Internet Appendix to "A Tug of War: Overnight Versus Intraday Expected Returns"

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This Appendix provides a variety of supplemental information for Lou, Polk, and Skouras (LPS 2018).

1 Momentum Robustness Tests

To ensure the reliability of our results, we have excluded microcaps and low-price stocks from the sample and sorted stocks into value-weight portfolios based on NYSE breakpoints. Furthermore, we have made sure that overnight returns are only based on traded prices. Nevertheless, Appendix Table A10 documents that our momentum findings are robust to subsample analysis.

One possibility is that our momentum finding is driven by extremes that occur in particular subperiods. Appendix Table A10 Panels A and B report the decomposition for the first and second halves of the sample. We find that momentum profits are entirely an overnight phenomenon in both the early subsample (1993-2002) and the late subsample (2003-2013). Specifically, we find that the three-factor alpha during the early period is 1.26% per month with a t-statistic of 3.99. The late period's three-factor alpha is 0.76 percent per month with a t-statistic of 2.15. Thus, our surprising finding is not just a historical quirk. Instead, these patterns are very much present in the recent data.

Despite using TAQ data to calculate volume-weighted prices actually traded around the open, a concern might be that our findings are driven by some microstructure artifact. Appendix Table A10 Panels C and D report our decomposition for small- and large-cap stocks separately. Presumably, by focusing on large-cap stocks, we can eliminate concerns that any such artifact drives our results. We sort stocks each month based on median NYSE market capitalization. We find that overnight returns to the momentum strategy are actually stronger for large-cap stocks. For small-cap stocks, the overnight three-factor alpha is 0.54% (t-statistic of 4.49) while the intraday three-factor alpha is 0.39% (t-statistic of 1.59). For large-cap stocks, the overnight three-factor alpha is 1.04% (t-statistic of 5.90) while the intraday three-factor alpha is actually negative, -0.24% (t-statistic of -0.79).

A related concern is that even though we are using traded prices, perhaps these prices disproportionately reflect the ask for the winner stocks and the bid for loser stocks. Appendix Table A10 Panels E and F split the sample based on price as high-priced stocks presumably have much lower bid-ask spreads on a percentage basis. We again split the sample based on monthly median NYSE values and find that overnight returns to the momentum strategy are actually stronger for high-price stocks. For low-price stocks, the overnight three-factor alpha is 0.66% (t-statistic of 3.59) while the intraday three-factor alpha is 0.33% (t-statistic of 1.17). For high-price stocks, the overnight three-factor alpha is 1.14% (t-statistic of 6.63) while the intraday three-factor alpha is again negative, -0.41% (t-statistic of -1.33).

We further test this concern by replacing our VWAP open price with the midpoint of the bid-ask spread. We limit the data to NYSE stocks that have quote data updated regularly throughout the day. Recall that Table II (Appendix Table A4) reports that the average excess overnight is 0.89% per month with an associated t-statistic of 3.44 and the average excess intraday return is -0.18% per month (t-statistic of -0.43) when using the VWAP price. In untabulated results, we find that these results are very similar if we instead use the midpoint of the bid-ask spread. In particular, the average excess overnight return is 0.95% per month with an associated t-statistic of 2.95, and the average excess intraday return is only 0.04% per month (t-statistic of 0.17).

In summary, our finding that momentum is an overnight phenomenon continues to hold even when we carefully examine various types of prices throughout the day, study only the largest or highest-priced stocks, or focus only on the last ten years of data.

Note that Table II amd Table A4 control for CAPM and three-factor risk by regressing monthly overnight or intraday MOM returns on the close-to-close monthly return of the factor(s) in question. Of course, since we are documenting that momentum returns occur disproportionately overnight, we must be careful to show that the risk premium implied by the CAPM or the three-factor model does not disproportionately occur overnight as well. Indeed, as mentioned above, for our sample, roughly 60% of the equity premium is earned overnight. In Appendix Table A11, we similarly decompose the market and three-factor model into overnight and intraday components and re-estimate the three-factor regression using these components. For now, we do not describe the way the properties of these factors vary from overnight to intraday; Section 4.4 will carefully decompose the size and value premiums into overnight and intraday components.

The top third of Appendix Table A11 examines the way the three-factor loadings of MOM's close-to-close return change as we split the Fama and French factors into their overnight and intraday components. We find that MOM's market loading is higher overnight than intraday, but is still negative. Moreover, MOM's SMB and HML loadings decrease and in both cases are negative. Thus, it seems unlikely that changing three-factor risks can account for the fact that momentum returns are primarily overnight.

We confirm that this is the case in the middle third of Appendix Table A11 where we explicitly regress the overnight MOM returns on the overnight Fama-French three-factor model. The three-factor loadings are negative, and the alpha remains an economically large 0.86% (t-statistic of 3.07). The lower third of Appendix Table A11 confirms that the intraday MOM three-factor alpha remains economically and statistically insignificant when the strategy and factor returns are both computed on an intraday basis.[1]

A naturally interesting aspect of momentum returns is the extent to which they revert (Jegadeesh and Titman 2001). Appendix Figures A2 and A3 examine this question by plotting the cumulative excess returns (Appendix Figure A2) and abnormal three-factor returns (Appendix Figure A3) on MOM for up to two years after portfolio formation. These figures plot not only the close-to-close return but also the overnight and intraday components. Appendix Figure A2 shows that overnight returns are strongly positive for up to 12 months. Then, starting around month 18, these returns begin to revert and, after two years, have reverted by roughly 30%. In stark contrast, intraday returns are strongly negative for the first two years.

Of course, an aspect of momentum strategies that complicates this analysis is that winner (loser) stocks are typically growth (value) stocks; this fact is true for MOM over our sample. Thus, one must be careful when examining the long-horizon performance of a momentum strategy as growth-minus-value bets are known to strongly underperform for several years in event time. By reporting cumulative three-factor residuals, Appendix Figure A3 removes this complicating aspect and reveals that the intraday profits are essentially zero for the first seven months. Indeed the curves representing the cumulative abnormal returns overnight and close-to-close are extremely close to each other all the way to month 12. After adjusting for three-factor exposure, we still find some evidence of long-run reversal as overnight profits revert partially (about 30%) during the second year.

Our momentum analysis has focused on the winner and loser decile portfolios. We now look more closely at how our decomposition varies across momentum decile portfolios. This closer look in turn leads us to show that the interaction between idiosyncratic volatility and momentum plays an important role in our momentum decomposition.

Appendix Figure A4 plots the value-weight excess returns from close-to-close, overnight, and intraday for ten value-weight momentum decile portfolios. Though the average close-to-close returns are roughly increasing as one moves from the loser decile to the winner decile, the overnight and intraday components are surprisingly U- and hump-shaped respectively.

To explain these patterns, we exploit two facts. The first fact is that both extreme winners and losers tend to be stocks with high idiosyncratic volatility. The second fact is that $IVOL$ is associated with a *positive* risk premium overnight, as our decomposition of $IVOL$ above shows. These two facts suggest an explanation for the U- and hump-shaped patterns of Figure A4; namely, extreme winner or loser stocks generally outperform overnight and underperform intraday because they tend to be high idiosyncratic volatility stocks.

[1] We have also examined estimating conditional pricing regressions using a variety of methods; our results are robust to this approach as well.

As a consequence, Appendix Table A12 Panels A and B decompose the excess returns on 25 momentum- and idiosyncratic-volatility-sorted portfolios into their overnight and intraday components respectively. There are several findings worth noting. First, within all but the highest idiosyncratic volatility quintile, average excess returns are increasing with momentum. And even within the highest idiosyncratic volatility quintile, the momentum effect is much more monotonic. Second, the t-statistics on the 5-1 long-short momentum portfolios within each idiosyncratic volatility quintile are now much more statistically significant. Third, the idiosyncratic–volatility-stratified intraday return on a momentum bet is statistically insignificant from zero. Finally, both the positive overnight and the negative intraday premia associated with idiosyncratic volatility remain robust in these double sorts that control for momentum.

Appendix Table A12 Panel C presents another way to control for this interesting interaction between momentum and idiosyncratic volatility, simply excluding high idiosyncratic stocks (stocks with idiosyncratic volatility above the NYSE 80th percentile) from the sample each month. As one might expect from findings of the previous two panels in the table, we find the overnight three-factor alphas on value-weight momentum deciles using this sample are now much more monotonic. The overnight return on a portfolio that is long the winner decile and short the loser decile has a three-factor alpha of 1.25% per month with a t-statistic of 4.28.

In results not shown, we measure the extent to which these overnight returns are spread evenly throughout weeknights and the weekend. Of the 89 basis points of excess return, 72 basis points accrue Monday through Thursday while 18 basis points accrue over the weekend. Thus, in this regard, the weekend is roughly similarly to one overnight period.

To ensure that we are not picking up a temporary spike in the prices of momentum stocks that occurs when the market opens but quickly reverts during the day, Appendix Figure A5 decomposes the intraday momentum return into its hourly components. There is no evidence of anything unusual throughout the day, confirming our paper's surprising result that the vast majority of momentum profits occur overnight. Appendix Figure A5 plots both excess and three-factor adjusted returns; our conclusions are robust when using either.

The fact that the negative skewness present in momentum returns tends to occur intraday raises the question of the way momentum strategies perform overnight versus intraday during momentum crashes. For insight along these lines, Appendix Figure A6 plots the components of momentum returns during 2009. In the first two months of 2009, overall momentum returns are positive. Beginning in March 2009, returns to the momentum strategy are negative for the next six months. Interestingly, March's negative return of -9.4% occurs entirely overnight (-12%) as the intraday return is positive (2.4%). The overnight crash in

March is then followed by a dramatic -41% return in April, which almost entirely occurs intraday (-39%) rather than overnight (-2%). The momentum crash continues in May as returns to the momentum strategy are -18%, driven by an overnight drop that month of -26%. Though of course the March-May momentum crash coincides with many other market phenomena, it is interesting to note that the largest decline occurred intraday, but was precipitated by a smaller, but still quite large, overnight drop the month before.

2 A Simple Model of Limits to Arbitrage

2.1 A Stylized Model

Let's consider a three-period economy, where assets are traded in periods 1 and 2 and pay off in period 3. There is one risky asset A, paying off $d_2 + d_3$ in period 3; d_2 is known in period 2 and d_3 is realized in period 3. For tractability, assume that both d_2 and d_3 are normally distributed; specifically, $d_2 = \bar{d}_2 + \sigma\varepsilon_2$ and $d_3 = \bar{d}_3 + \sigma\varepsilon_3$, where ε_2 and ε_3 are independent and follow the standard normal distribution. We will examine how shocks to the demand for the risky asset affect its equilibrium price p_A in periods 1 and 2. For simplicity, we set the riskfree rate to zero.

There are two types of agents: outside investors (or noise traders) and arbitrageurs. Outside investors' demand for the risky asset is inelastic and equal to u shares (with u positive or negative) in periods 1 and 2. By interpreting the demand shock u as net demand, we can normalize the supply of asset A to zero. This normalization ensures that absent a demand shock ($u = 0$), the price of asset A equals the asset's expected payoff $\bar{d}_A$.

Arbitrageurs are competitive, risk averse and maximize expected utility of wealth W_3 in period 3. For tractability, assume that utility is exponential. In period 1, a group of arbitrageurs with an aggregate risk aversion of α_1 is present in the market. In period 2, a second group of arbitrageurs with an aggregate risk aversion of α_2 arrives.

Intuitively, a demand shock $u \neq 0$ can push the price of asset A away from the expected payoff. Arbitrageurs trade to profit from this discrepancy; by doing so, they mitigate the price impact. Suppose, for example, that u is positive, in which case outside investors wish to buy asset A. Arbitrageurs provide liquidity because they take the opposite side of this transaction, shorting the asset and limiting the price rise.

