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Are Trade Size-Based Inferences About Traders Reliable? Evidence from Institutional Earnings-Related Trading

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ABSTRACT

The use of observed transaction sizes to differentiate between "small" and "large" investor trading patterns is widespread. A significant concern in such studies is spurious effects attributable to misclassification of transactions, particularly those originating from large investors. Such effects can arise unintentionally, strategically, or endogenously. We examine comprehensive records of a sample of institutional investors (i.e., "large" traders), including their order sizes and overall position changes, to assess the degree to which such misclassifications give rise to spurious inferences about "small" and "large" investor trading activities. Our analysis shows that these institutions are heavily involved in small transaction activity. It also shows that they increase their order sizes substantially in announcement periods relative to nonannouncement periods, presumably as an endogenous response to earnings news. In the immediate earnings announcement period, transaction size-based inferences about directional trading are quite misleading—producing

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spurious "small trader" effects and, more surprisingly, erroneous inferences about "large trader" activity.

1. Introduction

A considerable body of research, building on early work by Cready [1988] and Lee [1992] explores how investor information processing activity as expressed through trading differs by investor size. Commonly, these analyses infer trader characteristics indirectly, using transaction size to identify a trader as small (individual) or large (institutional).[1] As is also often recognized by such studies, these categorizations are imperfect. For example, large investor orders are often broken up in execution, resulting in multiple small transactions that are likely to be misattributed to small investors. If such distortions are systematic (e.g., they are related to the price adjustment process that is taking place), then linking size-stratified trading findings with investor scale is problematic. Small transaction activities of large investors or, conversely, large transaction activities of small investors, represent alternative explanations for supposed differences between small and large investors.

We investigate the reliability of transaction size-based inferences about trader behaviors using a detailed database on institutional transactions from Ancerno Ltd. These investors are all pension or mutual funds and Puckett and Yan [2011] conclude that Ancerno trading accounts for around 10% of institutional trading activity. We examine how Ancerno trading shows up across conventional small and large trade size classifications and the degree to which transaction size-based inferences accurately reflect underlying position changes. The analysis focuses on earnings announcement trading because the announcement trading response is quite large (per the existing literature) and has been subjected to extensive transaction size-based analysis. Hence, we should be able to readily detect systematic trading effects within the subset of investors examined. We can also interpret and relate what we find from the perspective of a sizable existent body of knowledge on transaction size-stratified trading around announcement dates.

We find that in announcement periods Ancerno investors seemingly trade in an unsophisticated manner. They buy when analyst or random walk earnings forecast errors are negative (bad news) and sell when these

[1] A review of the literature subsequent to Cready [1988] and Lee [1992] identified over 30 published papers employing transaction size-based techniques with 10 of them appearing in year 2010 or later. Most of these explicitly link these techniques to the idea of isolating individual or "small investor" from institutional or "large investor" trading activity, although a very few of them (e.g., O'Neil and Swisher [2003]) appeal to a more generic notion that trade size reflects how "informed" a trade is. That is, "large" transactions reflect informed trading while "small" transactions reflect uninformed trading apart from any link to the size of the investor making the trade.

errors are positive (good news). These patterns conflict with existing transaction size evidence that "large traders" trade in the direction of the analyst forecast error and ignore the random walk error (Battalio and Mendenhall [2005; henceforth BM], Ayers, Li, and Yeung [2011; henceforth ALY]). However, even though Ancerno investor trading constitutes a sizable portion of overall market trading activity, we find no evidence that their drift-facilitating announcement period trading impacts the magnitude of the subsequent post-earnings-announcement drift (PEAD).

Our analysis further identifies three substantive issues pertinent to drawing inferences about information-driven trading activities of small and large traders based on transaction sizes. First, large investors are heavily involved in small transaction and order activity.[2] In our data, it is not uncommon for over 50% of these investors' transactions to take place within traditional "small" investor transaction size categories. Hence, traditional "small investor" trade size cut-offs contain considerable levels of large investor trading. And, since this activity is intentional on the part of these investors (i.e., they choose to enter "small" orders), it follows that underlying factors that lead large investors to engage or not engage in small trade size activity is a potentially confounding factor when attributing small trade size findings to small traders.

