Revisiting Boehmer et al. (2021):
Recent Period, Alternative Method, Different Conclusions

David Ardia[a,*], Clément Aymard[a,b], Tolga Cenesizoglu[b]

[a]*GERAD & Department of Decision Sciences, HEC Montréal, Montréal, Canada*
[b]*Department of Finance, HEC Montréal, Montréal, Canada*

Abstract

We reassess the main conclusions of Boehmer et al. (2021, BJZZ) on the predictive power of retail order imbalance (ROI) for future stock returns in the more recent 2016-2021 period and/or using the alternative quote midpoint (QMP) method. The predictive power of ROI based on the BJZZ algorithm weakens in the 2016-2021 period. Specifically, past ROI no longer predicts weekly returns on large-cap stocks, and the long-short strategy is unprofitable. Interestingly, using the QMP method not only upholds BJZZ's main conclusions in their original sample but also offers stronger support for these conclusions during the 2016–2021 period compared to the BJZZ algorithm.

Keywords: Retail Investor, Retail Order Imbalance, Return Predictability, Quote Midpoint Method, Replication
JEL: G11, G12, G14

*Corresponding author. HEC Montréal, 3000 Chemin de la Côte-Sainte-Catherine, Montreal, QC, Canada H3T 2A7. Phone: +1 514 340 6103.
Email addresses: `david.ardia@hec.ca` (David Ardia), `clement.aymard@hec.ca` (Clément Aymard), `tolga.cenesizoglu@hec.ca` (Tolga Cenesizoglu)

1. Introduction

Boehmer et al. (2021, BJZZ) propose an algorithm for identifying and signing retail trades in the NYSE Trade and Quote (TAQ) datasets. This algorithm builds on the observation that retail trades are frequently executed off-exchange—by a wholesaler or through internalization—and often receive subpenny price improvements. This approach offers a better alternative to previous methods that relied on trade size as a differentiator (*e.g.*, Lee and Radhakrishna, 2000; Bhattacharya et al., 2007; Campbell et al., 2009) or private brokerage data (*e.g.*, Barber and Odean, 2008; Kelley and Tetlock, 2013) and has quickly gained popularity in the literature. According to Google Scholar, it has been cited by 526 articles as of mid-November 2024, some being published in top finance journals.[1] Moreover, the marketable retail order imbalances based on this algorithm are now available through the intraday indicators data set of Wharton Research Data Services (WRDS), covering all stocks and days since 1993, making it easily available for research on retail investors.

Despite its popularity, the BJZZ approach faces criticism. Battalio et al. (2024) and Barber et al. (2024) independently assess its accuracy. Based on proprietary data on retail and institutional trades from multiple sources, Battalio et al. (2024) identify both Type I (identifying non-retail trades as retail) and Type II errors (failure to correctly identify retail trades). For example, they find that "*(...) less than 28% of the sample of known retail trades that are matched to TRF trades are classified as retail by the BJZZ methodology*" (Battalio et al., 2024, p.4). Barber et al. (2024) find that the BJZZ approach accurately identifies only 35% of trades while incorrectly signing 28% of those identified, based on their execution of 85,000 trades across six retail brokerage accounts between December 2021 and June 2022. In addition, they suggest an alternative method based on the Lee and Ready (1991) quote midpoint (QMP) method and provide convincing empirical evidence that their proposed algorithm performs better than the BJZZ algorithm in the sense that the QMP method "*does not affect identification rates but reduces the signing error rates to 5%.*"

BJZZ developed their algorithm to address a central question, as formulated in their opening sentence: "*Can retail equity investors predict future stock returns, or do they make systematic, costly mistakes in their trading decisions?*". Their answer to this central question based on their proposed algorithm is that marketable retail order imbalances indeed predict future returns. Although Battalio et al. (2024) and Barber et al. (2024) provide convincing arguments that the BJZZ algorithm fails to identify and/or sign some of the retail trades, they do not address

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[1]See, *e.g.* Farrell et al. (2022); Barber et al. (2023); Bradley et al. (2022); Bryzgalova et al. (2023); Cookson et al. (2023); Döttling and Kim (2024).

whether the main conclusions of BJZZ continue to hold in their original sample when one replaces their proposed algorithm with the potentially better alternative QMP method. Equally important, BJZZ's main findings might not hold in the more recent period after 2015 due to ever evolving market dynamics, such as the significant increase in retail trading activity during and after the COVID-19 pandemic.

In this paper, we fill this gap. Specifically, we first analyze whether BJZZ's original findings based on the 2010-2015 period continue to hold in the more recent 2016-2021 period. Second, we analyze the effect of using the alternative QMP method to identify and sign retail trades on their original conclusions in the original 2010-2015 and the more recent 2016-2021 periods.

We reproduce the first eight tables of BJZZ using data from the more recent period between 2016 and 2021. Our main results can be summarized as follows: In the recent 2016-2021 period compared to 2010-2015: (Table II) the empirical evidence for their findings that the main determinant of retail order imbalance (ROI) is its first lag is statistically much weaker; (Table III) the original findings that past ROIs can predict next week returns are also statistically much weaker; (Table IV) the predictability patterns of large-cap and high-price stocks disappear, while those of small-cap and low-price stocks seriously weaken; (Table V) ROI's ability to predict returns is confined mostly to four weeks instead of the original six to eight weeks; (Table VI) long-short strategies based on ROI are no longer profitable across all stocks and significantly less profitable for small stocks; (Table VII) the evidence supporting the notion that ROI's predictive power for returns is primarily due to the persistence of ROI weakens, albeit remaining significant; (Table VIII) the lack of supporting evidence for the liquidity provision hypothesis persists and continues to conflict with the findings of Kaniel et al. (2008). Overall, our results indicate either a substantial weakening or a disappearance of most of BJZZ's main findings in the recent 2016-2021 period, potentially due to changing market conditions.

We then analyze the second and equally important question of whether BJZZ's main conclusions continue to hold when one uses the better QMP algorithm to identify retail trades. To do this, we compute all retail-trade quantities based on the QMP instead of the BJZZ approach for the original 2010-2015 and the recent 2016-2021 periods. Interestingly, most of BJZZ's empirical results continue to hold when we use the QMP method to identify and sign retail trades in the original period. Even more puzzling is that using the QMP method offers stronger support for BJZZ's main conclusions during the 2016–2021 period compared to BJZZ's own algorithm. These findings suggest that the differences between the two algorithms do not seem to affect BJZZ's main conclusions once one aggregates across trades and performs an aggregate level analysis using all stocks in their sample.

To facilitate the reproducibility of our study, we share the code and pseudo data at `https:`

`//github.com/ArdiaD/BJZZ.`

2. Data and Methodology

We construct two samples from January 1, 2010, to December 31, 2021. In the first sample, we identify and sign retail trades following the BJZZ approach, utilizing the replication code provided by the authors.[2] In the second sample, we implement the QMP approach based on our own code to identify and sign retail trades.We apply the data filters as specified by BJZZ to define the universe of stocks in both samples. Specifically, we retain only common stocks (CRSP's share codes 10 or 11) listed on the NYSE, NYSE MKT (formerly Amex), and NASDAQ, with a price of at least $1 at the previous month-end. Following Barber et al. (2023), we exclude stocks affected by the Tick Size Pilot program between October 2016 and October 2018.[3] We construct all variables necessary for reproducing Tables I-VIII in BJZZ. Non-retail-trade variables—stock return, market capitalization, turnover, book-to-market ratio, and volatility—are common to both samples, while retail-trade variables are sample-specific.

Having constructed these two samples based on BJZZ and QMP approaches, we split each sample into two six-year periods: January 1, 2010, to December 31, 2015, representing the original BJZZ period, and January 1, 2016, to December 31, 2021, representing the recent period. The resulting four samples—referred to as *(a) BJZZ 2010-2015*, *(b) QMP 2010-2015*, *(c) BJZZ 2016-2021*, and *(d) QMP 2016-2021* for brevity—serve as the basis for our comparisons. This framework enables four pairwise comparisons, two related to our first objective, examining the impact of the sample period (Panel (a) vs. (c) and Panel (b) vs. (d) in the various tables), and two related to our second objective, evaluating the effect of applying the QMP approach instead of the BJZZ approach on BJZZ's original conclusions (Panel (a) vs. (b) and Panel (c) vs. (d) in the various tables).

Before comparing periods and methods, we meticulously ensure the successful replication of BJZZ's original findings. Results of this replication exercise for each of the eight tables in BJZZ are reported in the Internet Appendix, Section A. Overall, our results demonstrate that we can accurately replicate BJZZ's original results. In all subsequent tables, Panel *(a) BJZZ 2010-2015* corresponds to these replication results.

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[2]BJZZ original replication code is accessible at `https://onlinelibrary.wiley.com/doi/abs/10.1111/jofi.13033`.

[3]Stocks from the test groups G2 and G3 are dropped. We identified these stocks using the `TICK_PILOT_INDICATOR` flag available in the TAQ datasets. See `https://www.finra.org/rules-guidance/key-topics/tick-size-pilot-program` for details.

3. Results

This section presents our main findings, addressing our two objectives in tandem. To save space, we report only selected results from most tables. The complete set of results is available in the Internet Appendix, Section B.

3.1. Summary Statistics

Table 1 reports the summary statistics for our four samples. Comparing the recent and original periods reveals an important increase in retail investor activity, as evidenced by both the daily average number of shares bought and sold (Mrbvol and Mrsvol) and the daily number of buy and sell transactions (Mrbtrd and Mrstrd). Furthermore, the daily mean and median of order imbalances (Mroibvol and Mroibtrd) are noticeably closer to zero in the recent period, suggesting that the heightened activity is predominantly driven by increased buying. When comparing the two approaches, the daily means and medians of Mrbvol, Mrsvol, Mrbtrd, and Mrstrd based on QMP are consistently higher than those based on BJZZ in both periods. This indicates that QMP captures a higher average trading activity than BJZZ. Additionally, QMP yields more negative order imbalances on average, suggesting that QMP might be better at identifying sell transactions than BJZZ. We also compute the correlations between the QMP-based and BJZZ-based quantities. Interestingly, the correlations between the order imbalance measures decrease significantly in the recent period. This finding might be an early indication that the potential divergence in the results based on the BJZZ and QMP approaches could be more pronounced in more recent years.

[Insert Table 1 about here.]

3.2. Determinants of Marketable Retail Order Imbalances

Table 2 reports the results on the determinants of marketable retail order imbalances (ROI), analogous to BJZZ's Table II. BJZZ investigate the relationship between retail investors' marketable order flow and past order flow, as well as past returns. They regress the current-week order imbalance for a given stock on the previous-week order imbalance, previous-week return, and various control variables.[4] They employ the Fama-MacBeth (1973) approach to analyze

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[4]Note that, while the variables Mroib and Ret are originally measured at the daily level, the analyses of BJZZ "*focus on weekly horizons to reduce the impact of microstructure noise on [their] results*" (Boehmer et al., 2021, p.2262). Also, in what follows, all discussions pertain to order imbalances based on share volume (Mroibvol for Mroib) and bid-ask average returns (Ret). Using order imbalances based on the number of trades (Mroibtrd) and/or CRSP closing price returns does not fundamentally change the interpretation; see the Internet Appendix.

this relation. Specifically, in the first stage, for each day, they estimate the following cross-sectional regression:

$$\mathsf{Mroib}_{i,w} = b_{0,w} + b_{1,w}\mathsf{Mroib}_{i,w-1} + b_{2,w}\mathsf{Ret}_{i,w-1} + b'_{3,w}\mathsf{CTRL}_{i,w-1} + u_{i,w}. \qquad (1)$$

In the second stage, they conduct statistical inference using the time series of the coefficients and Newey and West (1987) standard errors with six lags.[5]

BJZZ's original results suggest that the primary determinant of weekly ROI is its first lag. Our results in Panel (c) show that this conclusion still holds in 2016-2021, although its economic and statistical significances weaken. For instance, the coefficient estimate and the t-stat of the first lag, $\mathsf{Mroibvol}_{i,w-1}$, are 50% (0.0983 vs. 0.1982) and 20% (57.30 vs. 71.81) lower in 2016-2021 period, respectively. When we compare periods using the QMP method instead (Panel (d) vs. (b)), this weakening effect is also visible, although to a lesser extent.

Employing the QMP method does not materially alter BJZZ's original finding, as the $\mathsf{Mroibvol}_{i,w-1}$ estimate and t-stat are only slightly higher than those based on the BJZZ method in 2010-2015 (0.2360 and 84.01 in Panel (b) vs. 0.1982 and 71.81 in (a)). In the more recent period, however, the divergences increase, with $\mathsf{Mroibvol}_{i,w-1}$ estimate and t-stat much higher for QMP (0.1729 and 80.38, Panel (d)) than for BJZZ (0.0983 and 57.30, Panel (c)). Therefore, the QMP-based results provide similar evidence for BJZZ's finding in the original period but stronger evidence in 2016-2021.

[Insert Table 2 about here.]

3.3. Predicting Next-Week Returns Using Marketable Retail Order Imbalances

Table 3 presents results on the predictability of next-week returns using marketable retail order imbalances, analogous to Table III in BJZZ. To perform this analysis, BJZZ regress current-week returns on previous-week order imbalances. Regressions include the same controls as in (1), with the addition of past-week returns. Again, they estimate this regression using the Fama-MacBeth (1973) approach, where the first-stage cross-section regressions are given by:

$$\mathsf{Ret}_{i,w} = c_{0,w} + c_{1,w}\mathsf{Mroib}_{i,w-1} + c'_{2,w}\mathsf{CTRL}_{i,w-1} + u_{i,w}. \qquad (2)$$

In the second stage, they conduct statistical inference using the time-series of the coefficients and Newey and West (1987) standard errors with five lags. For more details, see Boehmer et al. (2021, pp.2266-2267).

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[5]In all tables, we compute standard errors following the method and lag specifications outlined in BJZZ. Specifically, for Table II (Tables III, IV, V, and VII), BJZZ use Newey-West standard errors with six (five) lags. We also consider a lag length of 10, and our results are similar to those presented.

BJZZ's original results indicate that past-week ROIs can predict future returns in the same direction, that is, the coefficient $\hat{c}_1$ is significantly positive. Our results based on the BJZZ method (Panel (c)) in the recent period reveal a considerably weaker predictive power compared to the BJZZ's original findings in 2010-2015. Specifically, the coefficient estimate of $\mathsf{Mroibvol}_{i,w-1}$ and its t-stat are 34% (0.0006 vs. 0.0009) and 48% (7.95 vs. 15.14) lower, respectively, and the corresponding economic magnitude decreases from 11.16 basis points per week (or $0.1116\% \times 52 = 5.8\%$ per year) to 6.02 basis points per week (3.1% per year). This finding holds when using QMP but to a lesser extent, with the economic magnitude decreasing only from 6.3% to 5.6% per year (Panel (d) vs. (b)).

Comparing BJZZ and QMP methods in 2010-2015, predictability holds with the same order of economic magnitude for both methods (Panel (b) vs. (a)). In 2016-2021, however, QMP tends to reinforce the evidence for predictability (Panel (d) vs. (c)). For example, the coefficient estimate on $\mathsf{Mroibvol}_{i,w-1}$ and its t-stat are 63% and 28% higher, respectively, corresponding to an economic magnitude increasing from 3.1% to 5.6% per year. We should note that we follow this example and base our discussions on the order imbalances based on share volume ($\mathsf{Mroibvol}$) for the rest of the paper. Using order imbalances based on the number of trades ($\mathsf{Mroibtrd}$) does not fundamentally change our main conclusions.

[Insert Table 3 about here.]

3.4. Marketable Retail Return Predictability Within Subgroups

Table 4 reports results about marketable retail return predictability within subgroups, analogous to Table IV in BJZZ. In this analysis, BJZZ explore questions such as (p.2267): "*(...) is the predictive power of marketable retail order imbalances restricted to a particular type of firm?*" or "*(...) do informed retail investors have preferences for particular types of firms?*" To address them, they construct subgroups based on three characteristics—market capitalization, share price, and turnover, all calculated at the previous month-end—and estimate (2) within each characteristic group. For more details, see Boehmer et al. (2021, p.2267).

BJZZ's original results indicate that predictability exists for all market-cap, share-price, and turnover groups. Furthermore, within these groups, they observe stronger predictability for small-cap, low-price, and low-turnover stocks. Reproducing the results for the recent period with the BJZZ approach (Panel (c) vs. (a)) reveals that the original conclusions tend to weaken or disappear in 2016-2021. Indeed, the economic magnitude associated with the predictability of small-cap (low-price) stocks decreases from 10.7% to 5.1% (10.7% to 6.9%) per year. Additionally, the statistically significant (at the 1% significance level) predictive power for big-cap and high-price stocks that existed in 2010-2015 completely disappears in 2016-2021. When

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we compare periods using QMP instead (Panel (d) vs. (b)), the predictive power still weakens or disappears in the recent period, but to a lesser extent. For example, the economic magnitude associated with the predictability of returns on small-cap stocks decreases only from 11.6% to 10.2%, and the predictability of returns on high-price stocks continues to hold.

Contrasting results between methods show that both yield similar results in 2010-2015 (Panel (b) vs. (a)). In 2016-2021, however, important differences arise with the QMP approach suggesting stronger predictability for most subgroups (Panel (d) vs. (c)). For instance, the economic magnitude associated with the predictability of returns on small-cap stocks is approximately twice as large with QMP (10.2% vs. 5.1%).

[Insert Table 4 about here.]

