Internet Appendix to "The Cross-Section of Intraday and Overnight Returns"

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This appendix is organized as follows. Section 1 reports additional tables and figures to supplement the main text. Section 2 examines the impact of nonsynchronous trading.

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1 Additional Tables and Figures

- Table IA.1 reports average cross-sectional correlations between characteristics in subsamples.
- Table IA.2 reports intraday and overnight alphas in basis points of long and short portfolios.
- Table IA.6 reports intraday and overnight return properties of anomalies with a price filter of $10.
- Table IA.7 reports intraday and overnight return properties of anomalies using trade-based returns. Trade-based returns are computed using the first available transaction price in each half-hour interval and the last available price of the day. A return is set to zero if there are no transactions during the interval. To remove abnormal data, I exclude transactions at prices that are greater than the ask plus the spread and lower than the bid minus the spread (Barndorff-Nielsen, Hansen, Lunde, and Shephard (2009)). Bid and ask quotes are matched to trades with a five-second lag before 1999 and no lag afterwards.
- Table IA.3 reports estimates of value-weighted Fama-MacBeth regressions with overpricing and underpricing indicators, and controlling for liquidity.
- Table IA.4 reports estimates of value-weighted Fama-MacBeth regressions of intraday and overnight returns on characteristics and a return seasonality variable.
- Table IA.5 reports estimates of value-weighted Fama-MacBeth regressions with institutional ownership as additional explanatory variable.
- Figure IA.1 reports mispricing end-of-day (3:30-4:00pm) market beta, alpha, and average return estimated with a 1-year rolling window.
- Figure IA.2 reports intraday and overnight t-statistics of market alphas of long-short portfolios across days of the week.

Table IA.1. Average cross-sectional correlation between characteristics in subsamples. The characteristics are accruals (AC), market beta (BE), log book-to-market (BM), log illiquidity (IL), idiosyncratic volatility (IV), past 12-month return skipping the last month (MO), log of net stock issues growth rate (NI), log of market capitalization (SI), and mispricing measure of Stambaugh, Yu, and Yuan (2012) (MIS). Details on the characteristics' construction are provided in the main text.

(a) 1986-1990

	AC	BE	BM	GP	IL	IV	MO	NI	SI	MIS
AC	1.00	0.05	-0.12	0.10	0.11	0.07	-0.01	0.05	-0.14	0.32
BE	0.05	1.00	-0.27	0.18	-0.43	0.19	0.07	0.02	0.38	-0.02
BM	-0.12	-0.27	1.00	-0.47	0.03	-0.12	-0.14	0.01	-0.07	0.12
GP	0.10	0.18	-0.47	1.00	0.03	0.07	0.04	-0.07	0.00	-0.33
IL	0.11	-0.43	0.03	0.03	1.00	0.25	0.00	0.04	-0.92	0.18
IV	0.07	0.19	-0.12	0.07	0.25	1.00	-0.05	0.04	-0.30	0.22
MO	-0.01	0.07	-0.14	0.04	0.00	-0.05	1.00	0.01	0.09	-0.28
NI	0.05	0.02	0.01	-0.07	0.04	0.04	0.01	1.00	-0.05	0.26
SI	-0.14	0.38	-0.07	0.00	-0.92	-0.30	0.09	-0.05	1.00	-0.28
MIS	0.32	-0.02	0.12	-0.33	0.18	0.22	-0.28	0.26	-0.28	1.00

(b) 1991-1995

	AC	BE	BM	GP	IL	IV	MO	NI	SI	MIS
AC	1.00	0.06	-0.09	0.08	0.03	0.05	-0.03	0.08	-0.06	0.28
BE	0.06	1.00	-0.31	0.19	-0.30	0.33	0.16	0.05	0.20	0.05
BM	-0.09	-0.31	1.00	-0.35	0.13	-0.18	-0.19	-0.04	-0.16	0.08
GP	0.08	0.19	-0.35	1.00	-0.03	0.07	0.06	-0.10	0.03	-0.39
IL	0.03	-0.30	0.13	-0.03	1.00	0.31	0.09	0.06	-0.90	0.14
IV	0.05	0.33	-0.18	0.07	0.31	1.00	0.09	0.11	-0.35	0.22
MO	-0.03	0.16	-0.19	0.06	0.09	0.09	1.00	0.03	-0.01	-0.25
NI	0.08	0.05	-0.04	-0.10	0.06	0.11	0.03	1.00	-0.08	0.31
SI	-0.06	0.20	-0.16	0.03	-0.90	-0.35	-0.01	-0.08	1.00	-0.24
MIS	0.28	0.05	0.08	-0.39	0.14	0.22	-0.25	0.31	-0.24	1.00

(c) 1996-2000

	AC	BE	BM	GP	IL	IV	MO	NI	SI	MIS
AC	1.00	0.05	-0.04	0.09	0.06	0.08	-0.07	0.12	-0.11	0.29
BE	0.05	1.00	-0.46	0.06	-0.30	0.40	0.22	0.12	0.21	0.14
BM	-0.04	-0.46	1.00	-0.17	0.17	-0.26	-0.26	-0.07	-0.21	-0.04
GP	0.09	0.06	-0.17	1.00	-0.03	0.01	0.01	-0.12	0.03	-0.38
IL	0.06	-0.30	0.17	-0.03	1.00	0.23	0.08	0.04	-0.89	0.13
IV	0.08	0.40	-0.26	0.01	0.23	1.00	0.15	0.14	-0.27	0.26
MO	-0.07	0.22	-0.26	0.01	0.08	0.15	1.00	0.03	0.07	-0.20
NI	0.12	0.12	-0.07	-0.12	0.04	0.14	0.03	1.00	-0.06	0.38
SI	-0.11	0.21	-0.21	0.03	-0.89	-0.27	0.07	-0.06	1.00	-0.23
MIS	0.29	0.14	-0.04	-0.38	0.13	0.26	-0.20	0.38	-0.23	1.00

(Table IA.1 continued.)

(d) 2001-2005

	AC	BE	BM	GP	IL	IV	MO	NI	SI	MIS
AC	1.00	-0.02	-0.00	-0.01	-0.01	-0.01	-0.06	0.05	-0.02	0.24
BE	-0.02	1.00	-0.15	-0.09	-0.15	0.30	-0.15	0.09	0.05	0.20
BM	-0.00	-0.15	1.00	-0.20	0.23	-0.11	-0.06	-0.03	-0.22	0.04
GP	-0.01	-0.09	-0.20	1.00	0.01	-0.01	0.06	-0.14	-0.02	-0.41
IL	-0.01	-0.15	0.23	0.01	1.00	0.30	0.21	0.03	-0.91	0.06
IV	-0.01	0.30	-0.11	-0.01	0.30	1.00	0.11	0.12	-0.33	0.21
MO	-0.06	-0.15	-0.06	0.06	0.21	0.11	1.00	0.01	-0.07	-0.26
NI	0.05	0.09	-0.03	-0.14	0.03	0.12	0.01	1.00	-0.05	0.37
SI	-0.02	0.05	-0.22	-0.02	-0.91	-0.33	-0.07	-0.05	1.00	-0.16
MIS	0.24	0.20	0.04	-0.41	0.06	0.21	-0.26	0.37	-0.16	1.00

(e) 2006-2010

	AC	BE	BM	GP	IL	IV	MO	NI	SI	MIS
AC	1.00	-0.03	0.02	0.01	0.02	-0.01	-0.02	0.04	-0.04	0.19
BE	-0.03	1.00	0.02	-0.07	-0.01	0.24	-0.01	0.07	-0.07	0.15
BM	0.02	0.02	1.00	-0.21	0.17	-0.03	-0.14	-0.00	-0.18	0.12
GP	0.01	-0.07	-0.21	1.00	-0.01	-0.01	-0.01	-0.17	-0.03	-0.41
IL	0.02	-0.01	0.17	-0.01	1.00	0.34	0.12	0.08	-0.92	0.17
IV	-0.01	0.24	-0.03	-0.01	0.34	1.00	0.09	0.10	-0.35	0.19
MO	-0.02	-0.01	-0.14	-0.01	0.12	0.09	1.00	0.04	0.02	-0.20
NI	0.04	0.07	-0.00	-0.17	0.08	0.10	0.04	1.00	-0.08	0.40
SI	-0.04	-0.07	-0.18	-0.03	-0.92	-0.35	0.02	-0.08	1.00	-0.23
MIS	0.19	0.15	0.12	-0.41	0.17	0.19	-0.20	0.40	-0.23	1.00

(f) 2011-2015

	AC	BE	BM	GP	IL	IV	MO	NI	SI	MIS
AC	1.00	-0.04	-0.00	-0.05	0.02	-0.02	-0.00	0.03	-0.01	0.16
BE	-0.04	1.00	-0.03	-0.10	0.13	0.26	0.01	0.15	-0.18	0.22
BM	-0.00	-0.03	1.00	-0.22	0.19	-0.05	-0.19	-0.05	-0.21	0.09
GP	-0.05	-0.10	-0.22	1.00	0.02	-0.01	-0.03	-0.19	-0.05	-0.41
IL	0.02	0.13	0.19	0.02	1.00	0.30	0.08	0.13	-0.94	0.20
IV	-0.02	0.26	-0.05	-0.01	0.30	1.00	0.07	0.16	-0.34	0.23
MO	-0.00	0.01	-0.19	-0.03	0.08	0.07	1.00	0.05	0.04	-0.19
NI	0.03	0.15	-0.05	-0.19	0.13	0.16	0.05	1.00	-0.13	0.45
SI	-0.01	-0.18	-0.21	-0.05	-0.94	-0.34	0.04	-0.13	1.00	-0.24
MIS	0.16	0.22	0.09	-0.41	0.20	0.23	-0.19	0.45	-0.24	1.00

Table IA.2. Intraday and overnight alphas in basis points of long and short portfolios. This table reports intraday and overnight alphas in basis points of long (α_L) and short (α_S) portfolios. At the end of each month, stocks are split into decile portfolios based on the NYSE breakpoints of the characteristics defined in the main text. Portfolios are value-weighted and held for one month. A stock is required to have a price greater than \$5 and a market capitalization greater than \$100 million at the end of the previous month to be included. Financial firms are excluded from portfolios based on accounting variables. Stock returns are computed using quote midpoints. The first interval starts at 9:45am. 10:00 indicates the half-hour interval that starts at 10:00am and ends before 10:30am. OV indicates the overnight interval. The sample is composed of NYSE, Amex, and NASDAQ common stocks from January 1, 1986, to December 31, 2015. NASDAQ stocks are included since 1993. The t-statistics are shown in parentheses and based on Newey and West (1987) standard errors with 14 lags. *, **, and *** denote significance at the 10%, 5%, and 1% level.

