https://doi.org/10.1016/j.frl.2022.103518

Pre-Holiday Limit Order Cancellation of Individual and Institutional Investors

Wei-Yu Kuo[1]

Department of International Business and Risk and Insurance Research Center, National Chengchi University

Jing Zhao[2]

School of Accounting and Finance, The Hong Kong Polytechnic University

November 2022

Abstract:

This paper shows that the time-to-cancellation is longer on trading days immediately before holidays. Pre-holiday time-to-cancellation is significantly higher for individual investors but not for institutional investors. Moreover, individual investors have a lower execution ratio and underperform institutional investors by a larger margin on days before holidays. These findings are consistent with the notion that pre-holiday inattention entails a higher opportunity cost for monitoring the market, and limit orders are more subject to the non-execution and pick-off risks on pre-holiday trading days.

Keywords:

Pre-holiday Trading, Order Cancellation, Retail investors, Institutional Investors

JEL Classifications: G02, G15

We thank the Taiwan Futures Exchange for providing us with data. Jing Zhao gratefully acknowledges the financial support provided by the Research Grants Council of Hong Kong. Project Number: 25508617. Wei-Yu Kuo is grateful to the Ministry of Science and Technology (Project Number: MOST 109-2410-H-004-022-MY3) for financial support.

[1]Tel.: +886-2-2939-8033. Fax: +886-2-2938-7699. E-mail address: wkuo@nccu.edu.tw.

[2]Corresponding Author. Tel.: +852-2766-4539. Fax: +852-2330-9845. E-mail address: jingzhao@polyu.edu.hk

1. Introduction

Holidays are woven into the fabric of daily life and can influence how we engage in actions ranging from social activities to investment decisions. A large body of research has established that the anticipation of an upcoming holiday can bring about an up-swing in mood and distract individuals from engaging in tasks such as information processing.[1] This paper aims to extend the literature on pre-holiday trading activities by exploring individual and institutional investors' limit order cancellation behavior on the last trading day immediately before holidays (including weekends and public holidays such as the Chinese Lunar New Year).

The anticipation of a holiday can serve as a distraction that may lead an individual to pay less attention to the financial markets and, for instance, fail to sufficiently monitor the limit order execution process. This lack of monitoring may put investors at risk, as limit orders suffer from adverse selection (pick-off) risk when prices change unexpectedly after the limit order is entered (Sandas 2001 and Linainmaa, 2010). Further, as Liu (2009) and Fong and Liu (2010) show, limit orders are subject to non-execution and free-option value risks.[2] Thus, investors could benefit from actively monitoring their limit orders and timely canceling their unexecuted orders when necessary.

However, the cost of monitoring the market may prevent investors from cancelling stale limit orders in time. Since the arrival of information is random, traders need to pay close attention to the information flow and the limit order book. This focused effort can be considered

[1] See, for example, Lakonishok and Smidt (1988), Ariel (1990), Fabozzi, Ma, and Briley (1994), Friender and Subrahmanyam (2004), and Autore, Bergsma, and Jiang (2019).

[2] Non-execution risk arises from the possibility that a limit order cannot be executed. Free-option value risk arises as a limit order provides an option for other traders to “pick off”.

an opportunity cost that prevents investors from making another investment or engaging in other activities. This opportunity cost is especially high on pre-holiday trading days, as investors could have spent their effort on more agreeable (holiday preparation) activities.

We use a dataset from the Taiwan Futures Exchange (TAIFEX) with time stamps of limit order submissions and cancellations to explore the pre-holiday limit order cancellation behavior.[3] Specifically, we find that investors take a long time before cancelling their stale orders on days immediately before holidays, suggesting that the pre-holiday inattention entails a higher opportunity cost for monitoring the market. This finding remains highly significant after controlling for other forms of the opportunity cost of limit order monitoring (such as the relative proportion of other futures products traded on the same day). The result is also robust after controlling for the non-execution risk and free-option value risk of limit orders (Fong and Liu 2010).

We further explore the heterogeneity of the pre-holiday effect among different investors. As trading is the job of professional institutional investors, it is anticipated that the cost of focusing on the market will be lower. Individual investors who view trading as a fun activity (Dorn and Sengmueller 2009) are less likely to monitor the market constantly. Besides, to the extent that pre-holiday distraction reflects investors' inadequate cognitive discipline, individual investors with low cognitive ability are expected to pay less attention to the financial market and to have a longer time-to-cancellation, especially on pre-holiday trading days.[4]

[3] The TAIFEX futures trading data is suitable to investigate pre-holiday behavior because this market has active individual investor participation (Kuo, Lin, Zhao 2015).

[4] Using investor account level data, Grinblatt, Keloharju, and Linnainmaa (2011a, 2011b) and Kuo, Lin, and Zhao (2015) suggest that investors with lower cognitive ability are more subject to behavioral biases. Lee, Lee, and Kim (2022) also document that the negative risk-return relation is prominent in stocks that attracts individual attention.

To the best of my knowledge, this paper is the first to investigate pre-holiday inattention separately for individual and institutional investors based on their limit order monitoring. Previous literature on pre-holiday effects mostly focuses on the *aggregate* Google search volumes or stock trading volumes and returns (Dellavigna and Pollet 2009; Hirshleifer, Lim, and Teoh 2009; and Lou 2014). Meshcheryakov and Winters (2022) show that higher levels of Google search activity are followed by more intensive trading with smaller orders, indicating that the increased trading activity is initiated by retail investors. However, they cannot rule out the possibility that smaller trades are generated by algorithm traders who closely follow information flows (that are searched for on Google). My paper complements these studies by examining the attention to monitoring the market through order cancellations. Pre-holiday inattention provides a quasi-natural shock to the opportunity cost of monitoring the market. Moreover, unlike the aggregate attention measures, time-to-cancellation can be constructed separately for various subsamples of investors. This enables us to investigate the heterogeneity in pre-holiday effects for individual and institutional investors.