3.5. *Predicting Returns k-Weeks Ahead*

Table 5 reports results on k-weeks ahead predictions, analogous to Table V in BJZZ. Specifically, they analyze the predictive power of marketable retail order imbalances at horizons longer than one week, aiming to discern whether the predictive power is transient or persistent. They state, "*(...) if the predictive power quickly reverses, the retail investors may be capturing price reversals; if the predictive power continues over time and then vanishes beyond some horizon, the retail investors may be informed about information related to firm fundamentals*" (Boehmer et al., 2021, p.2270). They address this question by making slight adjustments to (2), allowing for horizons of $k > 1$ weeks. The first stage of their Fama-MacBeth (1973) estimation becomes:

$$\mathsf{Ret}_{i,w+k} = c_{0,w} + c_{1,w}\mathsf{Mroib}_{i,w} + c'_{2,w}\mathsf{CTRL}_{i,w} + u_{i,w+k}\,, \tag{3}$$

where they allow k to vary from one to 12 weeks, and $\mathsf{Ret}_{i,w+k}$ represents the *one-week period* return k week ahead, rather than a cumulative return over k weeks. For more details, see Boehmer et al. (2021, pp.2270-2271).

BJZZ's original results indicate that retail order imbalances can predict future returns up to six to eight weeks ahead. In addition, they observe that the predictive power generally decreases monotonically with the horizon. BJZZ's original conclusions tend to weaken or disappear in 2016-2021 (Panel (c) vs. (a)). In 2010-2015, for instance, ROI can predict returns up to eight weeks ahead (*e.g.*, eight-week $\mathsf{Mroibvol}$ coefficient of 0.0002 with a t-stat of 3.96). In the recent period, however, the predictive significance starts to weaken at four weeks and beyond. Indeed, the four- and six-week $\mathsf{Mroibvol}$ coefficients of 0.0002 and 0.0002 are significant at the 5% level only, and the eight-week coefficient of 0.0001 is significant at the 10% level only. When comparing periods using the QMP method (Panel (d) vs. (b)), this interpretation holds

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true but to a lesser extent, as Mroibvol's predictive power loses statistical significance rather after six weeks than four weeks.

Regarding the comparison between methods (Panels (b) vs. (a) and (d) vs. (c)), both lead to similar conclusions and economic magnitudes in 2010-2015, but notable differences arise in 2016-2021, with stronger and more significant predictive coefficients for all horizons when using QMP. For example, in 2016-2021, the coefficient on Mroibvol at the two-week horizon and its t-stat are 0.0004 and 4.19 with QMP compared to 0.0003 and 3.46 with BJZZ. At the four-week horizon, they are 0.0004 and 3.91 with QMP compared to 0.0002 and 2.02 with BJZZ.

[Insert Table 5 about here.]

3.6. Long-Short Strategy Returns Based on Marketable Retail Order Imbalances

Table 6 reports results about long-short strategy returns based on marketable retail order imbalances, analogous to Table VI in BJZZ. Specifically, BJZZ analyze whether marketable retail order imbalances can be used as a signal to form a profitable trading strategy. Their insight is that "*(...) if retail investors on average can select the right stocks to buy and sell, then firms with higher or positive marketable retail order imbalance should outperform firms with lower or negative order imbalance*" (Boehmer et al., 2021, p.2271). To address this question, they form quintile portfolios based on the average order imbalance over the previous week and construct long-short portfolios where the stocks in the highest order imbalance quintile are bought, and the stocks in the lowest order imbalance quintile are shorted. The performance of the long-short portfolios is assessed in terms of raw and risk-adjusted returns (*i.e.*, alpha) against the Fama and French (1993) three-factor model, and for horizons up to 12 weeks. The returns are value-weighted using previous month-end market cap.[6]

BJZZ's original results indicate that such a long-short strategy generates statistically positive alphas at horizons from one to 12 weeks, and that results are more pronounced with a universe of small-cap stocks only. In 2016-2021, this strategy ceases to be profitable when we consider all stocks available in that sample period. Indeed, results in the recent period (Panels (c) and (d)) show that the alphas based on the universe of all stocks are no longer statistically significant in the recent period, regardless of the horizon or the method considered. For a strategy on small-cap stocks only, alphas remain statistically positive but experience a notable

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[6]Note that they further write: "*Notice that this exercise uses marketable retail order imbalance measures merely as a signal to predict future stock returns, and thus, it provides no information on whether retail investors with marketable orders profit from their own trades. We ignore trade frictions and transaction costs here, and thus, the results do not have implications for whether outsiders can profit from these signals*" (Boehmer et al., 2021, p.2271).

decline. Specifically, comparing BJZZ samples (Panel (c) vs. (a)) reveals that at all horizons, small-sample alphas and their t-stat are much lower compared to the 2010-2015 period. For example, for one- and two-week horizons, 2016-2021 alphas are more than 65% lower (0.143% vs. 0.437% and 0.177% vs. 0.613%, respectively). Moreover, at horizons of eight weeks and beyond, the 2016-2021 small-cap alphas are no longer significant. Based on the QMP method (Panel (d) vs. (b)), the small-sample alphas also exhibit a significant decrease, albeit less pronounced, and lose statistical significance at one more horizon step (*i.e.*, 10 weeks).

Turning to the comparison between methods, in general, both lead to similar conclusions and economic magnitudes in both periods (Panels (b) vs. (a) and (d) vs. (c))—with some notable differences in the recent period, such as significantly stronger one-week small cap alpha for the QMP method (0.295% vs. 0.143%).

<center>[Insert Table 6 about here.]</center>

3.7. Predictability Decomposition

Table 7 presents results regarding predictability decomposition, analogous to Table VII in BJZZ. In this analysis, BJZZ explore three alternative hypotheses that could elucidate why marketable retail order imbalance can predict future returns. The first hypothesis hinges on the persistence of order flows (see *e.g.*, Chordia and Subrahmanyam, 2004). The second hypothesis relies on the contrarian trading behavior exhibited by retail investors (see *e.g.*, Kaniel et al., 2008). The third hypothesis posits that retail investors may accurately predict the direction of future returns because they possess valuable information about the firm (see *e.g.*, Kelley and Tetlock, 2013). To test these hypotheses, BJZZ adopt a two-stage decomposition. First, they decompose their retail marketable order imbalance variable in three parts: $\mathsf{Mroib}_{i,w} = \widehat{\mathsf{Mroib}}_{i,w}^{pers} + \widehat{\mathsf{Mroib}}_{i,w}^{cont} + \widehat{\mathsf{Mroib}}_{i,w}^{other}$. Then, they estimate (2) where $\mathsf{Mroib}_{i,w-1}$ is replaced by these three components:

$$\mathsf{Ret}_{i,w} = e_{0,w} + e_{1,w}\widehat{\mathsf{Mroib}}_{i,w-1}^{pers} + e_{2,w}\widehat{\mathsf{Mroib}}_{i,w-1}^{cont} + e_{3,w}\widehat{\mathsf{Mroib}}_{i,w-1}^{other} + e_{4,w}'\mathsf{CTRL}_{i,w-1} + u_{i,w} . \quad (4)$$

For more details, see Boehmer et al. (2021, pp.2274-2277).

BJZZ's original results indicate that most of the predictability primarily comes from the persistence (PERS) and residual (OTHER) components of retail order imbalance—the latter aligning with the third hypothesis described above, that is, marketable retail investor trading contains valuable information about future stock price movements. They also show that the contrarian trading pattern component (CONT) lacks statistical significance. The persistence

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and residual components, though still significant, seriously weaken in the recent period. Specifically, based on the BJZZ samples (Panel (c) vs. (a)), the significance of PERS drops from 1 to 10%, and its economic magnitude decreases from 0.0692% (3.60% per year) to 0.0241% (1.25% per year); and the OTHER coefficient decreases from 0.0008 (t-stat of 13.02) to 0.0006 (t-stat of 7.68). If we rather consider the QMP samples (Panel (d) vs. (b)), we observe a similar trend, albeit less pronounced. Finally, regardless of the method used, the contrarian component remain statistically insignificant in 2016-2021.

When comparing methods, results are similar in 2010-2015. However, in 2016-2021, the persistence and residual components show greater statistical significance and larger economic magnitudes when we rely on QMP. For instance, PERS and OTHER based on Mroibvol in Panel (d) have economic magnitudes of 0.0534% and 0.0941%, respectively, compared to 0.0241% and 0.0580% in Panel (c).

[Insert Table 7 about here.]

3.8. Marketable Retail Order Imbalance and Contemporaneous Returns

Table 8 reports results about marketable retail order imbalance and contemporaneous returns, analogous to Table VIII in BJZZ. In this analysis, BJZZ explore the liquidity provision hypothesis, relying on the work of Kaniel et al. (2008, KST) who argue that "*(...) retail investors' contrarian trading provides liquidity to the market and leads to the positive predictive power of past marketable retail order imbalances for future stock returns*" (Boehmer et al., 2021, p.2281). Specifically, in their Table III, KST examine the past, contemporaneous, and future returns of intense buy and sell portfolios of retail investors, where these portfolios are constructed based on thre previous week's net individual trading (NIT)—the KST equivalent measure of retail trading flows. KST's findings are threefold: (i) they observe typical contrarian trading behavior by retail investors;[7] (ii) they show that retail trading can predict returns in the correct direction;[8] and (iii) they find that "*(...) the contemporaneous excess return is significantly positive for stocks that retail investors sell and negative for stocks that they buy*" (Boehmer et al., 2021, p.2282), which is in favor of the liquidity provision hypothesis.

To test for the liquidity provision hypothesis, BJZZ replicate Table III of KST, where they construct portfolios using their own retail order imbalance measures, Mroibvol and Mroibtrd.

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[7]That is, "*(...) the stocks that retail investors sell during the portfolio construction week (week 0)—the intense selling group—experience significantly positive excess returns before week 0, while the stocks that retail investors buy during week 0—the intense buying group—experience negative excess returns.*" (Boehmer et al., 2021, p.2282)

[8]That is, "*(...) after retail investors buy or sell, the stocks that retail investors sell during week 0 (the intense selling group) experience negative excess returns, while the stocks that retail investors buy during week 0 (the intense buying group) experience positive excess returns.*" (Boehmer et al., 2021, p.2282)

BJZZ's findings validate the first two observations of KST: the contrarian trading patterns of retail investors and the predictive power of order imbalance on future returns. However, BJZZ's results diverge from KST's third assertion concerning the liquidity provision hypothesis, with no supporting evidence found in BJZZ's findings, contrary to KST's. In the recent period, we observe notable changes in contrarian behaviors, primarily on the buying side. Retail investors still tend to buy stocks with negative returns but do not consistently sell stocks with positive returns. Indeed, results for both the BJZZ samples (Panel (c) vs. (a)) and QMP samples (Panel (d) vs. (b)) show low or insignificant t-stats for Intense Selling portfolios for $k < 0$. Regarding predictive power, the 2016-2021 results largely echo those of 2010-2015, with a noteworthy decline in significance specific to the buying side, dropping from 1 to 5%. Finally, aligning with BJZZ's 2010-2015 results, we do not find evidence supporting the liquidity provision hypothesis in the recent period, as $k = 0$ estimates are either zero or align with the trade direction.

When comparing methods, results align in 2010-2015, and slight variations emerge in 2016-2021. For instance, QMP tends to provide more supporting evidence for contrarian behavior on the selling side than the BJZZ approach.

[Insert Table 8 about here.]

4. Conclusion

In this paper, we show that BJZZ's main conclusions weaken significantly or disappear completely in the 2016–2021 period, potentially due to changes in market conditions. Notably, the predictability for large-cap and high-price stocks vanishes, and that for small-cap and low-price stocks seriously weakens. Additionally, the profitability of long-short strategies based on past ROI disappears in a universe of all stocks and substantially decreases in a universe of small-cap stocks only.

Equally important, we show that BJZZ's original findings continue to hold in their original 2010-2015 sample even if we use the better QMP algorithm proposed by Barber et al. (2024) instead of BJZZ's algorithm to identify retail trades. Interestingly, we also find that using the QMP method offers stronger support for BJZZ's main conclusions during the more recent 2016–2021 period compared to BJZZ's algorithm. Although Barber et al. (2024) show that the QMP method better identifies retail trades, our results suggest that the differences between the two algorithms do not seem to affect BJZZ's main conclusions once one aggregates across trades and performs an aggregate level analysis using all stocks in their sample.

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Overall, our study confirms the validity of BJZZ's main findings in their original sample while raising essential questions about the temporal stability of these findings. Equally important, we find that the use of the alternative QMP method does not significantly alter BJZZ's main findings in their original sample and provides stronger support for these findings during the 2016–2021 period compared to the BJZZ algorithm. Our findings underscore the necessity for a continuous reassessment of methodologies and conclusions in the rapidly evolving landscape of financial markets.

To ensure the reproducibility of our study, we share the code and pseudo data at `https://github.com/ArdiaD/BJZZ`.

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Table 1: Summary Statistics

This table presents selected summary statistics analogous to Table I of BJZZ. We only report results based on round and odd lots to save space. In Panel (a), we present statistics derived from our replication of their original sample. In Panels (b), (c), and (d), we report statistics derived from our samples in the recent period and those utilizing the QMP method. Mrbvol: Marketable retail buy volume based on shares traded; Mrsvol: Marketable retail sell volume based on shares traded; Mrbtrd: Marketable retail number of buy trades; Mrstrd: Marketable retail number of sell trades; Mroibvol: Marketable retail order imbalance based on shares traded; Mroibtrd: Marketable retail order imbalance based on number of trades.

			(a) BJZZ 2010-2015						(b) QMP 2010-2015				Cor
	N	Mean	Std	Median	Q1	Q3	N	Mean	Std	Median	Q1	Q3	
Mrbvol	4,348,327	39,840	278,026	4,899	1,130	19,165	4,383,761	42,359	290,669	5,832	1,370	21,939	0.99
Mrsvol	4,348,327	39,655	262,689	5,302	1,300	20,185	4,383,761	42,097	270,097	6,405	1,600	23,057	0.99
Mrbtrd	4,348,327	99	386	21	5	72	4,383,761	112	406	26	6	87	1.00
Mrstrd	4,348,327	97	330	22	6	74	4,383,761	110	350	28	7	90	0.99
Mroibvol	4,348,327	−0.036	0.470	−0.025	−0.304	0.224	4,383,761	−0.045	0.460	−0.032	−0.304	0.208	0.68
Mroibtrd	4,348,327	−0.031	0.443	−0.007	−0.280	0.213	4,383,761	−0.034	0.430	−0.014	−0.269	0.200	0.71
			(c) BJZZ 2016-2021						(d) QMP 2016-2021				Cor
	N	Mean	Std	Median	Q1	Q3	N	Mean	Std	Median	Q1	Q3	
Mrbvol	3,965,568	55,607	435,949	5,667	1,390	21,394	3,968,258	57,459	438,907	6,557	1,642	23,597	1.00
Mrsvol	3,965,568	54,750	416,327	5,928	1,480	22,144	3,968,258	56,211	414,076	7,032	1,875	24,535	1.00
Mrbtrd	3,965,568	218	1573	37	11	115	3,968,258	239	1699	44	13	134	0.99
Mrstrd	3,965,568	195	1256	38	11	114	3,968,258	205	1214	45	14	131	0.99
Mroibvol	3,965,568	−0.018	0.417	−0.011	−0.240	0.200	3,968,258	−0.036	0.416	−0.022	−0.262	0.189	0.44
Mroibtrd	3,965,568	−0.005	0.326	0.000	−0.154	0.149	3,968,258	−0.007	0.336	0.000	-0.172	0.171	0.53

Table 2: Determinants of Marketable Retail Order Imbalances

This table displays results analogous to Table II of BJZZ. Specifically, BJZZ investigate the relationship between retail investors' marketable order flow and past order flow through the following Fama-MacBeth (1973) two-stage estimation: $\mathsf{Mroib}_{i,w} = b_{0,w} + b_{1,w}\mathsf{Mroib}_{i,w-1} + b_{2,w}\mathsf{Ret}_{i,w-1} + b'_{3,w}\mathsf{CTRL}_{i,w-1} + u_{i,w}$. The (second-stage) standard error' estimates are calculated using Newey-West (1987) with six lags. In Panel (a), we report our replication of their original findings. In Panels (b), (c), and (d), we revisit them using a more recent period and the alternative QMP method. To save space, we only report results based on bid-ask returns and do not report coefficients for the controls.

| | (a) BJZZ 2010-2015 | | | | (b) QMP 2010-2015 | | | |
| | Mroibvol | | Mroibtrd | | Mroibvol | | Mroibtrd | |
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
Intercept	−0.2833	−22.23	−0.2866	−21.02	−0.3593	−22.43	−0.2998	−21.00
$\mathsf{Mroib}_{i,w-1}$	0.1982	71.81	0.2698	91.06	0.2360	84.01	0.2889	92.19
$\mathsf{Ret}_{i,w-1}$	−0.8302	−35.91	−0.7782	−31.41	−0.9157	−38.83	−0.8286	−34.99
Adj.R^2	5.06%		8.66%		7.11%		9.90%	

| | (c) BJZZ 2016-2021 | | | | (d) QMP 2016-2021 | | | |
| | Mroibvol | | Mroibtrd | | Mroibvol | | Mroibtrd | |
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
Intercept	−0.2072	−27.82	−0.1472	−19.54	−0.3968	−33.48	−0.2280	−23.28
$\mathsf{Mroib}_{i,w-1}$	0.0983	57.30	0.2237	84.06	0.1729	80.38	0.2978	128.10
$\mathsf{Ret}_{i,w-1}$	−0.3567	−25.85	−0.4100	−28.71	−0.5704	−30.34	−0.5363	−31.47
Adj.R^2	1.41%		6.14%		4.28%		10.68%	