	OV	9:45	10:00	10:30	11:00	11:30	12:00	12:30	1:00	1:30	2:00	2:30	3:00	3:30
Gross profitability														
α_L	0.07	-0.06	-0.03	0.40***	0.24**	0.14	0.22**	0.11	0.19**	0.03	0.06	0.34***	0.26**	-0.13
	(0.23)	(-0.42)	(-0.16)	(3.02)	(2.08)	(1.29)	(2.25)	(1.19)	(2.15)	(0.36)	(0.66)	(3.47)	(2.41)	(-1.12)
α_S	0.32	-0.19	-0.52***	-0.31**	-0.29**	-0.24**	-0.13	-0.14	-0.03	-0.16*	0.04	-0.16	0.14	1.10***
	(1.07)	(-1.29)	(-3.09)	(-2.20)	(-2.39)	(-2.06)	(-1.25)	(-1.35)	(-0.32)	(-1.65)	(0.39)	(-1.54)	(1.27)	(8.39)
Idiosyncratic volatility														
α_L	-1.27***	0.40***	0.78***	0.23**	0.41***	0.06	0.08	-0.01	0.17**	0.02	0.05	0.16*	0.26***	-0.14
	(-5.05)	(3.51)	(5.62)	(2.01)	(4.38)	(0.63)	(0.99)	(-0.14)	(2.30)	(0.25)	(0.54)	(1.81)	(2.74)	(-1.21)
α_S	3.79***	-1.17***	-1.62***	-1.02***	-0.88***	-0.39**	-0.34**	-0.21	-0.41***	-0.10	-0.12	-0.57***	-0.70***	1.12***
	(7.16)	(-4.66)	(-6.08)	(-4.81)	(-4.89)	(-2.38)	(-2.37)	(-1.46)	(-2.82)	(-0.64)	(-0.68)	(-3.40)	(-3.91)	(4.97)
Net stock issues														
α_L	0.09	0.20	0.30*	0.30**	0.05	0.31***	-0.12	0.30***	-0.05	0.16*	0.10	0.28***	-0.28***	-0.87***
	(0.29)	(1.34)	(1.91)	(2.37)	(0.42)	(2.92)	(-1.34)	(3.22)	(-0.56)	(1.69)	(1.03)	(2.75)	(-2.59)	(-6.50)
α_S	1.49***	-0.48***	-0.95***	-0.67***	-0.27**	-0.21*	-0.14	-0.08	0.03	-0.22**	-0.16	-0.24**	-0.04	0.84***
	(4.85)	(-2.97)	(-5.74)	(-4.92)	(-2.24)	(-1.96)	(-1.41)	(-0.88)	(0.31)	(-2.30)	(-1.62)	(-2.19)	(-0.31)	(5.83)

Table IA.3. Intraday and overnight average return variation relative to mispricing and illiquidity. This table reports estimates of value-weighted Fama-MacBeth regressions of intraday and overnight returns on underpricing and overpricing indicators based on the mispricing measure of Stambaugh, Yu, and Yuan (2012) and illiquidity. At the beginning of each month, stocks in the top (bottom) deciles of the mispricing measure are classified as overpriced (underpriced). Illiquidity is measured in log at the end of the previous month and is standardized to have a zero mean and a unit standard deviation at each date. Details on the characteristic's construction are provided in the main text. Illiquidity is winsorized at 0.05% each year. A stock is required to have a price greater than $5 and a market capitalization greater than $100 million at the end of the previous month to be included. Stock returns are computed using quote midpoints. The first interval starts at 9:45am. 10:00 indicates the half-hour interval that starts at 10:00am and ends before 10:30am. OV indicates the overnight interval. The sample is composed of NYSE, Amex, and NASDAQ common stocks from January 1, 1986, to December 31, 2015. The t-statistics are shown in parentheses and based on Newey-West standard errors with 10 lags. *, **, and *** denote significance at the 10%, 5%, and 1% level.

	OV	9:45	10:00	10:30	11:00	11:30	12:00	12:30	1:00	1:30	2:00	2:30	3:00	3:30
underpriced	-0.16	0.20	0.39***	-0.00	0.10	0.05	0.19**	0.04	0.20**	0.09	0.22**	0.22**	0.36***	-0.90***
	(-0.50)	(1.57)	(2.67)	(-0.03)	(0.92)	(0.54)	(1.97)	(0.44)	(2.36)	(0.99)	(2.37)	(2.37)	(3.39)	(-6.61)
overpriced	1.41***	-1.13***	-1.36***	-0.64***	-0.78***	-0.13	-0.15	-0.32***	-0.25**	-0.33***	-0.43***	-0.18	-0.17	0.59***
	(3.21)	(-6.01)	(-5.73)	(-3.55)	(-4.76)	(-0.95)	(-1.13)	(-2.67)	(-2.10)	(-2.62)	(-3.30)	(-1.36)	(-1.20)	(3.43)
Illiquidity	-1.09***	-0.03	-0.14	-0.41***	-0.05	0.05	0.16**	-0.02	0.16**	0.11	0.16**	0.07	0.20**	1.09***
	(-6.29)	(-0.33)	(-1.31)	(-4.12)	(-0.60)	(0.80)	(2.22)	(-0.40)	(2.36)	(1.63)	(2.29)	(0.86)	(2.48)	(10.05)

Table IA.4. Intraday and overnight cross-sectional average return variation and return persistence (full set of results). This table reports estimates of value-weighted Fama-MacBeth regressions of intraday and overnight returns on characteristics and a return seasonality variable. A stock's return seasonality variable ($\bar{r}^h_{1y}$) is the stock's average return over the past year in the same interval as the dependent variable return. For instance, when the return between 10:00am and 10:30am is the dependent variable, the regression includes the average return between 10:00am and 10:30am over the previous year as an explanatory variable. The characteristics are measured at the end of the previous month and are: accruals (AC), market beta (BE), log book-to-market (BM), log illiquidity (IL), idiosyncratic volatility (IV), past 12-month return skipping the last month (MO), log of net stock issues growth rate (NI), and log of market capitalization (SI). Details on the characteristics' construction are provided in the main text. All the variables are winsorized at 0.05% each year. Explanatory variables are standardized to have a zero mean and a unit standard deviation. A stock is required to have a price greater than \$5 and a market capitalization greater than \$100 million at the end of the previous month to be included. Stock returns are computed using quote midpoints. The first interval starts at 9:45am. 10:00 indicates the half-hour interval that starts at 10:00am and ends before 10:30am. OV indicates the overnight interval. The sample is composed of NYSE, Amex, and NASDAQ common stocks from January 1, 1986, to December 31, 2015. The t-statistics are shown in parentheses and based on Newey-West standard errors with 10 lags. *, **, and *** denote significance at the 10%, 5%, and 1% level.

	OV	9:45	10:00	10:30	11:00	11:30	12:00	12:30	1:00	1:30	2:00	2:30	3:00	3:30
AC	-0.20*	-0.10*	-0.09	0.04	0.12**	0.03	-0.13***	-0.04	-0.02	0.08**	-0.01	0.01	-0.01	-0.13**
	(-1.66)	(-1.68)	(-1.48)	(0.67)	(2.50)	(0.60)	(-3.17)	(-0.98)	(-0.60)	(2.15)	(-0.23)	(0.36)	(-0.29)	(-2.57)
BE	1.09***	-0.30**	-0.40**	-0.17	-0.21*	-0.13	-0.25**	0.04	-0.19**	-0.14	-0.21**	0.00	-0.07	-0.20*
	(3.59)	(-2.10)	(-2.31)	(-1.22)	(-1.88)	(-1.25)	(-2.55)	(0.52)	(-2.06)	(-1.55)	(-2.02)	(0.00)	(-0.63)	(-1.76)
BM	0.34**	0.08	0.17**	0.08	0.06	-0.01	-0.04	0.02	0.05	-0.02	-0.03	-0.02	-0.15***	-0.24***
	(2.35)	(1.10)	(2.41)	(1.35)	(1.11)	(-0.19)	(-0.84)	(0.40)	(1.31)	(-0.58)	(-0.77)	(-0.49)	(-3.04)	(-3.95)
GP	-0.03	0.08	0.27***	0.22***	0.13**	0.10**	0.09*	0.05	0.10***	0.03	0.04	0.09**	0.08	-0.25***
	(-0.19)	(1.16)	(3.51)	(3.64)	(2.48)	(2.23)	(1.92)	(1.22)	(2.61)	(0.75)	(0.84)	(2.19)	(1.51)	(-4.72)
IL	-3.32***	0.67***	0.67***	-0.12	0.05	-0.19	-0.07	0.27**	0.19	0.33**	0.06	0.00	0.42***	0.37*
	(-7.50)	(3.38)	(2.80)	(-0.65)	(0.27)	(-1.33)	(-0.59)	(2.12)	(1.61)	(2.52)	(0.45)	(0.00)	(2.92)	(1.95)
IV	1.37***	-0.35***	-0.61***	-0.21***	-0.31***	-0.13**	-0.07	-0.07	-0.10**	-0.19***	-0.10**	-0.15***	-0.25***	-0.08
	(8.29)	(-4.26)	(-6.62)	(-2.81)	(-4.71)	(-2.14)	(-1.31)	(-1.51)	(-2.10)	(-3.81)	(-1.99)	(-2.87)	(-4.21)	(-1.19)
MO	0.68***	-0.45***	-0.38***	-0.15*	-0.06	-0.04	-0.09	-0.08	-0.03	-0.06	-0.14***	-0.06	-0.29***	-0.39***
	(3.62)	(-4.51)	(-3.58)	(-1.70)	(-0.83)	(-0.59)	(-1.50)	(-1.59)	(-0.58)	(-1.08)	(-2.61)	(-1.09)	(-4.85)	(-4.62)
NI	0.16*	-0.12***	-0.11**	-0.07**	-0.02	-0.04	0.01	-0.05*	0.03	-0.06**	-0.02	-0.01	0.01	0.08**
	(1.79)	(-2.92)	(-2.44)	(-2.00)	(-0.73)	(-1.25)	(0.18)	(-1.85)	(1.32)	(-2.38)	(-0.87)	(-0.43)	(0.35)	(2.13)
SI	-1.79***	0.52***	0.57***	0.12	0.03	-0.23**	-0.20*	0.21**	0.03	0.14	-0.06	-0.07	0.13	-0.27
	(-5.14)	(3.24)	(2.90)	(0.80)	(0.25)	(-2.00)	(-1.79)	(2.03)	(0.32)	(1.37)	(-0.53)	(-0.59)	(1.10)	(-1.62)
$\bar{r}^h_{1y}$	4.79***	0.95***	0.92***	0.41***	0.20***	0.15***	0.28***	0.24***	0.13***	0.15***	0.25***	0.34***	0.75***	2.46***
	(24.33)	(14.24)	(12.08)	(3.34)	(3.15)	(6.15)	(5.63)	(3.31)	(3.77)	(5.69)	(5.89)	(8.17)	(15.27)	(29.41)

Table IA.5. Intraday and overnight cross-sectional average return variation and institutional ownership. This table reports estimates of value-weighted Fama-MacBeth regressions of intraday and overnight returns on characteristics. The characteristics are measured at the end of the previous month and are: accruals (AC), market beta (BE), log book-to-market (BM), log illiquidity (IL), idiosyncratic volatility (IV), past 12-month return skipping the last month (MO), log of net stock issues growth rate (NI), log of market capitalization (SI), and institutional ownership at the beginning of the current quarter (IO). Details on the characteristics' construction are provided in the main text. All the variables are winsorized at 0.05% each year. Explanatory variables are standardized to have a zero mean and a unit standard deviation. A stock is required to have a price greater than $5 and a market capitalization greater than $100 million at the end of the previous month to be included. Stock returns are computed using quote midpoints. The first interval starts at 9:45am. 10:00 indicates the half-hour interval that starts at 10:00am and ends before 10:30am. OV indicates the overnight interval. The sample is composed of NYSE, Amex, and NASDAQ common stocks from January 1, 1986, to December 31, 2015. The t-statistics are shown in parentheses and based on Newey-West standard errors with 10 lags. *, **, and *** denote significance at the 10%, 5%, and 1% level.