More importantly, this paper uses the lens of pre-holiday limit order cancellation to diagnose the poor performance of individual investors (Barber et al. 2009). Although it is reasonable to assume that people exhibit limited attention on pre-holidays, it is not clear that this leads to losses. Suppose that all investors, whether sophisticated or unsophisticated, whether buyers or sellers, reduce their monitoring efforts by a similar margin at the same time. In this case, investment performance could remain unaffected, especially in a zero-sum-game futures market. My results demonstrate that the opposite is true. Specifically, individual investors have a lower execution ratio and underperform institutional investors by a larger margin on pre-holidays. This finding indicates that insufficient monitoring could be associated with higher non-

execution risk and inferior performance among individual investors. Determining why individual investors lose money to institutional investors - whether they lose more money from pre-holiday trading - sheds light on our understanding of individual investor behavior.

2. Data and Empirical Setup

2.1 The Taiwan Futures Exchange (TAIFEX) and Public Holidays in Taiwan

We use a dataset from TAIFEX with time stamps of limit order submission and cancellation. The data covers the period from January 2004 to September 2008. As the data contains rich information on investor account identity and investor type, we are thus able to examine the pre-holiday order submission, cancellation, and execution patterns separately for individual and institutional investors. TAIFEX, a limit order is automatically invalidated if it is neither executed nor cancelled by the end of a trading day. [5]

TAIFEX is closed on Saturdays and Sundays. In addition, TAIFEX observes nine official public holidays during the year: New Year's Day, Chinese New Year's Eve, Spring Festival, 228 Peace Memorial Day, Children's Day, Labor Day, Dragon Boat Festival, Mid-Autumn Festival, and National Day.[6] We define pre-holiday days as the last trading day immediately before a weekend or public holiday.

2.2 Limit Order Submission Risks and Time-to-Cancellation

[5] A detailed discussion of the TAIFEX market and margin requirements can be found in Kuo, Lin, and Zhao (2015).

[6] Order revisions are also recorded as a cancellation and a new order is automatically placed. For detailed information on public holidays in Taiwan, see https://en.wikipedia.org/wiki/Public_holidays_in_Taiwan.

With heterogeneous information, limit orders traders face two types of risk before a limit order is settled (Liu 2009). First, they face the possibility of an execution failure (known as non-execution risk). Second, they may be "picked off" when prices change unexpectedly after the limit order is submitted (known as free-option value risk). To mitigate these risks, traders can monitor the market and cancel their orders in time. But such monitoring is costly, resulting in a trade-off between the cost of monitoring and the risks of limit order submission.

It is essential to control the opportunity cost of monitoring, non-execution risk, and free-option value risk, as they are important drivers of limit order cancellation decisions (Fong and Liu 2010). Firstly, we measure the cost of monitoring with $OtherProductRatio_{j,s,\tau}$, calculated as the relative trading volume of other products. This measure positively correlates with the value of alternative investment opportunities. Besides, $Volatility_s$ and $OrderSize_{j,s,\tau}$ are likely to be associated with the free-option value risk. $Maturity_{j,s,\tau}$ and $LimitOrderRatio$ (ratio of limit orders divided by the total number of limit and market orders) are linked to liquidity and, thus, non-execution risk. Besides, as Gherzi (2014) shows, investors increase their portfolio monitoring following both positive and daily negative market returns, indicating that market conditions affect investor attention. We follow their work to include market return and volatility as control variables. To further substantiate the pre-holiday effect, we also controlled for other factors that have been shown to reflect investor attention: the number of limit orders submitted and an indicator for buy orders.[7]

TAIFEX operates from 8:45 to 13:45 on trading days during the sample period. Because orders submitted at different times of the day may mechanically have a different time-to-cancellation, we calculate the measures separately for orders canceled at each of the five trading

[7] As Barber and Odean (2008) and Da, Engelberg, and Gao (2011) show, individual investors' buy decisions are more attention-driven compared with sell decisions.

hours and control for time-of-the-day fixed effects in all the regressions. That is, time-to-cancellation is measured as the interval from submission to cancellation for product j during trading hour τ on day s, and the measures are calculated separately for individual and institutional investors. The time-to-cancellation is scaled by 100 to ensure the readability of coefficients. The products are TX (the Taiwan Index Futures) and MTX (Mini Taiwan Index Futures) orders with maturities of the spot month, the next two calendar months, and the next three quarter-end months.

Table 1 presents the summary statistics of the variables used in this paper. The results show that, on average, investors cancel their limit orders 578 seconds after order submission. Interestingly, the time-to-cancellation is 1,062 seconds for individual investors, five times the 199 seconds time-to-cancellation of institutional investors. This sharp difference indicates individual investors pay less attention to the limit order execution process.

3. Empirical Findings

We first examine the pre-holiday inattention using the following equation:

$$TimeToCancellation_{j,s,\tau} = \alpha + \beta_1 D\_PreHoliday_s \quad + Controls + \varepsilon_{j,s} \qquad (1)$$

$D\_PreHoliday_s$ is a dummy variable that equals 1 for the last trading day immediately before the weekend or a public holiday. $Controls$ includes the daily market returns and the year, month, and time-of-the-day fixed effects, to mitigate the effect of the seasonality in investor sentiment (Kamstra, Kramer, and Levi 2003; Heston and Sadka 2008 and 2010; Hirshleifer et al. 2016; Keloharju, Linnainmaa, and Nyberg 2016; and Hirshleifer, Jiang, and Meng 2020).

Table 2 shows significant evidence supporting the effect of pre-holiday inattention. Based on Model 5, investors delay their stale order cancellation by 23.8 seconds on trading days before the holidays. Table 3 shows that the result is robust after controlling for several indicators for the opportunity cost of monitoring, free-option value risk, and non-execution risk of limit orders. The coefficients of the control variables are consistent with those of Fong and Liu (2010).