One possible interpretation of our setup is that outside investors submit uninformed demand at the market open when only a small number of arbitrageurs are ready to absorb the price impact. More arbitraguers arrive over the course of the day to push the price towards fundamental value.

2.2 Solving the Model

We solve the model by working backwards from period 3. In period 2, the group of arbitrageurs that arrived in period 1 chooses positions $x_{2,1}$ in the risky asset to maximize expected utility

$$-E_2[exp(-\alpha_1 W_{3,1})], \tag{1}$$

subject to the budget constraint:

$$W_{3,1} = W_{2,1} + x_{2,1}(d_2 + d_3 - p_2), \tag{2}$$

Substituting (2) into (1), and using normality, we find that arbitrageurs from group one maximize the mean-variance objective

$$x_{2,1}(d_2 + \bar{d}_3 - p_2) - \frac{\alpha_1}{2} x_{2,1}^2 \sigma^2. \tag{3}$$

The optimal demand of group one for asset A is

$$x_{2,1} = \frac{d_2 + \bar{d}_3 - p_2}{\alpha_1 \sigma^2}. \tag{4}$$

Similarly, the optimal demand for asset A by arbitrageurs that arrive in period 2 is

$$x_{2,2} = \frac{d_2 + \bar{d}_3 - p_2}{\alpha_2 \sigma^2}. \tag{5}$$

Since asset A is in zero supply, market clearing requires

$$x_{2,1} + x_{2,2} + u = 0. \tag{6}$$

Combining (4), (5) and (6), we find the equilibrium price of asset A:

$$p_2 = d_2 + \bar{d}_3 + \frac{\alpha_1 \alpha_2}{\alpha_1 + \alpha_2} \sigma^2 u. \tag{7}$$

Equation (7) highlights an important property: larger demand shocks have a larger price impact ($\partial p_2 / \partial u > 0$), because arbitrageurs must be compensated for bearing more risk.

We next consider period 1. Since the group of arbitrageurs that arrived in period 1 can also trade in period 2, they effectively solve a one-period maximization problem in period 1.

The optimal demand for asset A in period 1 can be written as:

$$x_{1,1} = \frac{E_1[p_2] - p_1}{\alpha_1 \sigma^2} \tag{8}$$

Market clearing implies

$$p_1 = \bar{d}_2 + \bar{d}_3 + (\frac{\alpha_1 \alpha_2}{\alpha_1 + \alpha_2} + \alpha_1)\sigma^2 u. \tag{9}$$

2.3 Comparative Statics

Further consider period 0, before the arrival of the outside investors, in which $p_0 = \bar{d}_2 + \bar{d}_3$. The returns (i.e., price changes) of asset A in periods 1 and 2 are:

$$r_1 = (\frac{\alpha_1 \alpha_2}{\alpha_1 + \alpha_2} + \alpha_1)\sigma^2 u, \tag{10}$$

$$r_2 = \sigma \varepsilon_2 - \alpha_1 \sigma^2 u. \tag{11}$$

Our tug-of-war-measure, i.e, the realized return difference between periods 1 and 2, is:

$$r_1 - r_2 = (\frac{\alpha_1 \alpha_2}{\alpha_1 + \alpha_2} + 2\alpha_1)\sigma^2 u - \sigma \varepsilon_2 \tag{12}$$

The return in period 3 is:

$$r_3 = \sigma \varepsilon_3 - \frac{\alpha_1 \alpha_2}{\alpha_1 + \alpha_2}\sigma^2 u. \tag{13}$$

The aggregate arbitrageur demand in asset A is $-u$, so the expected return in period 3 on their holdings of asset A is:

$$E_0[r_3^{arb}] = \frac{\alpha_1 \alpha_2}{\alpha_1 + \alpha_2}\sigma^2 u^2. \tag{14}$$

It is clear that as the magnitude of the uninformed demand, u, gets bigger, the magnitude of both (12) and (14) become larger. Holding arbitrageurs' risk aversion constant, a larger realized return difference between night and day (i.e. a larger tug-of-war) predicts a larger period three return to the arbitrageurs (long-run strategy profitability), because it reflects a larger uninformed demand (submitted overnight).[2] These effects are depicted in Figure A7 of our Internet Appendix.

[2] As discussed at length in Lou, Polk, and Skouras (2018), two strategies, momentum and short-term reversal, have their profits accrue overnight and have uninformed demand shocks during the day. It is straightforward to both change the model and the definition of our tug-of-war variable within that model to reflect this empirical fact.

References

Jegadeesh, Narasimhan and Sheridan Titman, 2001, Profitability of Momentum Strategies: An Evaluation of Alternative Explanations, *Journal of Finance* 56, 699–720.

Lou, Dong, Christopher Polk, and Spyros Skouras, 2018, "A Tug of War: Overnight Versus Intraday Expected Returns", London School of Economics working paper.

Table A1: Returns in Half-Hour Windows

This table reports overnight/intraday return persistence and reversal patterns of each half-hour window during the trading period. More specifically, in each row, at the end of each month, all stocks are sorted into deciles based on their lagged one-month returns in the corresponding window; for example, the time window 1 corresponds to the first half hour of the trading period. We then go long the value-weight winner decile and short the value-weight loser decile. The first three columns show the overnight returns of the long-short portfolio in the subsequent month, and the next three columns show the intraday returns of the long-short portfolio in the subsequent month. Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. We report monthly portfolio returns in excess of the risk-free rate, adjusted by the CAPM, and by the three-factor model. T-statistics, shown in parentheses, are computed based on standard errors corrected for serial-dependence with 12 lags. 5% statistical significance is indicated in bold.

	Overnight Returns			Intraday Returns		
Time	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	**-0.65%**	**-0.58%**	**-0.58%**	**0.91%**	**1.04%**	**1.11%**
	(-3.60)	(-3.25)	(-3.33)	(4.05)	(4.68)	(5.24)
2	**-0.78%**	**-0.78%**	**-0.78%**	**0.77%**	**0.92%**	**0.99%**
	(-4.72)	(-4.36)	(-4.21)	(3.14)	(3.60)	(4.10)
3	**-0.73%**	**-0.69%**	**-0.74%**	**0.89%**	**1.02%**	**0.98%**
	(-4.96)	(-4.41)	(-4.70)	(3.82)	(4.28)	(4.00)
4	**-0.53%**	**-0.51%**	**-0.49%**	**0.43%**	**0.50%**	**0.47%**
	(-3.24)	(-2.93)	(-2.82)	(2.07)	(2.37)	(2.36)
5	**-0.73%**	**-0.73%**	**-0.74%**	**0.42%**	**0.52%**	**0.46%**
	(-5.06)	(-4.82)	(-4.68)	(1.94)	(2.56)	(2.29)
6	**-0.74%**	**-0.70%**	**-0.68%**	0.41%	**0.44%**	**0.42%**
	(-4.94)	(-4.34)	(-4.30)	(1.83)	(2.04)	(2.00)
7	**-0.75%**	**-0.73%**	**-0.71%**	0.26%	0.32%	0.29%
	(-5.15)	(-4.66)	(-4.45)	(1.35)	(1.60)	(1.52)
8	**-0.48%**	**-0.44%**	**-0.38%**	**0.60%**	**0.65%**	**0.64%**
	(-3.63)	(-3.10)	(-2.82)	(2.58)	(2.64)	(2.80)
9	**-0.78%**	**-0.78%**	**-0.77%**	**0.46%**	**0.52%**	**0.52%**
	(-5.51)	(-5.22)	(-5.11)	(2.53)	(2.80)	(2.76)
10	**-0.68%**	**-0.66%**	**-0.67%**	**0.79%**	**0.83%**	**0.82%**
	(-4.83)	(-4.61)	(-4.62)	(4.05)	(4.19)	(4.11)
11	**-0.96%**	**-0.96%**	**-0.97%**	**0.87%**	**0.93%**	**0.90%**
	(-7.01)	(-6.87)	(-7.12)	(4.18)	(4.18)	(3.99)
12	**-1.41%**	**-1.35%**	**-1.33%**	**1.03%**	**0.98%**	**0.87%**
	(-10.85)	(-10.29)	(-10.00)	(5.25)	(4.97)	(4.54)
13	**-0.97%**	**-0.99%**	**-0.96%**	**0.60%**	**0.51%**	**0.48%**
	(-6.81)	(-6.80)	(-6.79)	(3.07)	(2.70)	(2.73)

Table A2: Overnight/Intraday Return Components: International Evidence

This table reports overnight/intraday return persistence and reversal patterns for the period 1996-2013 in nine foreign markets: Canada (North America), France, Germany, Italy, United Kingdom (Europe), Australia, Hong Kong, Japan (Asia-Pacific), and South Africa (Africa). Panel A conducts portfolio sorts based on lagged one-month close-to-close, overnight, or intraday returns. More specifically, at the end of each month, all stocks are sorted into deciles based on their past one month close-to-close (Columns 1-2), overnight (Columns 3-4), and intraday (Columns 5-6) returns. We then go long the value-weight winner decile and short the value-weight loser decile. Columns 1, 3, and 5 report the overnight long-short STR returns in the following month. Columns 2, 4 and 6 report the intraday STR returns in the following month. In the last two rows, we average the STR strategy returns across all countries, based on either equal weights or weights that are proportional to the total market value. Panel B reports Fama-MacBeth regressions of monthly stocks returns on lagged exponentially weighted moving average overnight ($EWMA\_NIGHT$) and intraday ($EWMA\_DAY$) returns (with a half-life to 60 months and skipping the most recent month). The dependent variable in Columns 1-2 is the close-to-close return in the following month; the dependent variable in Columns 3-4 is the overnight return in the following month, and that in Columns 5-6 is the intraday return in the following month. The main independent variable in Columns 1, 3, 5 is $EWMA\_NIGHT$, and that in Columns 2, 4, 6 is $EWMA\_DAY$. We also include in the regression the most recent one-month overnight and intraday returns as well as a set of other firm characteristics. In the last two rows, we average the regression coefficients across all countries, based on either equal weights or weights that are proportional to the total market value. We exclude stocks whose market capitalization is below the 50th percentile of the sample (i.e., focusing solely on large-cap stocks). T-statistics, shown in parentheses, are computed based on standard errors corrected for serial-dependence with 12 lags. 5% statistical significance is indicated in bold.