	OV	9:45	10:00	10:30	11:00	11:30	12:00	12:30	1:00	1:30	2:00	2:30	3:00	3:30
AC	-0.23*	-0.11*	-0.08	0.04	0.14***	0.02	-0.13***	-0.03	-0.03	0.09**	0.00	0.02	-0.01	-0.14***
	(-1.90)	(-1.76)	(-1.27)	(0.72)	(2.88)	(0.41)	(-3.26)	(-0.95)	(-0.72)	(2.50)	(0.06)	(0.59)	(-0.32)	(-2.70)
BE	2.72***	-0.37**	-0.49***	-0.20	-0.22**	-0.15	-0.27***	0.05	-0.20**	-0.17*	-0.23**	-0.00	-0.12	-0.36***
	(8.43)	(-2.54)	(-2.89)	(-1.46)	(-2.01)	(-1.44)	(-2.79)	(0.55)	(-2.16)	(-1.86)	(-2.23)	(-0.01)	(-1.15)	(-3.01)
BM	0.41***	0.10	0.19***	0.11*	0.05	-0.01	-0.03	0.03	0.05	-0.03	-0.03	-0.03	-0.19***	-0.30***
	(2.75)	(1.44)	(2.72)	(1.89)	(0.96)	(-0.23)	(-0.78)	(0.66)	(1.25)	(-0.62)	(-0.75)	(-0.77)	(-3.82)	(-4.77)
GP	-0.16	0.09	0.31***	0.26***	0.14***	0.10**	0.09**	0.06	0.09**	0.03	0.04	0.09**	0.09	-0.41***
	(-1.14)	(1.33)	(4.10)	(4.09)	(2.62)	(2.15)	(2.06)	(1.45)	(2.31)	(0.84)	(0.95)	(2.09)	(1.64)	(-7.45)
IL	-6.26***	0.85***	0.65**	-0.16	0.04	-0.16	0.09	0.33**	0.29**	0.38***	0.14	0.28**	0.98***	1.27***
	(-11.88)	(3.75)	(2.46)	(-0.81)	(0.19)	(-1.02)	(0.63)	(2.21)	(2.19)	(2.65)	(1.00)	(1.96)	(5.96)	(5.92)
IV	1.87***	-0.42***	-0.72***	-0.25***	-0.34***	-0.14**	-0.09	-0.07	-0.11**	-0.20***	-0.09*	-0.17***	-0.28***	0.05
	(10.71)	(-5.03)	(-7.54)	(-3.12)	(-4.98)	(-2.24)	(-1.62)	(-1.36)	(-2.22)	(-4.08)	(-1.80)	(-3.08)	(-4.60)	(0.67)
MO	2.67***	-0.28***	-0.23**	-0.07	-0.06	-0.01	-0.07	-0.06	-0.01	-0.05	-0.13**	-0.07	-0.30***	-0.14
	(12.15)	(-2.60)	(-2.11)	(-0.79)	(-0.74)	(-0.08)	(-1.12)	(-1.12)	(-0.09)	(-0.92)	(-2.14)	(-1.02)	(-4.67)	(-1.48)
NI	0.18**	-0.14***	-0.13***	-0.08**	-0.03	-0.04	-0.00	-0.04*	0.03	-0.06**	-0.03	-0.02	0.02	0.19***
	(2.03)	(-3.49)	(-2.82)	(-2.06)	(-0.89)	(-1.30)	(-0.12)	(-1.65)	(1.33)	(-2.39)	(-1.12)	(-0.56)	(0.57)	(5.03)
SI	-3.68***	0.67***	0.53**	0.08	-0.00	-0.22*	-0.08	0.25**	0.12	0.17	0.01	0.16	0.55***	0.07
	(-9.05)	(3.77)	(2.51)	(0.54)	(-0.00)	(-1.77)	(-0.64)	(2.11)	(1.07)	(1.53)	(0.11)	(1.35)	(4.11)	(0.37)
IO	-0.88***	-0.01	-0.12*	-0.07	0.02	0.03	0.10**	0.01	0.06	0.02	0.05	0.20***	0.28***	0.21***
	(-5.91)	(-0.19)	(-1.74)	(-1.27)	(0.32)	(0.71)	(2.46)	(0.14)	(1.49)	(0.49)	(1.24)	(4.77)	(5.70)	(3.41)

Table IA.6. Intraday and overnight return properties of long-short decile portfolios with price filter of $10. This table reports the average return ($\bar{r}$) and alpha (α) in basis points, the volatility in percent (σ), the skewness (skew), and the minimum return (min) in percent of long-short portfolios. At the end of each month, stocks are split into decile portfolios based on the NYSE breakpoints of the characteristics as defined in the main text. Portfolios are value-weighted and held for one month. A stock is required to have a price greater than $10 at the end of the previous month and a market capitalization greater than $100 million at the end of the previous month to be included. Financial firms are excluded from portfolios based on accounting variables. Stock returns are computed using quote midpoints. The first interval starts at 9:45am. 10:00 indicates the half-hour interval that starts at 10:00am and ends before 10:30am. OV indicates the overnight interval. The sample is composed of NYSE, Amex, and NASDAQ common stocks from January 1, 1986, to December 31, 2015. NASDAQ stocks are included since 1993. The t-statistics are shown in parentheses and based on Newey-West standard errors with 14 lags. *, **, and *** denote significance at the 10%, 5%, and 1% level.

	OV	9:45	10:00	10:30	11:00	11:30	12:00	12:30	1:00	1:30	2:00	2:30	3:00	3:30
Mispricing (low minus high)														
$\bar{r}$	0.31	1.13***	1.31***	0.84***	0.80***	0.28	0.16	0.49***	0.11	0.16	0.49***	0.33*	0.10	-2.40***
	(0.52)	(4.56)	(4.52)	(3.61)	(3.88)	(1.49)	(0.92)	(2.84)	(0.64)	(0.93)	(2.75)	(1.75)	(0.48)	(-9.97)
α	1.49***	1.02***	1.16***	0.88***	0.76***	0.28	0.13	0.49***	0.17	0.12	0.44**	0.41**	0.17	-2.40***
	(2.69)	(4.15)	(4.10)	(3.85)	(3.75)	(1.51)	(0.79)	(3.13)	(1.03)	(0.71)	(2.53)	(2.27)	(0.81)	(-10.04)
σ (%)	0.53	0.22	0.25	0.20	0.18	0.16	0.15	0.15	0.15	0.15	0.16	0.16	0.19	0.21
skew	-1.17	0.37	-0.14	0.17	0.21	0.05	-0.11	7.02	-4.29	-1.40	0.52	-0.03	-1.71	-0.92
min (%)	-9.54	-2.02	-2.79	-1.78	-1.74	-1.67	-1.87	-1.22	-4.16	-2.76	-1.55	-1.44	-3.12	-3.20
Accruals (low minus high)														
$\bar{r}$	0.71	0.69***	0.39	0.01	-0.44**	-0.06	0.25	0.27*	0.02	-0.24*	0.03	-0.07	-0.24	-0.39*
	(1.46)	(2.84)	(1.53)	(0.07)	(-2.46)	(-0.36)	(1.60)	(1.77)	(0.13)	(-1.67)	(0.22)	(-0.42)	(-1.45)	(-1.93)
α	0.58	0.78***	0.43*	0.00	-0.42**	-0.06	0.26*	0.21	-0.00	-0.21	0.06	-0.13	-0.29*	-0.40**
	(1.19)	(3.17)	(1.71)	(0.00)	(-2.35)	(-0.36)	(1.71)	(1.43)	(-0.02)	(-1.46)	(0.40)	(-0.85)	(-1.76)	(-1.99)
σ (%)	0.42	0.21	0.22	0.18	0.15	0.15	0.13	0.13	0.12	0.12	0.13	0.14	0.14	0.18
skew	1.24	1.82	2.06	-0.09	-0.23	-0.61	-0.23	2.70	0.03	0.03	0.62	-0.15	-0.17	0.00
min (%)	-3.93	-2.01	-1.99	-1.88	-1.27	-2.21	-1.61	-1.14	-1.06	-1.89	-0.93	-1.31	-1.02	-2.19
Beta (low minus high)														
$\bar{r}$	-7.04***	1.75***	1.81***	0.19	0.56	0.47	0.38	-0.35	0.12	0.54*	0.87***	-0.51	-0.07	0.27
	(-6.32)	(4.16)	(3.44)	(0.45)	(1.53)	(1.44)	(1.30)	(-1.18)	(0.40)	(1.75)	(2.59)	(-1.45)	(-0.20)	(0.64)
α	-2.83***	0.93***	0.95***	0.40	0.25	0.45**	0.22	0.16	0.43**	0.22	0.51***	0.26	0.54***	0.31
	(-4.20)	(3.32)	(2.94)	(1.57)	(1.15)	(2.23)	(1.23)	(0.93)	(2.58)	(1.22)	(2.72)	(1.36)	(2.66)	(1.25)
σ (%)	0.97	0.36	0.45	0.38	0.32	0.28	0.25	0.26	0.26	0.27	0.29	0.30	0.33	0.36
skew	-0.69	-0.10	-0.02	-0.14	-0.16	0.12	0.10	-6.42	-4.43	-1.49	-0.30	-0.79	-0.97	-0.24
min (%)	-14.70	-5.61	-4.03	-4.50	-6.00	-2.24	-3.19	-9.44	-7.39	-5.29	-2.84	-3.98	-5.10	-4.57

	OV	9:45	10:00	10:30	11:00	11:30	12:00	12:30	1:00	1:30	2:00	2:30	3:00	3:30
Book-to-market (high minus low)														
$\bar{r}$	-3.35***	0.85***	0.61**	-0.35	0.04	0.17	0.17	-0.11	0.37**	0.01	0.18	-0.18	0.03	0.97***
	(-6.26)	(3.27)	(2.09)	(-1.43)	(0.18)	(0.91)	(0.97)	(-0.68)	(2.08)	(0.05)	(1.01)	(-0.95)	(0.16)	(4.03)
α	-2.69***	0.64***	0.40	-0.30	-0.04	0.17	0.13	0.02	0.45***	-0.07	0.09	0.04	0.18	0.98***
	(-5.13)	(2.60)	(1.46)	(-1.30)	(-0.20)	(0.94)	(0.79)	(0.10)	(2.85)	(-0.43)	(0.56)	(0.21)	(0.95)	(4.46)
σ (%)	0.46	0.23	0.25	0.21	0.18	0.17	0.15	0.15	0.15	0.15	0.16	0.17	0.18	0.21
skew	0.11	1.05	0.15	-0.61	-0.48	0.76	0.26	-2.38	-4.47	-0.48	-0.51	-0.29	-0.19	1.04
min (%)	-3.57	-1.51	-3.50	-2.17	-2.23	-1.30	-1.49	-3.69	-4.97	-2.05	-1.85	-2.53	-2.15	-1.84
Gross profitability (high minus low)														
$\bar{r}$	-0.28	0.05	0.39	0.67***	0.48***	0.35**	0.34**	0.25	0.22	0.16	-0.01	0.52***	0.09	-1.21***
	(-0.59)	(0.20)	(1.52)	(3.16)	(2.58)	(2.05)	(2.15)	(1.53)	(1.55)	(1.06)	(-0.06)	(3.36)	(0.51)	(-6.39)
α	-0.09	0.08	0.42	0.66***	0.49***	0.35**	0.34**	0.19	0.23	0.17	-0.01	0.50***	0.09	-1.21***
	(-0.18)	(0.35)	(1.64)	(3.13)	(2.64)	(2.06)	(2.18)	(1.30)	(1.59)	(1.14)	(-0.05)	(3.30)	(0.53)	(-6.46)
σ (%)	0.41	0.20	0.22	0.18	0.16	0.15	0.14	0.14	0.13	0.13	0.13	0.13	0.15	0.16
skew	0.11	-0.04	0.08	-0.17	-0.08	0.06	-1.05	8.30	-0.89	0.57	-0.02	0.12	-1.32	-0.46
min (%)	-4.07	-1.64	-2.23	-2.08	-1.85	-1.25	-2.91	-1.12	-2.26	-1.57	-0.95	-1.31	-3.13	-1.70
Illiquidity (high minus low)														
$\bar{r}$	-3.27***	-0.06	0.29	-0.37	0.01	-0.02	0.10	-0.32	0.14	0.32*	0.45**	-0.10	0.19	3.27***
	(-7.20)	(-0.23)	(1.06)	(-1.54)	(0.06)	(-0.10)	(0.57)	(-1.64)	(0.82)	(1.76)	(2.34)	(-0.49)	(0.81)	(10.50)
α	-2.06***	-0.39*	0.00	-0.28	-0.12	-0.03	0.03	-0.06	0.28**	0.18	0.30*	0.24	0.46**	3.28***
	(-5.51)	(-1.81)	(0.02)	(-1.46)	(-0.69)	(-0.17)	(0.22)	(-0.45)	(2.05)	(1.23)	(1.95)	(1.50)	(2.56)	(11.60)
σ (%)	0.39	0.21	0.24	0.21	0.18	0.16	0.15	0.17	0.15	0.16	0.17	0.18	0.20	0.27
skew	-0.73	-2.78	-0.35	-0.97	-1.31	-0.15	0.04	-16.21	-2.83	1.45	-0.71	-0.79	0.22	0.94
min (%)	-6.49	-5.65	-3.06	-4.15	-4.39	-1.47	-1.33	-8.34	-4.08	-1.52	-2.24	-3.17	-1.67	-2.28
Idiosyncratic volatility (low minus high)														
$\bar{r}$	-6.99***	1.79***	2.71***	0.90***	1.22***	0.33	0.44**	-0.02	0.23	0.36	0.32	0.33	0.65**	-1.14***
	(-8.53)	(5.18)	(6.56)	(2.70)	(4.52)	(1.32)	(2.02)	(-0.09)	(1.01)	(1.57)	(1.22)	(1.29)	(2.31)	(-3.65)
α	-4.60***	1.32***	2.23***	1.00***	1.09***	0.33	0.36**	0.20	0.40**	0.20	0.16	0.67***	0.97***	-1.13***
	(-6.96)	(4.30)	(6.47)	(3.62)	(4.69)	(1.60)	(1.96)	(1.11)	(2.20)	(1.01)	(0.70)	(3.09)	(4.23)	(-3.98)
σ (%)	0.71	0.30	0.36	0.29	0.23	0.22	0.19	0.18	0.20	0.20	0.22	0.22	0.24	0.27
skew	-0.46	0.35	0.13	0.05	0.49	0.95	0.41	0.58	-5.96	-2.98	0.81	0.02	-0.85	-0.13
min (%)	-8.12	-2.28	-3.01	-3.04	-2.11	-1.97	-1.62	-1.29	-6.87	-5.47	-4.23	-2.04	-3.35	-3.04