We then explore the heterogeneity of pre-holiday inattention using the following regression:

$$TimeToCancellation_{j,s,\tau} = \alpha + \beta_1 D\_PreHoliday_s + \beta_2 D\_PreHoliday_s \times D\_Individual + \beta_3 D\_Individual + Controls + \varepsilon_{j,s} \quad (2)$$

Table 4 shows that the pre-holiday inattention is much more severe for individual investors. On pre-holiday trading days, individual investors increase their time-to-cancellation by 24.5 seconds, whereas institutional investors increase their time-to-cancellation by only 3.5 seconds. This sharp difference indicates that individual investors are more subject to pre-holiday inattention and pay less attention to the market after submitting limit orders.[8]

We then explore the potential outcome of insufficient monitoring on pre-holiday days. Table 5 shows that the proportion of limit orders getting executed is lower on pre-holiday trading days, and this execution ratio reduction is more significant for individual investors. Further, we

[8] In Tables A1 and A2 in the Appendix, we use the limit order submission volume and the frequency of limit order cancellations as alternative indicators for inattention. We find qualitatively similar results with cancellation frequency. The reduction in pre-holiday order cancellations is more prominent among individual investors than institutional investors.

examine the hold-till-maturity returns. The hold-till-maturity returns are first calculated with the following equation and then averaged up for product *j* executed during trading hour τ on day *s*: [9]

$$Return_{buy} = \frac{ExpirationPrice - BuyOrderPrice}{BuyOrderPrice} \quad \text{or } Return_{sell} = \frac{SellOrderPrice - ExpirationPrice}{SellOrderPrice} \quad (3)$$

Expiration price is the closing price on the futures expiration day. Equation (3) ensures that a buy (sell) order has a positive return when the expiration price is higher (lower) than the order price. Column 3 of Table 6 shows that the underperformance of individual investors relative to institutional investors is significant at 8.3 basis points.[10] This finding is consistent with Barber et al. (2009) and Kuo et al. (2015), who document that individual investors lose money to institutional investors. Our paper shows that they lose more money on pre-holiday trading days, possibly due to a lack of information monitoring on those days.

Table 7 shows that time-to-cancellation is prolonged on days immediately before holidays and returns to normal on other trading days. When using Mondays as a *pseudo* pre-holiday indicator, we find no increase in the time-to-cancellation on Mondays for either individual or institutional investors. Collectively, these results are consistent with the notion that

[9] Hold-till-maturity returns are hypothetical returns based on the assumption that the futures contracts are closed on the maturity date at the closing price. Using a similar dataset, Kuo, Lin, and Zhao (2015) investigates the intraday, 1-day, and 5-day marked-to-market returns. Instead of assuming for one arbitrary short-time holding period, we use the hold-till-maturity return, which takes into consideration the possibility that futures products with various maturity tend to have different holding periods.

[10] The futures contracts are traded with margin. The individual-level margin deposit is not available in the data. However, as TAIFEX requires a minimum initial margin of around 7%, 8.6 bps underperformance can be leverage up to 1.2%.

the pre-holiday inattention entails a higher opportunity cost for monitoring the market, such that the time-to-cancellation is higher on trading days immediately before holidays.

4. Conclusion

This paper is the first to investigate pre-holiday limit order cancellation decisions separately for individual and institutional investors. Our findings are consistent with the argument that pre-holiday inattention leads to a lack of monitoring of limit orders, which may expose individual investors to higher non-execution and free-option value risks. The pre-holiday execution probability is lower, and individual investors underperform institutional investors by a more considerable margin in their pre-holiday trades. However, we cannot completely rule out the alternative explanation with rational order cancellation decisions on pre-holidays, even if we have tried our best to control for a variety of variables related to the limit order cancellation choices. One limitation of this paper is that inattention is inferred from order cancellation behavior, not directly revealed by investors. Future work may extend this study to combine trading records with survey data to pinpoint the actual decision-making process of investors (Hoffmann et al., 2013, 2015).

References

Ariel, R. 1990. "High Stock Returns before Holidays: Existence and Evidence on Possible Cause." *Journal of Finance* 45 (5): 1611–26.

Autore, D., Bergsma, K., and Jiang, D. 2019. "The Pre-holiday Corporate Announcement Effect." *Journal of Financial Markets* 45:61–82.

Barber, B. M., and T. Odean. 2008. "All That Glitters: The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors." *The Review of Financial Studies,* 21 (2), 785–818.

Barber, B. M., Lee, Y.-T., Liu, Y.-J. & Odean, T. 2009. "Just how much do Individual Investors Lose by Trading?" *Review of Financial Studies* 22(2), 609–632.

Da, Z., Engelberg, J. and Gao, P. 2011. "In Search of Attention." *The Journal of Finance* 66:1461–99.

Davydov, D., Khrashchevskyi, I., and Peltomäki, J. 2021. "Investor Attention and Portfolio Performance: What Information does it Pay to Pay Attention to?" *The European Journal of Finance* 27 (17): 1740–64.

Dellavigna, S. and Pollet, J. 2009. "Investor Inattention and Friday Earnings Announcements." *Journal of Finance* 64 (2): 709–49.

Dorn, D., and Sengmueller, P. 2009. Trading as Entertainment? *Management Science*, 55(4), 591–603.

Fabozzi, F. J., Ma, C. K., and Briley, J. E. 1994. "Holiday Trading in Futures Markets." *Journal of Finance* 49:307–24.

Frieder, L. and Subrahmanyam, A. 2004. "Nonsecular Regularities in Returns and Volume." *Financial Analysts Journal* 60:29–34.

Gargano, A. and Rossi, G.A. 2018. "Does it Pay to Pay Attention?" *The Review of Financial Studies* 31 (12): 4595–649.

Gherzi, S., Egan, D., Stewart, N., Haisley, E., and Ayton, P. 2014. The Meerkat Effect: Personality and Market Returns Affect Investors' Portfolio Monitoring Behaviour. *Journal of Economic Behavior and Organization*, 107(November), 512–526.

Grinblatt, M., Keloharju, M. and Linnainmaa, J. 2011a. "IQ, Trading Behavior, and Performance." *Journal of Financial Economics* 104 (2): 1–24.

Grinblatt, M., Keloharju, M. and Linnainmaa, J. 2011b. "IQ and Stock Market Participation." *Journal of Finance* 66 (6): 2119–64.

Heston, S. L., and Sadka, R. 2008. "Seasonality in the Cross-section of Stock Returns." *Journal of Financial Economics* 87:418–45.

Heston, S. L., and Sadka, R. 2010. "Seasonality in the Cross-section of Stock Returns: The International Evidence." *Journal of Financial and Quantitative Analysis* 45:1133–60.