Panel A: Global Overnight/Intraday Return Components						
	Close-to-Close$_{t-1}$		Overnight$_{t-1}$		Intraday$_{t-1}$	
	Overnight$_t$	Intraday$_t$	Overnight$_t$	Intraday$_t$	Overnight$_t$	Intraday$_t$
Australia	-0.65%	**0.85%**	**2.35%**	**-1.62%**	**-3.51%**	**2.76%**
	(-1.64)	(2.58)	(6.10)	(-5.26)	(-9.55)	(8.35)
Canada	**-0.83%**	**1.45%**	**2.62%**	**-1.56%**	**-3.78%**	**3.59%**
	(-2.02)	(3.08)	(6.70)	(-3.96)	(-10.25)	(8.02)
France	**-1.28%**	**1.29%**	**3.62%**	**-4.85%**	**-4.65%**	**5.24%**
	(-2.80)	(2.37)	(7.62)	(-9.25)	(-10.77)	(8.79)
Germany	-1.11%	**2.26%**	**2.03%**	**-2.02%**	**-3.78%**	**3.81%**
	(-1.49)	(3.14)	(2.74)	(-3.36)	(-6.72)	(5.03)
Hong Kong	-0.45%	0.05%	**3.08%**	**-2.84%**	**-3.12%**	**2.29%**
	(-0.95)	(0.10)	(6.31)	(-6.12)	(-7.11)	(4.68)
Italy	-0.32%	0.57%	**3.21%**	**-2.89%**	**-2.99%**	**3.82%**
	(-0.67)	(1.17)	(6.09)	(-6.34)	(-6.52)	(5.80)
Japan	0.12%	-0.22%	**1.70%**	**-2.02%**	**-2.70%**	**1.70%**
	(0.22)	(-0.53)	(4.05)	(-6.02)	(-5.32)	(5.21)
South Africa	-0.71%	0.65%	**2.00%**	**-1.65%**	**-1.98%**	**1.92%**
	(-1.26)	(1.03)	(3.87)	(-2.86)	(-4.68)	(3.11)
UK	**-1.79%**	**1.44%**	**1.29%**	**-1.67%**	**-2.66%**	**2.28%**
	(-4.74)	(2.58)	(3.38)	(-3.92)	(-7.57)	(4.80)
All Countries	**-0.86%**	**0.98%**	**2.40%**	**-2.27%**	**-3.20%**	**2.99%**
	(-3.62)	(3.90)	(10.04)	(-13.56)	(-15.85)	(12.18)
All Countries	**-0.84%**	**0.87%**	**2.31%**	**-2.20%**	**-3.01%**	**2.80%**
(Weighted)	(-3.35)	(2.82)	(6.90)	(-8.72)	(-9.42)	(6.23)

Panel B: Global EWMA Overnight/Intraday Returns (FM Regressions)						
	Close-to-Close$_{t-1}$		Overnight$_{t-1}$		Intraday$_{t-1}$	
	Overnight$_t$	Intraday$_t$	Overnight$_t$	Intraday$_t$	Overnight$_t$	Intraday$_t$
Australia	5.954	4.145	**14.837**	**-19.594**	**-8.784**	**24.351**
	(0.69)	(0.57)	(1.98)	(-3.71)	(-2.57)	(5.43)
Canada	4.589	7.565	**21.153**	-8.322	**-16.902**	**15.613**
	(0.54)	(0.90)	(3.32)	(-1.50)	(-3.79)	(3.44)
France	10.017	9.380	**27.558**	-6.291	**-17.265**	**18.483**
	(1.23)	(1.09)	(3.85)	(-1.00)	(-3.29)	(3.25)
Germany	8.149	14.979	**17.102**	**-16.814**	-8.304	**32.811**
	(0.78)	(1.27)	(2.37)	(-2.82)	(-1.09)	(3.86)
Hong Kong	**-34.656**	-15.068	6.197	**-35.347**	**-27.764**	**23.311**
	(-2.15)	(-1.07)	(0.51)	(-3.32)	(-2.05)	(2.54)
Italy	11.349	15.546	**29.897**	0.224	**-18.241**	**16.249**
	(1.14)	(1.50)	(4.58)	(0.04)	(-2.49)	(1.90)
Japan	1.462	5.259	**19.368**	**-8.587**	**-17.475**	**15.029**
	(0.22)	(1.07)	(4.07)	(-2.59)	(-4.15)	(3.83)
South Africa	21.654	27.056	**45.895**	**14.739**	**-22.666**	14.664
	(1.79)	(2.65)	(6.55)	(2.16)	(-1.99)	(1.69)
UK	0.919	-3.147	**14.644**	**-10.054**	-13.123	7.841
	(0.12)	(-0.50)	(2.94)	(-2.34)	(-1.79)	(1.24)
All Countries	4.208	8.253	**20.214**	**-9.403**	**-15.542**	**18.993**
	(0.66)	(1.50)	(5.21)	(-2.95)	(-4.30)	(5.82)
All Countries	1.352	5.330	**17.813**	**-10.255**	**-15.966**	**16.752**
(Weighted)	(0.20)	(1.01)	(5.10)	(-3.38)	(-3.74)	(4.60)

Table A3: EWMA Returns in Half-Hour Windows (FM Regressions)

This table reports Fama-MacBeth regressions of monthly stocks returns on lagged exponentially weighted moving average return (EWMA) in each half-hour window during the trading period (with a half-life to 60 months and skipping the most recent month). The dependent variable in Column 1 is the close-to-close return in the following month; the dependent variable in Column 2 is the overnight return in the following month, and that in Column 3 is the intraday return in the following month. The main independent variable in each column is the EWMA of the half-hour return in the corresponding window; for example, time window 1 corresponds to the first half an hour of the trading period. We also include in the regression, as controls, the most recent one-month overnight and intraday returns, the lagged 12-month cumulative stock return (skipping the most recent month), market capitalization, book-to-market ratio, 12-month daily idiosyncratic volatility (with regard to the Carhart four factor model, with one lead and one lag), 12-month market beta (using daily returns with three lags), 12-month share turnover, return-on-equity, asset growth, equity issuance, and discretionary accruals. Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. Stock returns are expressed in percentage terms. Observations are weighted by lagged market capitalization in each cross sectional regression. Standard errors, shown in brackets, are adjusted for serial-dependence with 12 lags. *, **, *** denote statistical significance at the 90%, 95%, and 99% level, respectively.

	Dependent Variable		
Time	Close-to-Close	Overnight	Intraday
1	-0.955	-2.494***	1.571**
	[0.704]	[0.772]	[0.621]
2	31.405***	-43.898***	74.701***
	[11.571]	[8.489]	[7.961]
3	15.349***	4.454	10.819**
	[4.737]	[3.460]	[4.052]
4	-5.022	-31.102***	26.558***
	[13.565]	[11.083]	[10.431]
5	12.494	-25.152***	38.688***
	[10.425]	[9.491]	[11.813]
6	0.299	-34.217***	34.864***
	[12.992]	[11.289]	[7.909]
7	2.724	-18.562*	20.812*
	[11.865]	[11.869]	[10.806]
8	-36.433***	-60.367***	22.797
	[16.101]	[10.036]	[14.740]
9	12.733	-53.357***	66.995***
	[15.727]	[10.513]	[10.259]
10	-0.559	-29.946**	30.380***
	[10.466]	[12.539]	[8.953]
11	2.649	-62.800***	65.626***
	[11.467]	[10.812]	[7.875]
12	-1.879	-11.473***	9.622***
	[3.624]	[1.804]	[2.393]
13	3.073	-21.588***	27.209***
	[4.985]	[3.829]	[4.121]
Adj-R^2	0.123	0.105	0.124
No. Obs.	454,825	454,825	454,825

Table A4: Overnight/Intraday Cross-Sectional Returns

This table reports returns to various strategies during the day vs. at night. In Panel A, at the end of each month, all stocks are sorted into deciles based on prior quarter earnings surprises (= actual earnings – consensus forecast); in Panel B, all industries are sorted into quintiles based on lagged 12-month cumulative industry returns. In Panel C, stocks are sorted into deciles based on lagged return-to-equity; in Panel D, stocks are sorted into deciles based on lagged asset growth; in Panel E, stocks are sorted into deciles based on lagged 12-month market betas (using daily returns with three lags); in Panel F, stocks are sorted into deciles based on their lagged 12-month daily idiosyncratic volatilities (with regard to the Carhart four factor model, with one lead and one lag); in Panel G, stocks are sorted into deciles based on equity issuance in the prior year; in Panel H, stocks are sorted into deciles based on lagged discretionary accruals; in Panel I, stocks are sorted into deciles based on lagged 12-month share turnover; in Panel J, stocks are sorted into deciles based on lagged one month returns. We then go long the value-weight top decile (quintile) and short the value-weight bottom decile (quintile). Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. We report monthly portfolio returns in excess of the risk-free rate, adjusted by the CAPM, and by the three-factor model. T-statistics, shown in parentheses, are computed based on standard errors corrected for serial-dependence with 12 lags. 5% statistical significance is indicated in bold.

Panel A: Overnight vs. Intraday ME Returns

	Overnight		Intraday	
Decile	Excess	CAPM	Excess	CAPM
1	0.45%	0.25%	0.55%	0.11%
	(2.27)	(1.53)	(1.61)	(0.47)
10	0.32%	0.14%	-0.01%	-0.32%
	(2.04)	(1.12)	(-0.03)	(-2.49)
10 - 1	-0.13%	-0.11%	**-0.56%**	-0.43%
	(-0.91)	(-0.75)	(-2.28)	(-1.85)

Panel B: Overnight vs. Intraday BM Returns

	Overnight		Intraday	
Decile	Excess	CAPM	Excess	CAPM
1	0.29%	0.10%	0.00%	-0.34%
	(1.77)	(0.77)	(0.01)	(-2.16)
10	0.18%	0.00%	0.41%	0.14%
	(0.99)	(0.00)	(1.71)	(0.75)
10 - 1	-0.11%	-0.10%	0.41%	**0.48%**
	(-0.77)	(-0.67)	(1.85)	(2.21)

Panel C: Overnight vs. Intraday MOM Returns						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	0.39%	0.10%	0.15%	-0.51%	-1.05%	-1.13%
	(1.33)	(0.40)	(0.55)	(-1.09)	(-2.92)	(-3.07)
10	1.28%	1.09%	1.09%	-0.69%	-1.07%	-1.02%
	(6.35)	(6.37)	(6.33)	(-2.29)	(-4.82)	(-4.96)
10 - 1	**0.89%**	**0.98%**	**0.95%**	-0.18%	-0.02%	0.11%
	(3.44)	(3.84)	(3.65)	(-0.43)	(-0.06)	(0.27)

Panel D: Overnight vs. Intraday SUE Returns						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	0.30%	0.04%	0.02%	-0.20%	-0.70%	-0.93%
	(1.16)	(0.17)	(0.10)	(-0.47)	(-2.10)	(-3.22)
10	0.80%	0.60%	0.60%	-0.04%	-0.49%	-0.58%
	(4.08)	(3.72)	(3.74)	(-0.12)	(-2.26)	(-2.69)
10 - 1	**0.49%**	**0.56%**	**0.58%**	0.16%	0.21%	0.34%
	(2.98)	(3.20)	(3.23)	(0.56)	(0.70)	(1.20)

Panel E: Overnight vs. Intraday INDMOM Returns						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	-0.12%	-0.31%	-0.34%	0.52%	0.16%	0.05%
	(-0.62)	(-1.86)	(-2.05)	(1.62)	(0.66)	(0.22)
5	0.93%	0.77%	0.75%	-0.14%	-0.47%	-0.51%
	(5.08)	(4.79)	(4.73)	(-0.51)	(-2.41)	(-2.68)
5 - 1	**1.05%**	**1.07%**	**1.09%**	**-0.66%**	**-0.63%**	-0.56%
	(6.34)	(6.47)	(6.65)	(-2.16)	(-2.03)	(-1.92)

Panel F: Portfolios Sorted by ROE						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	1.09%	0.86%	0.88%	-0.84%	-1.36%	-1.30%
	(4.67)	(4.42)	(4.52)	(-2.24)	(-5.39)	(-5.44)
10	0.09%	-0.10%	-0.07%	0.35%	0.06%	0.13%
	(0.55)	(-0.78)	(-0.53)	(1.63)	(0.43)	(0.93)
10 - 1	**-1.00%**	**-0.95%**	**-0.95%**	**1.19%**	**1.42%**	**1.43%**
	(-6.46)	(-6.25)	(-6.22)	(4.33)	(5.58)	(6.44)

Panel G: Portfolios Sorted by INV						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	0.36%	0.19%	0.16%	0.25%	-0.09%	-0.19%
	(2.09)	(1.26)	(1.06)	(0.98)	(-0.53)	(-1.05)
10	0.69%	0.47%	0.52%	-0.64%	-1.06%	-0.97%
	(3.33)	(2.78)	(3.01)	(-2.04)	(-5.07)	(-4.71)
10 - 1	**0.33%**	**0.28%**	**0.36%**	**-0.88%**	**-0.97%**	**-0.78%**
	(2.49)	(2.10)	(2.85)	(-4.00)	(-4.39)	(-4.09)