	OV	9:45	10:00	10:30	11:00	11:30	12:00	12:30	1:00	1:30	2:00	2:30	3:00	3:30
Momentum (high minus low)														
$\bar{r}$	6.06***	-0.22	-0.53	-0.00	0.32	0.22	-0.16	-0.19	-0.25	-0.03	0.04	-0.12	-0.29	-0.57*
	(7.17)	(-0.63)	(-1.30)	(-0.00)	(1.07)	(0.80)	(-0.70)	(-0.87)	(-1.14)	(-0.12)	(0.17)	(-0.49)	(-1.07)	(-1.88)
α	6.36***	-0.17	-0.51	-0.01	0.35	0.22	-0.16	-0.23	-0.23	-0.03	0.04	-0.14	-0.29	-0.57*
	(7.60)	(-0.49)	(-1.23)	(-0.02)	(1.14)	(0.81)	(-0.70)	(-1.09)	(-1.07)	(-0.12)	(0.16)	(-0.55)	(-1.08)	(-1.91)
σ (%)	0.73	0.30	0.36	0.31	0.26	0.24	0.20	0.19	0.19	0.20	0.22	0.22	0.24	0.26
skew	-0.83	0.33	-0.91	-0.68	-0.42	-0.54	-0.19	0.94	-0.60	0.56	1.14	-0.06	-0.38	-0.42
min (%)	-10.06	-2.32	-4.73	-3.55	-3.72	-3.81	-2.28	-1.71	-2.20	-3.58	-2.06	-2.54	-3.24	-2.84
Net stock issues (low minus high)														
$\bar{r}$	-1.71***	0.71***	1.25***	0.93***	0.28*	0.54***	-0.04	0.34**	-0.09	0.38***	0.24*	0.46***	-0.33**	-1.67***
	(-3.91)	(3.20)	(5.40)	(4.88)	(1.66)	(3.59)	(-0.31)	(2.22)	(-0.68)	(2.81)	(1.70)	(3.16)	(-2.04)	(-8.81)
α	-1.31***	0.66***	1.18***	0.94***	0.26	0.54***	-0.05	0.33**	-0.07	0.36***	0.21	0.51***	-0.28*	-1.67***
	(-3.05)	(2.99)	(5.17)	(4.96)	(1.57)	(3.61)	(-0.37)	(2.38)	(-0.54)	(2.64)	(1.54)	(3.48)	(-1.75)	(-8.81)
σ (%)	0.38	0.19	0.20	0.16	0.15	0.13	0.12	0.13	0.11	0.12	0.12	0.13	0.14	0.16
skew	0.14	0.40	-0.48	0.64	0.07	0.65	-0.50	10.61	-0.47	-1.12	0.03	0.52	-1.38	-0.11
min (%)	-3.32	-3.02	-2.76	-1.49	-1.55	-1.40	-1.37	-0.78	-1.16	-2.38	-1.07	-1.15	-2.00	-1.66
Size (small minus large)														
$\bar{r}$	-2.20***	0.04	0.05	-0.41*	-0.11	0.05	0.06	-0.29	-0.04	0.12	0.23	-0.23	0.13	2.89***
	(-5.22)	(0.18)	(0.17)	(-1.74)	(-0.55)	(0.29)	(0.37)	(-1.56)	(-0.21)	(0.66)	(1.23)	(-1.11)	(0.54)	(9.52)
α	-1.10***	-0.28	-0.23	-0.33*	-0.23	0.04	-0.00	-0.05	0.09	-0.02	0.09	0.10	0.39**	2.91***
	(-3.15)	(-1.28)	(-0.96)	(-1.70)	(-1.37)	(0.29)	(-0.00)	(-0.36)	(0.67)	(-0.14)	(0.58)	(0.65)	(2.12)	(10.65)
σ (%)	0.37	0.21	0.23	0.20	0.18	0.16	0.15	0.16	0.15	0.15	0.17	0.18	0.20	0.26
skew	-0.67	-2.55	-0.01	-0.73	-1.73	-0.16	0.07	-13.01	-2.05	1.03	-0.84	-0.88	0.10	0.71
min (%)	-5.87	-5.48	-2.80	-4.07	-4.34	-1.50	-1.26	-7.50	-3.55	-1.53	-2.17	-3.38	-2.01	-2.09

Table IA.7. Intraday and overnight return properties of long-short portfolios using trade-based returns. This table reports the average return ($\bar{r}$) and alpha (α) in basis points, the volatility in percent (σ), the skewness (skew), and the minimum return (min) in percent of long-short portfolios. At the end of each month, stocks are split into decile portfolios based on the NYSE breakpoints of the characteristics as defined in the main text. Portfolios are value-weighted and held for one month. A stock is required to have a price greater than \$5 at the end of the previous month and a market capitalization greater than \$100 million at the end of the previous month to be included. Financial firms are excluded from portfolios based on accounting variables. Stock returns are computed using the first trade of the day and the last trade in each half-hour interval. 10:00 indicates the half-hour interval that starts at 10:00am and ends before 10:30am. OV indicates the overnight interval. The sample is composed of NYSE, Amex, and NASDAQ common stocks from January 1, 1986, to December 31, 2015. NASDAQ stocks are included since 1993. The t-statistics are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

	OV	9:30	10:00	10:30	11:00	11:30	12:00	12:30	1:00	1:30	2:00	2:30	3:00	3:30
Mispricing (low minus high)														
$\bar{r}$	-3.11***	4.10***	1.59***	0.93***	0.90***	0.42**	0.25	0.37**	0.11	0.21	0.50***	0.42**	0.28	-2.78***
	(-5.48)	(9.68)	(5.30)	(3.90)	(4.23)	(2.18)	(1.43)	(2.24)	(0.62)	(1.18)	(2.76)	(2.23)	(1.32)	(-11.40)
α	-2.20***	3.90***	1.37***	0.96***	0.86***	0.42**	0.23	0.40**	0.15	0.18	0.43**	0.51***	0.38*	-2.75***
	(-4.39)	(9.60)	(4.70)	(4.13)	(4.13)	(2.26)	(1.31)	(2.52)	(0.91)	(1.01)	(2.44)	(2.76)	(1.84)	(-11.42)
σ (%)	0.49	0.37	0.26	0.21	0.18	0.17	0.15	0.15	0.15	0.16	0.16	0.16	0.18	0.21
skew	-3.99	0.82	-0.33	0.14	-0.03	0.26	-0.07	2.29	-3.42	-1.69	-0.27	-0.15	-1.22	-1.50
min (%)	-15.17	-5.01	-2.90	-1.42	-2.02	-1.80	-1.81	-1.40	-4.16	-2.96	-1.36	-1.87	-3.29	-3.21
Accruals (low minus high)														
$\bar{r}$	0.56	1.17***	0.16	0.05	-0.36**	-0.15	0.24	0.28*	0.01	-0.25*	0.01	-0.11	-0.23	-0.47**
	(1.21)	(3.40)	(0.65)	(0.25)	(-2.00)	(-0.86)	(1.54)	(1.83)	(0.07)	(-1.73)	(0.04)	(-0.67)	(-1.36)	(-2.22)
α	0.28	1.21***	0.24	0.03	-0.34*	-0.15	0.25	0.22	-0.01	-0.23	0.04	-0.18	-0.29*	-0.51**
	(0.62)	(3.52)	(0.98)	(0.16)	(-1.88)	(-0.86)	(1.64)	(1.52)	(-0.04)	(-1.61)	(0.25)	(-1.18)	(-1.76)	(-2.48)
σ (%)	0.40	0.30	0.21	0.18	0.16	0.15	0.13	0.13	0.12	0.13	0.13	0.14	0.14	0.18
skew	1.90	0.14	0.18	0.23	0.18	-0.60	-0.22	1.77	-0.41	0.10	0.24	0.53	-0.49	-3.20
min (%)	-4.20	-1.98	-2.29	-1.61	-1.21	-2.31	-1.73	-1.16	-1.30	-0.80	-0.86	-0.97	-1.64	-5.39
Beta (low minus high)														
$\bar{r}$	-8.22***	2.93***	1.92***	0.03	0.56	0.44	0.43	-0.06	0.14	0.49	1.02***	-0.59*	-0.00	-0.17
	(-7.78)	(4.37)	(3.60)	(0.07)	(1.50)	(1.32)	(1.45)	(-0.20)	(0.48)	(1.53)	(3.02)	(-1.67)	(-0.01)	(-0.38)
α	-4.63***	2.17***	0.84**	0.23	0.29	0.45**	0.27	0.43**	0.37**	0.27	0.56***	0.16	0.72***	0.24
	(-8.06)	(4.33)	(2.52)	(0.86)	(1.27)	(2.17)	(1.45)	(2.36)	(2.12)	(1.42)	(2.83)	(0.80)	(3.44)	(0.79)
σ (%)	0.92	0.58	0.46	0.39	0.33	0.29	0.26	0.27	0.26	0.28	0.29	0.31	0.33	0.39
skew	-1.39	-0.16	-0.25	-0.23	-0.22	0.11	-0.15	-4.22	-2.10	-2.29	-0.31	-0.82	-0.82	-5.47
min (%)	-21.79	-9.31	-4.44	-4.36	-5.97	-2.52	-3.55	-8.75	-5.61	-5.65	-2.81	-4.14	-5.19	-13.31