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Table 3: Predicting Next-Week Returns Using Marketable Retail Order Imbalances

This table displays results analogous to Table III of BJZZ. Specifically, BJZZ examine the predictive power of order imbalances on future returns through the following Fama-MacBeth (1973) two-stage estimation: $\text{Ret}_{i,w} = c_{0,w} + c_{1,w}\text{Mroib}_{i,w-1} + c'_{2,w}\text{CTRL}_{i,w-1} + u_{i,w}$. The (second-stage) standard errors' estimates are calculated using Newey-West (1987) with five lags. In Panel (a), we report our replication of their original findings. In Panels (b), (c), and (d), we revisit them using a more recent period and the alternative QMP method. To save space, we only report results based on bid-ask returns and do not report coefficients for the controls.

| | *(a) BJZZ 2010-2015* | | | | *(b) QMP 2010-2015* | | | |
| | Mroibvol | | Mroibtrd | | Mroibvol | | Mroibtrd | |
	Coef	*t*-stat	Coef	*t*-stat	Coef	*t*-stat	Coef	*t*-stat
Intercept	0.0033	2.24	0.0033	2.23	0.0034	2.33	0.0033	2.26
$\text{Mroib}_{i,w-1}$	0.0009	15.14	0.0008	11.93	0.0010	14.84	0.0009	12.13
Adj.R^2	3.75%		3.74%		3.76%		3.75%	
IQR	1.1950		1.2279		1.2014		1.1984	
IQR w. ret. diff	0.1116%		0.0977%		0.1210%		0.1031%	

| | *(c) BJZZ 2016-2021* | | | | *(d) QMP 2016-2021* | | | |
| | Mroibvol | | Mroibtrd | | Mroibvol | | Mroibtrd | |
	Coef	*t*-stat	Coef.	*t*-stat	Coef	*t*-stat	Coef	*t*-stat
Intercept	0.0041	2.24	0.0042	2.25	0.0044	2.38	0.0042	2.26
$\text{Mroib}_{i,w-1}$	0.0006	7.95	0.0007	4.86	0.0010	10.17	0.0007	4.81
Adj.R^2	4.35%		4.37%		4.38%		4.39%	
IQR	0.9863		0.8114		1.0746		0.9831	
IQR w. ret. diff	0.0602%		0.0548%		0.1069%		0.0699%	

Table 4: Marketable Retail Return Predictability Within Subgroups

This table displays results analogous to Table IV of BJZZ. Specifically, BJZZ analyze the predictive power of order imbalances on future returns conditional on three firms' characteristics: market capitalization, share price, and turnover. They estimate variants of specifications (2), where all coefficients can be different within each subgroup. Standard error estimates are calculated using Newey-West (1987) with five lags. In Panel (a), we report our replication of their original findings. In Panels (b), (c), and (d), we revisit them using a more recent period and the alternative QMP method. To save space, we only report results based on Mroibvol.

	(a) BJZZ 2010-2015				*(b) QMP 2010-2015*			
	Coef	*t*-stat	IQR	W.R. Diff.	Coef	*t*-stat	IQR	W.R. Diff.
Market-Cap Subgroups								
Small	0.0013	13.87	1.6010	0.205%	0.0014	14.47	1.6209	0.223%
Medium	0.0005	6.70	1.2386	0.068%	0.0005	5.73	1.2353	0.065%
Big	0.0003	3.79	0.8746	0.028%	0.0004	4.43	0.8804	0.037%
Share-Price Subgroups								
Low	0.0015	13.40	1.4088	0.205%	0.0016	13.39	1.4106	0.219%
Medium	0.0006	7.76	1.2672	0.074%	0.0006	7.89	1.2606	0.080%
High	0.0002	3.37	0.9495	0.023%	0.0003	4.38	0.9703	0.032%
Turnover Subgroups								
Low	0.0010	14.99	1.7156	0.176%	0.0011	15.46	1.7491	0.193%
Medium	0.0008	8.32	1.1589	0.090%	0.0009	9.18	1.1550	0.101%
High	0.0009	5.19	0.8681	0.074%	0.0009	4.84	0.8661	0.075%
	(c) BJZZ 2016-2021				*(d) QMP 2016-2021*			
	Coef	*t*-stat	IQR	W.R. Diff.	Coef	*t*-stat	IQR	W.R. Diff.
Market-Cap Subgroups								
Small	0.0007	6.44	1.3347	0.098%	0.0014	10.35	1.4216	0.197%
Medium	0.0004	4.03	1.0890	0.045%	0.0005	4.30	1.1385	0.058%
Big	0.0002	1.54	0.6799	0.014%	0.0001	0.55	0.7859	0.006%
Share-Price Subgroups								
Low	0.0012	7.79	1.1461	0.133%	0.0018	10.63	1.2062	0.216%
Medium	0.0002	2.31	1.1309	0.025%	0.0004	3.60	1.1889	0.047%
High	0.0000	0.06	0.7410	0.000%	0.0003	3.13	0.8662	0.029%
Turnover Subgroups								
Low	0.0006	7.48	1.4643	0.082%	0.0011	12.41	1.5670	0.176%
Medium	0.0007	4.72	0.9304	0.064%	0.0008	5.28	1.0188	0.084%
High	0.0007	2.69	0.7346	0.049%	0.0010	3.85	0.7951	0.078%

Table 5: Predicting Returns k Weeks Ahead

This table displays results analogous to Table V of BJZZ. Specifically, BJZZ analyze the predictive power of marketable retail order imbalances at horizons longer than one week through the following Fama-MacBeth (1973) two-stage estimation: $\mathsf{Ret}_{i,w+k} = c_{0,w} + c_{1,w}\mathsf{Mroib}_{i,w} + c'_{2,w}\mathsf{CTRL}_{i,w} + u_{i,w+k}$. The (second-stage) standard errors' estimates are calculated using Newey-West (1987) with five lags, and $\mathsf{Ret}_{i,w+k}$ represents the *one-week period* return k week ahead, rather than a cumulative return over k week. In Panel (a), we report our replication of their original findings. In Panels (b), (c), and (d), we revisit them using a more recent period and the alternative QMP method. To save space, we only report results based on bid-ask returns.

| | (a) BJZZ 2010-2015 | | | | (b) QMP 2010-2015 | | | |
| | Mroibvol | | Mroibtrd | | Mroibvol | | Mroibtrd | |
	Coef	t-stat	Coef.	t-stat	Coef	t-stat	Coef	t-stat
1 week	0.0009	15.14	0.0008	11.93	0.0010	14.84	0.0009	12.13
2 weeks	0.0006	9.48	0.0005	7.77	0.0006	9.00	0.0005	7.09
4 weeks	0.0003	5.64	0.0003	5.40	0.0003	5.52	0.0003	5.59
6 weeks	0.0003	4.53	0.0002	3.31	0.0003	4.64	0.0002	3.67
8 weeks	0.0002	3.96	0.0002	2.43	0.0002	2.51	0.0001	1.96
10 weeks	0.0000	0.78	-0.0001	-0.87	0.0000	0.21	-0.0001	-0.87
12 weeks	0.0001	2.48	0.0002	2.68	0.0002	2.92	0.0002	3.30
	(c) BJZZ 2016-2021				(d) QMP 2016-2021			
	Mroibvol		Mroibtrd		Mroibvol		Mroibtrd	
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
1 week	0.0006	7.95	0.0007	4.86	0.0010	10.17	0.0007	4.81
2 weeks	0.0003	3.46	0.0003	2.27	0.0004	4.19	0.0002	1.54
4 weeks	0.0002	2.02	0.0003	1.79	0.0004	3.91	0.0003	2.03
6 weeks	0.0002	2.10	0.0002	1.61	0.0002	2.20	0.0001	0.99
8 weeks	0.0001	1.79	0.0003	1.97	0.0002	1.81	0.0001	1.01
10 weeks	0.0002	2.74	0.0003	2.49	0.0003	3.61	0.0003	2.47
12 weeks	0.0002	2.55	0.0003	2.20	0.0004	3.73	0.0003	2.21

Table 6: Long-Short Strategy Returns Based on Marketable Retail Order Imbalances

This table displays results analogous to Table VI of BJZZ. BJZZ analyze whether marketable retail order imbalances can be used as a signal to form a profitable trading strategy. They form quintile portfolios based on the previous week's average order imbalance and construct long-short portfolios where the stocks in the highest (lowest) order imbalance quintile are bought (shorted). The performance of the portfolios is assessed in terms of raw returns and alpha against the Fama and French (1993) three-factor model and for horizons up to 12 weeks. The returns are value-weighted using the previous month-end market cap. The standard errors are adjusted using Hansen and Hodrick (1980) with a dynamic number of lags as a function of the horizon. In Panel (a), we report our replication of their original findings. In Panels (b), (c), and (d), we revisit them using a more recent period and the alternative QMP method. To save space, we only report results based on Mroibvol and alphas.

| | (a) BJZZ 2010-2015 | | | | | | | | (b) QMP 2010-2015 | | | | | | | |
| | All Stocks | | Small | | Medium | | Big | | All Stocks | | Small | | Medium | | Big | |
	Alpha	t-stat	Alpha	t-stat	Alpha	t-stat	Alpha	t-stat	Alpha	t-stat	Alpha	t-stat	Alpha	t-stat	Alpha	t-stat
1 week	0.083%	2.77	0.437%	10.39	0.175%	5.59	0.051%	1.52	0.072%	2.18	0.411%	9.99	0.180%	5.25	0.033%	1.02
2 weeks	0.090%	1.81	0.613%	8.68	0.270%	5.01	0.052%	1.04	0.087%	1.72	0.607%	8.11	0.257%	4.63	0.047%	0.89
4 weeks	0.167%	2.04	0.852%	7.15	0.377%	4.46	0.125%	1.54	0.182%	1.97	0.769%	7.30	0.366%	4.23	0.124%	1.35
6 weeks	0.285%	2.56	0.909%	6.54	0.471%	3.88	0.193%	1.76	0.272%	2.26	0.871%	5.85	0.453%	3.83	0.214%	1.80
8 weeks	0.412%	2.57	0.992%	4.96	0.523%	3.07	0.297%	2.03	0.341%	2.09	0.983%	5.28	0.514%	3.11	0.253%	1.61
10 weeks	0.373%	1.73	0.905%	3.68	0.406%	2.58	0.263%	1.40	0.226%	1.02	0.893%	3.96	0.373%	2.23	0.101%	0.53
12 weeks	0.564%	2.07	0.988%	4.02	0.364%	2.05	0.416%	1.64	0.384%	1.32	0.878%	3.60	0.331%	1.83	0.203%	0.81

| | (c) BJZZ 2016-2021 | | | | | | | | (d) QMP 2016-2021 | | | | | | | |
| | All Stocks | | Small | | Medium | | Big | | All Stocks | | Small | | Medium | | Big | |
	Alpha	t-stat	Alpha	t-stat	Alpha	t-stat	Alpha	t-stat	Alpha	t-stat	Alpha	t-stat	Alpha	t-stat	Alpha	t-stat
1 week	−0.021%	−0.48	0.143%	3.16	0.067%	1.61	−0.042%	−0.91	−0.009%	−0.17	0.295%	5.11	0.098%	1.97	−0.043%	−1.01
2 weeks	0.004%	0.07	0.177%	2.54	0.025%	0.41	−0.075%	−1.10	−0.060%	−0.92	0.347%	3.44	0.116%	1.56	−0.100%	−1.32
4 weeks	−0.018%	−0.20	0.381%	2.75	−0.013%	−0.14	−0.114%	−1.01	−0.145%	−1.18	0.507%	3.06	0.074%	0.70	−0.161%	−1.15
6 weeks	−0.126%	−1.02	0.424%	2.56	−0.128%	−1.24	−0.211%	−1.62	−0.254%	−1.52	0.644%	3.51	−0.020%	−0.13	−0.336%	−2.08
8 weeks	−0.241%	−1.36	0.171%	0.73	−0.199%	−1.52	−0.260%	−1.34	−0.353%	−1.57	0.526%	2.62	−0.222%	−1.44	−0.420%	−1.97
10 weeks	−0.243%	−1.00	0.097%	0.38	−0.221%	−1.41	−0.187%	−0.70	−0.361%	−1.28	0.293%	1.63	−0.388%	−2.08	−0.415%	−1.60
12 weeks	−0.255%	−0.86	−0.014%	−0.04	−0.284%	−1.82	−0.214%	−0.77	−0.442%	−1.23	0.083%	0.49	−0.524%	−2.36	−0.458%	−1.35

Table 7: Predictability Decomposition

This table displays results analogous to Table VII of BJZZ. BJZZ explore three alternative hypotheses that could explain why marketable retail order imbalance can predict future returns. The first hypothesis hinges on the persistence of order flows; the second hypothesis relies on the contrarian trading behavior exhibited by retail investors; and the third hypothesis posits that retail investors may accurately predict the direction of future returns because they possess valuable information about the firm. To test these hypotheses, BJZZ adopt a two-stage decomposition. First, they decompose their retail marketable order imbalance variable in three parts as $\text{Mroib}_{i,w} = \widehat{\text{Mroib}}_{i,w}^{pers} + \widehat{\text{Mroib}}_{i,w}^{cont} + \widehat{\text{Mroib}}_{i,w}^{other}$. Then, they estimate (2) where $\text{Mroib}_{i,w}$ is replaced by its three components. Standard error estimates are calculated using Newey-West (1987) with five lags. In Panel (a), we report our replication of their original findings. In Panels (b), (c), and (d), we revisit them using a more recent period and the alternative QMP method. To save space, we only report results on the three components from the second-stage decomposition and based on bid-ask returns.

	(a) BJZZ 2010-2015				(b) QMP 2010-2015			
	Mroibvol		Mroibtrd		Mroibvol		Mroibtrd	
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
PERS	0.0030	8.14	0.0019	7.35	0.0026	8.32	0.0018	6.89
CONT	−0.0114	−0.42	−0.0227	−0.82	0.0057	0.69	−0.0105	−0.27
OTHER	0.0008	13.02	0.0006	9.73	0.0009	13.28	0.0007	10.47
	Mroibvol		Mroibtrd		Mroibvol		Mroibtrd	
	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff
PERS	0.2319	0.0692%	0.3305	0.0636%	0.2836	0.0745%	0.3466	0.0635%
CONT	0.0358	−0.0408%	0.0328	−0.0743%	0.0401	0.0229%	0.0358	−0.0375%
OTHER	1.1260	0.0902%	1.1333	0.0734%	1.1190	0.0953%	1.0977	0.0788%
	(c) BJZZ 2016-2021				(d) QMP 2016-2021			
	Mroibvol		Mroibtrd		Mroibvol		Mroibtrd	
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
PERS	0.0026	1.80	0.0022	3.23	0.0029	4.64	0.0043	2.29
CONT	−0.0885	−1.01	−0.0074	−0.13	0.0324	0.78	0.0013	2.45
OTHER	0.0006	7.68	0.0006	4.89	0.0009	9.94	−0.0271	−0.72
	Mroibvol		Mroibtrd		Mroibvol		Mroibtrd	
	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff
PERS	0.0913	0.0241%	0.1810	0.0402%	0.1845	0.0534%	0.2970	0.0371%
CONT	0.0164	−0.1453%	0.0196	−0.0146%	0.0266	0.0862%	0.0257	−0.0697%
OTHER	0.9640	0.0580%	0.7614	0.0480%	1.0331	0.0941%	0.8861	0.0579%

Table 8: Marketable Retail Order Imbalance and Contemporaneous Returns

This table displays results analogous to Table VIII in BJZZ. BJZZ explore the liquidity provision hypothesis, relying on the work of Kaniel et al. (2008) (KST). Specifically, they replicate Table III of KST. In this table, KST examine the past, contemporaneous, and future returns of intense buy and sell portfolios. Portfolios are constructed based on the previous week's net individual trading (NIT)—the KST equivalent measure of retail trading flows. KST's findings are threefold: (i) they observe typical contrarian trading behavior by retail investors; (ii) they show that retail trading can predict returns in the correct direction; and (iii) they obtain results in favor of the liquidity provision hypothesis. Table VIII of BJZZ corresponds to their replication results of table III of KST, where they construct portfolios using their own retail order imbalance measures, Mroibvol and Mroibtrd. In Panel (a), we report our replication of their original findings. In Panels (b), (c), and (d), we revisit them using a more recent period and the alternative QMP method. We only report results based on cumulative market-adjusted returns and intense buy and intense sell portfolios to save space. ** and * indicate 1% and 5% level significance, respectively. We adjust t-statistics using Newey-West (1987) with four lags.