Panel H: Portfolios Sorted by Market BETA						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	0.38%	0.17%	0.19%	-0.08%	-0.41%	-0.36%
	(1.60)	(0.80)	(0.87)	(-0.27)	(-1.74)	(-1.54)
10	0.92%	0.66%	0.68%	-0.58%	-1.11%	-1.16%
	(3.66)	(3.17)	(3.18)	(-1.53)	(-4.68)	(-4.87)
10 - 1	**0.54%**	**0.49%**	**0.49%**	-0.50%	**-0.70%**	**-0.80%**
	(2.43)	(2.17)	(2.10)	(-1.63)	(-2.40)	(-2.60)

Panel I: Portfolios Sorted by IVOL						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	-0.23%	-0.32%	-0.38%	0.72%	0.62%	0.53%
	(-1.75)	(-2.48)	(-3.16)	(3.67)	(3.10)	(2.83)
10	1.49%	1.15%	1.22%	-1.21%	-1.86%	-1.81%
	(4.67)	(4.48)	(4.65)	(-2.49)	(-5.79)	(-6.95)
10 - 1	**1.71%**	**1.46%**	**1.61%**	**-1.93%**	**-2.48%**	**-2.34%**
	(5.57)	(5.23)	(5.81)	(-3.86)	(-6.21)	(-7.82)

Panel J: Portfolios Sorted by Equity ISSUE						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	0.08%	-0.11%	-0.12%	0.56%	0.15%	0.07%
	(0.43)	(-0.72)	(-0.75)	(2.08)	(0.75)	(0.35)
10	0.67%	0.40%	0.40%	-0.48%	-0.98%	-0.98%
	(3.41)	(2.49)	(2.34)	(-1.63)	(-5.23)	(-5.13)
10 - 1	**0.60%**	**0.52%**	**0.52%**	**-1.03%**	**-1.13%**	**-1.05%**
	(3.94)	(3.27)	(3.35)	(-5.41)	(-6.13)	(-6.05)

Panel K: Portfolios Sorted by Discretionary ACCRUALS						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	0.11%	-0.05%	-0.10%	0.35%	-0.03%	-0.03%
	(0.78)	(-0.40)	(-0.71)	(1.55)	(-0.17)	(-0.18)
10	0.73%	0.41%	0.47%	-0.56%	-1.12%	-0.96%
	(3.19)	(2.30)	(2.52)	(-1.59)	(-4.50)	(-4.32)
10 - 1	**0.62%**	**0.47%**	**0.56%**	**-0.90%**	**-1.10%**	**-0.94%**
	(3.82)	(3.25)	(4.00)	(-3.75)	(-4.73)	(-4.95)

Panel L: Portfolios Sorted by TURNOVER						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	0.24%	0.08%	0.07%	0.16%	-0.11%	-0.07%
	(1.68)	(0.69)	(0.61)	(0.84)	(-0.88)	(-0.56)
10	0.61%	0.37%	0.42%	-0.23%	-0.68%	-0.59%
	(2.65)	(1.97)	(2.21)	(-0.72)	(-3.00)	(-3.19)
10 - 1	**0.37%**	0.29%	**0.35%**	-0.40%	**-0.57%**	**-0.52%**
	(2.39)	(1.98)	(2.54)	(-1.74)	(-2.58)	(-3.22)

Panel M: Portfolios Sorted by One-Month Returns						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	1.39%	1.06%	1.04%	-1.03%	-1.65%	-1.67%
	(5.54)	(4.95)	(4.76)	(-2.73)	(-6.15)	(-6.18)
10	0.38%	0.14%	0.16%	-0.17%	-0.60%	-0.63%
	(1.83)	(0.78)	(0.86)	(-0.60)	(-2.75)	(-2.97)
10 - 1	**-1.01%**	**-0.93%**	**-0.88%**	**0.86%**	**1.05%**	**1.05%**
	(-4.74)	(-4.28)	(-4.01)	(2.67)	(3.25)	(3.26)

Table A5: Fama-MacBeth Return Regressions

This table reports Fama-MacBeth regressions of monthly excess stock returns on lagged firm characteristics. The dependent variables in Columns 1-3 are the close-to-close return, the overnight return, and the intraday return in the following month, respectively. In Column 4, we report the difference between the coefficients in Columns 2 and 3 (i.e., overnight-intraday). In Column 5, we report the difference between the overnight coefficient *24/17.5 and intraday coefficient *24/6.5. The main independent variables include the lagged 12-month cumulative stock return (skipping the most recent month), market capitalization, book-to-market ratio, one-month stock return, 12-month daily idiosyncratic volatility (with regard to the Carhart four factor model, with one lead and one lag), 12-month market beta (using daily returns with three lags), 12-month share turnover, return-on-equity, asset growth, equity issuance, and discretionary accruals. In Column 6, we regress the time series of coefficients from the analysis in the Column 2 on the contemporaneous overnight market return and report the intercept from that regression. Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. Stock returns are expressed in percentage terms. Observations are weighted by lagged market capitalization in each cross sectional regression. Standard errors, shown in brackets, are adjusted for serial-dependence with 12 lags. *, **, *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

X 100	Close-to-Close	Overnight	Intraday	Overnight-Intraday	Scaled Difference
	[1]	[2]	[3]	[4]	[5]
MOM	0.159	0.578***	-0.417*	0.996***	2.334***
	[0.327]	[0.134]	[0.230]	[0.192]	[0.763]
$SIZE$	-0.079	0.157***	-0.246***	0.403***	1.125***
	[0.062]	[0.034]	[0.051]	[0.059]	[0.192]
BM	0.037	-0.149	0.157*	-0.302**	-0.785**
	[0.074]	[0.092]	[0.081]	[0.124]	[0.350]
$RET1$	-1.743***	-2.939***	1.169**	-4.107***	-8.345***
	[0.609]	[0.728]	[0.595]	[1.185]	[2.908]
$IVOL$	-0.052	0.295***	-0.285***	0.580***	1.457***
	[0.101]	[0.084]	[0.064]	[0.109]	[0.270]
$BETA$	-0.101	0.208*	-0.310***	0.519***	1.431***
	[0.172]	[0.110]	[0.119]	[0.179]	[0.480]
$TURNOVER$	0.092	0.223***	-0.161***	0.384***	0.900***
	[0.066]	[0.054]	[0.043]	[0.073]	[0.183]
ROE	0.230	-0.399***	0.631***	-1.030***	-2.877***
	[0.250]	[0.109]	[0.267]	[0.323]	[1.051]
INV	-0.594**	0.077	-0.685***	0.762***	2.634***
	[0.239]	[0.111]	[0.235]	[0.276]	[0.905]
$ISSUE$	-0.780***	-0.190	-0.583**	0.394	1.893*
	[0.276]	[0.241]	[0.229]	[0.382]	[1.002]
$ACCRUALS$	-0.462	0.224	-0.715*	0.938	2.946
	[0.471]	[0.344]	[0.398]	[0.715]	[2.084]
Adj-R^2	0.118	0.083	0.119		
No. Obs.	462,070	462,070	462,070		

Table A6: News Announcements

This table reports returns to various cross-sectional strategies during the day vs. at night around news announcements. In Panel A, we examine overnight and intraday returns to these strategies (described below) in the three days (t-1 to t+1) around FOMC announcements. In Panel B, we examine overnight and intraday returns to these strategies in the three days (t-1 to t+1) around quarterly earnings announcements. In Panel C, we show the differences in overnight and intraday returns between months with and without firm-specific news announcements. News months are defined as those with earnings announcements or news coverage in Dow Jones Newswire. For all panels, in row 1, at the end of each month, all stocks are sorted into deciles based on the prior month market capitalization; in row 2, stocks are sorted into decile portfolios based on lagged book-to-market ratio; in row 3, stocks are sorted into deciles based on lagged 12-month cumulative returns (skipping the most recent month); in row 4, all stocks are sorted into deciles based on prior quarter earnings surprises (= actual earnings – consensus forecast); in row 5, stocks are sorted into deciles based on lagged return-to-equity; in row 6, stocks are sorted into deciles based on lagged asset growth; in row 7, stocks are sorted into deciles based on lagged 12-month market betas (using daily returns with three lags); in row 8, stocks are sorted into deciles based on their lagged 12-month daily idiosyncratic volatilities (with regard to the Carhart four factor model, with one lead and one lag); in row 9, stocks are sorted into deciles based on equity issuance in the prior year; in row 10, stocks are sorted into deciles based on lagged discretionary accruals; in row 11, stocks are sorted into deciles based on lagged 12-month share turnover; in row 12, stocks are sorted into deciles based on lagged one month returns. We then go long the value-weight top decile (quintile) and short the value-weight bottom decile (quintile) in the subsequent month. In the case of earnings and news announcements, we invest only in stocks which have such an announcement in the subsequent month, while in the case of FOMC and earnings announcements we measure returns only in our three day holding period around the announcement, not over the entire month. Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. T-statistics, shown in parentheses, are computed based on standard errors corrected for serial-dependence with 12 lags. 5% statistical significance is indicated in bold.

Panel A: Returns around FOMC Announcements					
	Close-to-Close$_t$	Intraday$_t$	Overnight$_t$	Intraday$_{t-1}$	Overnight$_{t+1}$
ME	0.02%	0.00%	0.00%	0.10%	0.01%
	(0.30)	(-0.05)	(0.02)	(1.05)	(0.42)
BM	0.05%	0.00%	0.05%	-0.02%	0.01%
	(0.66)	(0.03)	(0.88)	(-0.31)	(0.23)
MOM	0.01%	0.03%	-0.05%	0.09%	0.03%
	(0.05)	(0.48)	(-0.37)	(0.90)	(0.42)
SUE	-0.07%	0.02%	-0.18%	0.05%	0.07%
	(-1.02)	(0.34)	(-1.64)	(0.77)	(1.44)
ROE	-0.07%	-0.10%	0.02%	0.16%	-0.06%
	(-1.02)	(-1.03)	(0.27)	(1.59)	(-1.52)
INV	0.06%	0.08%	-0.02%	-0.13%	0.03%
	(1.00)	(1.53)	(-0.37)	(-1.48)	(0.88)
BETA	**0.38%**	**0.14%**	**0.23%**	-0.03%	0.06%
	(3.19)	(2.44)	(2.21)	(-0.35)	(0.77)
IVOL	**0.28%**	**0.21%**	0.09%	-0.29%	0.12%
	(2.27)	(3.53)	(0.83)	(-1.81)	(1.72)
ISSUE	**0.13%**	0.07%	0.06%	-0.17%	-0.02%
	(2.41)	(1.43)	(1.34)	(-1.02)	(-0.77)
ACCRUALS	0.09%	0.09%	0.01%	-0.11%	0.08%
	(1.33)	(0.91)	(0.21)	(-1.81)	(1.75)
TURNOVER	0.15%	0.12%	0.01%	-0.17%	0.11%
	(1.78)	(1.77)	(0.12)	(-1.34)	(1.37)
STR	-0.02%	-0.06%	0.02%	0.18%	-0.04%
	(-0.18)	(-1.30)	(0.25)	(1.13)	(-0.56)