Second, order sizes of Ancerno investors increase around 40% in announcement periods. Hence order and, by extension, transaction size are substantive endogenous aspects of investor response to information. This trade size effect undercuts the reliability of commonly encountered assertions based on transaction size categories. For example, in our data, trading activity increases by much higher percentages in large trade size categories relative to small trade size categories, consistent with the idea that investor responsiveness to earnings news increases with size/scale (Cready [1988], Lee [1992]). However, the opposite is true when we examine response by institution size: smaller institution trading response is stronger than large institution response. It is the upward shift in order sizes that gives rise to the appearance of a higher (lower) trade response by large (small) investors in our analyses. This finding has implications for small trade size-based inferences about small investor trading found in the existing literature. For example, is the Asthana, Balsam, and Sankaraguruswamy [2004] finding that EDGAR increased small, but not large, trader response to 10K filings due to small investors ramping up their trading, or is it due to large investors becoming less inclined to shift to larger event period order sizes in the new EDGAR disclosure environment? Is the lower small trader response to relative report complexity in Miller [2010] due to inhibited information

[2] An order represents a specific point-in-time request by an investor to buy or sell shares of a security. Execution of such orders results in transactions. In the execution process, a single order can be broken up into multiple transactions or several orders can be aggregated together into a single transaction. This distinction is important because trade size-based research largely relies on easy-to-observe transactions rather than hard-to-observe orders.

processing by small traders or to institutions being more inclined to shift from small to large order sizes when reports are complex?

Third, inferences about differences in "small" and "large" investor announcement period directional trading behaviors are impacted by how orders show up as executed transactions. At the order level, Ancerno investors are forecast error contrarian or neutral across both small and large order size categories. At the transaction level, however, these consistent patterns shift—net buying is positively associated with the simple random walk forecast error within small trade size categories and with the analyst forecast error within large trade size categories. That is, the process by which orders are converted into transactions gives rise to spurious inferences about the actual trading activities of these investors. It seems likely that the information assimilation process accompanying the earnings announcement introduces systematic biases into how orders are processed into transactions. Moreover, this proclivity toward generating spurious "wrong direction" relations raises serious reliability issues for directional transaction size-based analyses. Specifically, absent the supplemental order and position change data available to us, a conventional transactions-based analysis would wrongly suggest that small Ancerno investors trade with random walk forecast error and against analyst forecast error (behaviors the literature attributes to "small traders") and that large Ancerno investors trade with the analyst forecast error (a behavior the literature attributes to "large" traders).[3]

2. *Related Literature*

2.1 TRANSACTION SIZE-BASED ANALYSES

Cready [1988] introduces the linkage of transaction sizes with trader size as a means for evaluating differences in trading patterns across investor types and concludes that large traders, particularly institutional traders, are more responsive and more quickly responsive to earnings news than smaller traders. Lee [1992] adds directional insight to small and large announcement period trading, employing surrounding bid-ask quotes to infer trade direction (Lee and Ready [1991]) and finds that small traders also tend to buy after earnings announcements irrespective of the direction of the earnings news. Subsequent studies find that small traders are more responsive to random walk forecast errors (Bhattacharya [2001], BM) and to pro-forma earnings numbers (Allee et al. [2007], Bhattacharya, Black, and Christensen [2007]) and less responsive to annual report complexity (Miller [2010]).

[3] Analyses of broader sets of institutions such as Kaniel et al. [2012] indicate that, at the aggregate, institutions do appear to trade in an AFE-consistent fashion after earnings announcements and, in fact, in our data they also trade in an AFE-consistent fashion in the post-announcement period (i.e., days +6 to +65 after the announcement date). They do not seem to do so, however, in the immediate announcement period.

Several studies examining directional trading find evidence of large and small traders trading in opposite directions from each other. BM find that, with respect to analyst forecast errors, small traders are net sellers while large traders are net buyers in the announcement period. ALY find a similar pattern holds in the post-announcement period. They also find evidence that large traders appear to trade against the random walk forecast error in the post-announcement period while small traders trade in the direction of the random walk forecast error. Battalio et al. [2012] find that small and large traders trade in opposite directions in response to accrual information.

Frankel, Johnson, and Skinner [1999] employ transaction sizes to infer that large investors are more active than small investors in response to conference calls (see also, Bushee, Matsumoto, and Miller [2003]). Transaction sizes are also used to assess differences between small and large investor responses to analyst recommendations (Malmendier and Shanthikumar [2007], Mikhail, Walther, and Willis [2007]) and the relative usefulness of EDGAR filings to small versus large investors (Asthana, Balsam, and Sankaraguruswamy [2004]). In the tax literature, trade size-based designs are used to discriminate between tax-driven trading differences between individuals and institutions (e.g., Seida [2001], Ayers, Li, and Robinson [2008], Li [2010]).