	(a) BJZZ 2010-2015				(b) QMP 2010-2015			
	Intense Selling		Intense Buying		Intense Selling		Intense Buying	
	Mean	t-stat	Mean	t-stat	Mean	t-stat	Mean	t-stat
$k = -20$	0.0074^{**}	7.33	-0.0166^{**}	-19.30	0.0075^{**}	7.16	-0.0154^{**}	-18.32
$k = -15$	0.0071^{**}	9.34	-0.0137^{**}	-21.05	0.0074^{**}	9.49	-0.0130^{**}	-20.85
$k = -10$	0.0059^{**}	10.89	-0.0103^{**}	-20.67	0.0061^{**}	10.90	-0.0101^{**}	-21.55
$k = -5$	0.0039^{**}	12.56	-0.0064^{**}	-20.74	0.0040^{**}	11.46	-0.0061^{**}	-21.04
$k = 0$	-0.0026^{**}	-6.49	0.0021^{**}	5.44	-0.0040^{**}	-8.84	0.0048^{**}	10.84
$k = 5$	-0.0017^{**}	-6.58	0.0026^{**}	10.34	-0.0019^{**}	-7.31	0.0027^{**}	10.43
$k = 10$	-0.0028^{**}	-6.04	0.0039^{**}	9.09	-0.0033^{**}	-7.12	0.0041^{**}	9.12
$k = 15$	-0.0039^{**}	-6.10	0.0049^{**}	8.36	-0.0047^{**}	-7.45	0.0048^{**}	8.13
$k = 20$	-0.0047^{**}	-5.38	0.0052^{**}	6.27	-0.0052^{**}	-6.00	0.0051^{**}	6.36

	(c) BJZZ 2016-2021				(d) QMP 2016-2021			
	Intense Selling		Intense Buying		Intense Selling		Intense Buying	
	Mean	t-stat	Mean	t-stat	Mean	t-stat	Mean	t-stat
$k = -20$	-0.0025^{*}	-2.06	-0.0179^{**}	-12.93	0.0012	0.84	-0.0219^{**}	-14.46
$k = -15$	-0.0009	-0.90	-0.0148^{**}	-13.69	0.0020	1.65	-0.0185^{**}	-15.33
$k = -10$	0.0005	0.64	-0.0114^{**}	-14.88	0.0025^{**}	2.62	-0.0145^{**}	-15.72
$k = -5$	0.0009	1.80	-0.0071^{**}	-16.25	0.0022^{**}	4.07	-0.0087^{**}	-15.37
$k = 0$	-0.0054^{**}	-9.81	-0.0003	-0.60	-0.0067^{**}	-11.19	0.0028^{**}	5.41
$k = 5$	-0.0013^{**}	-3.16	0.0007	1.84	-0.0020^{**}	-4.46	0.0020^{**}	4.82
$k = 10$	-0.0021^{**}	-2.85	0.0014^{*}	2.17	-0.0032^{**}	-4.29	0.0023^{**}	3.76
$k = 15$	-0.0032^{**}	-3.34	0.0019^{*}	2.06	-0.0046^{**}	-4.51	0.0032^{**}	4.03
$k = 20$	-0.0038^{**}	-3.06	0.0020	1.90	-0.0054^{**}	-3.96	0.0033^{**}	3.51

– Internet Appendix –
"Revisiting Boehmer et al. (2021): Recent Period, Alternative Method, Different Conclusions"

This Internet Appendix provides the following supplemental contents:

- Description of the variables.

- Tables A1-A8: Replication results of Tables I to VIII in Boehmer et al. (2021, BJZZ).

- Tables B2-B8: Complete set of results for Tables 2 to 8 in the paper.

The replication code for our study with pseudo data is available at

$$\texttt{https://github.com/ArdiaD/BJZZ}$$

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Description of Variables

This table presents the variables used in our analyses.

Variable	Description
Retail-Trades Variables Specific to BJZZ or QMP Samples	
Mrbvol	Marketable retail buy volume based on shares traded
Mrsvol	Marketable retail sell volume based on shares traded
Mrbtrd	Marketable retail number of buy trades
Mrstrd	Marketable retail number of sell trades
Mroibvol	Marketable retail order imbalance based on shares traded
Mroibtrd	Marketable retail order imbalance based on number of trades
Non-Retail-Trades Variables Common to BJZZ and QMP Samples	
Ret	Bid-ask average return
Lmto	Last-month-end turnover
Size	Last-month-end logarithm of market value
Lbm	Last-month-end logarithm of book-to-market
Lvol	Last-month volatility of daily returns

A. Replication Results

Table A1: Summary Statistics – Replication Results

This table reports results of Table I in Boehmer et al. (2021, BJZZ) in Panel A and our replication results with our sample in Panel B. Results in Panel B correspond to the results in Panel (a) of Table 1 in our paper. Please refer to Table 1 in our paper for details.

	N	Mean	Std	Median	Q1	Q3
	Panel A: Original Results Reported in BJZZ					
Mrbvol	4,628,957	42,481	280,474	5,165	1,200	20,681
Mrsvol	4,628,957	42,430	264,704	5,635	1,369	21,828
Mrbtrd	4,628,957	110	410	22	5	79
Mrstrd	4,628,957	108	355	24	6	81
Mroibvol	4,628,957	-0.038	0.464	-0.027	-0.301	0.217
Mroibtrd	4,628,957	-0.032	0.437	-0.010	-0.276	0.205
	Panel B: Replication Results					
Mrbvol	4,348,327	39,840	278,026	4,899	1,130	19,165
Mrsvol	4,348,327	39,655	262,689	5,302	1,300	20,185
Mrbtrd	4,348,327	99	386	21	5	72
Mrstrd	4,348,327	97	330	22	6	74
Mroibvol	4,348,327	-0.036	0.470	-0.025	-0.304	0.224
Mroibtrd	4,348,327	-0.031	0.443	-0.007	-0.280	0.213

Table A2: Determinants of Marketable Retail Order Imbalances – Replication Results

This table reports results of Table II in Boehmer et al. (2021, BJZZ) in Panel A and our replication results with our sample in Panel B. Results in Panel B correspond to the results in Panel (a) of Table 2 in our paper. Please refer to Table 2 in our paper for details.

	Panel A: Original Results Reported in BJZZ							
	Mroibvol Bid-Ask Return		Mroibvol CRSP Return		Mroibtrd Bid-Ask Return		Mroibtrd CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	−0.4013	−20.03	−0.4065	−20.19	−0.4326	−22.00	−0.4357	−22.01
$\text{Mroib}_{i,w-1}$	0.2200	92.53	0.2201	92.57	0.2865	150.01	0.2866	150.06
$\text{Ret}_{i,w-1}$	−0.9481	−40.60	−0.9620	−41.43	−0.9003	−35.92	−0.9156	−36.74
$\text{Ret}_{i,m-1}$	−0.2778	−19.24	−0.2784	−19.30	−0.2258	−14.84	−0.2262	−14.87
$\text{Ret}_{i,m-7,m-2}$	−0.0586	−11.49	−0.0584	−11.46	−0.0380	−6.50	−0.0378	−6.48
Lmto	0.0003	5.31	0.0003	5.19	0.0002	3.93	0.0002	3.83
Lvol	0.8100	8.37	0.8478	8.79	0.4366	4.24	0.4633	4.51
Size	0.0154	12.06	0.0157	12.31	0.0209	16.37	0.0211	16.48
Lbm	−0.0275	−17.66	−0.0274	−17.61	−0.0274	−18.09	−0.0273	−18.05
Adj.R^2	6.00%		6.01%		9.49%		9.50%	

	Panel B: Replication Results							
	Mroibvol Bid-Ask Return		Mroibvol CRSP Return		Mroibtrd Bid-Ask Return		Mroibtrd CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	−0.2833	−22.23	−0.2848	−22.13	−0.2866	−21.02	−0.2868	−20.91
$\text{Mroib}_{i,w-1}$	0.1982	71.81	0.1982	71.82	0.2698	91.06	0.2698	91.07
$\text{Ret}_{i,w-1}$	−0.8302	−35.91	−0.8311	−36.26	−0.7782	−31.41	−0.7811	−31.85
$\text{Ret}_{i,m-1}$	−0.1680	−13.08	−0.1681	−13.08	−0.1214	−8.91	−0.1213	−8.91
$\text{Ret}_{i,m-7,m-2}$	−0.0252	−5.20	−0.0252	−5.20	−0.0080	−1.44	−0.0080	−1.44
Lmto	0.0007	11.73	0.0007	11.84	0.0006	9.52	0.0006	9.70
Lvol	0.5684	6.43	0.5794	6.53	0.3049	3.18	0.3008	3.18
Size	0.0151	10.89	0.0152	10.95	0.0200	14.36	0.0200	14.32
Lbm	−0.0211	−16.95	−0.0211	−16.95	−0.0218	−17.77	−0.0218	−17.79
Adj.R^2	5.06%		5.06%		8.66%		8.66%	

Table A3: Predicting Next-Week Returns Using Marketable Retail Order Imbalances – Replication Results

This table reports results of Table III in Boehmer et al. (2021, BJZZ) in Panel A and our replication results with our sample in Panel B. Results in Panel B correspond to the results in Panel (a) of Table 3 in our paper. Please refer to Table 3 in our paper for details.

| | Panel A: Original Results Reported in BJZZ | | | | | | | |
| | Mroibvol Bid-Ask Return | | Mroibvol CRSP Return | | Mroibtrd Bid-Ask Return | | Mroibtrd CRSP Return | |
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	0.0050	2.58	0.0056	2.85	0.0050	2.58	0.0056	2.85
$\text{Mroib}_{i,w-1}$	0.0009	15.60	0.0010	16.29	0.0008	12.30	0.0008	13.20
$\text{Ret}_{i,w-1}$	-0.0185	-5.83	-0.0220	-6.85	-0.0186	-5.88	-0.0222	-6.91
$\text{Ret}_{i,m-1}$	0.0006	0.35	0.0006	0.34	0.0005	0.29	0.0005	0.29
$\text{Ret}_{i,m-7,m-2}$	0.0008	1.16	0.0008	1.16	0.0008	1.12	0.0008	1.12
Lmto	0.0000	-3.37	-0.0000	-3.76	-0.0000	-3.36	-0.0000	-3.75
Lvol	-0.0223	-1.41	-0.0205	-1.31	-0.0217	-1.37	-0.0198	-1.27
Size	-0.0001	-0.86	-0.0001	-0.92	-0.0001	-0.90	-0.0001	-0.96
Lbm	-0.0001	-0.39	-0.0000	-0.07	-0.0001	-0.42	-0.0000	-0.10
Adj.R^2	3.85%		3.85%		3.84%		3.84%	
IQR	1.1888		1.1888		1.2292		1.2292	
IQR w. ret. diff	0.1089%		0.1144%		0.0931%		0.0997%	
	Panel B: Replication Results							
	Mroibvol Bid-Ask Return		Mroibvol CRSP Return		Mroibtrd Bid-Ask Return		Mroibtrd CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	0.0033	2.24	0.0036	2.42	0.0033	2.23	0.0036	2.40
$\text{Mroib}_{i,w-1}$	0.0009	15.14	0.0009	14.55	0.0008	11.93	0.0008	11.41
$\text{Ret}_{i,w-1}$	-0.0172	-5.45	-0.0206	-6.50	-0.0174	-5.50	-0.0208	-6.56
$\text{Ret}_{i,m-1}$	-0.0001	-0.03	-0.0003	-0.16	-0.0001	-0.07	-0.0004	-0.20
$\text{Ret}_{i,m-7,m-2}$	0.0007	1.07	0.0007	1.04	0.0007	1.05	0.0007	1.01
Lmto	-0.0000	-2.79	-0.0000	-2.90	-0.0000	-2.76	-0.0000	-2.87
Lvol	-0.0133	-0.81	-0.0109	-0.68	-0.0130	-0.79	-0.0106	-0.66
Size	-0.0000	-0.11	-0.0001	-0.40	-0.0000	-0.17	-0.0001	-0.45
Lbm	0.0002	1.12	0.0002	1.08	0.0002	1.10	0.0002	1.06
Adj.R^2	3.75%		3.73%		3.74%		3.72%	
IQR	1.1950		1.1950		1.2279		1.2279	
IQR w. ret. diff	0.1116%		0.1079%		0.0977%		0.0939%	

Table A4: Marketable Retail Return Predictability Within Subgroups – Replication Results

This table reports results of Table IV in Boehmer et al. (2021, BJZZ) in Panel A and our replication results with our sample in Panel B. Results in Panel B correspond to the results in Panel (a) of Table 4 in our paper. Please refer to Table 4 in our paper for details.

	Mroibvol				Mroibtrd			

Panel A: Original Results Reported in BJZZ								
	Mroibvol				**Mroibtrd**			
	Coef.	*t*-Stat	IQR	W.R. Diff.	Coef.	*t*-Stat	IQR	W.R. Diff.
Market-cap subgroups								
Small	0.0013	13.90	1.6630	0.219%	0.0012	11.58	1.7360	0.207%
Medium	0.0007	9.18	1.3230	0.087%	0.0004	5.63	1.3460	0.059%
Big	0.0003	3.68	0.8920	0.026%	0.0002	2.52	0.9290	0.019%
Share-price subgroups								
Low	0.0014	13.34	1.4320	0.205%	0.0012	10.34	1.5860	0.185%
Medium	0.0008	10.00	1.2890	0.089%	0.0005	7.56	1.3090	0.070%
High	0.0002	3.23	0.9610	0.020%	0.0002	2.19	0.9610	0.015%
Turnover subgroups								
Low	0.0011	15.60	1.8370	0.205%	0.0011	14.71	1.7770	0.195%
Medium	0.0008	10.21	1.2190	0.094%	0.0006	7.05	1.2280	0.071%
High	0.0007	4.98	0.9100	0.065%	0.0004	2.55	1.0050	0.015%

Panel B: Replication Results								
	Mroibvol				**Mroibtrd**			
	Coef.	*t*-Stat	IQR	W.R. Diff.	Coef.	*t*-Stat	IQR	W.R. Diff.
Market-cap subgroups								
Small	0.0013	13.87	1.6010	0.205%	0.0011	11.12	1.6768	0.184%
Medium	0.0005	6.70	1.2386	0.068%	0.0004	4.89	1.2411	0.054%
Big	0.0003	3.79	0.8746	0.028%	0.0003	2.85	0.8972	0.023%
Share-price subgroups								
Low	0.0015	13.40	1.4088	0.205%	0.0012	10.43	1.5648	0.182%
Medium	0.0006	7.76	1.2672	0.074%	0.0005	5.87	1.2700	0.062%
High	0.0002	3.37	0.9495	0.023%	0.0002	2.62	0.9275	0.019%
Turnover subgroups								
Low	0.0010	14.99	1.7156	0.176%	0.0010	13.22	1.6539	0.158%
Medium	0.0008	8.32	1.1589	0.090%	0.0006	5.87	1.1577	0.069%
High	0.0009	5.19	0.8681	0.074%	0.0006	3.29	0.9684	0.055%

Table A5: Predicting Returns k Weeks Ahead – Replication Results

This table reports results of Table V in Boehmer et al. (2021, BJZZ) in Panel A and our replication results with our sample in Panel B. Results in Panel B correspond to the results in Panel (a) of Table 5 in our paper. Please refer to Table 5 in our paper for details.

| | Panel A: Original Results Reported in BJZZ | | | |
| | Mroibvol | | Mroibtrd | |
	Coef.	*t*-Stat	Coef.	*t*-Stat
Bid-ask average returns				
1 week	0.0009	15.60	0.0008	12.30
2 weeks	0.0006	9.35	0.0005	7.89
4 weeks	0.0003	5.56	0.0003	4.66
6 weeks	0.0002	3.90	0.0002	2.60
8 weeks	0.0002	3.47	0.0001	1.75
10 weeks	0.0001	1.82	0.0000	0.35
12 weeks	0.0001	1.29	0.0001	1.52
CRSP returns				
1 week	0.0010	16.29	0.0008	13.20
2 weeks	0.0006	9.99	0.0005	8.57
4 weeks	0.0003	5.92	0.0003	5.05
6 weeks	0.0002	4.18	0.0002	2.93
8 weeks	0.0002	3.50	0.0001	1.80
10 weeks	0.0001	2.04	0.0001	0.81
12 weeks	0.0001	1.39	0.0001	1.76

| | Panel B: Replication Results | | | |
| | Mroibvol | | Mroibtrd | |
	Coef.	*t*-Stat	Coef.	*t*-Stat
Bid-ask average returns				
1 week	0.0009	15.14	0.0008	11.93
2 weeks	0.0006	9.48	0.0005	7.77
4 weeks	0.0003	5.64	0.0003	5.40
6 weeks	0.0003	4.53	0.0002	3.31
8 weeks	0.0002	3.96	0.0002	2.43
10 weeks	0.0000	0.78	-0.0001	-0.87
12 weeks	0.0001	2.48	0.0002	2.68
CRSP returns				
1 week	0.0009	14.55	0.0008	11.41
2 weeks	0.0006	9.37	0.0005	7.58
4 weeks	0.0003	5.67	0.0003	5.41
6 weeks	0.0003	4.67	0.0002	3.43
8 weeks	0.0002	3.83	0.0001	2.34
10 weeks	0.0000	0.75	-0.0001	-0.89
12 weeks	0.0002	2.52	0.0002	2.74

Table A6: Long-Short Strategy Returns Based on Marketable Retail Order Imbalances – Replication Results

This table reports results of Table VI in Boehmer et al. (2021, BJZZ) in Panel A and our replication results with our sample in Panel B. Results in Panel B correspond to the results in Panel (a) of Table 6 in our paper. Please refer to Table 6 in our paper for details.