	OV	9:30	10:00	10:30	11:00	11:30	12:00	12:30	1:00	1:30	2:00	2:30	3:00	3:30
Book-to-market (high minus low)														
$\bar{r}$	-2.88***	0.44	0.40	-0.36	-0.30	0.12	0.03	0.13	0.46**	-0.06	0.26	-0.11	0.29	1.34***
	(-5.69)	(1.09)	(1.32)	(-1.43)	(-1.43)	(0.63)	(0.15)	(0.72)	(2.57)	(-0.32)	(1.42)	(-0.58)	(1.39)	(5.72)
α	-2.10***	0.34	0.18	-0.31	-0.36*	0.13	-0.01	0.25	0.51***	-0.10	0.15	0.09	0.45**	1.44***
	(-4.44)	(0.85)	(0.63)	(-1.31)	(-1.78)	(0.69)	(-0.07)	(1.54)	(3.02)	(-0.61)	(0.88)	(0.50)	(2.30)	(6.61)
σ (%)	0.44	0.35	0.26	0.22	0.19	0.17	0.15	0.15	0.15	0.15	0.16	0.17	0.18	0.20
skew	0.09	-0.81	1.51	-0.42	-0.62	0.40	0.64	-1.74	1.34	-0.52	-0.46	-0.26	-0.07	0.87
min (%)	-4.87	-6.62	-3.48	-2.13	-2.60	-1.20	-1.50	-3.96	-2.81	-1.98	-2.28	-2.73	-2.11	-1.88
Gross profitability (high minus low)														
$\bar{r}$	-1.76***	1.81***	0.49*	0.75***	0.61***	0.33*	0.37**	0.24	0.11	0.15	0.01	0.53***	-0.03	-1.54***
	(-4.10)	(4.28)	(1.96)	(3.51)	(3.29)	(1.92)	(2.44)	(1.37)	(0.67)	(1.02)	(0.09)	(3.48)	(-0.15)	(-8.52)
α	-1.69***	1.83***	0.50**	0.74***	0.62***	0.33*	0.37**	0.19	0.12	0.16	0.01	0.52***	-0.02	-1.57***
	(-3.82)	(4.25)	(2.00)	(3.49)	(3.34)	(1.92)	(2.45)	(1.16)	(0.68)	(1.06)	(0.10)	(3.43)	(-0.14)	(-8.72)
σ (%)	0.37	0.37	0.22	0.18	0.16	0.15	0.13	0.15	0.15	0.13	0.13	0.13	0.15	0.16
skew	7.75	-10.92	0.14	-0.08	0.42	-0.30	-0.02	4.10	-12.99	0.63	0.12	0.12	-1.64	-0.38
min (%)	-3.35	-16.02	-1.99	-2.53	-1.27	-2.18	-1.52	-4.30	-6.61	-1.18	-0.89	-1.41	-3.21	-1.55
Illiquidity (high minus low)														
$\bar{r}$	-2.25***	-2.15***	-0.10	-0.34	-0.03	-0.04	0.11	-0.30	0.13	0.40**	0.38*	-0.08	0.03	4.81***
	(-4.79)	(-6.79)	(-0.37)	(-1.33)	(-0.13)	(-0.21)	(0.60)	(-1.48)	(0.70)	(2.15)	(1.87)	(-0.37)	(0.14)	(14.82)
α	-1.19***	-2.38***	-0.48**	-0.25	-0.15	-0.04	0.04	-0.03	0.23*	0.30**	0.16	0.29*	0.38**	4.95***
	(-3.16)	(-8.39)	(-1.98)	(-1.23)	(-0.84)	(-0.22)	(0.25)	(-0.24)	(1.68)	(2.08)	(1.03)	(1.73)	(2.07)	(16.39)
σ (%)	0.41	0.27	0.24	0.22	0.19	0.17	0.16	0.18	0.16	0.16	0.18	0.19	0.21	0.28
skew	-3.39	-0.73	-0.63	-1.37	-1.35	-0.09	0.16	-12.52	-1.09	0.87	-0.47	-1.11	0.24	1.01
min (%)	-12.06	-2.96	-3.11	-4.73	-4.55	-1.42	-1.36	-7.95	-3.01	-1.38	-1.89	-3.90	-1.55	-2.41
Idiosyncratic volatility (low minus high)														
$\bar{r}$	-10.46***	5.15***	3.03***	1.20***	1.30***	0.43	0.58**	0.08	0.35	0.18	0.40	0.38	0.91***	-1.85***
	(-13.49)	(9.07)	(7.06)	(3.52)	(4.65)	(1.64)	(2.57)	(0.39)	(1.55)	(0.73)	(1.57)	(1.44)	(3.16)	(-5.76)
α	-8.44***	4.67***	2.38***	1.30***	1.18***	0.45**	0.50***	0.30	0.47**	0.07	0.18	0.71***	1.29***	-1.69***
	(-13.67)	(9.39)	(6.69)	(4.56)	(4.92)	(2.03)	(2.61)	(1.56)	(2.47)	(0.31)	(0.83)	(3.14)	(5.42)	(-5.84)
σ (%)	0.67	0.49	0.37	0.30	0.24	0.23	0.20	0.19	0.20	0.21	0.22	0.23	0.25	0.28
skew	-1.00	0.20	-0.03	0.07	0.57	0.79	0.48	0.69	-1.42	-4.36	-1.85	-0.08	-0.83	-0.34
min (%)	-10.77	-7.14	-3.61	-2.79	-1.95	-2.11	-1.65	-1.72	-4.56	-5.92	-4.76	-2.25	-3.45	-3.35

	OV	9:30	10:00	10:30	11:00	11:30	12:00	12:30	1:00	1:30	2:00	2:30	3:00	3:30
Momentum (high minus low)														
$\bar{r}$	5.26***	0.51	-0.23	0.17	0.67**	0.51*	-0.13	-0.29	-0.27	0.21	-0.02	0.04	-0.34	-0.87***
	(6.79)	(0.86)	(-0.54)	(0.47)	(2.16)	(1.82)	(-0.53)	(-1.24)	(-1.14)	(0.87)	(-0.09)	(0.16)	(-1.20)	(-2.87)
α	5.67***	0.42	-0.26	0.17	0.68**	0.51*	-0.13	-0.32	-0.25	0.20	-0.04	0.04	-0.32	-0.87***
	(7.54)	(0.70)	(-0.62)	(0.47)	(2.18)	(1.83)	(-0.54)	(-1.38)	(-1.07)	(0.82)	(-0.14)	(0.15)	(-1.13)	(-2.88)
σ (%)	0.67	0.52	0.37	0.32	0.27	0.24	0.21	0.20	0.20	0.21	0.23	0.23	0.25	0.26
skew	-3.21	0.47	-0.78	-0.45	-0.04	-0.36	-0.31	0.77	-0.44	0.07	0.49	-0.08	-0.37	-0.26
min (%)	-18.36	-4.29	-3.91	-3.85	-2.89	-3.62	-2.60	-2.32	-2.38	-3.77	-2.14	-2.93	-3.27	-2.70
Net stock issues (low minus high)														
$\bar{r}$	-4.08***	2.79***	1.69***	0.82***	0.27*	0.44***	0.06	0.37**	0.01	0.42***	0.26*	0.44***	-0.15	-1.83***
	(-10.35)	(8.87)	(7.52)	(4.30)	(1.66)	(2.87)	(0.42)	(2.49)	(0.11)	(2.94)	(1.90)	(3.04)	(-0.93)	(-9.29)
α	-3.80***	2.71***	1.59***	0.83***	0.26	0.44***	0.05	0.37***	0.03	0.40***	0.23*	0.49***	-0.09	-1.82***
	(-9.73)	(8.72)	(7.18)	(4.38)	(1.57)	(2.91)	(0.34)	(2.68)	(0.23)	(2.81)	(1.69)	(3.39)	(-0.55)	(-9.28)
σ (%)	0.34	0.27	0.20	0.17	0.14	0.13	0.12	0.13	0.11	0.12	0.12	0.13	0.14	0.17
skew	0.86	0.66	0.02	0.31	-0.10	0.85	-0.35	7.42	-0.33	-3.59	0.13	0.46	-1.19	-4.56
min (%)	-2.99	-1.47	-1.71	-1.76	-1.46	-1.21	-1.30	-0.76	-1.17	-3.72	-0.96	-1.09	-1.97	-5.45
Size (small minus large)														
$\bar{r}$	-0.91**	-2.02***	-0.60**	-0.63**	-0.22	-0.07	0.02	-0.28	-0.09	0.16	0.16	-0.36	-0.16	5.06***
	(-2.06)	(-6.29)	(-2.19)	(-2.54)	(-1.06)	(-0.35)	(0.10)	(-1.41)	(-0.53)	(0.88)	(0.79)	(-1.63)	(-0.66)	(15.95)
α	0.04	-2.23***	-0.93***	-0.55***	-0.33*	-0.06	-0.05	-0.03	0.00	0.07	-0.05	-0.01	0.16	5.19***
	(0.11)	(-7.54)	(-3.79)	(-2.70)	(-1.87)	(-0.38)	(-0.32)	(-0.19)	(0.03)	(0.47)	(-0.28)	(-0.05)	(0.88)	(17.65)
σ (%)	0.38	0.28	0.24	0.21	0.18	0.16	0.16	0.17	0.15	0.16	0.17	0.19	0.21	0.28
skew	-3.53	-0.54	-0.51	-1.08	-1.09	-0.06	0.10	-11.28	-0.71	0.45	-0.61	-1.15	0.02	0.91
min (%)	-11.78	-2.71	-2.72	-4.23	-4.00	-1.38	-1.32	-7.45	-2.49	-1.44	-1.84	-4.00	-2.15	-2.26

Figure IA.1. Mispricing end-of-day (3:30-4:00pm) market beta, alpha, and average return estimated with a 1-year rolling window. Panel (a) reports the rolling beta. Panel (b) reports the rolling alpha and average return. Details on the construction of the mispricing strategy are provided in the caption of Table 1 in the main text.