2.2 TRANSACTION SIZE AND INVESTOR TYPE

Reliability of transaction sizes as a means of identifying underlying trader sizes and types is addressed to some degree in the existing literature. Cready [1988] cites share ownership data collected by the NYSE as a supporting linkage between trade size and portfolio size. An analysis of a proprietary set of institutional orders by Chan and Lakonishok [1993] suggests that fewer than 10% of their orders are under $10,000 in value. Lee and Radhakrishna [2000] find that, while market orders are not generally split up in execution, when such splits do happen they coincide with substantive price changes. They also report a high degree of correspondence between order and transaction sizes and whether the trade is initiated by an individual or institutional investor and that large trades are almost entirely attributable to institutions. However, their data cover only three months of trading for 144 firms. Barber, Odean, and Zhu [2009] identify a strong general link between small investor net buying based on detailed brokerage records of individual orders and transaction size–inferred small trader net buying. Collectively, this evidence supports the notion that, in general, small investor trading patterns survive within small transaction size partitions. What is not clear from these analyses, however, is: (1) how well the small trader small transaction size linkage holds up in specific conditional settings such as information assimilation and price adjustment periods; and, (2) whether large trader trading in small trade sizes introduces confounding effects into small trade size patterns.

In contrast to fairly common concerns about large investor trade activity taking the form of small transactions, there is general acceptance of the notion that large trade size activity is dominated by institutional investors. Campbell, Ramadori, and Schwartz [2009] explore this idea empirically, examining the relation between changes in quarterly institutional holdings and trading activity across transaction size categories. They find that an estimation-based moving cutoff outperforms fixed cutoff points (e.g., transactions in excess of $30,000) in identifying institutional ownership changes. However, they conclude that transaction sizes in excess of $30,000 are revealing of institutional trading activity. But, of direct relevance to our findings, they find that small transactions (those under $2,000) are also revealing of institutional trading activity, particularly when the traded stock has a high level of institutional ownership.

2.3 EARNINGS ANNOUNCEMENT TRADING

Earnings announcement–related trading is the focus of our analysis due to its magnitude and the extensive attention the literature gives it. Cready [1988] and Lee [1992] conclude that large traders are more responsive to earnings news based on comparisons of the degree to which large trade size activity increases relative to small trade size activity. They also find that large trader responses are speedier as large trade size (trader) increases are higher and relatively more concentrated in the immediate announcement period (e.g., day or hour of the announcement disclosure). Lee [1992] also evaluates directional trade responses to earnings news. He finds that net buying occurs in small trade size categories regardless of the direction of the earnings news. Bhattacharya [2001] argues that smaller investors are mostly unaware of analyst forecasts and sophisticated time series–based earnings expectations models. He finds that small investors are more responsive to seasonal random walk earnings forecast errors (*SRWFE*). He also finds that large investor trading is negatively related to both *SRWFE* and analyst forecast error (*AFE*) magnitudes. That is, large investors seemingly actively avoid trading on forecast errors.

BM build on the Bhattacharya [2001] analysis by introducing directional trading metrics. BM find that net buy activity of large investors is positively associated with *AFE* and unrelated to *SRWFE*. Alternatively, the net buy activity of small investors is positively associated with *SRWFE*. Shanthikumar [2012], however, shows that this directional trading impact is specific to those instances when the earnings change is preceded by a prior same direction earnings change, reflecting a behavioral "momentum" effect. BM also find that small transaction size net buying is negatively associated with *AFE*.

ALY extend the BM analysis to examine trading patterns by large and small investors in the post-announcement period. Their analysis revisits issues initially addressed in Shanthikumar [2004] concerning the relation between small and large directional trade size activity and PEAD. Shanthikumar focuses mostly on *SRWFE* and presents a more mixed

picture of small and large trader post–earnings announcement trading activity. Large traders, but not small traders, trade in the first few weeks after the announcement date in the direction of *SRWFE*. ALY find that in the post-announcement period small trade size net buying is clearly in the direction of the random walk forecast error but is contrary to *AFE*. While, for large trade sizes, net buying is contrary to the *SRWFE* but consistent with the *AFE*. They also find that the magnitude of the *SRWFE* based PEAD effect is negatively related to announcement period small trade size net buying and positively related to announcement period large trade size net buying, a result that is similar to findings reported in Shanthikumar [2004]. The magnitude of the analyst forecast PEAD effect, however, is unrelated to small investor net buying and negatively related to large investor announcement period net buying.