Hirshleifer, D., Lim, S., and Teoh, S. 2009. “Driven to Distraction: Extraneous Events and Underreaction to Earnings News.” *Journal of Finance* 64:2289–325.

Hirshleifer, D., Jiang, D., Meng, Y., and Peterson, D.R. 2016. "'Tis the Season! Mood-Based Cross-Sectional Return Seasonality." Working paper.

Hirshleifer, D., Jiang, D., Meng, Y. 2020. "Mood Beta and Seasonalities in Stock Returns." *Journal of Financial Economics* 137 (1): 272–95.

Hoffmann, A. O. I., Post, T., and Pennings, J. M. E. 2013. Individual Investor Perceptions and Behavior During the Financial Crisis. *Journal of Banking and Finance*, 37(1), 60–74.

Hoffmann, A. O. I., Post, T., and Pennings, J. M. E. 2015. How Investor Perceptions Drive Actual Trading and Risk-Taking Behavior. *Journal of Behavioral Finance, 16*(1), 94–103.

Kamstra, M. J., Kramer, L. A., and Levi, M. D. 2003. "Winter Blues: A SAD Stock Market Cycle." *American Economic Review* 93:324–43.

Keloharju, M., Linnainmaa, J. T., and Nyberg, P. 2016. "Return Seasonalities." *Journal of Finance* 71 (4): 1557–90.

Kuo, W.Y., Lin, T.C., and Zhao, J. 2015. "Cognitive Limitation and Investment Performance: Evidence from Limit Order Clustering." *Review of Financial Studies* 28 (3): 838–75.

Lakonishok, J., and Smidt, S. 1988. "Are Seasonal Anomalies Real? A Ninety-year Perspective." *Review of Financial Studies* 1:403–25.

Lee, E.J., Lee, Y.K. and Kim, R. 2022. "Investor Attention and the Risk-return Trade-off." *Finance Research Letters* 47: 102524.

Linnainmaa, J. 2010. "Do Limit Orders alter Inferences about Investor Performance and Behavior?" *Journal of Finance* 65(4): 1473–506.

Lou, D. 2014. "Attracting Investor Attention through Advertising." *The Review of Financial Studies* 27(6): 1797–829.

Meshcheryakov, A., and Winters, D. B. 2022. Retail Investor Attention and the Limit Order Book: Intraday Analysis of Attention-Based Trading. *International Review of Financial Analysis*, 81, 101627.

Pham, L. and Huynh, T.L.D. 2020. "How Does Investor Attention Influence the Green Bond Market?" *Finance Research Letters* 35:101533.

Sandås, P. 2001. "Adverse Selection and Competitive Market Making: Empirical Evidence from a Limit Order Market." *The Review of Financial Studies* 14 (3): 705–34.

Table 1. Summary Statistics

This table reports the summary statistics for the full sample and for individual and institutional investors separately. The index futures orders and trades data on the Taiwan Futures Exchange ranges from January 2004 to September 2008. In 2008, the data are available only from January to September. $TimeToCancellation$ is the time interval from submission to cancellation for a product during one of the trading hours on a trading day. We include all cancelled limit orders in our tests and scale all time-to-cancellation by 100 seconds. $OrderSize$ is the natural log of the average number of contracts in a limit order. $LimitOrderRatio$ is the ratio of limit orders divided by the total number of limit and market orders submitted. $ExecutionRatio$ is the ratio of uncancelled limit orders that are executed divided by the total number of limit orders submitted. $TimeToCancellation$, $OrderSize$, $LimitOrderRatio$, and $ExecutionRatio$ are first aggregated for each product to the hourly level, and then averaged across all products and trading hours. The products are TX and MTX orders with the maturity of the spot month, the next two calendar months, and the next three quarter-end months. Summary statistics are reported separately for all trading days, pre-holiday trading days (which includes all days immediately before public holidays and weekends), and other trading days.

Variables	Full Sample	Individual Investors	Institutional Investors
All Trading Days			
Number of Trading Days	1,173		
Number of Investors	290,175	283,625	6,550
Number of Limit Orders Submitted	322,313,875	143,888,175	178,425,700
Number of Limit Orders Cancelled	200,611,485	58,965,186	141,646,299
$TimeToCancellation$	5.779	10.616	1.993
$OrderSize$	3.293	1.693	4.544
$LimitOrderRatio$	0.949	0.896	0.991
$ExecutionRatio$	0.928	0.908	0.954
Preholiday Trading Days			
Number of Trading Days	258		
Number of Limit Orders Submitted	70,280,581	32,021,928	38,258,653
Number of Limit Orders Cancelled	43,992,673	13,254,989	30,737,684
$TimeToCancellation$	5.946	10.881	2.031
$OrderSize$	3.257	1.668	4.516
$LimitOrderRatio$	0.950	0.899	0.991
$ExecutionRatio$	0.924	0.903	0.950
Other Trading Days			
Number of Trading Days	915		
Number of Limit Orders Submitted	252,033,294	111,866,247	140,167,047
Number of Limit Orders Cancelled	156,618,812	45,710,197	110,908,615
$TimeToCancellation$	5.733	10.543	1.982
$OrderSize$	3.303	1.700	4.551
$LimitOrderRatio$	0.949	0.895	0.990
$ExecutionRatio$	0.929	0.909	0.954

Table 2. Time-to-Cancellation on Days Immediately before Holidays

This table reports the parameter estimates of the following regression:

$$TimeToCancellation_{j,s,\tau} = \alpha + \beta_1 D\_PreHoliday_s \quad + Controls + \varepsilon_{j,s}$$

where $TimeToCancellation_{j,s,\tau}$ is the time interval from submission to cancellation on product j during the trading hour τ on day s. We include all of the canceled limit orders in our tests and scale all time-to-cancellation by 100 seconds. The products are TX and MTX orders with the maturity of the spot month, the next two calendar months, and the next three quarter-end months. $D\_PreHoliday_s$ is a dummy variable that equals 1 if the trading day is a pre-holiday which includes all days immediately before public holidays and weekends. $Market\ Return_s$ is the daily market return on day s. In Model 5, we control for the year fixed effect, month fixed effect, and time-of-the-day fixed effect. Standard errors are adjusted for heteroskedasticity and clustered at the index futures product level. *, **, and *** indicate significance levels of 0.1, 0.05, and 0.01, respectively.