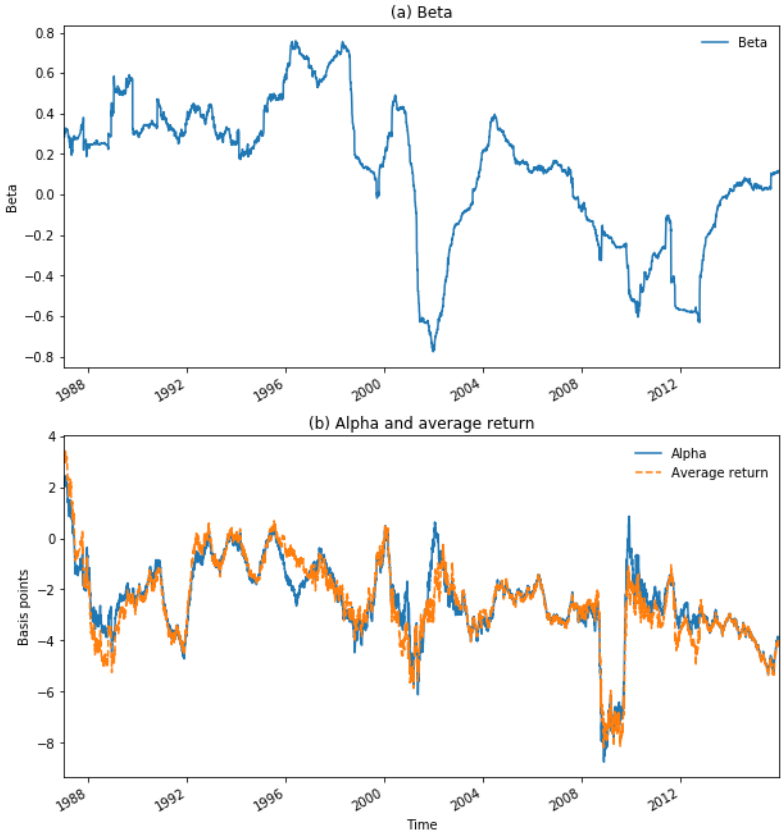
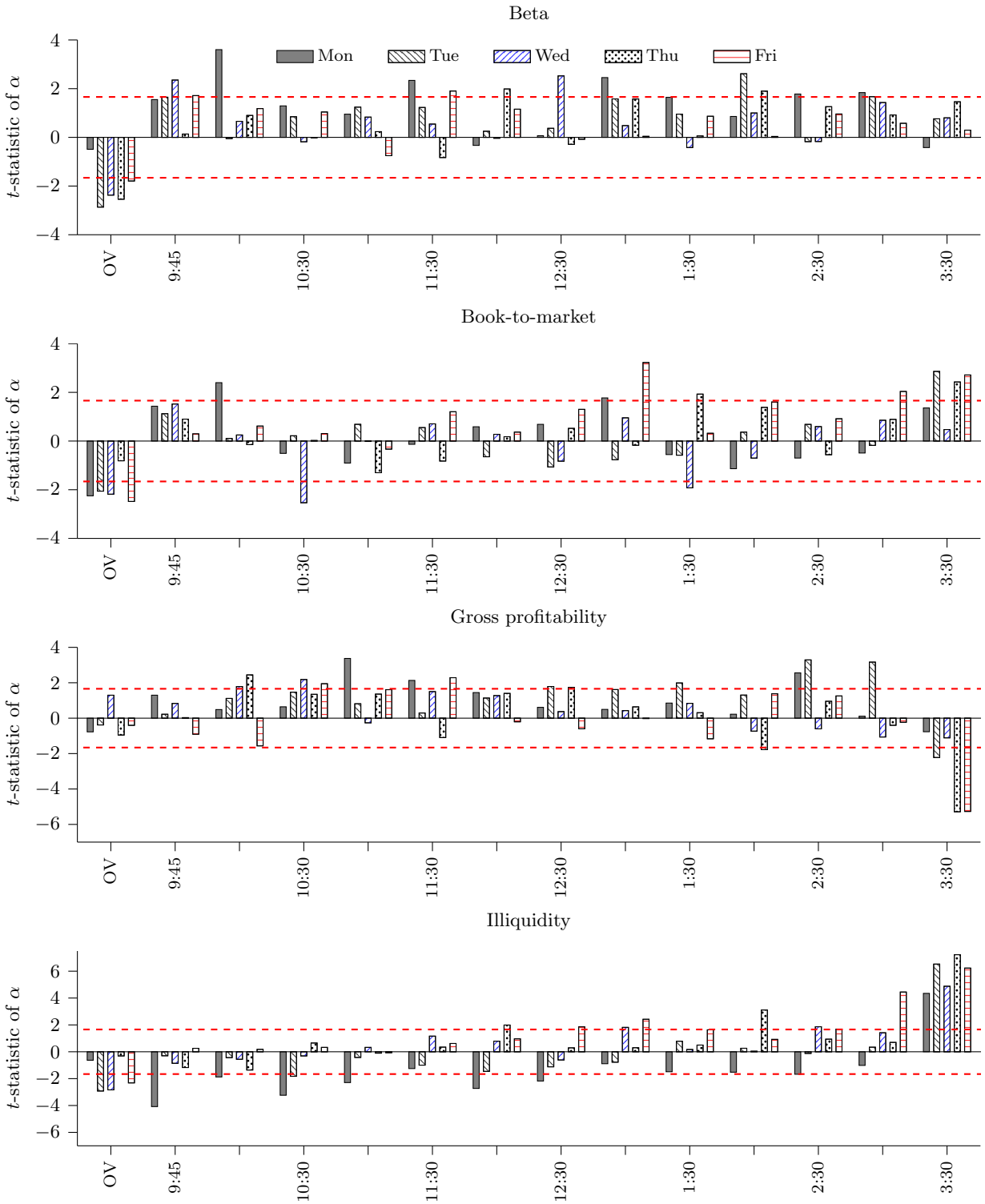
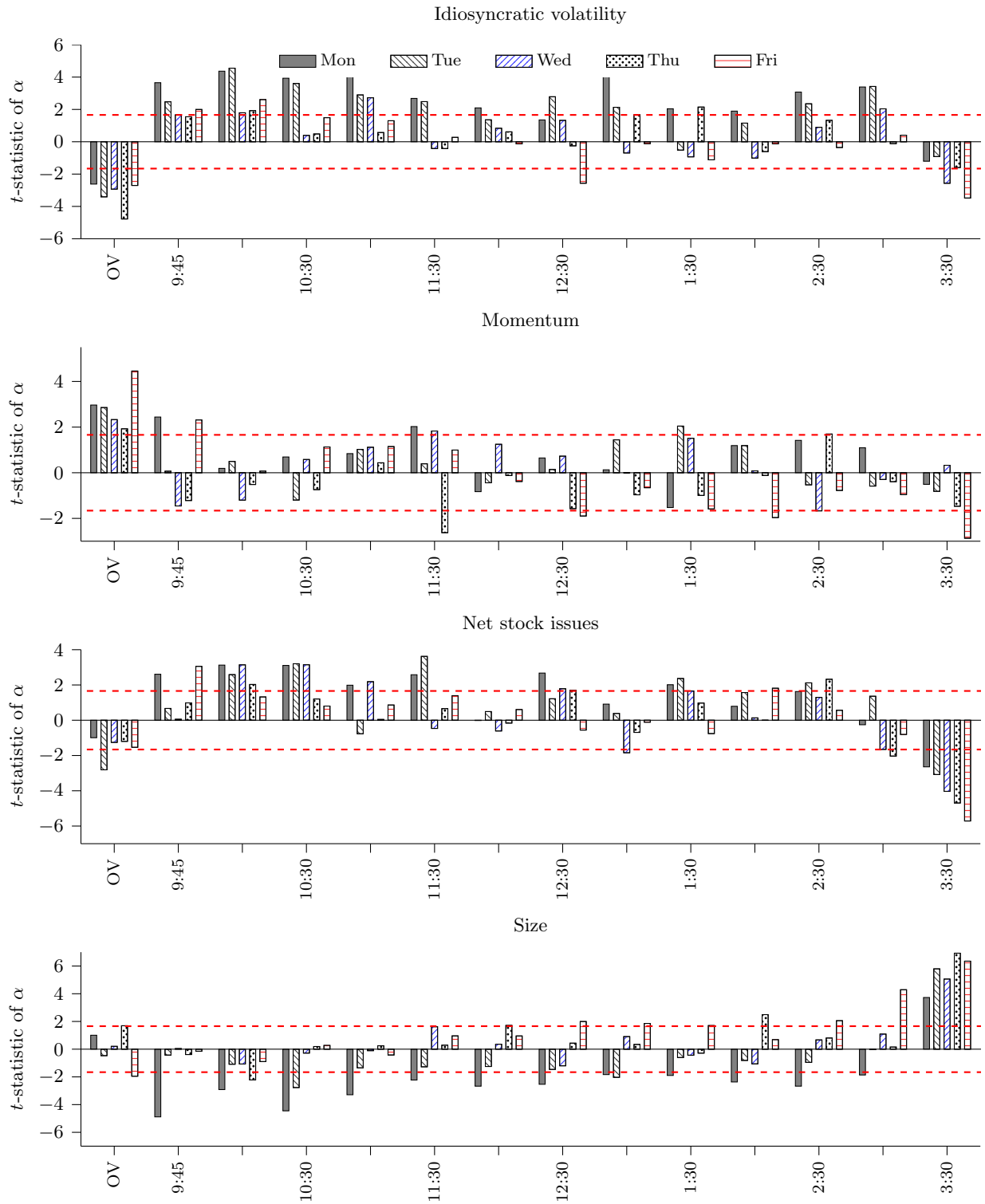


Figure IA.2. Intraday and overnight t-statistics of market alphas of long-short portfolios across days of the week. The first interval starts at 9:45am. 10:00 indicates the half-hour interval that starts at 10:00am and ends before 10:30am. OV indicates the overnight interval. Dashed red lines indicate significance at the level of 10%. The t-statistics are based on heteroskedasticity-adjusted standard errors.



(Figure IA.2 continued.)



2 Nonsynchronous Trading

Nonsynchronous trading is an important issue to consider when studying returns over short horizons. Nonsynchronous trading smoothes portfolio returns, which generates positive portfolio return autocorrelation (e.g., Fisher (1966)) and lowers a portfolio's volatility below its true economic volatility. Furthermore, nonsynchronous trading can generate spurious time-of-day patterns in average returns. Consider the extreme example of a stock that is traded only at the end of the day. If the stock's average return over the period is positive, then one observes a high end-of-day return and zero returns over the rest of the day for this stock. The use of midquote returns, which are not necessarily associated with trades, and the filters used in the main analysis should limit the problem. Still, quotes may not be revised actively, especially during the old part of the sample.

To assess the impact of nonsynchronous trading, I apply the following volume filter: each year, a stock is required to have trades in the first, second, second to last, and last half hours of the trading day on at least 90% of the days for which the stock has a valid CRSP daily return. In addition to excluding stocks that trade particularly infrequently, this restriction ensures that the overnight and opening half-hour returns are associated with actual transactions. The ISSM data set misses some volume data in 1987. I use as a benchmark the maximum number of days for which a stock has ISSM volume data in this year (210).

Table IA.8 reports intraday and overnight alphas of anomalies with the volume filter. The patterns in Tables 1 and 7 in the main text do not appear to be driven by nonsynchronous trading. Alphas tend to be slightly smaller over the trading day, and a few differences arise for overnight and first-hour returns. The results are also robust to including lagged and one-period ahead market returns (Table IA.9).

To further examine the impact of nonsynchronous trading, I compute the autocorrelation of overnight returns with past and subsequent returns for large, small, and micro portfolios over different subsamples. Figure IA.3 reports the autocorrelations. In the first part of the sample, large positive autocorrelations of the overnight return with subsequent returns throughout the day strongly suggest delayed quote adjustments among stocks in the small and micro portfolios (Panel (a)). Panel (b) confirms this result. Applying the volume filter described above affects only the small and micro portfolios significantly (Figure IA.4). Autocorrelations in the later part of the

sample do not show marked evidence of nonsynchronous trading and are not affected by the volume filter. Overall, nonsynchronous trading seems to be a potential concern only in the first part of the sample.

Trade-based returns give similar results except for the autocorrelation of overnight returns with first half-hour returns (Figures IA.5 and IA.6). These autocorrelations are always higher using trade-based returns than using midquote returns. All size groups exhibit a difference in this respect. This evidence is consistent with nonsynchronous trading being more of an issue for trade-based returns than for midquote returns.

Table IA.8. Intraday and overnight alphas in basis points of long-short portfolios with volume filter. Each year, a stock is required to have trades in the first, second, second to last, and last half-hours of the trading day on at least 90% of the days for which it has a valid CRSP daily return. At the end of each month, stocks are split into decile portfolios based on the NYSE breakpoints of the characteristics defined in the main text. Portfolios are value-weighted and held for one month. A stock is required to have a price greater than $5 at the end of the previous month and a market capitalization greater than $100 million at the end of the previous month to be included. Financial firms are excluded from portfolios based on accounting variables. Stock returns are computed using quote midpoints. The first interval starts at 9:45am. 10:00 indicates the half-hour interval that starts at 10:00am and ends before 10:30am. OV indicates the overnight interval. The sample is composed of NYSE, Amex, and NASDAQ common stocks from January 1, 1986, to December 31, 2015. NASDAQ stocks are included since 1993. The t-statistics are shown in parentheses and based on Newey and West (1987) standard errors with 14 lags. *, **, and *** denote significance at the 10%, 5%, and 1% level.