	Panel A: Original Results Reported in BJZZ									
	All Stocks				Small		Medium		Big	
	Mean	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat
Form Portfolios on the Previous Week's Mroibvol										
1 week	0.092%	2.66	0.084%	2.43	0.403%	9.16	0.170%	6.24	0.067%	1.78
2 weeks	0.147%	2.45	0.135%	2.46	0.669%	9.01	0.292%	6.81	0.105%	1.70
4 weeks	0.223%	1.89	0.208%	2.00	1.124%	10.43	0.423%	6.36	0.143%	1.22
6 weeks	0.310%	1.72	0.277%	1.73	1.399%	13.02	0.558%	6.07	0.171%	1.05
8 weeks	0.448%	1.92	0.460%	2.26	1.709%	17.13	0.623%	4.18	0.342%	1.69
10 weeks	0.515%	1.99	0.484%	1.81	1.704%	11.17	0.578%	3.87	0.381%	1.53
12 weeks	0.588%	2.09	0.629%	1.89	1.857%	7.65	0.556%	3.20	0.477%	1.48
Form Portfolios on the Previous Week's Mroibtrd										
1 week	0.056%	1.34	0.061%	1.44	0.343%	7.04	0.104%	3.52	0.055%	1.42
2 weeks	0.137%	1.72	0.143%	1.89	0.557%	6.72	0.194%	4.02	0.119%	1.61
4 weeks	0.238%	1.61	0.251%	1.88	0.880%	6.98	0.277%	3.75	0.214%	1.61
6 weeks	0.311%	1.50	0.350%	1.93	1.145%	6.25	0.313%	2.62	0.304%	1.84
8 weeks	0.427%	1.58	0.523%	2.26	1.468%	6.40	0.353%	1.91	0.449%	2.19
10 weeks	0.454%	1.41	0.529%	1.74	1.442%	5.37	0.292%	1.56	0.483%	1.64
12 weeks	0.529%	1.47	0.667%	1.70	1.672%	5.30	0.228%	1.05	0.567%	1.51
	Panel B: Replication Results									
	All Stocks				Small		Medium		Big	
	Mean	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat
Form Portfolios on the Previous Week's Mroibvol										
1 week	0.095%	3.27	0.083%	2.77	0.437%	10.39	0.175%	5.59	0.051%	1.52
2 weeks	0.124%	2.38	0.090%	1.81	0.613%	8.68	0.270%	5.01	0.052%	1.04
4 weeks	0.226%	2.67	0.167%	2.04	0.852%	7.15	0.377%	4.46	0.125%	1.54
6 weeks	0.347%	2.84	0.285%	2.56	0.909%	6.54	0.471%	3.88	0.193%	1.76
8 weeks	0.465%	2.69	0.412%	2.57	0.992%	4.96	0.523%	3.07	0.297%	2.03
10 weeks	0.510%	2.31	0.373%	1.73	0.905%	3.68	0.406%	2.58	0.263%	1.40
12 weeks	0.599%	2.33	0.564%	2.07	0.988%	4.02	0.364%	2.05	0.416%	1.64
Form Portfolios on the Previous Week's Mroibtrd										
1 week	0.072%	1.97	0.061%	1.65	0.342%	7.13	0.117%	3.76	0.047%	1.26
2 weeks	0.150%	2.15	0.118%	1.83	0.528%	6.39	0.167%	3.32	0.097%	1.44
4 weeks	0.250%	2.25	0.190%	1.98	0.638%	5.02	0.262%	3.68	0.176%	1.61
6 weeks	0.388%	2.70	0.323%	2.76	0.605%	3.60	0.333%	3.12	0.252%	2.01
8 weeks	0.508%	2.59	0.443%	2.53	0.620%	2.95	0.330%	1.91	0.346%	1.94
10 weeks	0.515%	2.11	0.404%	1.75	0.480%	1.70	0.147%	0.86	0.351%	1.33
12 weeks	0.577%	2.07	0.516%	1.62	0.506%	1.81	0.064%	0.31	0.464%	1.34

Table A7: Predictability Decomposition – Replication Results

This table reports results of Table VII in Boehmer et al. (2021, BJZZ) in Panel A and our replication results with our sample in Panel B. Results in Panel B correspond to the results in Panel (a) of Table 7 in our paper. Please refer to Table 7 in our paper for details.

Panel A: Original Results Reported in BJZZ

First Stage of Projecting Order Imbalance on Persistence and Past Returns

	$\text{Mroivol}_{i,w-1}$ Bid-Ask Return		$\text{Mroivol}_{i,w-1}$ CRSP Return		$\text{Mroitrd}_{i,w-1}$ Bid-Ask Return		$\text{Mroitrd}_{i,w-1}$ CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	−0.1413	−24.66	−0.1408	−24.61	−0.1054	−17.23	−0.1049	−17.19
$\text{Mroivol}_{i,w-2}$	0.2227	96.20	0.2228	96.20	0.2906	149.82	0.2907	149.85
$\text{Ret}_{i,w-2}$	−0.9286	−38.93	−0.9422	−39.80	−0.8926	−34.92	−0.9076	−35.81
$\text{Ret}_{i,m-1}$	−0.2029	−13.93	−0.2025	−13.90	−0.1591	−10.72	−0.1588	−10.70
$\text{Ret}_{i,m-7,m-2}$	−0.0267	−4.98	−0.0268	−4.99	−0.0054	−0.86	−0.0055	−0.88
Adj.R^2	5.62%		5.63%		8.99%		9.00%	

Second-Stage Decomposition of Order Imbalance's Predictive Power

	$\text{Mroivol}_{i,w}$ Bid-Ask Return		$\text{Mroivol}_{i,w}$ CRSP Return		$\text{Mroitrd}_{i,w}$ Bid-Ask Return		$\text{Mroitrd}_{i,w}$ CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	0.0046	2.25	0.0052	2.54	0.0046	2.23	0.0052	2.52
PERS	0.0027	8.75	0.0029	9.41	0.0018	7.80	0.0019	8.56
CONT	−0.0044	−0.42	−0.1310	−1.46	−0.0073	−0.73	0.0328	1.62
OTHER	0.0008	14.47	0.0009	15.48	0.0006	10.51	0.0007	11.64
$\text{Ret}_{i,w-1}$	−0.0176	−5.41	−0.0206	−6.27	−0.0177	−5.45	−0.0207	−6.30
$\text{Ret}_{i,m-1}$	−0.0060	−0.67	0.0002	0.03	0.0017	0.56	0.0093	1.13
$\text{Ret}_{i,m-7,m-2}$	−0.0009	−0.65	−0.0127	−1.12	0.0017	0.95	−0.0008	−0.34
Lmto	0.0000	−3.49	0.0000	−3.80	0.0000	−3.48	0.0000	−3.78
Lvol	−0.0230	−1.48	−0.0231	−1.50	−0.0224	−1.44	−0.0225	−1.46
Size	−0.0001	−0.61	−0.0001	−0.67	−0.0001	−0.65	−0.0001	−0.72
Lbm	−0.0001	−0.46	0.0000	−0.14	−0.0001	−0.56	−0.0001	−0.23
Adj.R^2	4.26%		4.27%		4.25%		4.26%	
	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff
PERS	0.2591	0.0688%	0.2593	0.0739%	0.3498	0.0620%	0.3500	0.0679%
CONT	0.0627	−0.0277%	0.0631	−0.8265%	0.0614	−0.0445%	0.0619	0.2031%
OTHER	1.1141	0.0915%	1.1141	0.0977%	1.1326	0.0718%	1.1327	0.0792%

Table A7: Predictability Decomposition – Replication Results (Continued)

Panel B: Replication Results

First Stage of Projecting Order Imbalance on Persistence and Past Returns

	$\text{Mroivol}_{i,w-1}$ Bid-Ask Return		$\text{Mroivol}_{i,w-1}$ CRSP Return		$\text{Mroitrd}_{i,w-1}$ Bid-Ask Return		$\text{Mroitrd}_{i,w-1}$ CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	−0.1351	−23.28	−0.1350	−23.27	−0.1127	−12.63	−0.1126	−12.62
$\text{Mroivol}_{i,w-2}$	0.2014	78.12	0.2015	78.13	0.2743	97.13	0.2744	97.13
$\text{Ret}_{i,w-2}$	−0.8235	−36.14	−0.8250	−36.49	−0.7798	−31.83	−0.7833	−32.29
$\text{Ret}_{i,m-1}$	−0.1228	−9.91	−0.1228	−9.90	−0.0857	−6.75	−0.0856	−6.74
$\text{Ret}_{i,m-7,m-2}$	−0.0052	−1.12	−0.0053	−1.13	0.0143	2.62	0.0143	2.61
Adj.R^2	4.69%		4.69%		8.20%		8.21%	

Second-Stage Decomposition of Order Imbalance's Predictive Power

	$\text{Mroivol}_{i,w}$ Bid-Ask Return		$\text{Mroivol}_{i,w}$ CRSP Return		$\text{Mroitrd}_{i,w}$ Bid-Ask Return		$\text{Mroitrd}_{i,w}$ CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	0.0032	2.04	0.0035	2.19	0.0032	2.00	0.0034	2.15
PERS	0.0030	8.14	0.0028	6.75	0.0019	7.35	0.0018	6.11
CONT	−0.0114	−0.42	0.0056	0.43	−0.0227	−0.82	0.0305	1.04
OTHER	0.0008	13.02	0.0008	12.72	0.0006	9.73	0.0006	9.55
$\text{Ret}_{i,w-1}$	−0.0167	−5.20	−0.0195	−6.03	−0.0168	−5.24	−0.0196	−6.07
$\text{Ret}_{i,m-1}$	0.0000	0.00	−0.0002	−0.12	−0.0002	−0.08	−0.0004	−0.20
$\text{Ret}_{i,m-7,m-2}$	0.0007	1.07	0.0007	1.06	0.0007	1.04	0.0007	1.03
Lmto	0.0000	−2.71	0.0000	−2.82	0.0000	−2.67	0.0000	−2.78
Lvol	−0.0152	−0.93	−0.0127	−0.79	−0.0146	−0.89	−0.0121	−0.75
Size	0.0000	0.01	0.0000	−0.22	0.0000	−0.03	0.0000	−0.27
Lbm	0.0002	1.14	0.0002	1.10	0.0002	1.09	0.0002	1.05
Adj.R^2	4.12%		4.10%		4.11%		4.10%	
	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff
PERS	0.2319	0.0692%	0.2319	0.0648%	0.3305	0.0636%	0.3305	0.0588%
CONT	0.0358	−0.0408%	0.0369	0.0207%	0.0328	−0.0743%	0.0339	0.1036%
OTHER	1.1260	0.0902%	1.1261	0.0885%	1.1333	0.0734%	1.1333	0.0721%

Table A8: Marketable Retail Order Imbalance and Contemporaneous Returns – Replication Results

This table reports results of Table VIII in Boehmer et al. (2021, BJZZ) in Panel A and our replication results with our sample in Panel B. Results in Panel B correspond to the results in Panel (a) of Table 8 in our paper. Please refer to Table 8 in our paper for details.

| | Panel A: Original Results Reported in BJZZ | | | | | | | |
| | Intense Selling | | Selling | | Buying | | Intense Buying | |
	Mean	t-Stat	Mean	t-Stat	Mean	t-Stat	Mean	t-Stat
Cumulative Market-Adjusted Return								
$k = -20$	0.0067^{**}	5.48	0.0063^{**}	8.10	-0.0111^{**}	-19.00	-0.0129^{**}	-12.49
$k = -15$	0.0056^{**}	5.62	0.0055^{**}	8.71	-0.0096^{**}	-20.87	-0.0109^{**}	-12.91
$k = -10$	0.0041^{**}	5.40	0.0042^{**}	9.04	-0.0074^{**}	-20.83	-0.0084^{**}	-12.93
$k = -5$	0.0027^{**}	6.06	0.0028^{**}	10.07	-0.0047^{**}	-24.09	-0.0053^{**}	-15.62
$k = 0$	-0.0024^{**}	-5.30	-0.0019^{**}	-5.65	0.0011^{**}	4.02	0.0011^{**}	2.69
$k = 5$	-0.0016^{**}	-3.89	-0.0012^{**}	-5.07	0.0018^{**}	9.58	0.0024^{**}	6.99
$k = 10$	-0.0023^{**}	-3.16	-0.0018^{**}	-4.35	0.0028^{**}	8.38	0.0036^{**}	5.89
$k = 15$	-0.0025^{*}	-2.45	-0.0022^{**}	-3.97	0.0036^{**}	8.39	0.0046^{**}	5.51
$k = 20$	-0.0030^{*}	-2.36	-0.0025^{**}	-3.63	0.0043^{**}	8.89	0.0057^{**}	5.74
Weekly Market-Adjusted Return								
$k = -20$	0.0010^{**}	2.75	0.0008^{**}	3.36	-0.0016^{**}	-8.15	-0.0019^{**}	-5.90
$k = -15$	0.0016^{**}	4.12	0.0014^{**}	5.66	-0.0022^{**}	-12.70	-0.0026^{**}	-7.97
$k = -10$	0.0014^{**}	3.59	0.0015^{**}	5.88	-0.0028^{**}	-12.66	-0.0030^{**}	-7.62
$k = -5$	0.0027^{**}	6.06	0.0028^{**}	10.07	-0.0047^{**}	-24.09	-0.0053^{**}	-15.62
$k = 0$	-0.0024^{**}	-5.30	-0.0019^{**}	-5.65	0.0011^{**}	4.02	0.0011^{**}	2.69
$k = 5$	-0.0016^{**}	-3.89	-0.0012^{**}	-5.07	0.0018^{**}	9.58	0.0024^{**}	6.99
$k = 10$	-0.0006	-1.51	-0.0006^{*}	-2.42	0.0010^{**}	5.38	0.0013^{**}	3.68
$k = 15$	-0.0001	-0.21	-0.0004	-1.74	0.0009^{**}	4.61	0.0010^{**}	2.77
$k = 20$	-0.0005	-1.34	-0.0003	-1.29	0.0006^{**}	3.84	0.0010^{**}	2.80
	Panel B: Replication Results							
	Intense Selling		Selling		Buying		Intense Buying	
	Mean	t-Stat	Mean	t-Stat	Mean	t-Stat	Mean	t-Stat
Cumulative Market-Adjusted Return								
$k = -20$	0.0074^{**}	7.33	0.0066^{**}	8.18	-0.0127^{**}	-15.39	-0.0166^{**}	-19.30
$k = -15$	0.0071^{**}	9.34	0.0064^{**}	10.94	-0.0108^{**}	-17.91	-0.0137^{**}	-21.05
$k = -10$	0.0059^{**}	10.89	0.0055^{**}	13.04	-0.0083^{**}	-19.19	-0.0103^{**}	-20.67
$k = -5$	0.0039^{**}	12.56	0.0035^{**}	15.59	-0.0051^{**}	-19.37	-0.0064^{**}	-20.74
$k = 0$	-0.0026^{**}	-6.49	-0.0021^{**}	-6.30	0.0016^{**}	4.82	0.0021^{**}	5.44
$k = 5$	-0.0017^{**}	-6.58	-0.0012^{**}	-5.96	0.0018^{**}	9.12	0.0026^{**}	10.34
$k = 10$	-0.0028^{**}	-6.04	-0.0021^{**}	-6.46	0.0027^{**}	7.70	0.0039^{**}	9.09
$k = 15$	-0.0039^{**}	-6.10	-0.0028^{**}	-5.98	0.0032^{**}	6.72	0.0049^{**}	8.36
$k = 20$	-0.0047^{**}	-5.38	-0.0036^{**}	-5.28	0.0034^{**}	4.82	0.0052^{**}	6.27
Weekly Market-Adjusted Return								
$k = -20$	0.0007^{*}	2.48	0.0006^{*}	2.44	-0.0018^{**}	-8.18	-0.0028^{**}	-10.48
$k = -15$	0.0014^{**}	4.69	0.0012^{**}	6.01	-0.0024^{**}	-10.00	-0.0033^{**}	-12.31
$k = -10$	0.0021^{**}	6.47	0.0020^{**}	7.83	-0.0031^{**}	-13.25	-0.0039^{**}	-13.42
$k = -5$	0.0039^{**}	12.56	0.0035^{**}	15.59	-0.0051^{**}	-19.37	-0.0064^{**}	-20.74
$k = 0$	-0.0026^{**}	-6.49	-0.0021^{**}	-6.30	0.0016^{**}	4.82	0.0021^{**}	5.44
$k = 5$	-0.0017^{**}	-6.58	-0.0012^{**}	-5.96	0.0018^{**}	9.12	0.0026^{**}	10.34
$k = 10$	-0.0011^{**}	-3.97	-0.0009^{**}	-4.91	0.0009^{**}	3.91	0.0013^{**}	4.83
$k = 15$	-0.0010^{**}	-3.85	-0.0007^{**}	-3.64	0.0007^{**}	3.56	0.0012^{**}	4.49
$k = 20$	-0.0007^{*}	-2.48	-0.0005^{**}	-2.72	0.0004	1.84	0.0004	1.71

B. Complete Set of Results

Table B2: Determinants of Marketable Retail Order Imbalances

This table reports the complete set of results of Table 2 in our paper. Please refer to Table 2 in our paper for details.