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5
$D\_PreHoliday_s$	**0.244*** **	**0.236*** **	**0.241*** **	**0.238*** **	**0.238*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
$Market\ Return_s$		15.317***	15.937***	12.000***	12.000***
		(0.000)	(0.000)	(0.000)	(0.000)
Constant	6.329***	6.330***	6.329***	6.330***	6.330***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year Fixed Effect	No	No	Yes	Yes	Yes
Month Fixed Effect	No	No	Yes	Yes	Yes
Time-of-the-day Fixed Effect	No	No	No	Yes	Yes
Product-level Cluster	No	No	No	No	Yes
N	1,510,968	1,510,968	1,510,830	1,510,830	1,510,830
Adjusted R^2	0.000	0.000	0.051	0.080	0.080

Table 3. Time-to-Cancellation on Days Immediately before Holidays: Robustness

This table reports the parameter estimates of the following regression:

$$TimeToCancellation_{j,s,\tau} = \alpha + \beta_1 D\_PreHoliday_s \quad + Controls + \varepsilon_{j,s}$$

where $TimeToCancellation_{j,s,\tau}$ is the time interval from submission to cancellation on product j during the trading hour τ on day s. We include all of the canceled limit orders in our tests and scale all time-to-cancellation by 100 seconds. The products are TX and MTX orders with the maturity of the spot month, the next two calendar months, and the next three quarter-end months. $D\_PreHoliday_s$ is a dummy variable that equals 1 if the trading day is a pre-holiday which includes all days immediately before public holidays and weekends. $Market\ Return_s$ is the daily market return on day s. The control variables include several indicators for opportunity cost of monitoring, free option value risk, and non-execution risk of limit orders (Fong and Liu, 2010). $OtherProductRatio_{j,s,\tau}$is the relative trading volume of other products. $Volatility_s$ is the daily market volatility, calculated as the daily price range divided by the closing price on day s. $OrderSize_{j,s,\tau}$ is the natural log of the average number of contracts in a limit order. $Maturity_{j,s,\tau}$ is the number of months till the contract maturity. $LimitOrderRatio$ is the ratio of limit orders divided by the total number of limit and market orders submitted. $SubmissionVolume_{j,s,\tau}$ is the natural log of the number of limit orders submitted. $D\_Buy_{j,s,\tau}$ is a dummy variable that indicates buy orders. Standard errors are adjusted for heteroskedasticity and clustered at the index futures product level. *, **, and *** indicate significance levels of 0.1, 0.05, and 0.01, respectively.

Independent Variables	Model 1	Model 2	Model 3	Model 4
$D\_PreHoliday_s$	**0.209*** **	**0.164*** **	**0.179*** **	**0.174*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**
$Market\ Return_s$	11.076***	0.801	8.857***	0.017
	(0.000)	(0.621)	(0.000)	(0.991)
$OtherProductRatio_{j,s,\tau}$	0.072***			0.012**
	(0.000)			(0.012)
$Volatility_s$		-0.669***		-0.608***
		(0.000)		(0.000)
$OrderSize_{j,s,\tau}$		-2.805***		-1.725***
		(0.000)		(0.000)
$Maturity_{j,s,\tau}$		-0.158***		-0.318***
		(0.000)		(0.000)
$LimitOrderRatio_{j,s,\tau}$		-12.339***		-17.211***
		(0.000)		(0.000)
$SubmissionVolume_{j,s,\tau}$			-0.745***	-0.803***
			(0.000)	(0.000)
$D\_Buy_{j,s,\tau}$			0.002	0.041
			(0.963)	(0.378)
Constant	5.734***	21.206***	8.627***	28.270***
	(0.000)	(0.000)	(0.000)	(0.000)
Year Fixed Effect	Yes	Yes	Yes	Yes
Month Fixed Effect	Yes	Yes	Yes	Yes
Time-of-the-day Fixed Effect	Yes	Yes	Yes	Yes
Product-level Cluster	Yes	Yes	Yes	Yes
N	1,453,675	1,452,443	1,453,675	1,452,443
Adjusted R^2	0.085	0.133	0.098	0.142

Table 4. Pre-Holiday Time-to-Cancellation of Individual and Institutional Investors

This table reports the parameter estimates of the following regression:

$$TimeToCancellation_{j,s,\tau} = \alpha + \beta_1 D\_PreHoliday_s + \beta_2 D\_PreHoliday_s \times D\_Individual + \beta_3 D\_Individual + Controls + \varepsilon_{j,s}$$

where $TimeToCancellation_{j,s,\tau}$ is the time interval from submission to cancellation on product j during the trading hour τ on day s. We include all of the canceled limit orders in our tests and scale all time-to-cancellation by 100 seconds. The products are TX and MTX orders with the maturity of the spot month, the next two calendar months, and the next three quarter-end months. $D\_PreHoliday_s$ is a dummy variable that equals 1 if the trading day is a pre-holiday which includes all days immediately before public holidays and weekends. The control variables include several indicators for opportunity cost of monitoring, free option value risk, and non-execution risk of limit orders (Fong and Liu, 2010). $Market\ Return_s$ is the daily market return on day s. The control variables include several indicators for opportunity cost of monitoring, free option value risk, and non-execution risk of limit orders (Fong and Liu, 2010). $OtherProductRatio_{j,s,\tau}$is the relative trading volume of other products. $Volatility_s$ is the daily market volatility, calculated as the daily price range divided by the closing price on day s. $OrderSize_{j,s,\tau}$ is the natural log of the average number of contracts in a limit order. $Maturity_{j,s,\tau}$ is the number of months till the contract maturity. $LimitOrderRatio$ is the ratio of limit orders divided by the total number of limit and market orders submitted. $SubmissionVolume_{j,s,\tau}$ is the natural log of the number of limit orders submitted. $D\_Buy_{j,s,\tau}$ is a dummy variable that indicates buy orders. Standard errors are adjusted for heteroskedasticity and clustered at the index futures product level. *, **, and *** indicate significance levels of 0.1, 0.05, and 0.01, respectively.