Panel B: Returns around Earnings Announcement Days					
	Close-to-Close$_t$	Intraday$_t$	Overnight$_t$	Intraday$_{t-1}$	Overnight$_{t+1}$
ME	0.05%	0.09%	-0.06%	**-0.10%**	-0.03%
	(0.49)	(1.17)	(-0.99)	(-2.15)	(-0.98)
BM	**0.33%**	**0.32%**	0.07%	**0.18%**	**0.12%**
	(2.77)	(3.55)	(0.88)	(2.99)	(2.49)
MOM	**0.49%**	**0.60%**	-0.11%	0.04%	**0.17%**
	(4.35)	(6.95)	(-1.55)	(0.67)	(4.06)
SUE	-0.12%	**0.29%**	**-0.49%**	0.10%	0.09%
	(-0.82)	(2.95)	(-5.13)	(1.66)	(1.76)
ROE	0.17%	-0.15%	**0.32%**	-0.06%	-0.06%
	(1.54)	(-1.69)	(4.49)	(-0.96)	(-1.32)
INV	-0.25%	-0.13%	0.01%	**-0.26%**	-0.02%
	(-1.96)	(-1.43)	(0.09)	(-4.27)	(-0.35)
BETA	-0.20%	-0.16%	-0.06%	-0.04%	-0.04%
	(-1.84)	(-1.81)	(-0.80)	(-0.62)	(-0.72)
IVOL	**-0.29%**	0.03%	**-0.34%**	0.03%	0.09%
	(-2.52)	(0.25)	(-4.34)	(0.49)	(1.98)
ISSUE	**-0.43%**	**-0.20%**	**-0.21%**	**-0.13%**	0.04%
	(-4.31)	(-2.49)	(-2.91)	(-2.36)	(0.83)
ACCRUALS	**-0.27%**	-0.02%	**-0.22%**	0.11%	-0.01%
	(-2.22)	(-0.22)	(-2.73)	(1.67)	(-0.24)
TURNOVER	**-0.46%**	**-0.24%**	**-0.35%**	**-0.23%**	-0.09%
	(-4.91)	(-2.95)	(-4.71)	(-3.80)	(-1.72)
STR	**0.24%**	**0.27%**	-0.02%	**0.12%**	-0.05%
	(2.25)	(3.10)	(-0.22)	(2.40)	(-1.05)

Panel C: News vs. No-News Months		
	Overnight Return	Intraday Return
ME	0.36%	-0.36%
	(1.84)	(-1.35)
BM	0.30%	-0.09%
	(1.64)	(-0.24)
MOM	0.29%	-0.32%
	(1.07)	(-1.13)
SUE	0.15%	-0.14%
	(0.42)	(-0.31)
ROE	-0.26%	0.42%
	(-1.08)	(1.20)
INV	0.17%	-0.23%
	(0.86)	(-0.80)
BETA	-0.08%	-0.02%
	(-0.36)	(-0.05)
IVOL	0.50%	0.36%
	(1.95)	(1.12)
ISSUE	0.25%	-0.09%
	(0.95)	(-0.28)
ACCRUALS	0.33%	0.10%
	(0.91)	(0.25)
TURNOVER	-0.32%	0.58%
	(-1.09)	(1.64)
STR	-0.19%	-0.08%
	(-0.69)	(-0.22)

Table A7: Institutional Trading and Contemporaneous Returns

This table reports Fama-MacBeth regressions of changes in institutional ownership on contemporaneous stock returns. The dependent variable is the change in the fraction of shares outstanding held by all institutional investors. The independent variable in Column 1 is the cumulative overnight return measured in the contemporaneous period, and that in Column 2 is the cumulative intraday return in the same period. Column 3 reports the difference between the coefficients on overnight vs. intraday cumulative returns. Panel A uses quarterly changes in institutional ownership as reported in 13-F filings. Panel B uses daily changes in institutional ownership as inferred from large trades in the TAQ database (following Campbell, Ramadorai and Schwartz, 2008). Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. We further sort stocks into five quintiles based on institutional ownership at the beginning of the quarter and conduct the same regression for each IO quintile. Standard errors, shown in brackets, are adjusted for serial-dependence with 12 lags. *, **, *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Quarterly Change in IO			
DepVar = Contemporaneous Qtrly Change in Institutional Ownership			
IO	Overnight Return	Intraday Return	Overnight –Intraday
1	-0.003	0.030*	-0.033
	[0.007]	[0.017]	[0.022]
2	-0.001	0.055***	-0.056***
	[0.005]	[0.003]	[0.005]
3	0.000	0.073***	-0.073***
	[0.003]	[0.004]	[0.005]
4	-0.005	0.071***	-0.077***
	[0.003]	[0.009]	[0.007]
5	-0.008	0.070***	-0.077***
	[0.006]	[0.010]	[0.006]
5-1	-0.005	0.039*	-0.044*
	[0.008]	[0.023]	[0.027]

Panel B: Daily Change in IO			
DepVar = Contemporaneous Daily Change in Institutional Ownership			
IO	Overnight Return	Intraday Return	Overnight –Intraday
1	0.177***	0.159***	0.018
	[0.041]	[0.019]	[0.040]
2	0.119***	0.395***	-0.276***
	[0.024]	[0.053]	[0.038]
3	0.142***	0.705***	-0.563***
	[0.024]	[0.062]	[0.067]
4	0.166***	0.997***	-0.830***
	[0.031]	[0.086]	[0.082]
5	0.130***	1.254***	-1.123***
	[0.039]	[0.116]	[0.104]
5-1	-0.047	1.095***	-1.141***
	[0.051]	[0.078]	[0.062]

Table A8: Overnight/Intraday Momentum Returns: International Evidence

This table reports returns to momentum strategies during the day vs. at night for the period 1996-2013 in nine markets and four regions: Canada (North America), France, Germany, Italy, United Kingdom (Europe), Australia, Hong Kong, Japan (Asia-Pacific), and South Africa (Africa). At the end of each month, all stocks are sorted into deciles based on their lagged 12-month cumulative returns (skipping the most recent month). We then go long the value-weight winner decile and short the value-weight loser decile. Panel A reports stock momentum returns in each of the nine markets. Columns 1 and 4 report the close-to-close long-short momentum returns in the following month. Columns 2 and 5 report the overnight, while Columns 3 and 6 the intraday momentum returns in the following month. In the first three columns, we exclude stocks whose market capitalization is below the 10th percentile of the sample. In the next three columns, we exclude stocks whose market capitalization is below the 50th percentile of the sample (i.e., large-cap stocks). Panel B reports industry momentum returns (based on 2-digit SIC codes) in each of the four regions. We also report the average stock/industry momentum returns across all markets/regions. T-statistics, shown in parentheses, are computed based on standard errors corrected for serial-dependence with 12 lags. 5% statistical significance is indicated in bold.

Panel A: Global Price Momentum Returns						
	Full Sample			Large-Cap Stocks		
	Close-to-Close	Overnight	Intraday	Close-to-Close	Overnight	Intraday
Canada	**1.45%**	-0.10%	**1.34%**	**1.14%**	**1.00%**	0.14%
	(2.23)	(-0.19)	(2.39)	(2.19)	(2.41)	(0.29)
France	1.13%	-0.78%	**1.84%**	1.01%	0.37%	0.73%
	(1.42)	(-1.31)	(4.15)	(1.75)	(0.87)	(1.38)
Germany	**1.83%**	-0.59%	**2.49%**	1.43%	-0.09%	**1.60%**
	(2.19)	(-1.08)	(4.55)	(1.73)	(-0.16)	(2.55)
Italy	**1.86%**	0.30%	**1.37%**	**1.55%**	**1.17%**	0.38%
	(2.62)	(0.51)	(3.72)	(2.11)	(2.23)	(0.77)
UK	1.18%	0.32%	0.71%	1.10%	**0.86%**	0.28%
	(1.93)	(0.98)	(1.71)	(1.46)	(2.16)	(0.44)
Australia	**1.93%**	0.75%	**1.15%**	**1.68%**	**1.37%**	0.30%
	(3.17)	(1.76)	(3.08)	(2.50)	(2.89)	(0.76)
Hong Kong	0.07%	0.01%	0.10%	0.57%	0.04%	0.54%
	(0.11)	(0.03)	(0.18)	(0.86)	(0.07)	(1.02)
Japan	0.43%	-0.02%	0.45%	0.76%	0.62%	0.15%
	(0.76)	(-0.04)	(1.65)	(1.34)	(1.69)	(0.47)
South Africa	**2.29%**	**1.61%**	0.75%	**2.25%**	**1.76%**	0.53%
	(2.91)	(2.94)	(1.17)	(2.65)	(3.00)	(0.77)
All Countries	**1.42%**	0.23%	**1.12%**	**1.37%**	**0.81%**	**0.59%**
	(3.22)	(0.84)	(4.73)	(3.07)	(3.20)	(2.16)
All Countries	**1.28%**	0.23%	**0.96%**	**1.24%**	**0.80%**	0.44%
(Weighted)	(2.55)	(0.58)	(3.62)	(2.17)	(2.50)	(1.24)

Panel B: Global Industry Momentum Returns			
	Close-to-Close	Overnight	Intraday
North America	**1.05%**	**0.95%**	0.05%
	(2.16)	(2.67)	(0.17)
Europe	**0.87%**	**0.67%**	0.19%
	(2.04)	(2.72)	(0.73)
Asia	0.06%	0.09%	0.03%
	(0.11)	(0.24)	(0.10)
Africa	**2.18%**	**1.98%**	0.30%
	(2.70)	(3.13)	(0.48)
All Regions	**1.01%**	**0.90%**	0.14%
	(2.67)	(3.35)	(0.63)

Table A9: Overnight/Intraday Momentum Returns: 1927-1962

This table reports returns to the momentum strategy during the day vs. at night for the period 1927-1962. At the end of each month, all stocks are sorted into deciles based on their lagged 12-month cumulative returns (skipping the most recent month). We then go long the value-weight winner decile and short the value-weight loser decile. Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. We report the close-to-close, overnight and intraday momentum returns in the following month. Panel A reports momentum returns for the full sample. Panel B reports momentum returns for large cap stocks (i.e., whose market capitalization is above the NYSE median cut-off). We report monthly portfolio returns in excess of the risk-free rate, adjusted by the CAPM, and by the three-factor model. T-statistics, shown in parentheses, are computed based on standard errors corrected for serial-dependence with 12 lags. 5% statistical significance is indicated in bold.

Panel A: Full Sample									
	Close-to-Close			Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	0.48%	-0.86%	-0.94%	1.55%	1.18%	1.14%	-0.84%	-1.74%	-1.79%
	(0.82)	(-3.67)	(-4.36)	(6.09)	(5.70)	(5.77)	(-1.94)	(-7.44)	(-7.98)
10	1.23%	0.48%	0.50%	1.56%	1.35%	1.36%	-0.25%	-0.78%	-0.77%
	(3.63)	(2.89)	(3.02)	(9.45)	(9.08)	(9.07)	(-0.92)	(-4.19)	(-4.19)
10 - 1	0.75%	**1.34%**	**1.45%**	0.01%	0.18%	0.21%	0.59%	**0.96%**	**1.03%**
	(1.70)	(3.97)	(4.43)	(0.06)	(0.78)	(0.97)	(1.64)	(3.07)	(3.43)

Panel B: Large-Cap Stocks									
	Close-to-Close			Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	0.35%	-0.80%	-0.86%	1.38%	1.06%	1.03%	-0.91%	-1.71%	-1.74%
	(0.72)	(-4.77)	(-5.41)	(6.76)	(6.46)	(6.35)	(-2.40)	(-8.71)	(-8.97)
10	1.22%	0.50%	0.53%	1.57%	1.37%	1.38%	-0.31%	-0.82%	-0.79%
	(3.61)	(2.87)	(3.07)	(9.59)	(9.31)	(9.31)	(-1.14)	(-4.40)	(-4.37)
10 - 1	**0.86%**	**1.30%**	**1.39%**	0.20%	0.31%	**0.34%**	0.60%	**0.90%**	**0.95%**
	(2.27)	(4.31)	(4.74)	(1.10)	(1.83)	(2.05)	(1.88)	(3.23)	(3.51)

Table A10: Overnight/Intraday Momentum Returns: Subsamples

This table reports returns to the momentum strategy during the day vs. at night for the period 1993-2013. At the end of each month, all stocks are sorted into deciles based on their lagged 12-month cumulative returns (skipping the most recent month). We then go long the value-weight winner decile and short the value-weight loser decile. Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. Panels A and B report overnight and intraday momentum returns in the following month in the first and second half of the sample period, respectively. Panels C and D report overnight and intraday momentum returns among small-cap and large-cap stocks, respectively. Panels E and F report overnight and intraday momentum returns among low-price and high-price stocks, respectively. We report monthly portfolio returns in excess of the risk-free rate, adjusted by the CAPM, and by the three-factor model. T-statistics, shown in parentheses, are computed based on standard errors corrected for serial-dependence with 12 lags. 5% statistical significance is indicated in bold.