| | *(a) BJZZ 2010-2015* | | | | | | | |
| | Mroibvol Bid-Ask Return | | Mroibvol CRSP Return | | Mroibtrd Bid-Ask Return | | Mroibtrd CRSP Return | |
	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat
Intercept	-0.2833	-22.23	-0.2848	-22.13	-0.2866	-21.02	-0.2868	-20.91
$\text{Mroib}_{i,w-1}$	0.1982	71.81	0.1982	71.82	0.2698	91.06	0.2698	91.07
$\text{Ret}_{i,w-1}$	-0.8302	-35.91	-0.8311	-36.26	-0.7782	-31.41	-0.7811	-31.85
$\text{Ret}_{i,m-1}$	-0.1680	-13.08	-0.1681	-13.08	-0.1214	-8.91	-0.1213	-8.91
$\text{Ret}_{i,m-7,m-2}$	-0.0252	-5.20	-0.0252	-5.20	-0.0080	-1.44	-0.0080	-1.44
Lmto	0.0007	11.73	0.0007	11.84	0.0006	9.52	0.0006	9.70
Lvol	0.5684	6.43	0.5794	6.53	0.3049	3.18	0.3008	3.18
Size	0.0151	10.89	0.0152	10.95	0.0200	14.36	0.0200	14.32
Lbm	-0.0211	-16.95	-0.0211	-16.95	-0.0218	-17.77	-0.0218	-17.79
Adj.R^2	5.06%		5.06%		8.66%		8.66%	

| | *(b) QMP 2010-2015* | | | | | | | |
| | Mroibvol Bid-Ask Return | | Mroibvol CRSP Return | | Mroibtrd Bid-Ask Return | | Mroibtrd CRSP Return | |
	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat
Intercept	-0.3593	-22.43	-0.3599	-22.25	-0.2998	-21.00	-0.2977	-20.75
$\text{Mroib}_{i,w-1}$	0.2360	84.01	0.2361	84.04	0.2889	92.19	0.2890	92.19
$\text{Ret}_{i,w-1}$	-0.9157	-38.83	-0.9178	-39.30	-0.8286	-34.99	-0.8323	-35.41
$\text{Ret}_{i,m-1}$	-0.1599	-12.39	-0.1595	-12.38	-0.0730	-5.74	-0.0723	-5.71
$\text{Ret}_{i,m-7,m-2}$	-0.0163	-3.25	-0.0165	-3.28	0.0098	1.81	0.0096	1.78
Lmto	0.0009	14.15	0.0009	14.31	0.0006	10.24	0.0007	10.50
Lvol	0.7436	7.84	0.7287	7.59	0.1224	1.31	0.0785	0.85
Size	0.0220	13.72	0.0221	13.66	0.0225	15.39	0.0223	15.20
Lbm	-0.0264	-21.48	-0.0264	-21.47	-0.0242	-21.75	-0.0243	-21.78
Adj.R^2	7.11%		7.12%		9.90%		9.90%	

Table B2: Determinants of Marketable Retail Order Imbalances (Continued)

(c) BJZZ 2016-2021

	Mroibvol Bid-Ask Return		Mroibvol CRSP Return		Mroibtrd Bid-Ask Return		Mroibtrd CRSP Return	
	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat
Intercept	-0.2072	-27.82	-0.2075	-27.68	-0.1472	-19.54	-0.1468	-19.54
$\text{Mroib}_{i,w-1}$	0.0983	57.30	0.0984	57.30	0.2237	84.06	0.2238	84.08
$\text{Ret}_{i,w-1}$	-0.3567	-25.85	-0.3538	-25.83	-0.4100	-28.71	-0.4076	-28.66
$\text{Ret}_{i,m-1}$	-0.0933	-12.49	-0.0928	-12.40	-0.1023	-13.87	-0.1016	-13.72
$\text{Ret}_{i,m-7,m-2}$	-0.0225	-6.72	-0.0226	-6.73	-0.0122	-4.34	-0.0123	-4.37
Lmto	0.0000	2.14	0.0000	2.45	0.0001	4.82	0.0001	5.14
Lvol	0.4199	6.59	0.4008	6.36	0.5800	9.73	0.5392	9.01
Size	0.0151	18.36	0.0152	18.33	0.0140	14.52	0.0140	14.60
Lbm	-0.0085	-10.13	-0.0086	-10.13	-0.0099	-12.57	-0.0100	-12.65
Adj.R^2	1.41%		1.41%		6.14%		6.14%	

(d) QMP 2016-2021

	Mroibvol Bid-Ask Return		Mroibvol CRSP Return		Mroibtrd Bid-Ask Return		Mroibtrd CRSP Return	
	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat
Intercept	-0.3968	-33.48	-0.3979	-33.47	-0.2280	-23.28	-0.2262	-23.09
$\text{Mroib}_{i,w-1}$	0.1729	80.38	0.1730	80.38	0.2978	128.10	0.2980	128.29
$\text{Ret}_{i,w-1}$	-0.5704	-30.34	-0.5699	-30.65	-0.5363	-31.47	-0.5365	-31.82
$\text{Ret}_{i,m-1}$	-0.1475	-14.92	-0.1466	-14.78	-0.0823	-9.47	-0.0807	-9.23
$\text{Ret}_{i,m-7,m-2}$	-0.0296	-6.86	-0.0297	-6.86	0.0024	0.75	0.0022	0.68
Lmto	0.0002	6.04	0.0002	6.46	0.0001	6.40	0.0002	6.97
Lvol	1.2780	13.83	1.2269	13.63	0.8878	11.30	0.8018	10.35
Size	0.0282	26.06	0.0284	26.30	0.0220	19.40	0.0219	19.37
Lbm	-0.0173	-18.01	-0.0173	-18.06	-0.0186	-21.69	-0.0187	-21.82
Adj.R^2	4.28%		4.27%		10.68%		10.67%	

Table B3: Predicting Next-Week Returns Using Marketable Retail Order Imbalances

This table reports the complete set of results of Table 3 in our paper. Please refer to Table 3 in our paper for details.

(a) BJZZ 2010-2015

	Mroibvol Bid-Ask Return		Mroibvol CRSP Return		Mroibtrd Bid-Ask Return		Mroibtrd CRSP Return	
	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat
Intercept	0.0033	2.24	0.0036	2.42	0.0033	2.23	0.0036	2.40
$\text{Mroib}_{i,w-1}$	0.0009	15.14	0.0009	14.55	0.0008	11.93	0.0008	11.41
$\text{Ret}_{i,w-1}$	-0.0172	-5.45	-0.0206	-6.50	-0.0174	-5.50	-0.0208	-6.56
$\text{Ret}_{i,m-1}$	-0.0001	-0.03	-0.0003	-0.16	-0.0001	-0.07	-0.0004	-0.20
$\text{Ret}_{i,m-7,m-2}$	0.0007	1.07	0.0007	1.04	0.0007	1.05	0.0007	1.01
Lmto	-0.0000	-2.79	-0.0000	-2.90	-0.0000	-2.76	-0.0000	-2.87
Lvol	-0.0133	-0.81	-0.0109	-0.68	-0.0130	-0.79	-0.0106	-0.66
Size	-0.0000	-0.11	-0.0001	-0.40	-0.0000	-0.17	-0.0001	-0.45
Lbm	0.0002	1.12	0.0002	1.08	0.0002	1.10	0.0002	1.06
Adj.R^2	3.75%		3.73%		3.74%		3.72%	
IQR	1.1950		1.1950		1.2279		1.2279	
IQR w. ret. diff	0.1116%		0.1079%		0.0977%		0.0939%	

(b) QMP 2010-2015

	Mroibvol Bid-Ask Return		Mroibvol CRSP Return		Mroibtrd Bid-Ask Return		Mroibtrd CRSP Return	
	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat
Intercept	0.0034	2.33	0.0037	2.52	0.0033	2.26	0.0036	2.44
$\text{Mroib}_{i,w-1}$	0.0010	14.84	0.0010	13.96	0.0009	12.13	0.0008	11.25
$\text{Ret}_{i,w-1}$	-0.0181	-5.73	-0.0217	-6.82	-0.0183	-5.79	-0.0219	-6.87
$\text{Ret}_{i,m-1}$	-0.0001	-0.04	-0.0003	-0.17	-0.0002	-0.13	-0.0005	-0.25
$\text{Ret}_{i,m-7,m-2}$	0.0007	1.01	0.0007	0.98	0.0007	0.96	0.0007	0.94
Lmto	-0.0000	-2.83	-0.0000	-2.94	-0.0000	-2.76	-0.0000	-2.88
Lvol	-0.0132	-0.80	-0.0106	-0.66	-0.0124	-0.75	-0.0098	-0.61
Size	-0.0000	-0.17	-0.0001	-0.49	-0.0000	-0.18	-0.0001	-0.49
Lbm	0.0002	1.10	0.0002	1.08	0.0002	1.05	0.0002	1.03
Adj.R^2	3.76%		3.74%		3.75%		3.73%	
IQR	1.2014		1.2014		1.1984		1.1984	
IQR w. ret. diff	0.1210%		0.1144%		0.1031%		0.0961%	

Table B3: Predicting Next-Week Returns Using Marketable Retail Order Imbalances (Continued)

(c) BJZZ 2016-2021

	Mroibvol Bid-Ask Return		Mroibvol CRSP Return		Mroibtrd Bid-Ask Return		Mroibtrd CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	0.0041	2.24	0.0045	2.42	0.0042	2.25	0.0045	2.43
$\text{Mroib}_{i,w-1}$	0.0006	7.95	0.0006	7.54	0.0007	4.86	0.0006	4.49
$\text{Ret}_{i,w-1}$	-0.0138	-3.73	-0.0174	-4.74	-0.0138	-3.74	-0.0174	-4.74
$\text{Ret}_{i,m-1}$	-0.0019	-0.98	-0.0020	-1.03	-0.0019	-0.97	-0.0020	-1.02
$\text{Ret}_{i,m-7,m-2}$	-0.0001	-0.19	-0.0001	-0.23	-0.0001	-0.20	-0.0001	-0.24
Lmto	-0.0000	-0.81	-0.0000	-1.01	-0.0000	-0.82	-0.0000	-1.02
Lvol	0.0125	0.73	0.0174	1.04	0.0123	0.72	0.0172	1.03
Size	-0.0002	-1.08	-0.0002	-1.36	-0.0002	-1.12	-0.0002	-1.40
Lbm	0.0001	0.62	0.0001	0.66	0.0001	0.63	0.0001	0.67
Adj.R^2	4.35%		4.33%		4.37%		4.35%	
IQR	0.9863		0.9863		0.8114		0.8114	
IQR w. ret. diff	0.0602%		0.0577%		0.0548%		0.0510%	

(d) QMP 2016-2021

	Mroibvol Bid-Ask Return		Mroibvol CRSP Return		Mroibtrd Bid-Ask Return		Mroibtrd CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	0.0044	2.38	0.0047	2.55	0.0042	2.26	0.0045	2.44
$\text{Mroib}_{i,w-1}$	0.0010	10.17	0.0009	9.34	0.0007	4.81	0.0006	4.13
$\text{Ret}_{i,w-1}$	-0.0141	-3.82	-0.0177	-4.83	-0.0140	-3.80	-0.0177	-4.81
$\text{Ret}_{i,m-1}$	-0.0018	-0.91	-0.0019	-0.96	-0.0019	-0.97	-0.0020	-1.03
$\text{Ret}_{i,m-7,m-2}$	-0.0001	-0.18	-0.0001	-0.21	-0.0001	-0.23	-0.0002	-0.26
Lmto	-0.0000	-0.84	-0.0000	-1.04	-0.0000	-0.83	-0.0000	-1.02
Lvol	0.0110	0.65	0.0158	0.95	0.0121	0.71	0.0169	1.01
Size	-0.0002	-1.14	-0.0002	-1.42	-0.0002	-1.10	-0.0002	-1.37
Lbm	0.0001	0.73	0.0002	0.76	0.0001	0.73	0.0002	0.75
Adj.R^2	4.38%		4.35%		4.39%		4.37%	
IQR	1.0746		1.0746		0.9831		0.9831	
IQR w. ret. diff	0.1069%		0.1008%		0.0699%		0.0608%	

Table B4: Marketable Retail Return Predictability within Subgroups

This table reports the complete set of results of Table 4 in our paper. Please refer to Table 4 in our paper for details.

	Mroibvol				Mroibtrd			
	Coef.	*t*-Stat	IQR	W.R. Diff.	Coef.	*t*-Stat	IQR	W.R. Diff.

(a) BJZZ 2010-2015

	Coef.	*t*-Stat	IQR	W.R. Diff.	Coef.	*t*-Stat	IQR	W.R. Diff.
Market-cap subgroups								
Small	0.0013	13.87	1.6010	0.205%	0.0011	11.12	1.6768	0.184%
Medium	0.0005	6.70	1.2386	0.068%	0.0004	4.89	1.2411	0.054%
Big	0.0003	3.79	0.8746	0.028%	0.0003	2.85	0.8972	0.023%
Share-price subgroups								
Low	0.0015	13.40	1.4088	0.205%	0.0012	10.43	1.5648	0.182%
Medium	0.0006	7.76	1.2672	0.074%	0.0005	5.87	1.2700	0.062%
High	0.0002	3.37	0.9495	0.023%	0.0002	2.62	0.9275	0.019%
Turnover subgroups								
Low	0.0010	14.99	1.7156	0.176%	0.0010	13.22	1.6539	0.158%
Medium	0.0008	8.32	1.1589	0.090%	0.0006	5.87	1.1577	0.069%
High	0.0009	5.19	0.8681	0.074%	0.0006	3.29	0.9684	0.055%

(b) QMP 2010-2015

	Mroibvol				Mroibtrd			
	Coef.	*t*-Stat	IQR	W.R. Diff.	Coef.	*t*-Stat	IQR	W.R. Diff.
Market-cap subgroups								
Small	0.0014	14.47	1.6209	0.223%	0.0012	11.74	1.6507	0.194%
Medium	0.0005	5.73	1.2353	0.065%	0.0004	4.06	1.2038	0.047%
Big	0.0004	4.43	0.8804	0.037%	0.0003	3.54	0.8741	0.030%
Share-price subgroups								
Low	0.0016	13.39	1.4106	0.219%	0.0013	10.66	1.5044	0.192%
Medium	0.0006	7.89	1.2606	0.080%	0.0005	5.61	1.2160	0.056%
High	0.0003	4.38	0.9703	0.032%	0.0003	3.68	0.9312	0.029%
Turnover subgroups								
Low	0.0011	15.46	1.7491	0.193%	0.0010	13.55	1.6621	0.169%
Medium	0.0009	9.18	1.1550	0.101%	0.0007	6.28	1.1194	0.074%
High	0.0009	4.84	0.8661	0.075%	0.0006	3.09	0.9306	0.054%

Table B4: Marketable Retail Return Predictability within Subgroups (Continued)

	Mroibvol				Mroibtrd			
(c) BJZZ 2016-2021								
	Coef.	*t*-Stat	IQR	W.R. Diff.	Coef.	*t*-Stat	IQR	W.R. Diff.
Market-cap subgroups								
Small	0.0007	6.4400	1.3347	0.098%	0.0008	4.6500	1.1714	0.094%
Medium	0.0004	4.0300	1.0890	0.045%	0.0006	3.4800	0.8699	0.053%
Big	0.0002	1.5400	0.6799	0.014%	-0.0001	-0.6600	0.5317	-0.006%
Share-price subgroups								
Low	0.0012	7.7900	1.1461	0.133%	0.0012	5.7100	1.1059	0.138%
Medium	0.0002	2.3100	1.1309	0.025%	0.0001	0.9900	0.9184	0.011%
High	0.0000	0.0600	0.7410	0.000%	-0.0001	-0.8600	0.5278	-0.006%
Turnover subgroups								
Low	0.0006	7.4800	1.4643	0.082%	0.0006	5.5900	1.1037	0.065%
Medium	0.0007	4.7200	0.9304	0.064%	0.0005	2.6200	0.7114	0.037%
High	0.0007	2.6900	0.7346	0.049%	0.0009	2.4100	0.6842	0.064%
(d) QMP 2016-2021								
	Coef.	*t*-Stat	IQR	W.R. Diff.	Coef.	*t*-Stat	IQR	W.R. Diff.
Market-cap subgroups								
Small	0.0014	10.3500	1.4216	0.197%	0.0010	5.2500	1.2979	0.129%
Medium	0.0005	4.3000	1.1385	0.058%	0.0005	3.5200	0.9929	0.054%
Big	0.0001	0.5500	0.7859	0.006%	-0.0003	-1.3100	0.7494	-0.019%
Share-price subgroups								
Low	0.0018	10.6300	1.2062	0.216%	0.0013	5.9300	1.1805	0.158%
Medium	0.0004	3.6000	1.1889	0.047%	0.0002	1.1100	1.0324	0.016%
High	0.0003	3.1300	0.8662	0.029%	0.0003	1.6900	0.7770	0.021%
Turnover subgroups								
Low	0.0011	12.4100	1.5670	0.176%	0.0009	9.0100	1.2908	0.122%
Medium	0.0008	5.2800	1.0188	0.084%	0.0005	2.5300	0.8883	0.044%
High	0.0010	3.8500	0.7951	0.078%	0.0004	1.1700	0.8280	0.036%

Table B5: Predicting Returns k Weeks Ahead

This table reports the complete set of results of Table 5 in our paper. Please refer to Table 5 in our paper for details.

| | *(a) BJZZ 2010-2015* | | | | *(b) QMP 2010-2015* | | | |
| | Mroibvol | | Mroibtrd | | Mroibvol | | Mroibtrd | |
	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat
Bid-ask average returns								
1 week	0.0009	15.14	0.0008	11.93	0.0010	14.84	0.0009	12.13
2 weeks	0.0006	9.48	0.0005	7.77	0.0006	9.00	0.0005	7.09
4 weeks	0.0003	5.64	0.0003	5.40	0.0003	5.52	0.0003	5.59
6 weeks	0.0003	4.53	0.0002	3.31	0.0003	4.64	0.0002	3.67
8 weeks	0.0002	3.96	0.0002	2.43	0.0002	2.51	0.0001	1.96
10 weeks	0.0000	0.78	-0.0001	-0.87	0.0000	0.21	-0.0001	-0.87
12 weeks	0.0001	2.48	0.0002	2.68	0.0002	2.92	0.0002	3.30
CRSP returns								
1 week	0.0009	14.55	0.0008	11.41	0.0010	13.96	0.0008	11.25
2 weeks	0.0006	9.37	0.0005	7.58	0.0006	8.96	0.0005	7.01
4 weeks	0.0003	5.67	0.0003	5.41	0.0003	5.57	0.0003	5.63
6 weeks	0.0003	4.67	0.0002	3.43	0.0003	4.63	0.0002	3.64
8 weeks	0.0002	3.83	0.0001	2.34	0.0002	2.45	0.0001	1.84
10 weeks	0.0000	0.75	-0.0001	-0.89	0.0000	0.20	-0.0001	-0.89
12 weeks	0.0002	2.52	0.0002	2.74	0.0002	2.86	0.0002	3.21

| | *(c) BJZZ 2016-2021* | | | | *(d) QMP 2016-2021* | | | |
| | Mroibvol | | Mroibtrd | | Mroibvol | | Mroibtrd | |
	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat
Bid-ask average returns								
1 week	0.0006	7.95	0.0007	4.86	0.0010	10.17	0.0007	4.81
2 weeks	0.0003	3.46	0.0003	2.27	0.0004	4.19	0.0002	1.54
4 weeks	0.0002	2.02	0.0003	1.79	0.0004	3.91	0.0003	2.03
6 weeks	0.0002	2.10	0.0002	1.61	0.0002	2.20	0.0001	0.99
8 weeks	0.0001	1.79	0.0003	1.97	0.0002	1.81	0.0001	1.01
10 weeks	0.0002	2.74	0.0003	2.49	0.0003	3.61	0.0003	2.47
12 weeks	0.0002	2.55	0.0003	2.20	0.0004	3.73	0.0003	2.21
CRSP returns								
1 week	0.0006	7.54	0.0006	4.49	0.0009	9.34	0.0006	4.13
2 weeks	0.0003	3.25	0.0003	2.16	0.0004	4.02	0.0002	1.45
4 weeks	0.0002	2.21	0.0003	1.86	0.0004	3.82	0.0003	1.90
6 weeks	0.0002	2.08	0.0002	1.58	0.0002	2.20	0.0001	0.93
8 weeks	0.0001	1.66	0.0002	1.81	0.0001	1.64	0.0001	0.83
10 weeks	0.0002	2.63	0.0003	2.35	0.0003	3.48	0.0003	2.27
12 weeks	0.0002	2.41	0.0003	2.07	0.0003	3.65	0.0003	2.09

Table B6: Long-Short Strategy Returns Based on Marketable Retail Order Imbalances

This table reports the complete set of results of Table 6 in our paper. Please refer to Table 6 in our paper for details.

