusions

Conclusions

- We document a strong return reversal around the last settlement day of the month, *T-4*, which guarantees cash for month-end distributions

- We present strong evidence that links the return reversals around *T-4* to institutions' trading

- The return reversals around T-4 have become stronger over time with the growth of institutional asset management industry and are stronger in countries with larger mutual fund industry

- The reversals around T-4 are related to availability of funding liquidity and affect mutual fund alphas