Panel A: 1993-2002						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	0.20%	-0.05%	0.01%	-0.79%	-1.19%	-1.17%
	(0.50)	(-0.16)	(0.04)	(-1.22)	(-2.29)	(-1.95)
10	1.48%	1.29%	1.27%	-0.82%	-1.15%	-0.98%
	(4.95)	(5.35)	(4.92)	(-1.84)	(-3.40)	(-3.04)
10 - 1	**1.28%**	**1.34%**	**1.26%**	-0.03%	0.04%	0.20%
	(3.90)	(4.16)	(3.99)	(-0.06)	(0.07)	(0.29)

Panel B: 2003-2013						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	0.60%	0.09%	0.17%	-0.03%	-0.85%	-0.94%
	(1.41)	(0.25)	(0.48)	(-0.06)	(-1.94)	(-2.25)
10	1.21%	0.93%	0.92%	-0.59%	-1.13%	-1.19%
	(4.73)	(4.09)	(4.09)	(-1.61)	(-4.24)	(-4.80)
10 - 1	**0.61%**	**0.85%**	**0.76%**	-0.56%	-0.29%	-0.25%
	(1.65)	(2.42)	(2.15)	(-1.10)	(-0.59)	(-0.53)

Panel C: Small-Cap Stocks (< NYSE Median)						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	-0.17%	-0.45%	-0.47%	0.66%	0.02%	-0.21%
	(-0.84)	(-2.86)	(-2.94)	(1.55)	(0.05)	(-0.86)
5	0.35%	0.08%	0.07%	0.78%	0.30%	0.18%
	(1.76)	(0.53)	(0.49)	(2.59)	(1.38)	(1.12)
5 - 1	**0.52%**	**0.54%**	**0.54%**	0.13%	0.29%	0.39%
	(4.09)	(4.31)	(4.49)	(0.46)	(1.14)	(1.59)

Panel D: Large-Cap Stocks (>= NYSE Median)						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	0.08%	-0.24%	-0.25%	0.07%	-0.47%	-0.53%
	(0.34)	(-1.28)	(-1.29)	(0.20)	(-1.82)	(-2.01)
5	1.00%	0.79%	0.79%	-0.39%	-0.79%	-0.77%
	(6.01)	(5.72)	(5.57)	(-1.60)	(-4.69)	(-4.60)
5 - 1	**0.93%**	**1.03%**	**1.04%**	-0.46%	-0.32%	-0.24%
	(5.13)	(5.92)	(5.90)	(-1.49)	(-1.06)	(-0.79)

Panel E: Low-Price Stocks (< NYSE Median)						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	0.33%	-0.03%	-0.09%	-0.12%	-0.75%	-0.86%
	(1.31)	(-0.14)	(-0.40)	(-0.30)	(-2.63)	(-3.02)
5	0.89%	0.60%	0.57%	0.07%	-0.43%	-0.53%
	(4.03)	(3.30)	(3.20)	(0.22)	(-1.82)	(-2.65)
5 - 1	**0.56%**	**0.63%**	**0.66%**	0.19%	0.33%	0.33%
	(2.89)	(3.35)	(3.59)	(0.66)	(1.13)	(1.17)

Panel F: High-Price Stocks (>= NYSE Median)						
	Overnight			Intraday		
Decile	Excess	CAPM	3-Factor	Excess	CAPM	3-Factor
1	-0.14%	-0.42%	-0.40%	0.20%	-0.13%	-0.29%
	(-0.63)	(-2.30)	(-2.15)	(0.80)	(-0.85)	(-1.07)
5	0.95%	0.74%	0.74%	-0.22%	-0.42%	-0.70%
	(5.78)	(5.43)	(5.30)	(-1.36)	(-2.36)	(-4.28)
5 - 1	**1.08%**	**1.16%**	**1.14%**	-0.42%	-0.29%	-0.41%
	(6.31)	(6.77)	(6.63)	(-1.90)	(-1.56)	(-1.33)

Table A11: Factor Betas of Price Momentum

This table reports factor betas of momentum returns. At the end of each month, all stocks are sorted into deciles based on their lagged 12-month cumulative returns (skipping the most recent month). We then go long the value-weight winner decile and short the value-weight loser decile. Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. The first four rows report factor exposures of close-to-close momentum returns, the middle four rows report the exposures of overnight momentum returns, and the last four rows report the exposures of intraday momentum returns. In the first two columns, we include in the time-series regression monthly Fama-French factors; in the next four columns, we include in the regression the overnight and intraday versions of the Fama-French factors. T-statistics, shown in parentheses, are computed based on standard errors corrected for serial-dependence with 12 lags. 5% statistical significance is indicated in bold.

	FF Factors		Overnight Factors		Intraday Factors	
	Close-to-Close MOM Returns					
Alpha	**1.05%**	(2.22)	0.56%	(1.17)	**1.04%**	(2.01)
Mktrf	**-0.55**	(-3.22)	-0.20	(-0.78)	**-0.87**	(-3.36)
SMB	0.19	(0.72)	-0.31	(-0.61)	0.17	(0.64)
HML	-0.36	(-1.06)	-1.02	(-1.25)	-0.68	(-1.23)
	Overnight MOM Returns					
Alpha	**0.95%**	(3.65)	**0.86%**	(3.07)	**0.74%**	(2.36)
Mktrf	**-0.20**	(-2.38)	**-0.35**	(-2.34)	-0.13	(-1.73)
SMB	0.18	(2.28)	-0.04	(-0.18)	0.13	(1.67)
HML	0.03	(0.29)	-0.84	(-1.51)	0.30	(1.48)
	Intraday MOM Returns					
Alpha	0.11%	(0.27)	-0.26%	(-0.69)	0.30%	(0.68)
Mktrf	**-0.36**	(-2.86)	0.15	(0.74)	**-0.74**	(-3.21)
SMB	0.00	(0.01)	-0.27	(-0.65)	0.03	(0.10)
HML	-0.35	(-1.32)	-0.07	(-0.09)	-0.90	(-1.80)

Table A12: Overnight/Intraday Momentum, Controlling for IVOL

This table reports returns to the momentum strategy during the day vs. at night after controlling for idiosyncratic volatility. In Panels A and B, at the end of each month, all stocks are independently sorted into a 5 by 5 matrix based on lagged 12-month daily idiosyncratic volatilities (with regard to the Carhart four factor model, with one lead and one lag to incorporate non-synchronous trading) and lagged 12-month cumulative returns (skipping the most recent month). Panel A reports the value-weight overnight returns to these 25 portfolios in the following month. Panel B reports the value-weight intraday returns to these portfolios in the following month. Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. In Panel C, we further exclude stocks whose lagged 12-month idiosyncratic volatility (IVOL) is in the top NYSE IVOL quintile; the remaining stocks are then sorted into deciles based on their lagged 12-month cumulative returns. Reported below are the monthly portfolio returns in excess of the risk-free rate. T-statistics, shown in parentheses, are computed based on standard errors corrected for serial-dependence with 12 lags. 5% statistical significance is indicated in bold.

Panel A: Overnight Returns					
	IVOL				
MOM	1	2	3	4	5
1	-0.65%	-0.33%	-0.11%	-0.08%	0.63%
	(-2.19)	(-1.29)	(-0.42)	(-0.29)	(2.29)
5	-0.03%	0.58%	0.74%	1.19%	1.52%
	(-0.13)	(3.66)	(3.95)	(5.80)	(5.12)
5 - 1	**0.78%**	**0.92%**	**0.85%**	**1.27%**	**0.89%**
	(2.16)	(3.84)	(3.37)	(5.52)	(4.09)

Panel B: Intraday Returns					
	IVOL				
MOM	1	2	3	4	5
1	0.63%	1.11%	0.38%	0.14%	-0.87%
	(1.89)	(2.42)	(0.94)	(0.36)	(-1.73)
5	0.84%	0.09%	-0.22%	-0.50%	-0.67%
	(2.59)	(0.38)	(-0.82)	(-1.62)	(-1.65)
5 - 1	0.19%	**-1.02%**	-0.60%	-0.64%	0.19%
	(0.43)	(-2.38)	(-1.68)	(-1.84)	(0.56)

Panel C: Excluding stocks with high IVOL			
Overnight MOM Returns			
Decile	Excess	CAPM	3-Factor
1	-0.05%	-0.30%	-0.29%
	(-0.15)	(-1.05)	(-0.99)
2	-0.16%	-0.36%	-0.40%
	(-0.74)	(-1.89)	(-1.91)
3	-0.23%	-0.41%	-0.47%
	(-1.23)	(-2.51)	(-2.99)
4	-0.13%	-0.29%	-0.32%
	(-0.79)	(-2.10)	(-2.38)
5	-0.25%	-0.39%	-0.41%
	(-1.60)	(-2.85)	(-3.11)
6	-0.07%	-0.20%	-0.27%
	(-0.44)	(-1.43)	(-1.98)
7	0.00%	-0.14%	-0.18%
	(0.02)	(-1.11)	(-1.42)
8	0.12%	-0.04%	-0.08%
	(0.80)	(-0.30)	(-0.58)
9	0.37%	0.23%	0.19%
	(2.43)	(1.74)	(1.47)
10	1.14%	0.97%	0.96%
	(6.38)	(6.28)	(6.18)
10 – 1	**1.19%**	**1.26%**	**1.25%**
	(4.04)	(4.37)	(4.28)