(a) BJZZ 2010-2015

	All Stocks				Small		Medium		Big	
	Mean	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat
Form Portfolios on the Previous Week's Mroibvol										
1 week	0.095%	3.27	0.083%	2.77	0.437%	10.39	0.175%	5.59	0.051%	1.52
2 weeks	0.124%	2.38	0.090%	1.81	0.613%	8.68	0.270%	5.01	0.052%	1.04
4 weeks	0.226%	2.67	0.167%	2.04	0.852%	7.15	0.377%	4.46	0.125%	1.54
6 weeks	0.347%	2.84	0.285%	2.56	0.909%	6.54	0.471%	3.88	0.193%	1.76
8 weeks	0.465%	2.69	0.412%	2.57	0.992%	4.96	0.523%	3.07	0.297%	2.03
10 weeks	0.510%	2.31	0.373%	1.73	0.905%	3.68	0.406%	2.58	0.263%	1.40
12 weeks	0.599%	2.33	0.564%	2.07	0.988%	4.02	0.364%	2.05	0.416%	1.64
Form Portfolios on the Previous Week's Mroibtrd										
1 week	0.072%	1.97	0.061%	1.65	0.342%	7.13	0.117%	3.76	0.047%	1.26
2 weeks	0.150%	2.15	0.118%	1.83	0.528%	6.39	0.167%	3.32	0.097%	1.44
4 weeks	0.250%	2.25	0.190%	1.98	0.638%	5.02	0.262%	3.68	0.176%	1.61
6 weeks	0.388%	2.70	0.323%	2.76	0.605%	3.60	0.333%	3.12	0.252%	2.01
8 weeks	0.508%	2.59	0.443%	2.53	0.620%	2.95	0.330%	1.91	0.346%	1.94
10 weeks	0.515%	2.11	0.404%	1.75	0.480%	1.70	0.147%	0.86	0.351%	1.33
12 weeks	0.577%	2.07	0.516%	1.62	0.506%	1.81	0.064%	0.31	0.464%	1.34

(b) QMP 2010-2015

	All Stocks				Small		Medium		Big	
	Mean	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat
Form Portfolios on the Previous Week's Mroibvol										
1 week	0.091%	2.81	0.072%	2.18	0.411%	9.99	0.180%	5.25	0.033%	1.02
2 weeks	0.133%	2.44	0.087%	1.72	0.607%	8.11	0.257%	4.63	0.047%	0.89
4 weeks	0.260%	2.74	0.182%	1.97	0.769%	7.30	0.366%	4.23	0.124%	1.35
6 weeks	0.391%	2.83	0.272%	2.26	0.871%	5.85	0.453%	3.83	0.214%	1.80
8 weeks	0.512%	2.72	0.341%	2.09	0.983%	5.28	0.514%	3.11	0.253%	1.61
10 weeks	0.488%	1.96	0.226%	1.02	0.893%	3.96	0.373%	2.23	0.101%	0.53
12 weeks	0.609%	2.06	0.384%	1.32	0.878%	3.60	0.331%	1.83	0.203%	0.81
Form Portfolios on the Previous Week's Mroibtrd										
1 week	0.064%	1.72	0.047%	1.28	0.299%	6.55	0.105%	3.21	0.017%	0.47
2 weeks	0.159%	2.15	0.125%	1.81	0.464%	5.75	0.185%	3.18	0.086%	1.27
4 weeks	0.311%	2.55	0.260%	2.45	0.523%	4.50	0.333%	4.04	0.156%	1.39
6 weeks	0.493%	2.98	0.431%	3.39	0.531%	3.54	0.425%	4.25	0.256%	1.84
8 weeks	0.624%	2.83	0.550%	3.01	0.623%	3.01	0.434%	2.93	0.318%	1.70
10 weeks	0.622%	2.30	0.500%	1.98	0.393%	1.31	0.272%	1.56	0.263%	0.99
12 weeks	0.697%	2.31	0.592%	1.73	0.298%	0.93	0.211%	1.02	0.302%	0.85

Table B6: Long-Short Strategy Returns Based on Marketable Retail Order Imbalances (Continued)

	All Stocks				Small		Medium		Big	
	Mean	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat

(c) BJZZ 2016-2021

Form Portfolios on the Previous Week's Mroibvol										
1 week	−0.008%	−0.18	−0.021%	−0.48	0.143%	3.16	0.067%	1.61	−0.042%	−0.91
2 weeks	0.063%	1.04	0.004%	0.07	0.177%	2.54	0.025%	0.41	−0.075%	−1.10
4 weeks	0.105%	0.99	−0.018%	−0.20	0.381%	2.75	−0.013%	−0.14	−0.114%	−1.01
6 weeks	0.086%	0.58	−0.126%	−1.02	0.424%	2.56	−0.128%	−1.24	−0.211%	−1.62
8 weeks	0.078%	0.42	−0.241%	−1.36	0.171%	0.73	−0.199%	−1.52	−0.260%	−1.34
10 weeks	0.021%	0.09	−0.243%	−1.00	0.097%	0.38	−0.221%	−1.41	−0.187%	−0.70
12 weeks	0.069%	0.25	−0.255%	−0.86	−0.014%	−0.04	−0.284%	−1.82	−0.214%	−0.77
Form Portfolios on the Previous Week's Mroibtrd										
1 week	−0.019%	−0.23	−0.030%	−0.38	0.061%	1.02	0.110%	1.84	−0.019%	−0.25
2 weeks	−0.063%	−0.42	−0.104%	−0.86	0.128%	1.11	0.103%	1.06	−0.074%	−0.65
4 weeks	0.002%	0.01	−0.053%	−0.26	0.364%	1.67	0.190%	1.45	0.011%	0.05
6 weeks	0.087%	0.20	0.052%	0.17	0.539%	1.67	0.167%	1.03	0.051%	0.17
8 weeks	0.172%	0.28	0.149%	0.38	0.306%	0.60	0.058%	0.30	−0.055%	−0.14
10 weeks	0.144%	0.19	0.211%	0.36	0.241%	0.37	−0.060%	−0.20	0.007%	0.01
12 weeks	0.188%	0.19	0.241%	0.29	0.061%	0.08	−0.191%	−0.61	0.075%	0.10

	All Stocks				Small		Medium		Big	
	Mean	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat	Alpha	*t*-Stat

(d) QMP 2016-2021

Form Portfolios on the Previous Week's Mroibvol										
1 week	0.002%	0.03	−0.009%	−0.17	0.295%	5.11	0.098%	1.97	−0.043%	−1.01
2 weeks	0.015%	0.21	−0.060%	−0.92	0.347%	3.44	0.116%	1.56	−0.100%	−1.32
4 weeks	0.054%	0.40	−0.145%	−1.18	0.507%	3.06	0.074%	0.70	−0.161%	−1.15
6 weeks	0.088%	0.41	−0.254%	−1.52	0.644%	3.51	−0.020%	−0.13	−0.336%	−2.08
8 weeks	0.027%	0.10	−0.353%	−1.57	0.526%	2.62	−0.222%	−1.44	−0.420%	−1.97
10 weeks	0.005%	0.02	−0.361%	−1.28	0.293%	1.63	−0.388%	−2.08	−0.415%	−1.60
12 weeks	0.069%	0.18	−0.442%	−1.23	0.083%	0.49	−0.524%	−2.36	−0.458%	−1.35
Form Portfolios on the Previous Week's Mroibtrd										
1 week	0.028%	0.29	−0.026%	−0.32	0.120%	1.61	0.060%	1.03	−0.053%	−0.71
2 weeks	0.052%	0.32	−0.050%	−0.38	0.128%	1.01	0.029%	0.30	−0.094%	−0.79
4 weeks	0.211%	0.71	−0.024%	−0.11	0.162%	0.70	0.112%	0.72	−0.093%	−0.50
6 weeks	0.416%	0.90	−0.004%	−0.01	0.090%	0.28	0.158%	0.68	−0.100%	−0.38
8 weeks	0.481%	0.75	−0.005%	−0.01	−0.127%	−0.27	0.024%	0.08	−0.240%	−0.68
10 weeks	0.425%	0.54	−0.137%	−0.23	−0.510%	−0.84	−0.225%	−0.57	−0.393%	−0.80
12 weeks	0.553%	0.55	−0.187%	−0.23	−0.735%	−0.94	−0.490%	−0.99	−0.473%	−0.71

Table B7: Predictability Decomposition

This table reports the complete set of results of Table 7 in our paper. Please refer to Table 7 in our paper for details.

(a) BJZZ 2010-2015

First Stage of Projecting Order Imbalance on Persistence and Past Returns

	$\text{Mroivol}_{i,w-1}$ Bid-Ask Return		$\text{Mroivol}_{i,w-1}$ CRSP Return		$\text{Mroitrd}_{i,w-1}$ Bid-Ask Return		$\text{Mroitrd}_{i,w-1}$ CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	−0.1351	−23.28	−0.1350	−23.27	−0.1127	−12.63	−0.1126	−12.62
$\text{Mroivol}_{i,w-2}$	0.2014	78.12	0.2015	78.13	0.2743	97.13	0.2744	97.13
$\text{Ret}_{i,w-2}$	−0.8235	−36.14	−0.8250	−36.49	−0.7798	−31.83	−0.7833	−32.29
$\text{Ret}_{i,m-1}$	−0.1228	−9.91	−0.1228	−9.90	−0.0857	−6.75	−0.0856	−6.74
$\text{Ret}_{i,m-7,m-2}$	−0.0052	−1.12	−0.0053	−1.13	0.0143	2.62	0.0143	2.61
Adj.R^2	4.69%		4.69%		8.20%		8.21%	

Second-Stage Decomposition of Order Imbalance's Predictive Power

	$\text{Mroivol}_{i,w}$ Bid-Ask Return		$\text{Mroivol}_{i,w}$ CRSP Return		$\text{Mroitrd}_{i,w}$ Bid-Ask Return		$\text{Mroitrd}_{i,w}$ CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	0.0032	2.04	0.0035	2.19	0.0032	2.00	0.0034	2.15
PERS	0.0030	8.14	0.0028	6.75	0.0019	7.35	0.0018	6.11
CONT	−0.0114	−0.42	0.0056	0.43	−0.0227	−0.82	0.0305	1.04
OTHER	0.0008	13.02	0.0008	12.72	0.0006	9.73	0.0006	9.55
$\text{Ret}_{i,w-1}$	−0.0167	−5.20	−0.0195	−6.03	−0.0168	−5.24	−0.0196	−6.07
$\text{Ret}_{i,m-1}$	0.0000	0.00	−0.0002	−0.12	−0.0002	−0.08	−0.0004	−0.20
$\text{Ret}_{i,m-7,m-2}$	0.0007	1.07	0.0007	1.06	0.0007	1.04	0.0007	1.03
Lmto	0.0000	−2.71	0.0000	−2.82	0.0000	−2.67	0.0000	−2.78
Lvol	−0.0152	−0.93	−0.0127	−0.79	−0.0146	−0.89	−0.0121	−0.75
Size	0.0000	0.01	0.0000	−0.22	0.0000	−0.03	0.0000	−0.27
Lbm	0.0002	1.14	0.0002	1.10	0.0002	1.09	0.0002	1.05
Adj.R^2	4.12%		4.10%		4.11%		4.10%	
	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff
PERS	0.2319	0.0692%	0.2319	0.0648%	0.3305	0.0636%	0.3305	0.0588%
CONT	0.0358	−0.0408%	0.0369	0.0207%	0.0328	−0.0743%	0.0339	0.1036%
OTHER	1.1260	0.0902%	1.1261	0.0885%	1.1333	0.0734%	1.1333	0.0721%

Table B7: Predictability Decomposition (Continued)

(b) QMP 2010-2015

First Stage of Projecting Order Imbalance on Persistence and Past Returns

| | $\text{Mroivol}_{i,w-1}$ Bid-Ask Return | | $\text{Mroivol}_{i,w-1}$ CRSP Return | | $\text{Mroitrd}_{i,w-1}$ Bid-Ask Return | | $\text{Mroitrd}_{i,w-1}$ CRSP Return | |
	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat
Intercept	−0.1507	−21.98	−0.1505	−21.97	−0.1094	−13.80	−0.1092	−13.79
$\text{Mroibvol}_{i,w-2}$	0.2417	91.63	0.2418	91.64	0.2945	98.54	0.2946	98.53
$\text{Ret}_{i,w-2}$	−0.9146	−39.00	−0.9175	−39.46	−0.8332	−35.86	−0.8379	−36.31
$\text{Ret}_{i,m-1}$	−0.1056	−8.48	−0.1055	−8.47	−0.0459	−3.87	−0.0458	−3.86
$\text{Ret}_{i,m-7,m-2}$	0.0095	1.92	0.0095	1.90	0.0344	6.34	0.0343	6.33
Adj.R^2	6.52%		6.52%		9.32%		9.33%	

Second-Stage Decomposition of Order Imbalance's Predictive Power

| | $\text{Mroivol}_{i,w}$ Bid-Ask Return | | $\text{Mroivol}_{i,w}$ CRSP Return | | $\text{Mroitrd}_{i,w}$ Bid-Ask Return | | $\text{Mroitrd}_{i,w}$ CRSP Return | |
	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat	Coef.	*t*-Stat
Intercept	0.0034	2.19	0.0036	2.32	0.0032	2.07	0.0034	2.20
PERS	0.0026	8.32	0.0024	6.37	0.0018	6.89	0.0016	5.36
CONT	0.0057	0.69	−0.0133	−1.17	−0.0105	−0.27	0.0820	1.43
OTHER	0.0009	13.28	0.0008	12.76	0.0007	10.47	0.0007	9.98
$\text{Ret}_{i,w-1}$	−0.0173	−5.38	−0.0201	−6.22	−0.0174	−5.41	−0.0202	−6.25
$\text{Ret}_{i,m-1}$	0.0000	−0.01	−0.0002	−0.13	−0.0002	−0.13	−0.0005	−0.25
$\text{Ret}_{i,m-7,m-2}$	0.0006	0.93	0.0006	0.91	0.0006	0.88	0.0006	0.86
Lmto	0.0000	−2.82	0.0000	−2.96	0.0000	−2.73	0.0000	−2.86
Lvol	−0.0150	−0.91	−0.0120	−0.74	−0.0138	−0.84	−0.0107	−0.66
Size	0.0000	−0.09	−0.0001	−0.34	0.0000	−0.08	0.0000	−0.32
Lbm	0.0002	1.08	0.0002	1.05	0.0001	0.99	0.0001	0.96
Adj.R^2	4.11%		4.09%		4.09%		4.08%	
	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff
PERS	0.2836	0.0745%	0.2837	0.0687%	0.3466	0.0635%	0.3467	0.0569%
CONT	0.0401	0.0229%	0.0415	−0.0553%	0.0358	−0.0375%	0.0372	0.3046%
OTHER	1.1190	0.0953%	1.1192	0.0919%	1.0977	0.0788%	1.0976	0.0752%

Table B7: Predictability Decomposition (Continued)