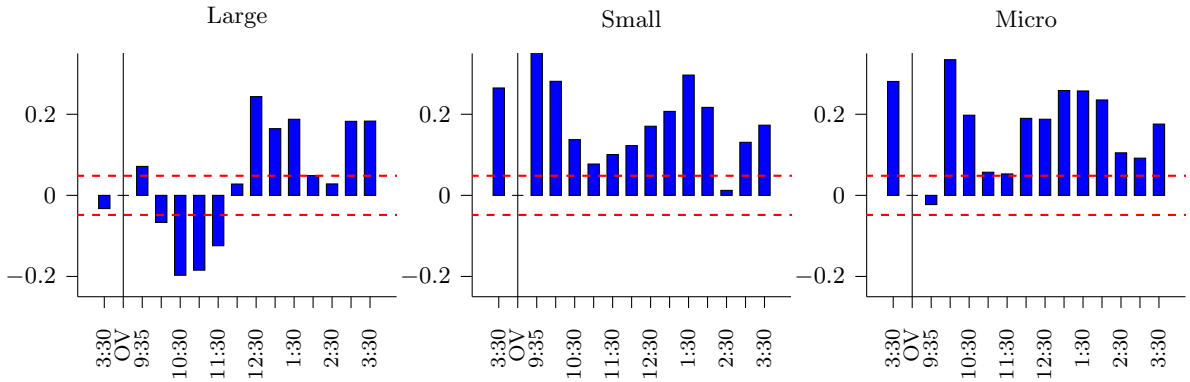
	OV	9:45	10:00	10:30	11:00	11:30	12:00	12:30	1:00	1:30	2:00	2:30	3:00	3:30
Mispricing														
α	1.16**	0.95***	1.12***	0.69***	0.58***	0.33*	0.03	0.43***	0.21	0.13	0.46***	0.44**	0.11	-2.56***
	(2.15)	(3.78)	(3.86)	(3.06)	(2.77)	(1.75)	(0.18)	(2.65)	(1.25)	(0.74)	(2.62)	(2.37)	(0.53)	(-10.55)
Accruals														
α	0.12	0.94***	0.34	-0.06	-0.38*	0.04	0.23	0.13	-0.06	-0.23	0.17	-0.08	-0.22	-0.14
	(0.25)	(3.44)	(1.28)	(-0.26)	(-1.95)	(0.20)	(1.37)	(0.80)	(-0.38)	(-1.48)	(1.01)	(-0.50)	(-1.23)	(-0.65)
Beta														
α	-3.80***	0.90***	0.85**	0.51*	0.15	0.47**	0.21	0.24	0.61***	0.11	0.53***	0.23	0.37*	-0.15
	(-5.40)	(2.88)	(2.42)	(1.83)	(0.65)	(2.16)	(1.05)	(1.31)	(3.33)	(0.58)	(2.62)	(1.10)	(1.65)	(-0.56)
Book-to-market														
α	-2.79***	0.62**	0.44	-0.32	-0.14	0.13	0.09	0.12	0.43**	-0.05	-0.01	0.05	0.15	1.00***
	(-5.14)	(2.36)	(1.53)	(-1.35)	(-0.68)	(0.69)	(0.55)	(0.74)	(2.55)	(-0.27)	(-0.04)	(0.27)	(0.73)	(4.21)
Gross Profitability														
α	-0.48	-0.04	0.37	0.64***	0.49**	0.31*	0.35**	0.21	0.21	0.15	-0.04	0.52***	0.08	-1.11***
	(-0.95)	(-0.17)	(1.34)	(2.79)	(2.42)	(1.68)	(2.03)	(1.25)	(1.30)	(0.90)	(-0.25)	(3.04)	(0.42)	(-5.37)
Illiquidity														
α	0.02	-0.72***	-0.52*	-0.41*	0.05	0.03	0.21	-0.07	0.16	0.25	0.23	0.08	0.21	3.21***
	(0.06)	(-2.94)	(-1.89)	(-1.75)	(0.26)	(0.17)	(1.18)	(-0.41)	(0.98)	(1.47)	(1.27)	(0.43)	(1.02)	(10.77)
Idiosyncratic volatility														
α	-5.75***	1.03***	1.83***	0.77***	1.04***	0.14	0.15	0.12	0.43**	0.12	0.01	0.66***	0.96***	-0.96***
	(-8.59)	(3.18)	(5.15)	(2.69)	(4.22)	(0.65)	(0.77)	(0.66)	(2.29)	(0.58)	(0.04)	(2.98)	(4.04)	(-3.25)
Momentum														
α	6.33***	-0.30	-0.74*	-0.06	0.22	0.08	-0.13	-0.35	-0.15	-0.03	-0.12	-0.09	-0.42	-0.97***
	(7.60)	(-0.85)	(-1.77)	(-0.16)	(0.70)	(0.29)	(-0.51)	(-1.55)	(-0.68)	(-0.12)	(-0.47)	(-0.33)	(-1.49)	(-3.16)
Net stock issues														
α	-1.51***	0.71***	1.20***	0.89***	0.35*	0.56***	-0.06	0.37**	-0.12	0.36**	0.22	0.50***	-0.23	-1.55***
	(-3.33)	(2.94)	(4.87)	(4.40)	(1.94)	(3.32)	(-0.38)	(2.44)	(-0.86)	(2.45)	(1.45)	(3.12)	(-1.35)	(-7.48)
Size														
α	1.67***	-0.87***	-0.80***	-0.24	0.15	0.19	0.31*	0.01	0.15	0.02	0.13	0.03	0.10	3.05***
	(4.19)	(-3.42)	(-2.85)	(-1.05)	(0.72)	(1.02)	(1.74)	(0.05)	(0.91)	(0.09)	(0.73)	(0.15)	(0.46)	(10.57)

Table IA.9. Intraday and overnight alphas in basis points of long-short portfolios with lead-lag market returns. Portfolio returns are regressed on lagged, current, and one-period ahead market returns. At the end of each month, stocks are split into decile portfolios based on the NYSE breakpoints of the characteristics defined in the main text. Portfolios are value-weighted and held for one month. A stock is required to have a price greater than $5 at the end of the previous month and a market capitalization greater than $100 million at the end of the previous month to be included. Financial firms are excluded from portfolios based on accounting variables. Stock returns are computed using quote midpoints. The first interval starts at 9:45am. 10:00 indicates the half-hour interval that starts at 10:00am and ends before 10:30am. OV indicates the overnight interval. The sample is composed of NYSE, Amex, and NASDAQ common stocks from January 1, 1986, to December 31, 2015. NASDAQ stocks are included since 1993. The t-statistics are shown in parentheses and based on Newey and West (1987) standard errors with 14 lags. *, **, and *** denote significance at the 10%, 5%, and 1% level.

	OV	9:45	10:00	10:30	11:00	11:30	12:00	12:30	1:00	1:30	2:00	2:30	3:00	3:30
Mispricing														
α	1.29**	0.97***	1.20***	0.87***	0.83***	0.35*	0.22	0.46***	0.25	0.16	0.45**	0.45**	0.24	-2.40***
	(2.33)	(3.92)	(4.16)	(3.81)	(4.03)	(1.90)	(1.31)	(2.93)	(1.50)	(0.92)	(2.55)	(2.44)	(1.16)	(-10.08)
Accruals														
α	0.60	0.94***	0.26	0.04	-0.38**	-0.07	0.19	0.24*	-0.01	-0.30**	0.05	-0.17	-0.31*	-0.34*
	(1.24)	(3.88)	(1.05)	(0.21)	(-2.18)	(-0.41)	(1.26)	(1.69)	(-0.10)	(-2.15)	(0.33)	(-1.10)	(-1.86)	(-1.70)
Beta														
α	-3.01***	0.73***	0.90***	0.35	0.26	0.47**	0.27	0.23	0.44**	0.19	0.53***	0.29	0.62***	0.39
	(-4.43)	(2.61)	(2.75)	(1.36)	(1.17)	(2.32)	(1.48)	(1.33)	(2.56)	(1.09)	(2.84)	(1.57)	(3.04)	(1.55)
Book-to-market														
α	-2.33***	0.53**	0.39	-0.26	-0.17	0.13	0.03	0.06	0.44***	-0.08	0.13	0.13	0.27	1.00***
	(-4.29)	(2.09)	(1.41)	(-1.11)	(-0.82)	(0.72)	(0.17)	(0.41)	(2.71)	(-0.48)	(0.74)	(0.75)	(1.37)	(4.47)
Gross profitability														
α	-0.17	0.13	0.46*	0.69***	0.54***	0.38**	0.37**	0.24*	0.23*	0.22	0.01	0.48***	0.11	-1.24***
	(-0.37)	(0.58)	(1.85)	(3.27)	(2.94)	(2.29)	(2.46)	(1.67)	(1.67)	(1.49)	(0.06)	(3.21)	(0.67)	(-6.68)
Illiquidity														
α	-1.49***	-0.82***	-0.28	-0.27	-0.23	0.02	-0.04	-0.07	0.15	0.08	0.25*	0.27*	0.39**	3.63***
	(-4.00)	(-4.08)	(-1.24)	(-1.49)	(-1.42)	(0.13)	(-0.28)	(-0.51)	(1.17)	(0.56)	(1.79)	(1.76)	(2.21)	(13.09)
Idiosyncratic volatility														
α	-5.00***	1.42***	2.35***	1.17***	1.31***	0.43**	0.42**	0.20	0.62***	0.14	0.11	0.72***	1.01***	-1.20***
	(-7.26)	(4.59)	(6.66)	(4.16)	(5.50)	(1.98)	(2.23)	(1.07)	(3.30)	(0.67)	(0.51)	(3.26)	(4.27)	(-4.06)
Momentum														
α	5.69***	0.28	-0.18	0.09	0.62**	0.33	-0.03	-0.27	-0.03	0.01	0.06	-0.03	-0.13	-0.69**
	(6.59)	(0.78)	(-0.42)	(0.25)	(1.97)	(1.19)	(-0.12)	(-1.22)	(-0.11)	(0.04)	(0.21)	(-0.13)	(-0.47)	(-2.26)
Net stock issues														
α	-1.34***	0.66***	1.19***	0.97***	0.32**	0.52***	0.04	0.38***	-0.06	0.38***	0.25*	0.51***	-0.24	-1.66***
	(-3.14)	(3.01)	(5.17)	(5.18)	(1.96)	(3.51)	(0.28)	(2.74)	(-0.48)	(2.83)	(1.82)	(3.51)	(-1.52)	(-8.85)
Size														
α	0.03	-0.82***	-0.71***	-0.50***	-0.42***	0.00	-0.06	-0.12	-0.07	-0.12	-0.01	0.07	0.21	3.43***
	(0.09)	(-3.99)	(-3.12)	(-2.69)	(-2.58)	(0.00)	(-0.43)	(-0.91)	(-0.51)	(-0.90)	(-0.05)	(0.43)	(1.18)	(12.53)

Figure IA.3. Correlations of overnight returns with past and subsequent returns on value-weighted portfolios. Stocks are allocated into micro, small, and large portfolios based on the 20$^{\text{th}}$ and 50$^{\text{th}}$ percentiles of NYSE market capitalization each year at the end of June. The volume filter requires each year a stock to have trades in the first, second, second to last, and last half-hours of the trading day on at least 90% of the days for which it has a valid CRSP daily return. Stock returns are computed using quote midpoints. OV indicates the overnight interval. The sample is composed of NYSE, Amex, and NASDAQ common stocks from October 1, 1985, to December 31, 2015. NASDAQ stocks are included starting from 1993. Dashed red lines indicate bootstrapped confidence intervals at the level of 1%.

(a) 1985-1992 without volume filter



(b) 1985-1992 with volume filter

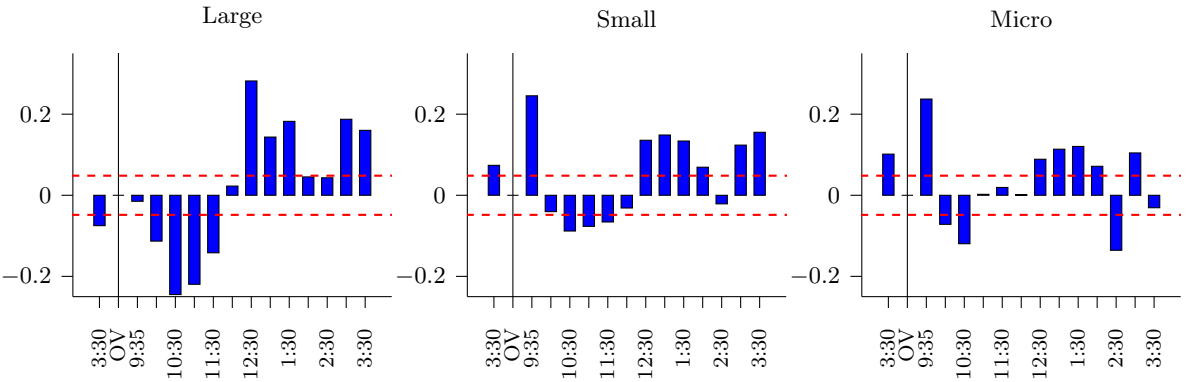


Figure IA.4. Correlations of overnight returns with past and subsequent returns on value-weighted portfolios for different subsamples (with volume filter). Stocks are allocated into micro, small, and large portfolios based on the 20th and 50th percentiles of NYSE market capitalization each year at the end of June. Each year, a stock is required to have trades in the first, second, and last half-hour of the trading day on at least 90% of the days for which it has a valid CRSP daily return. Stock returns are computed using quote midpoints. OV indicates the overnight interval. The sample is composed of NYSE, Amex, and NASDAQ common stocks from October 1, 1985, to December 31, 2015. NASDAQ stocks are included starting from 1993. Dashed red lines indicate bootstrapped confidence intervals at the level of 1%.