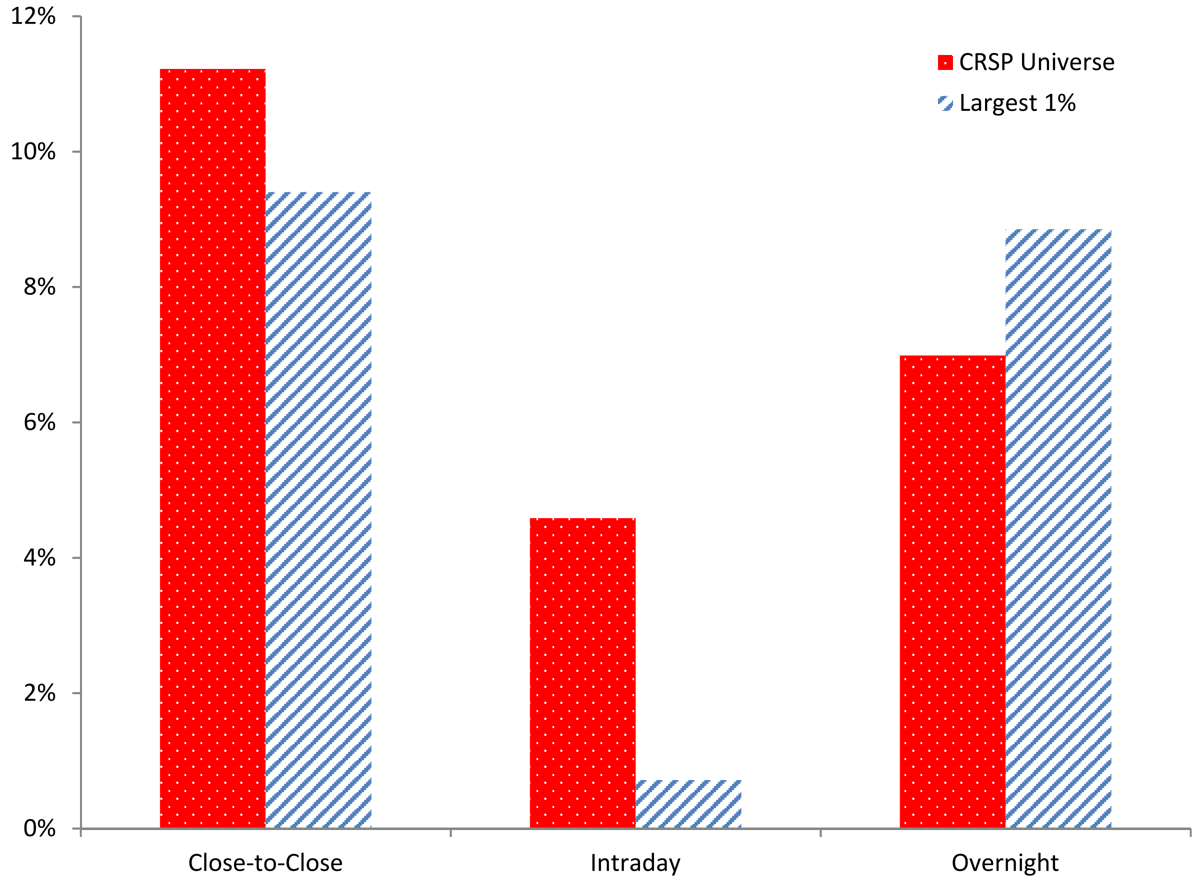

Figure A1: This figure shows the average monthly returns of the value-weight market portfolio for the period 1993-2013. The first two bars show the average close-to-close market return. The next two bars show the average intraday market return, and the last two bars show the average overnight market return. The red solid bars correspond to the value-weight CRSP index and the blue wide-upward-diagonal bars correspond to the value-weight portfolio that only includes stocks whose market capitalization is above the 99th percentile of the NYSE sample.

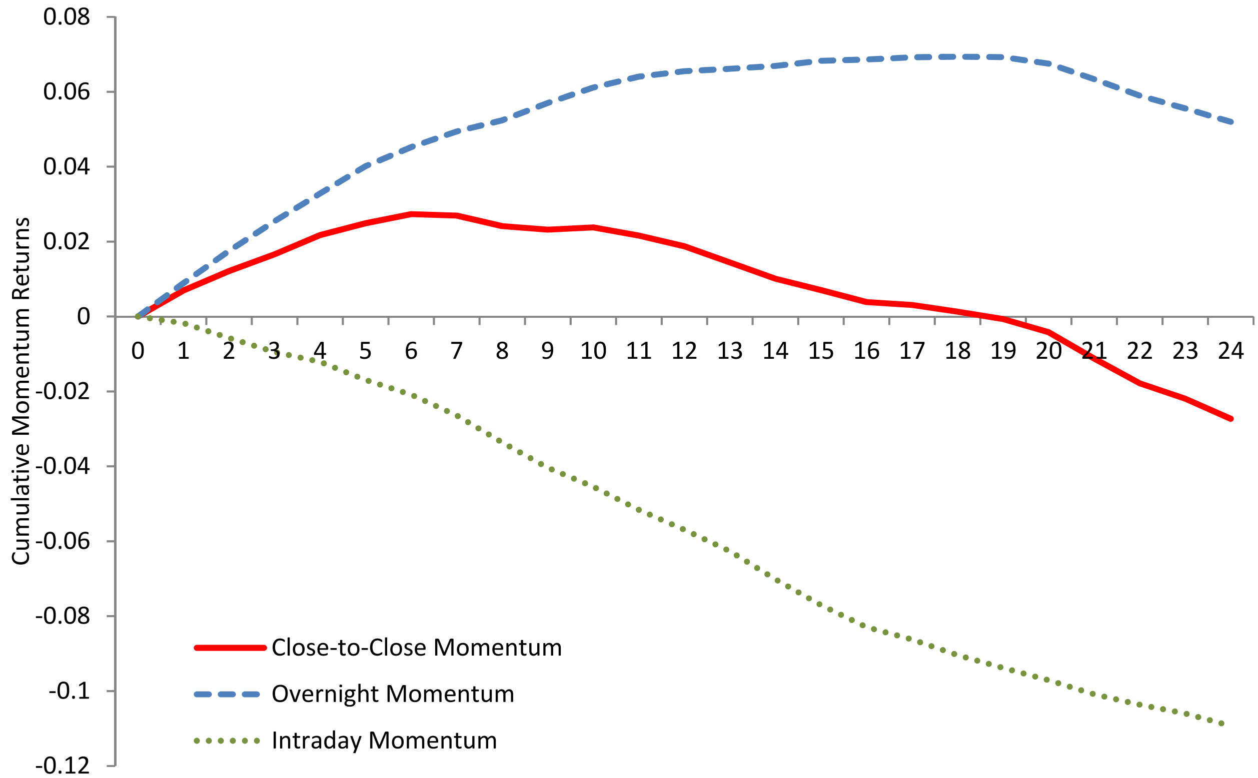

Figure A2: This figure plots cumulative returns to the momentum strategy during the day vs. at night in the 24 months following portfolio formation. At the end of each month, all stocks are sorted into deciles based on their lagged 12-month cumulative returns (skipping the most recent month). We then go long the value-weight winner decile and short the value-weight loser decile. Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. The red solid curve (respectively blue dashed curve/ green dotted curve) shows the cumulative close-to-close (respectively overnight / intraday) momentum returns in the 24 months following portfolio formation.

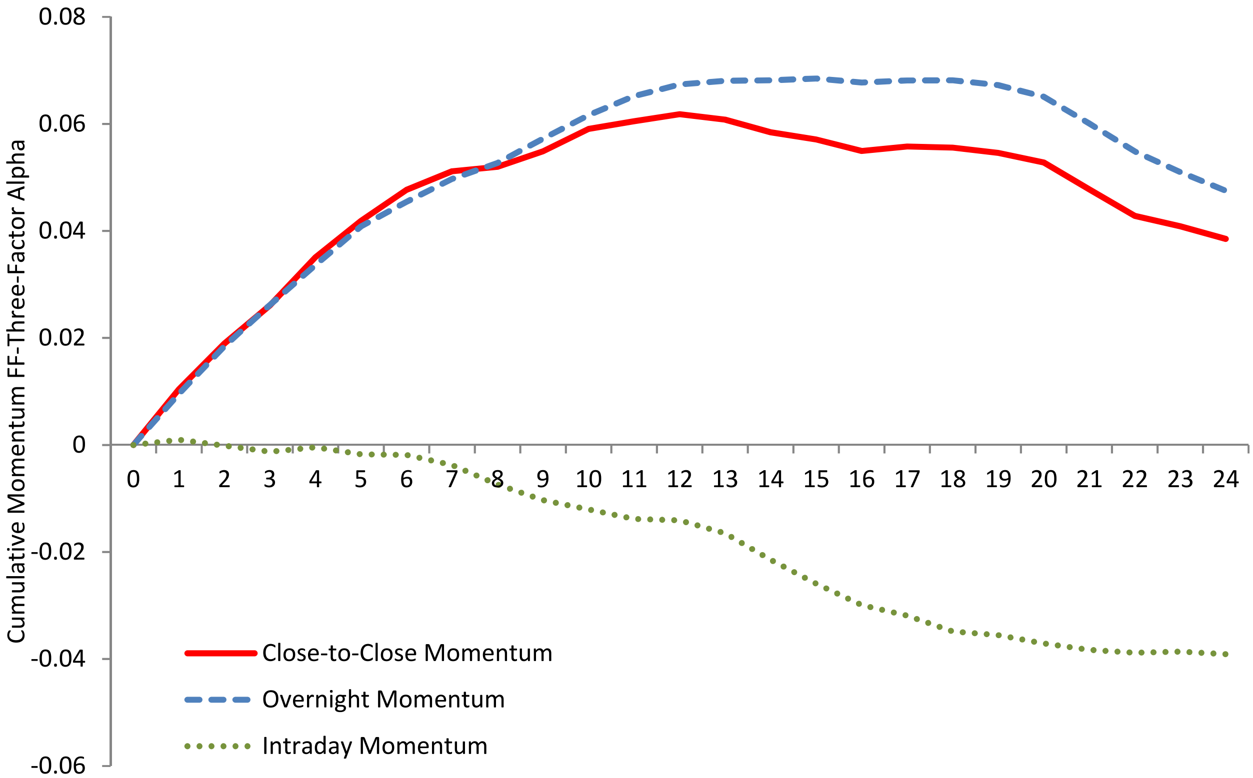

Figure A3: This figure shows cumulative Fama-French three-factor alpha to the momentum strategy during the day vs. at night in the 24 months following portfolio formation. At the end of each month, all stocks are sorted into deciles based on their lagged 12-month cumulative returns (skipping the most recent month). We then go long the value-weight winner decile and short the value-weight loser decile. Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. The red solid (respectively blue dashed / green dotted) curve shows the cumulative close-to-close (respectively overnight / intraday) momentum returns in the 24 months following portfolio formation.

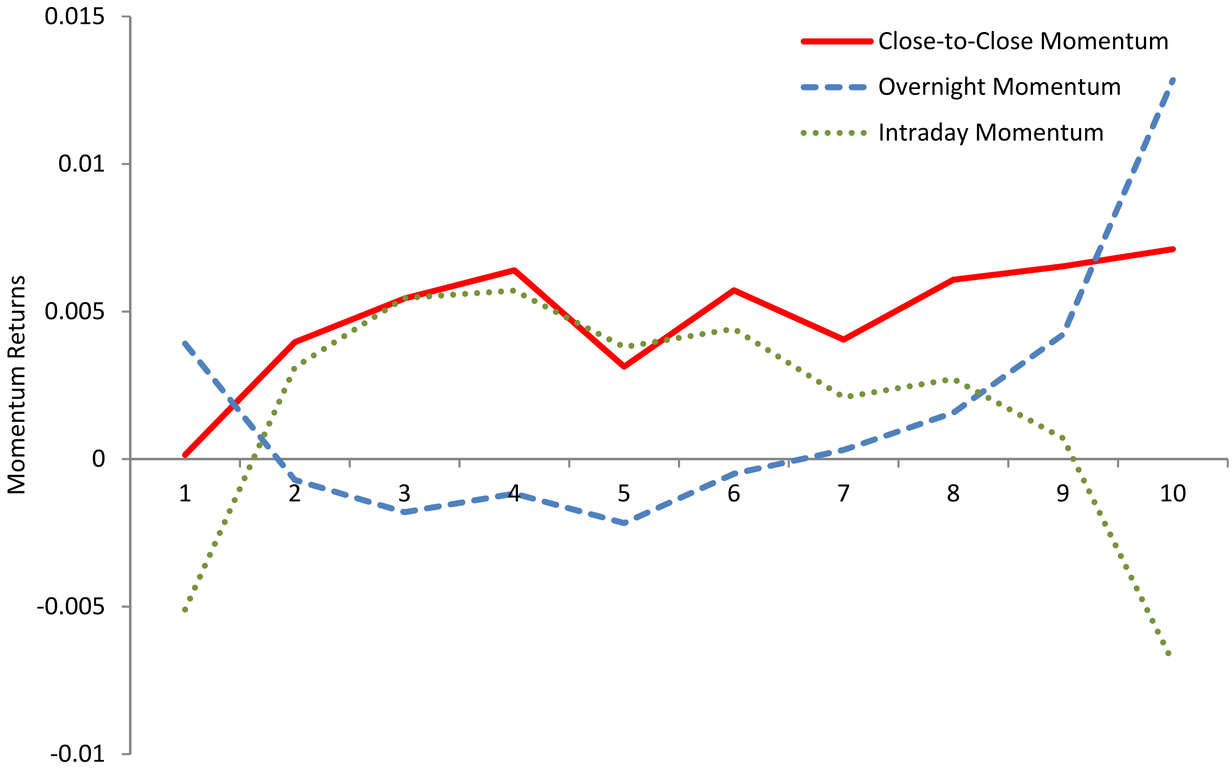

Figure A4: This figure shows value-weight portfolio returns of the ten momentum deciles during the day vs. at night. At the end of each month, all stocks are sorted into deciles based on their lagged 12-month cumulative returns (skipping the most recent month). Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. The red solid curve shows the value-weight close-to-close returns of the ten momentum deciles in the following month. The blue dashed curve shows the value-weight overnight returns of the ten momentum deciles in the following month. The green dotted curve shows the value-weight intraday returns of the ten momentum deciles in the following month. Appendix Table A4 Panel C documents that the U-shaped overnight momentum pattern of this graph becomes much more monotonic once we exclude the 20% of stocks with high idiosyncratic volatility.