(c) BJZZ 2016-2021

First Stage of Projecting Order Imbalance on Persistence and Past Returns

	$\text{Mroivol}_{i,w-1}$ Bid-Ask Return		$\text{Mroivol}_{i,w-1}$ CRSP Return		$\text{Mroitrd}_{i,w-1}$ Bid-Ask Return		$\text{Mroitrd}_{i,w-1}$ CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	−0.0804	−22.69	−0.0803	−22.70	−0.0209	−4.70	−0.0208	−4.68
$\text{Mroibvol}_{i,w-2}$	0.1003	60.92	0.1003	60.92	0.2281	89.64	0.2281	89.63
$\text{Ret}_{i,w-2}$	−0.3506	−26.56	−0.3483	−26.59	−0.4036	−29.31	−0.4016	−29.34
$\text{Ret}_{i,m-1}$	−0.0697	−10.75	−0.0698	−10.76	−0.0676	−10.67	−0.0677	−10.68
$\text{Ret}_{i,m-7,m-2}$	−0.0130	−4.04	−0.0130	−4.05	−0.0031	−1.09	−0.0031	−1.11
Adj.R^2	1.20%		1.20%		5.70%		5.70%	

Second-Stage Decomposition of Order Imbalance's Predictive Power

	$\text{Mroivol}_{i,w}$ Bid-Ask Return		$\text{Mroivol}_{i,w}$ CRSP Return		$\text{Mroitrd}_{i,w}$ Bid-Ask Return		$\text{Mroitrd}_{i,w}$ CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	0.0043	2.29	0.0046	2.45	0.0043	2.29	0.0046	2.45
PERS	0.0026	1.80	0.0024	1.58	0.0022	3.23	0.0022	3.19
CONT	−0.0885	−1.01	−0.1385	−0.69	−0.0074	−0.13	0.5561	1.46
OTHER	0.0006	7.68	0.0006	7.40	0.0006	4.89	0.0006	4.57
$\text{Ret}_{i,w-1}$	−0.0128	−3.40	−0.0161	−4.32	−0.0128	−3.41	−0.0162	−4.33
$\text{Ret}_{i,m-1}$	−0.0019	−1.01	−0.0020	−1.05	−0.0019	−0.98	−0.0019	−1.02
$\text{Ret}_{i,m-7,m-2}$	−0.0002	−0.29	−0.0002	−0.33	−0.0002	−0.31	−0.0002	−0.35
Lmto	0.0000	−0.94	0.0000	−1.14	0.0000	−0.94	0.0000	−1.14
Lvol	0.0121	0.72	0.0170	1.02	0.0118	0.70	0.0167	1.00
Size	−0.0002	−1.25	−0.0003	−1.50	−0.0002	−1.29	−0.0003	−1.55
Lbm	0.0001	0.59	0.0001	0.63	0.0001	0.60	0.0001	0.63
Adj.R^2	4.70%		4.68%		4.74%		4.71%	
	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff
PERS	0.0913	0.0241%	0.0913	0.0221%	0.1810	0.0402%	0.1810	0.0400%
CONT	0.0164	−0.1453%	0.0165	−0.2282%	0.0196	−0.0146%	0.0198	1.1010%
OTHER	0.9640	0.0580%	0.9640	0.0566%	0.7614	0.0480%	0.7613	0.0451%

Table B7: Predictability Decomposition (Continued)

(d) QMP 2016-2021

First Stage of Projecting Order Imbalance on Persistence and Past Returns

	$\text{Mroivol}_{i,w-1}$ Bid-Ask Return		$\text{Mroivol}_{i,w-1}$ CRSP Return		$\text{Mroitrd}_{i,w-1}$ Bid-Ask Return		$\text{Mroitrd}_{i,w-1}$ CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	−0.1436	−24.95	−0.1435	−24.94	−0.0268	−3.81	−0.0266	−3.79
$\text{Mroibvol}_{i,w-2}$	0.1794	86.84	0.1794	86.84	0.3061	138.00	0.3062	137.97
$\text{Ret}_{i,w-2}$	−0.5597	−31.36	−0.5601	−31.70	−0.5262	−32.16	−0.5270	−32.58
$\text{Ret}_{i,m-1}$	−0.0888	−10.32	−0.0889	−10.31	−0.0404	−5.49	−0.0405	−5.48
$\text{Ret}_{i,m-7,m-2}$	−0.0101	−2.43	−0.0102	−2.44	0.0184	5.68	0.0183	5.67
Adj.R^2	3.64%		3.64%		9.92%		9.92%	

Second-Stage Decomposition of Order Imbalance's Predictive Power

	$\text{Mroivol}_{i,w}$ Bid-Ask Return		$\text{Mroivol}_{i,w}$ CRSP Return		$\text{Mroitrd}_{i,w}$ Bid-Ask Return		$\text{Mroitrd}_{i,w}$ CRSP Return	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Intercept	0.0046	2.45	0.0049	2.61	0.0043	2.29	0.0046	2.44
PERS	0.0029	4.64	0.0029	4.56	0.0013	2.45	0.0012	2.38
CONT	0.0324	0.78	0.0234	0.56	−0.0271	−0.72	0.0438	0.95
OTHER	0.0009	9.94	0.0009	9.33	0.0007	5.08	0.0006	4.47
$\text{Ret}_{i,w-1}$	−0.0130	−3.46	−0.0165	−4.40	−0.0130	−3.46	−0.0164	−4.40
$\text{Ret}_{i,m-1}$	−0.0018	−0.94	−0.0019	−0.98	−0.0019	−0.99	−0.0020	−1.03
$\text{Ret}_{i,m-7,m-2}$	−0.0002	−0.33	−0.0002	−0.37	−0.0002	−0.39	−0.0003	−0.42
Lmto	0.0000	−0.98	0.0000	−1.19	0.0000	−0.97	0.0000	−1.18
Lvol	0.0106	0.63	0.0156	0.93	0.0121	0.72	0.0171	1.03
Size	−0.0002	−1.33	−0.0003	−1.59	−0.0002	−1.25	−0.0003	−1.50
Lbm	0.0001	0.70	0.0001	0.73	0.0001	0.66	0.0001	0.69
Adj.R^2	4.73%		4.71%		4.76%		4.74%	
	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff	IQR	R. Diff
PERS	0.1845	0.0534%	0.1845	0.0529%	0.2970	0.0371%	0.2971	0.0362%
CONT	0.0266	0.0862%	0.0271	0.0635%	0.0257	−0.0697%	0.0261	0.1144%
OTHER	1.0331	0.0941%	1.0332	0.0901%	0.8861	0.0579%	0.8861	0.0517%

Table B8: Marketable Retail Order Imbalance and Contemporaneous Returns

This table reports the complete set of results of Table 8 in our paper. Please refer to Table 8 in our paper for details.

(a) BJZZ 2010-2015

	Intense Selling		Selling		Buying		Intense Buying	
	Mean	*t*-Stat	Mean	*t*-Stat	Mean	*t*-Stat	Mean	*t*-Stat
Cumulative Market-Adjusted Return								
$k = -20$	0.0074**	7.33	0.0066**	8.18	−0.0127**	−15.39	−0.0166**	−19.30
$k = -15$	0.0071**	9.34	0.0064**	10.94	−0.0108**	−17.91	−0.0137**	−21.05
$k = -10$	0.0059**	10.89	0.0055**	13.04	−0.0083**	−19.19	−0.0103**	−20.67
$k = -5$	0.0039**	12.56	0.0035**	15.59	−0.0051**	−19.37	−0.0064**	−20.74
$k = 0$	−0.0026**	−6.49	−0.0021**	−6.30	0.0016**	4.82	0.0021**	5.44
$k = 5$	−0.0017**	−6.58	−0.0012**	−5.96	0.0018**	9.12	0.0026**	10.34
$k = 10$	−0.0028**	−6.04	−0.0021**	−6.46	0.0027**	7.70	0.0039**	9.09
$k = 15$	−0.0039**	−6.10	−0.0028**	−5.98	0.0032**	6.72	0.0049**	8.36
$k = 20$	−0.0047**	−5.38	−0.0036**	−5.28	0.0034**	4.82	0.0052**	6.27
Weekly Market-Adjusted Return								
$k = -20$	0.0007*	2.48	0.0006*	2.44	−0.0018**	−8.18	−0.0028**	−10.48
$k = -15$	0.0014**	4.69	0.0012**	6.01	−0.0024**	−10.00	−0.0033**	−12.31
$k = -10$	0.0021**	6.47	0.0020**	7.83	−0.0031**	−13.25	−0.0039**	−13.42
$k = -5$	0.0039**	12.56	0.0035**	15.59	−0.0051**	−19.37	−0.0064**	−20.74
$k = 0$	−0.0026**	−6.49	−0.0021**	−6.30	0.0016**	4.82	0.0021**	5.44
$k = 5$	−0.0017**	−6.58	−0.0012**	−5.96	0.0018**	9.12	0.0026**	10.34
$k = 10$	−0.0011**	−3.97	−0.0009**	−4.91	0.0009**	3.91	0.0013**	4.83
$k = 15$	−0.0010**	−3.85	−0.0007**	−3.64	0.0007**	3.56	0.0012**	4.49
$k = 20$	−0.0007*	−2.48	−0.0005**	−2.72	0.0004	1.84	0.0004	1.71

(b) QMP 2010-2015

	Intense Selling		Selling		Buying		Intense Buying	
	Mean	*t*-Stat	Mean	*t*-Stat	Mean	*t*-Stat	Mean	*t*-Stat
Cumulative Market-Adjusted Return								
$k = -20$	0.0075**	7.16	0.0067**	8.17	−0.0120**	−15.43	−0.0154**	−18.32
$k = -15$	0.0074**	9.49	0.0066**	11.03	−0.0103**	−17.73	−0.0130**	−20.85
$k = -10$	0.0061**	10.90	0.0056**	13.01	−0.0080**	−18.83	−0.0101**	−21.55
$k = -5$	0.0040**	11.46	0.0035**	13.44	−0.0049**	−18.81	−0.0061**	−21.04
$k = 0$	−0.0040**	−8.84	−0.0037**	−10.94	0.0041**	11.72	0.0048**	10.84
$k = 5$	−0.0019**	−7.31	−0.0015**	−7.15	0.0019**	9.87	0.0027**	10.43
$k = 10$	−0.0033**	−7.12	−0.0023**	−6.54	0.0029**	8.35	0.0041**	9.12
$k = 15$	−0.0047**	−7.45	−0.0031**	−6.17	0.0034**	7.11	0.0048**	8.13
$k = 20$	−0.0052**	−6.00	−0.0037**	−5.20	0.0034**	5.03	0.0051**	6.36
Weekly Market−Adjusted Return								
$k = -20$	0.0004	1.40	0.0006*	2.48	−0.0016**	−7.54	−0.0023**	−8.99
$k = -15$	0.0014**	4.66	0.0012**	5.45	−0.0022**	−10.01	−0.0030**	−11.83
$k = -10$	0.0022**	7.56	0.0022**	9.43	−0.0032**	−13.18	−0.0040**	−14.96
$k = -5$	0.0040**	11.46	0.0035**	13.44	−0.0049**	−18.81	−0.0061**	−21.04
$k = 0$	−0.0040**	−8.84	−0.0037**	−10.94	0.0041**	11.72	0.0048**	10.84
$k = 5$	−0.0019**	−7.31	−0.0015**	−7.15	0.0019**	9.87	0.0027**	10.43
$k = 10$	−0.0013**	−4.62	−0.0008**	−3.98	0.0010**	4.84	0.0014**	4.97
$k = 15$	−0.0012**	−4.54	−0.0008**	−3.82	0.0006**	3.36	0.0008**	2.93
$k = 20$	−0.0004	−1.30	−0.0003	−1.73	0.0002	1.25	0.0004	1.58

Table B8: Marketable Retail Order Imbalance and Contemporaneous Returns (Continued)

(c) BJZZ 2016-2021

	Intense Selling		Selling		Buying		Intense Buying	
	Mean	t-Stat	Mean	t-Stat	Mean	t-Stat	Mean	t-Stat
Cumulative Market-Adjusted Return								
$k = -20$	-0.0025^*	-2.06	-0.0008	-1.04	-0.0142^{**}	-14.76	-0.0179^{**}	-12.93
$k = -15$	-0.0009	-0.90	0.0002	0.36	-0.0117^{**}	-16.10	-0.0148^{**}	-13.69
$k = -10$	0.0005	0.64	0.0008	1.60	-0.0091^{**}	-17.21	-0.0114^{**}	-14.88
$k = -5$	0.0009	1.80	0.0009^{**}	2.89	-0.0059^{**}	-17.72	-0.0071^{**}	-16.25
$k = 0$	-0.0054^{**}	-9.81	-0.0043^{**}	-9.94	0.0004	1.16	-0.0003	-0.60
$k = 5$	-0.0013^{**}	-3.16	-0.0009^{**}	-3.88	0.0007^*	2.46	0.0007	1.84
$k = 10$	-0.0021^{**}	-2.85	-0.0013^{**}	-3.40	0.0009	1.94	0.0014^*	2.17
$k = 15$	-0.0032^{**}	-3.34	-0.0021^{**}	-3.61	0.0014^*	2.28	0.0019^*	2.06
$k = 20$	-0.0038^{**}	-3.06	-0.0024^{**}	-3.06	0.0018^*	2.41	0.0020	1.90
Weekly Market$-$Adjusted Return								
$k = -20$	-0.0012^{**}	-3.28	-0.0008^{**}	-2.98	-0.0023^{**}	-7.63	-0.0029^{**}	-6.88
$k = -15$	-0.0013^{**}	-3.34	-0.0005^*	-2.05	-0.0027^{**}	-9.11	-0.0033^{**}	-8.09
$k = -10$	-0.0004	-1.04	-0.0001	-0.46	-0.0032^{**}	-11.20	-0.0043^{**}	-10.41
$k = -5$	0.0009	1.80	0.0009^{**}	2.89	-0.0059^{**}	-17.72	-0.0071^{**}	-16.25
$k = 0$	-0.0054^{**}	-9.81	-0.0043^{**}	-9.94	0.0004	1.16	-0.0003	-0.60
$k = 5$	-0.0013^{**}	-3.16	-0.0009^{**}	-3.88	0.0007^*	2.46	0.0007	1.84
$k = 10$	-0.0008	-1.83	-0.0004	-1.68	0.0002	0.74	0.0007	1.71
$k = 15$	-0.0011^{**}	-2.97	-0.0008^{**}	-2.88	0.0005	1.69	0.0005	1.35
$k = 20$	-0.0007	-1.56	-0.0004	-1.35	0.0003	0.91	0.0000	0.07

(d) QMP 2016-2021

	Intense Selling		Selling		Buying		Intense Buying	
	Mean	t-Stat	Mean	t-Stat	Mean	t-Stat	Mean	t-Stat
Cumulative Market-Adjusted Return								
$k = -20$	0.0012	0.84	0.0026^*	2.53	-0.0161^{**}	-15.42	-0.0219^{**}	-14.46
$k = -15$	0.0020	1.65	0.0031^{**}	3.70	-0.0137^{**}	-15.90	-0.0185^{**}	-15.33
$k = -10$	0.0025^{**}	2.62	0.0031^{**}	4.56	-0.0110^{**}	-15.94	-0.0145^{**}	-15.72
$k = -5$	0.0022^{**}	4.07	0.0024^{**}	5.92	-0.0069^{**}	-15.31	-0.0087^{**}	-15.37
$k = 0$	-0.0067^{**}	-11.19	-0.0060^{**}	-13.08	0.0032^{**}	8.85	0.0028^{**}	5.41
$k = 5$	-0.0020^{**}	-4.46	-0.0013^{**}	-4.69	0.0013^{**}	4.47	0.0020^{**}	4.82
$k = 10$	-0.0032^{**}	-4.29	-0.0020^{**}	-4.05	0.0016^{**}	3.44	0.0023^{**}	3.76
$k = 15$	-0.0046^{**}	-4.51	-0.0030^{**}	-4.09	0.0024^{**}	3.89	0.0032^{**}	4.03
$k = 20$	-0.0054^{**}	-3.96	-0.0039^{**}	-4.13	0.0027^{**}	3.73	0.0033^{**}	3.51
Weekly Market-Adjusted Return								
$k = -20$	-0.0006	-1.28	-0.0004	-1.16	-0.0024^{**}	-8.43	-0.0034^{**}	-7.93
$k = -15$	-0.0002	-0.56	0.0002	0.87	-0.0029^{**}	-9.37	-0.0041^{**}	-9.36
$k = -10$	0.0003	0.65	0.0007^*	2.10	-0.0043^{**}	-12.72	-0.0059^{**}	-12.50
$k = -5$	0.0022^{**}	4.07	0.0024^{**}	5.92	-0.0069^{**}	-15.31	-0.0087^{**}	-15.37
$k = 0$	-0.0067^{**}	-11.19	-0.0060^{**}	-13.08	0.0032^{**}	8.85	0.0028^{**}	5.41
$k = 5$	-0.0020^{**}	-4.46	-0.0013^{**}	-4.69	0.0013^{**}	4.47	0.0020^{**}	4.82
$k = 10$	-0.0013^{**}	-2.87	-0.0007^*	-2.20	0.0003	1.11	0.0004	1.21
$k = 15$	-0.0015^{**}	-3.21	-0.0009^{**}	-3.02	0.0007^{**}	2.65	0.0009^*	2.26
$k = 20$	-0.0007	-1.47	-0.0009^{**}	-2.65	0.0003	1.15	0.0001	0.20