Independent Variables	Individual Investors	Institutional Investors	Interaction
$D\_PreHoliday_s$	0.245***	0.035	0.005
	(0.001)	(0.111)	(0.847)
$D\_PreHoliday_s \times D\_Individual$			**0.274*** **
			(0.000)
$D\_Individual$			8.501***
			(0.000)
$Market\ Return_s$	-1.392	-0.023	-1.273
	(0.598)	(0.978)	(0.360)
$OtherProductRatio_{j,s,\tau}$	1.094***	0.008***	0.004
	(0.000)	(0.000)	(0.152)
$Volatility_s$	-1.239***	-0.176***	-0.645***
	(0.000)	(0.000)	(0.000)
$OrderSize_{j,s,\tau}$	1.568***	0.916***	1.042***
	(0.000)	(0.000)	(0.000)
$Maturity_{j,s,\tau}$	-0.337***	-0.097***	-0.170***
	(0.000)	(0.000)	(0.000)
$LimitOrderRatio_{j,s,\tau}$	-3.381***	-7.826***	-2.051***
	(0.000)	(0.000)	(0.005)
$SubmissionVolume_{j,s,\tau}$	-1.258***	-0.650***	-0.875***
	(0.000)	(0.000)	(0.000)
$D\_Buy_{j,s,\tau}$	0.107	-0.103***	-0.032
	(0.179)	(0.000)	(0.429)
Constant	19.033***	11.817***	7.832***
	(0.000)	(0.000)	(0.000)
Year Fixed Effect	Yes	Yes	Yes
Month Fixed Effect	Yes	Yes	Yes
Time-of-the-day Fixed Effect	Yes	Yes	Yes

Product-level Cluster	Yes	Yes	Yes
N	637,456	814,987	1,452,443
Adjusted R^2	0.160	0.062	0.209

Table 5. Pre-Holiday Execution Ratio of Individual and Institutional Investors

This table reports the parameter estimates of the following regression:

$$ExecutionRatio_{j,s,\tau} = \alpha + \beta_1 D\_PreHoliday_s \quad + \beta_2 D\_PreHoliday_s \times D\_Individual + \beta_3 D\_Individual + Controls + \varepsilon_{j,s}$$

Where $ExecutionRatio_{j,s,\tau}$ is the ratio of uncancelled limit orders that are executed divided by the total number of limit orders submitted for product j during the trading hour τ on day s. The products are TX and MTX orders with the maturity of the spot month, the next two calendar months, and the next three quarter-end months. $D\_PreHoliday_s$ is a dummy variable that equals 1 if the trading day is a pre-holiday which includes all days immediately before public holidays and weekends. $D\_Individual$ is an indicator for individual investors. Panels A, B, and C report the regression results for hold-till-maturity returns of all executed orders, limit orders, and market orders, respectively. In all specifications, we control for the year fixed effect, month fixed effect, and time-of-the-day fixed effect. Standard errors are adjusted for heteroskedasticity and clustered at the index futures product level. *, **, and *** indicate significance levels of 0.1, 0.05, and 0.01, respectively.

Independent Variables	Individual Investors	Institutional Investors	Interaction
$D\_PreHoliday_s$	-0.006***	-0.003***	-0.003***
	(0.000)	(0.000)	(0.000)
$D\_PreHoliday_s \times D\_Individual$			**-0.003****
			(0.031)
$D\_Individual$			-0.048***
			(0.000)
$Market\ Return_s$	-0.137*	0.014	-0.068
	(0.076)	(0.736)	(0.225)
Constant	0.909***	0.954***	0.956***
	(0.000)	(0.000)	(0.000)
Year Fixed Effect	Yes	Yes	Yes
Month Fixed Effect	Yes	Yes	Yes
Time-of-the-day Fixed Effect	Yes	Yes	Yes
Product-level Cluster	Yes	Yes	Yes
N	676,342	589,127	1,265,469
Adjusted R^2	0.057	0.194	0.102

Table 6. Pre-Holiday Investment Performance of Individual and Institutional Investors

This table reports the parameter estimates of the following regression:

$$Return_{j,s,\tau} = \alpha + \beta_1 D\_PreHoliday_s \quad + \beta_2 D\_PreHoliday_s \times D\_Individual + \beta_3 D\_Individual + Controls + \varepsilon_{j,s}$$

Where $Return_{j,s,\tau}$ is the hypothetical return of the executed orders, assuming that the futures contracts are held till maturity. The products are TX and MTX orders with the maturity of the spot month, the next two calendar months, and the next three quarter-end months. $D\_PreHoliday_s$ is a dummy variable that equals 1 if the trading day is a pre-holiday which includes all days immediately before public holidays and weekends. $D\_Individual$ is an indicator for individual investors. In all specifications, we control for the year fixed effect, month fixed effect, and time-of-the-day fixed effect. Standard errors are adjusted for heteroskedasticity and clustered at the index futures product level. *, **, and *** indicate significance levels of 0.1, 0.05, and 0.01, respectively.

Independent Variables	Individual Investors	Institutional Investors	Interaction
$D\_PreHoliday_s$	-0.036**	0.048*	0.048*
	(0.013)	(0.063)	(0.060)
$D\_PreHoliday_s \times D\_Individual$			**-0.083****
			(0.018)
$D\_Individual$			0.019
			(0.646)
$Market\ Return_s$	1.687	0.690	1.225*
	(0.545)	(0.803)	(0.085)
Constant	-0.003	-0.022	-0.022
	(0.886)	(0.374)	(0.418)
Year Fixed Effect	Yes	Yes	Yes
Month Fixed Effect	Yes	Yes	Yes
Time-of-the-day Fixed Effect	Yes	Yes	Yes
Product-level Cluster	Yes	Yes	Yes
N	689,387	599,772	1,289,159
Adjusted R^2	0.000	0.000	-0.000

Table 7. Friday and Monday Time-to-Cancellation of Individual and Institutional Investors