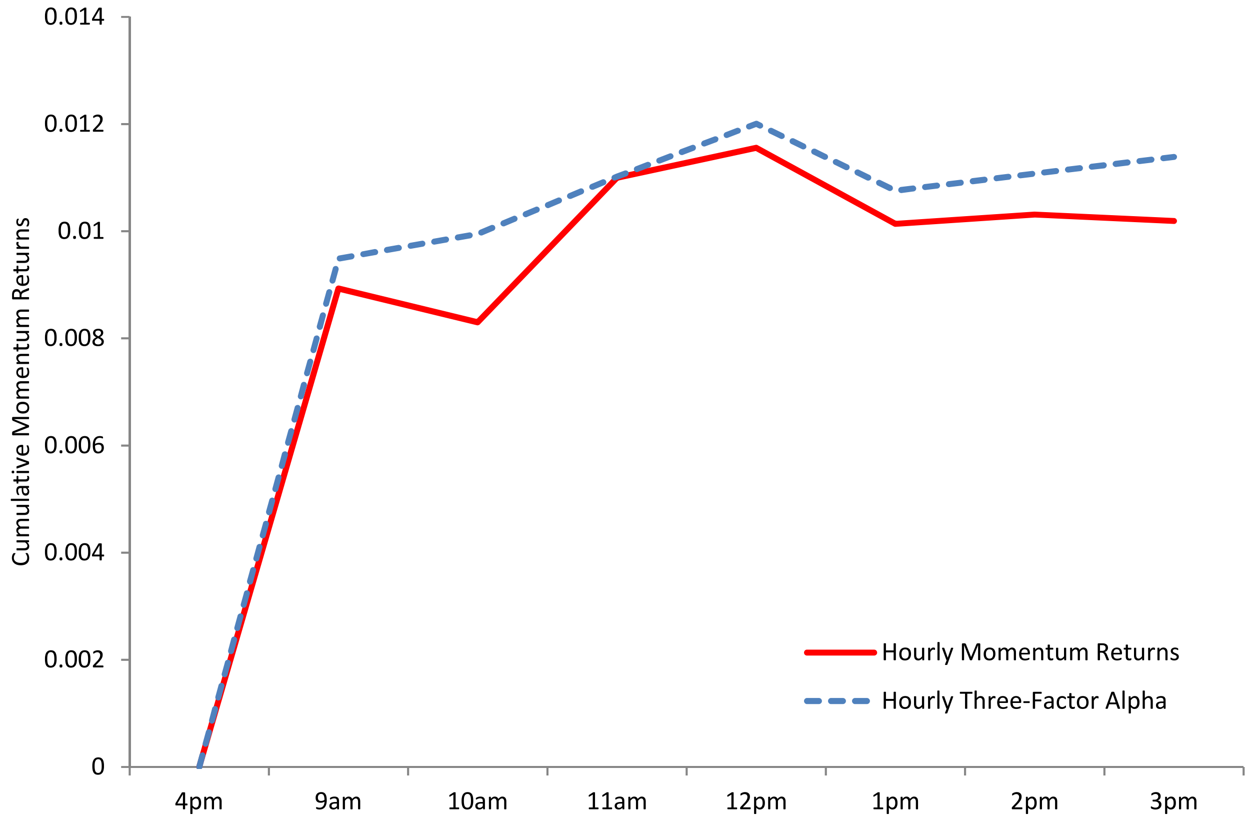

Figure A5: This figure shows the cumulative hourly (abnormal) returns to the momentum strategy from the previous close to the next close, aggregated to the monthly level. At the end of each month, all stocks are sorted into deciles based on their lagged 12-month cumulative returns (skipping the most recent month). We then go long the value-weight winner decile and short the value-weight loser decile. Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. The red solid curve shows the cumulative hourly returns to the momentum strategy. The blue dashed curve shows the cumulative Fama-French three-factor alpha to the momentum strategy.

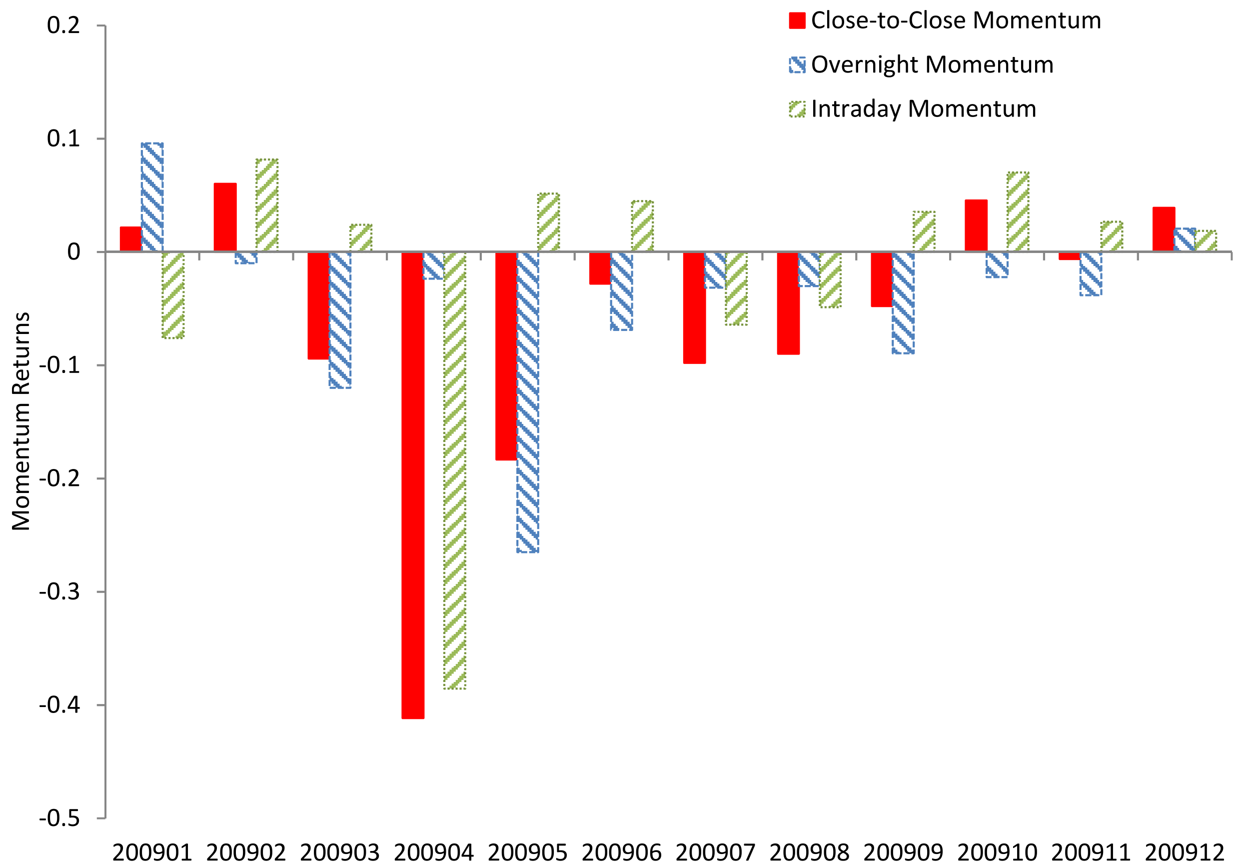

Figure A6: This figure shows monthly returns to the momentum strategy during the day vs. at night in the year 2009. At the end of each month, all stocks are sorted into deciles based on their lagged 12-month cumulative returns (skipping the most recent month). We then go long the value-weight winner decile and short the value-weight loser decile. Stocks with prices below $5 a share and/or that are in the bottom NYSE size quintile are excluded from the sample. The red solid bars show the value-weight close-to-close momentum return in each month of 2009. The blue shaded bars show the value-weight overnight momentum return in each month, and the green shaded bars show the value-weight intraday momentum return in each month.

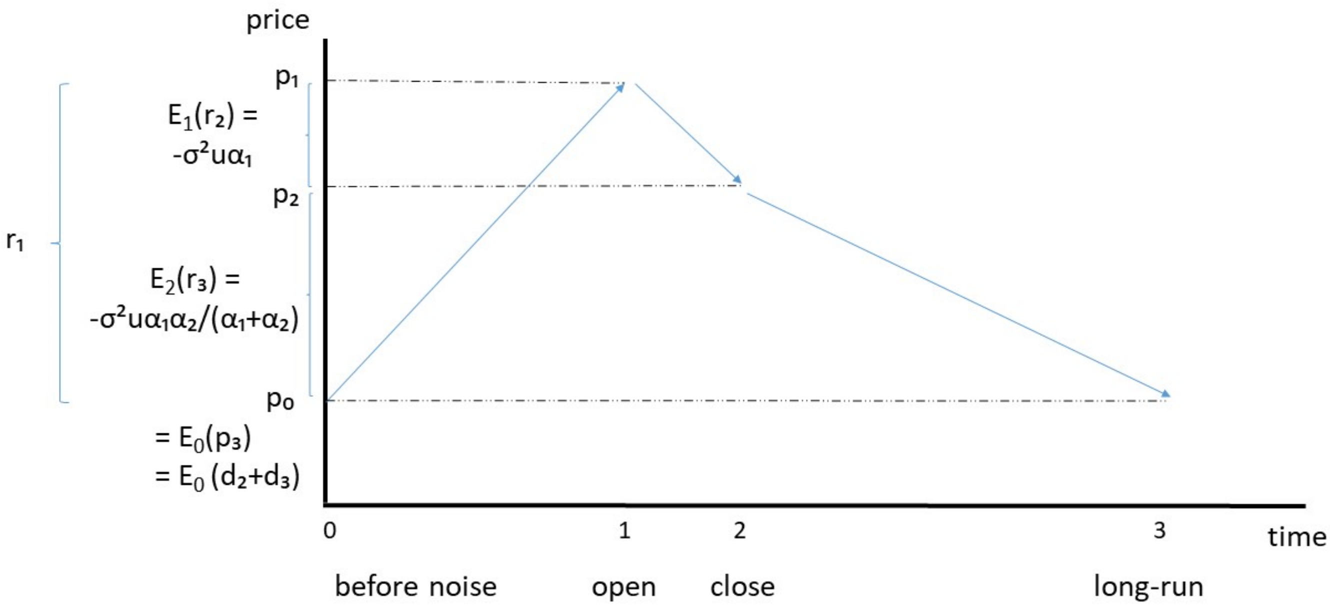

Figure A7: This figure depicts the returns in each period of our limits to arbitrage model as developed in the Appendix. A larger level of noise trading u, will be observable in realized returns as an larger tug of war r_1-r_2 on average and a lower long-run return r_3 (and thus larger return to arbitrageurs who sell the asset in period 2).