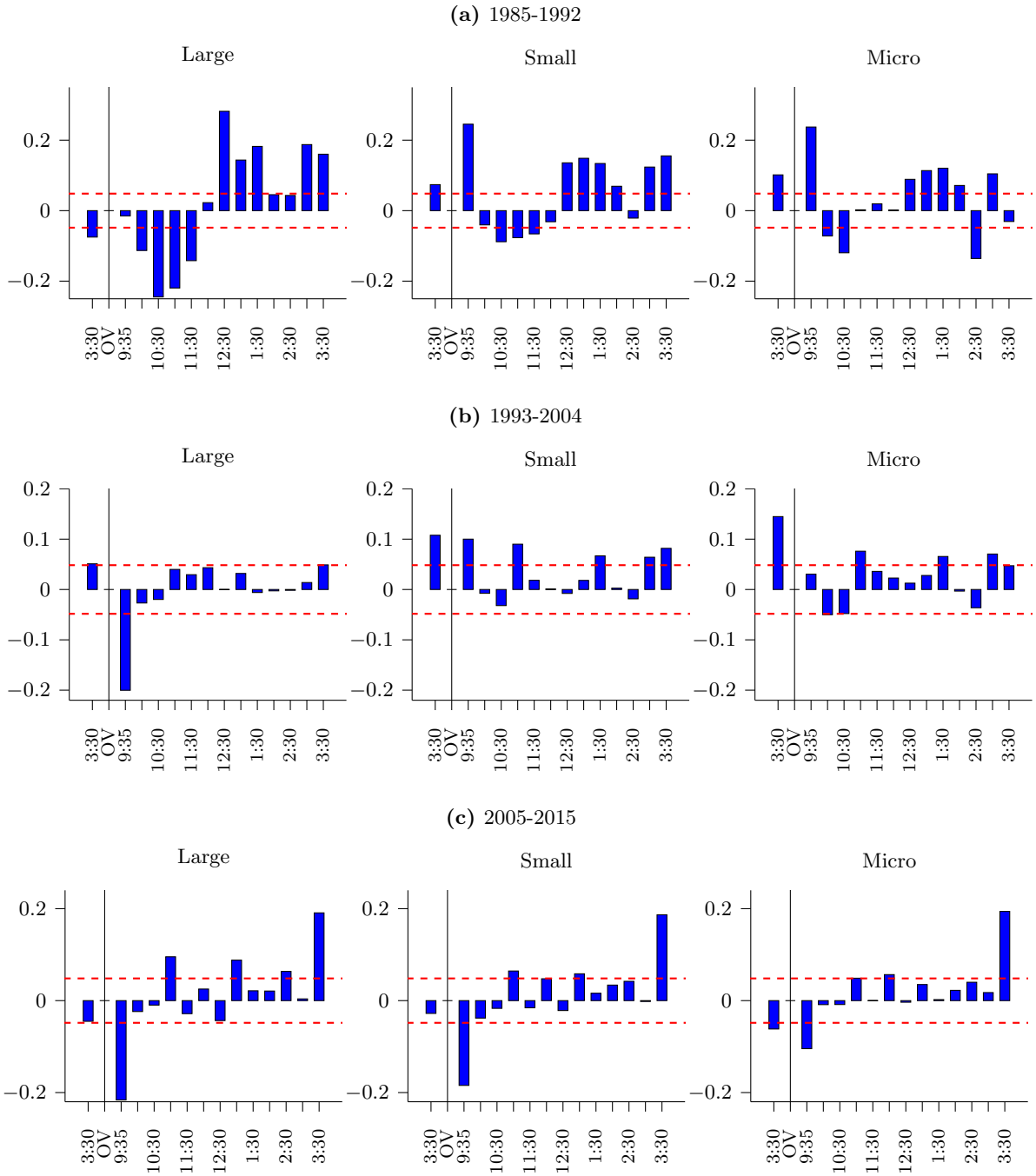


Figure IA.5. Correlations of overnight returns with past and subsequent returns on value-weighted portfolios for different subsamples (trade-based returns). Stocks are allocated into micro, small, and large portfolios based on the 20$^{\text{th}}$ and 50$^{\text{th}}$ percentiles of NYSE market capitalization each year at the end of June. Stock returns are computed using trades. OV indicates the overnight interval. The sample is composed of NYSE, Amex, and NASDAQ common stocks from October 1, 1985, to December 31, 2015. NASDAQ stocks are included starting from 1993. Dashed red lines indicate bootstrapped confidence intervals at the level of 1%.

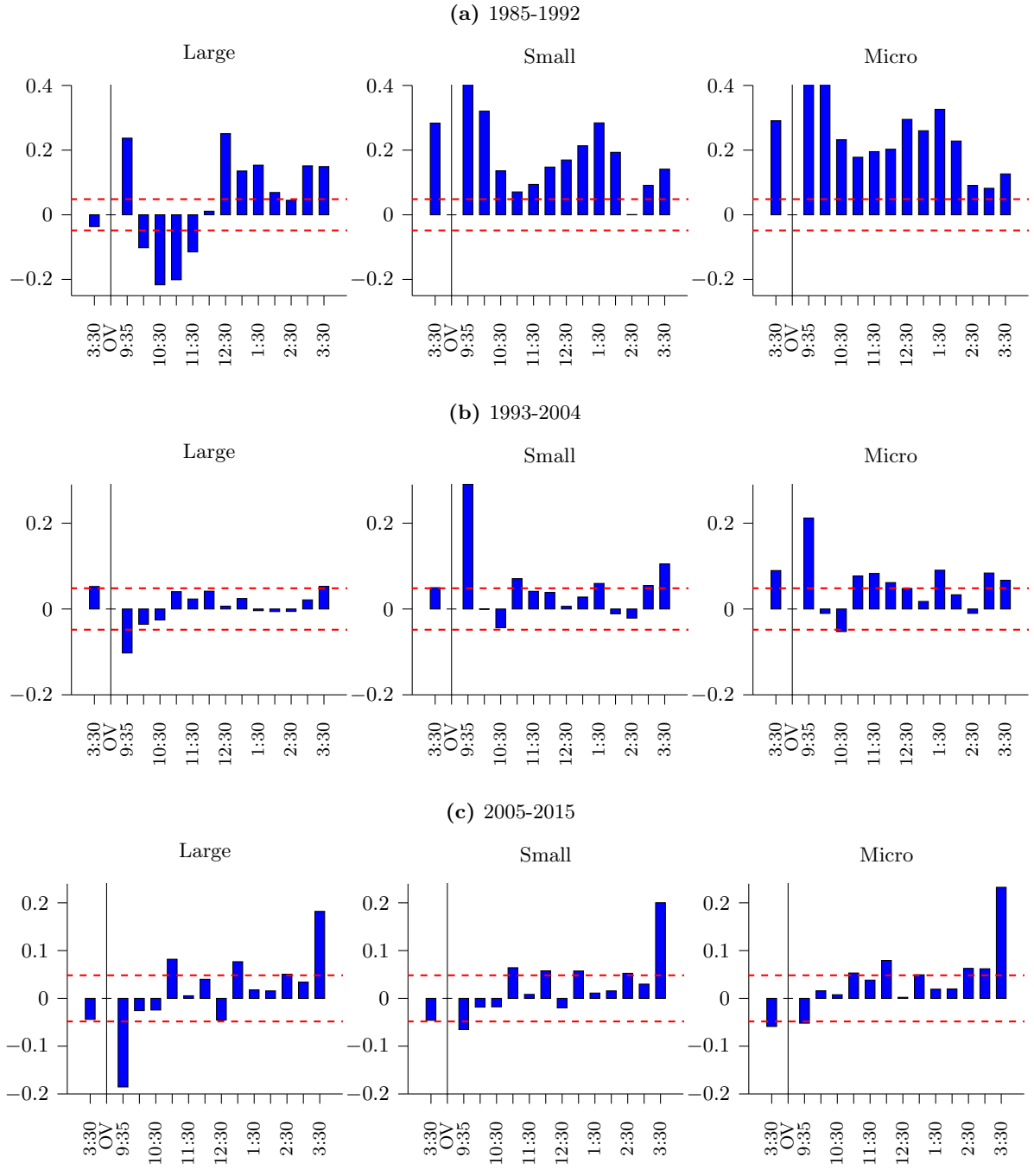
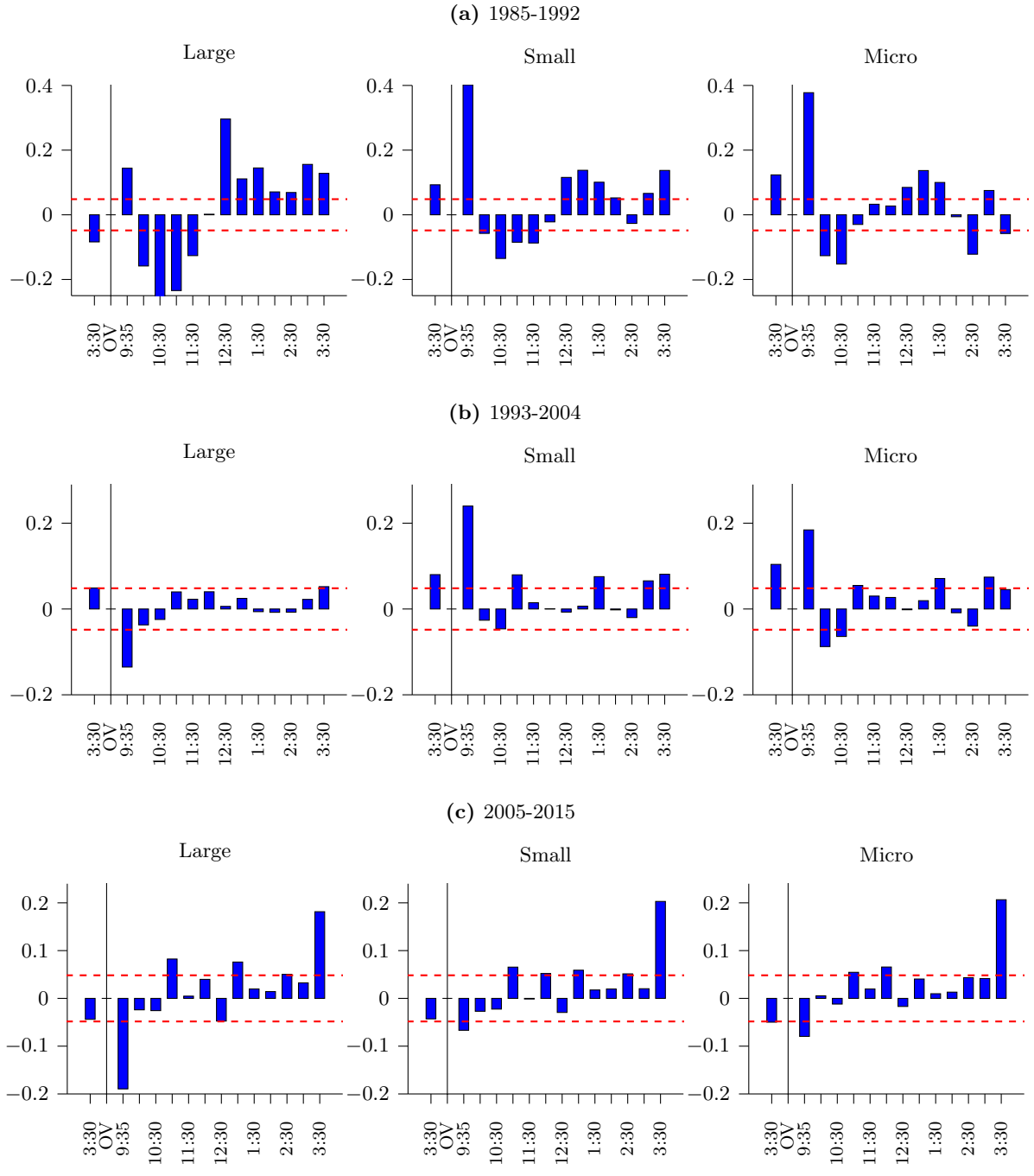


Figure IA.6. Correlations of overnight returns with past and subsequent returns on value-weighted portfolios for different subsamples (trade-based returns with volume filter). Stocks are allocated into micro, small, and large portfolios based on the 20$^{\text{th}}$ and 50$^{\text{th}}$ percentiles of NYSE market capitalization each year at the end of June. Stock returns are computed using trades. OV indicates the overnight interval. The sample is composed of NYSE, Amex, and NASDAQ common stocks from October 1, 1985, to December 31, 2015. NASDAQ stocks are included starting from 1993. Dashed red lines indicate bootstrapped confidence intervals at the level of 1%.



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