Panels A and B of this table report the parameter estimates of the following regressions:

$$TimeToCancellation_{j,s,\tau} = \alpha + \beta_1 D\_Friday_s + \beta_2 D\_Friday_s \times D\_Individual + \beta_3 D\_Individual + Controls + \varepsilon_{j,s}$$
$$TimeToCancellation_{j,s,\tau} = \alpha + \beta_1 D\_Monday_s + \beta_2 D\_Monday_s \times D\_Individual + \beta_3 D\_Individual + Controls + \varepsilon_{j,s}$$

$TimeToCancellation_{j,s,\tau}$ is the time interval from submission to cancellation on product j during the trading hour τ on day s. We include all of the canceled limit orders in our tests and scale all time-to-cancellation by 100 seconds. The products are TX and MTX orders with the maturity of the spot month, the next two calendar months, and the next three quarter-end months. D_Friday_s is a dummy variable that equals 1 if the trading day is a Friday (i.e., the day immediately before weekend) and 0 otherwise. D_Monday_s is a dummy variable that equals 1 if the trading day is a Monday and 0 otherwise. $D\_Individual$ is an indicator for individual investors. The control variables include several indicators for opportunity cost of monitoring, free option value risk, and non-execution risk of limit orders (Fong and Liu, 2010). Standard errors are adjusted for heteroskedasticity and clustered at the index futures product level. *, **, and *** indicate significance levels of 0.1, 0.05, and 0.01, respectively.

Panel A: Friday Time-to-Cancellation of Individual and Institutional Investors

Independent Variables	Individual Investors	Institutional Investors	Interaction
D_Friday_s	0.237***	0.035	0.007
	(0.003)	(0.109)	(0.782)
$D\_Friday_s \times D\_Individual$			**0.268*** **
			(0.001)
$D\_Individual$			8.507***
			(0.000)
$Market\ Return_s$	-1.381	-0.021	-1.268
	(0.601)	(0.979)	(0.362)
$OtherProductRatio_{j,s,\tau}$	1.094***	0.008***	0.004
	(0.000)	(0.000)	(0.152)
$Volatility_s$	-1.239***	-0.176***	-0.645***
	(0.000)	(0.000)	(0.000)
$OrderSize_{j,s,\tau}$	1.567***	0.916***	1.042***
	(0.000)	(0.000)	(0.000)
$Maturity_{j,s,\tau}$	-0.337***	-0.097***	-0.170***
	(0.000)	(0.000)	(0.000)
$LimitOrderRatio_{j,s,\tau}$	-3.380***	-7.826***	-2.051***
	(0.000)	(0.000)	(0.005)
$SubmissionVolume_{j,s,\tau}$	-1.258***	-0.650***	-0.875***
	(0.000)	(0.000)	(0.000)
$D\_Buy_{j,s,\tau}$	0.107	-0.103***	-0.032
	(0.179)	(0.000)	(0.428)
Constant	19.039***	11.818***	7.832***
	(0.000)	(0.000)	(0.000)
Year Fixed Effect	Yes	Yes	Yes
Month Fixed Effect	Yes	Yes	Yes
Time-of-the-day Fixed Effect	Yes	Yes	Yes
Product-level Cluster	Yes	Yes	Yes
N	637,456	814,987	1,452,443
Adjusted R^2	0.160	0.062	0.209

Panel B: Monday Time-to-Cancellation of Individual and Institutional Investors

Independent Variables	Individual Investors	Institutional Investors	Interaction
D_Monday_s	0.041	-0.022	0.005
	(0.614)	(0.319)	(0.852)
$D\_Monday_s \times D\_Individual$			**-0.012**
			(0.884)
$D\_Individual$			8.563***
			(0.000)
$Market\ Return_s$	-1.339	-0.017	-1.244
	(0.612)	(0.984)	(0.371)
$OtherProductRatio_{j,s,\tau}$	1.096***	0.008***	0.004
	(0.000)	(0.000)	(0.148)
$Volatility_s$	-1.243***	-0.176***	-0.646***
	(0.000)	(0.000)	(0.000)
$OrderSize_{j,s,\tau}$	1.563***	0.916***	1.042***
	(0.000)	(0.000)	(0.000)
$Maturity_{j,s,\tau}$	-0.335***	-0.097***	-0.170***
	(0.000)	(0.000)	(0.000)
$LimitOrderRatio_{j,s,\tau}$	-3.371***	-7.824***	-2.043***
	(0.000)	(0.000)	(0.005)
$SubmissionVolume_{j,s,\tau}$	-1.256***	-0.650***	-0.875***
	(0.000)	(0.000)	(0.000)
$D\_Buy_{j,s,\tau}$	0.107	-0.103***	-0.032
	(0.180)	(0.000)	(0.428)
Constant	19.068***	11.827***	7.825***
	(0.000)	(0.000)	(0.000)
Year Fixed Effect	Yes	Yes	Yes
Month Fixed Effect	Yes	Yes	Yes
Time-of-the-day Fixed Effect	Yes	Yes	Yes
Product-level Cluster	Yes	Yes	Yes
N	637,456	814,987	1,452,443
Adjusted R^2	0.160	0.062	0.209

Online Appendix

Appendix Table A1. Pre-holiday Submission Volume of Individual and Institutional Investors

This table reports the parameter estimates of the following regression:

$$SubmissionVolume_{j,s,\tau} = \alpha + \beta_1 D\_PreHoliday_s + \beta_2 D\_PreHoliday_s \times D\_Individual + \beta_3 D\_Individual + Controls + \varepsilon_{j,s}$$

where $SubmissionVolume_{j,s,\tau}$ is the natural log of the number of limit orders submitted for product j during the trading hour τ on day s. The products are TX and MTX orders with the maturity of the spot month, the next two calendar months, and the next three quarter-end months. $D\_PreHoliday_s$ is a dummy variable that equals 1 if the trading day is a pre-holiday which includes all days immediately before public holidays and weekends. $D\_Individual$ is an indicator for individual investors. $Market\ Return_s$ is the daily market return on day s. The control variables include several indicators for opportunity cost of monitoring, free option value risk, and non-execution risk of limit orders (Fong and Liu, 2010). $OtherProductRatio_{j,s,\tau}$is the relative trading volume of other products. $Volatility_s$ is the daily market volatility, calculated as the daily price range divided by the closing price on day s. $OrderSize_{j,s,\tau}$ is the natural log of the average number of contracts in a limit order. $Maturity_{j,s,\tau}$ is the number of months till the contract maturity. $LimitOrderRatio$ is the ratio of limit orders divided by the total number of limit and market orders submitted. $SubmissionVolume_{j,s,\tau}$ is the natural log of the number of limit orders submitted. $D\_Buy_{j,s,\tau}$ is a dummy variable that indicates buy orders. Standard errors are adjusted for heteroskedasticity and clustered at the index futures product level. *, **, and *** indicate significance levels of 0.1, 0.05, and 0.01, respectively.Standard errors are adjusted for heteroskedasticity and clustered at the index futures product level. *, **, and *** indicate significance levels of 0.1, 0.05, and 0.01, respectively.

Independent Variables	Individual Investors	Institutional Investors	Interaction
$D\_PreHoliday_s$	0.045***	0.007	0.013
	(0.000)	(0.409)	(0.137)
$D\_PreHoliday_s \times D\_Individual$			**0.006**
			(0.607)
$D\_Individual$			0.134
			(0.183)
$Market\ Return_s$	1.025	-1.502***	-0.681
	(0.170)	(0.003)	(0.213)
$OtherProductRatio_{j,s,\tau}$	-0.364***	-0.024***	-0.027***
	(0.000)	(0.000)	(0.000)
$Volatility_s$	0.100***	0.138***	0.102***
	(0.000)	(0.000)	(0.000)
$OrderSize_{j,s,\tau}$	2.415***	1.032***	1.325***
	(0.000)	(0.000)	(0.000)
$Maturity_{j,s,\tau}$	-0.335***	-0.174***	-0.227***
	(0.000)	(0.000)	(0.000)
$LimitOrderRatio_{j,s,\tau}$	-4.358***	0.724***	-4.377***
	(0.000)	(0.000)	(0.000)
$D\_Buy_{j,s,\tau}$	0.129***	0.102***	0.101***
	(0.000)	(0.000)	(0.000)
Constant	7.219***	2.238***	7.088***
	(0.000)	(0.000)	(0.000)
Year Fixed Effect	Yes	Yes	Yes

Month Fixed Effect	Yes	Yes	Yes
Time-of-the-day Fixed Effect	Yes	Yes	Yes
Product-level Cluster	Yes	Yes	Yes
N	637,456	814,987	1,452,443
Adjusted R^2	0.688	0.460	0.504

Appendix Table A2. Pre-holiday Cancellation Frequency of Individual and Institutional Investors

This table reports the parameter estimates of the following regression:

$$LnCancelledQnty_{j,s,\tau} = \alpha + \beta_1 D\_PreHoliday_s \quad + \beta_2 D\_PreHoliday_s \times D\_Individual + \beta_3 D\_Individual + Controls + \varepsilon_{j,s}$$

where $LnCancelFreq_{j,s,\tau}$ is the natural log of the frequency of limit order cancellation for product j during the trading hour τ on day s. The products are TX and MTX orders with the maturity of the spot month, the next two calendar months, and the next three quarter-end months. $D\_PreHoliday_s$ is a dummy variable that equals 1 if the trading day is a pre-holiday which includes all days immediately before public holidays and weekends. $D\_Individual$ is an indicator for individual investors. $Market\ Return_s$ is the daily market return on day s. The control variables include several indicators for opportunity cost of monitoring, free option value risk, and non-execution risk of limit orders (Fong and Liu, 2010). $OtherProductRatio_{j,s,\tau}$is the relative trading volume of other products. $Volatility_s$ is the daily market volatility, calculated as the daily price range divided by the closing price on day s. $OrderSize_{j,s,\tau}$ is the natural log of the average number of contracts in a limit order. $Maturity_{j,s,\tau}$ is the number of months till the contract maturity. $LimitOrderRatio$ is the ratio of limit orders divided by the total number of limit and market orders submitted. $SubmissionVolume_{j,s,\tau}$ is the natural log of the number of limit orders submitted. $D\_Buy_{j,s,\tau}$ is a dummy variable that indicates buy orders. Standard errors are adjusted for heteroskedasticity and clustered at the index futures product level. *, **, and *** indicate significance levels of 0.1, 0.05, and 0.01, respectively. Standard errors are adjusted for heteroskedasticity and clustered at the index futures product level. *, **, and *** indicate significance levels of 0.1, 0.05, and 0.01, respectively.

Independent Variables	Individual Investors	Institutional Investors	Interaction
$D\_PreHoliday_s$	0.005**	0.014***	0.016***
	(0.036)	(0.000)	(0.000)
$D\_PreHoliday_s \times D\_Individual$			**-0.016*** **
			(0.000)
$D\_Individual$			-0.309***
			(0.000)
$Market\ Return_s$	0.230*	-0.033	0.012
	(0.072)	(0.881)	(0.926)
$OtherProductRatio_{j,s,\tau}$	-0.033***	-0.001**	-0.002***
	(0.000)	(0.020)	(0.000)
$Volatility_s$	-0.002	-0.007	-0.006
	(0.596)	(0.386)	(0.240)
$OrderSize_{j,s,\tau}$	-0.771***	-0.984***	-0.948***
	(0.000)	(0.000)	(0.000)
$Maturity_{j,s,\tau}$	0.048***	0.072***	0.069***
	(0.000)	(0.000)	(0.000)
$LimitOrderRatio_{j,s,\tau}$	0.820***	3.105***	1.610***
	(0.000)	(0.000)	(0.000)
$SubmissionVolume_{j,s,\tau}$	0.851***	0.953***	0.923***
	(0.000)	(0.000)	(0.000)
$D\_Buy_{j,s,\tau}$	0.029***	0.018***	0.018***
	(0.000)	(0.000)	(0.000)
Constant	-1.293***	-3.482***	-1.928***
	(0.000)	(0.000)	(0.000)
Year Fixed Effect	Yes	Yes	Yes
Month Fixed Effect	Yes	Yes	Yes

Time-of-the-day Fixed Effect	Yes	Yes	Yes
Product-level Cluster	Yes	Yes	Yes
N	637,456	814,987	1,452,443
Adjusted R^2	0.920	0.848	0.875