In contrast with transaction size-based lines of inquiry, several recent efforts employ more direct measures of individual and institutional trading. Hirshleifer et al. [2008] and Taylor [2010, 2011] employ brokerage house records of individual trades in the 1991–1996 time period to examine relations between individual investor trading behavior and the PEAD. Hirshleifer et al. [2008] find some evidence that individual investor net buying in the immediate post-announcement period is negatively related to subsequent returns. This effect seems unrelated to earnings surprises since the drift coefficient (on *SRWFE*) is unaffected by the inclusion of individual investor net buying as an additional explanatory variable. Taylor [2010] finds that directional individual investor trading, particularly trading by less active individuals, around earnings announcements is more negatively associated with subsequent returns than is generally true.[4] Taylor [2011] finds that the announcement period earnings surprise coefficient magnitude is larger and the PEAD magnitude is larger when individual announcement period trading is surprise contrarian. He also finds evidence of a positive relation between *SRWFE* and individual investor announcement period net buying activity.

Most recently, Kaniel et al. [2012] examine earnings announcement trading using the NYSE's Consolidated Equity Audit Trail Data, which identifies all NYSE executed orders by retail traders in the 2000–2003 time period to examine earnings announcement–related trading. They find no evidence of a relation between directional individual investor announcement period trading and *AFE*, in contrast to the positive "small trader" relation documented in ALY and the brokerage analysis of Taylor [2011]. They also find

[4] Hirshleifer et al. [2008] also present evidence of an inverse relation between net buy and subsequent return, which is broadly consistent with the general negative relation identified in Odean [1999]. However, evidence in Kaniel et al. [2012] identifies a positive relation between pre-announcement individual trade imbalance and earnings announcement returns, which is incremental to the general positive relation between individual investor net buying and returns documented in Kaniel, Saar, and Titman [2008]. And, table 4 of ALY suggests a positive marginal relation between announcement period small trade size net buying and post-announcement period return.

that individuals are net sellers at announcement dates in contrast with evidence of announcement period net buying in small transaction sizes documented in Lee [1992]. Griffin, Shu, and Topaloglu [2008, 2012] evaluate NASDAQ trading over the 1997–2002 time period where the type of investor engaged in a trade is inferred based on linking investor types and brokerage houses where orders originate. They find that institutional trading imbalance (net buying) in the announcement period positively predicts returns over the following 65 trading days.

Collectively, the evidence on announcement-related trading strongly supports the position that, in both the immediate announcement and post-announcement periods, directional small transactions are consistent with *SRWFE* and are *AFE*-contrarian. For the immediate announcement period, however, the evidence is mixed as to whether small traders (individual investors) are the source of this directional trading. Directional large transaction size trading is *AFE* consistent in the announcement period, but there is no evidence that directly links this trading with specific types of large investors.

3. Research Issues

Our analysis encompasses three distinct areas of inquiry with respect to institutional and transaction size-stratified trading at and after earnings announcements: (1) How do the types of institutions covered in our data (i.e., pension and mutual funds) trade in response to earnings news and to what extent do such responses vary with institution size? (2) What are the announcement and post-announcement period large transaction size profiles for these institutions? Do they, in particular, accurately reflect the actual order activities and overall position changes that are occurring among these institutions? (3) Finally, what are the small transaction size profiles of these institutions?

3.1 EARNINGS ANNOUNCMENT TRADING BY PENSION AND MUTUAL FUNDS

Our data pertain to trading activity by pension and mutual funds. Compared to other types of institutions (e.g., hedge funds), these types of funds are arguably less sophisticated. Ke and Ramalingegowda [2005], in fact, find evidence that transient institutions (Bushee [2001]) trade in a drift-exploiting manner but that other less sophisticated types (i.e., quasi-indexers and dedicated) do not. Similarly, Griffin, Shu, and Topaloglu [2008] find evidence that general institutional trading (which would include pension and mutual funds) is in the opposite direction of announcement period returns. Hence, it is also of interest to examine the role of these investors in the context of the PEAD phenomenon. Are these types of investors neutral players? Do they trade to exploit the drift? Or, do they possibly trade in a drift-sustaining fashion? This last possibility is particularly

intriguing as the scale at which these investors operate seems sufficient to impact market prices.[5]

Consistent with the approaches taken in Hirshleifer et al. [2008] and ALY, we examine whether earnings announcement trading by pension and mutual funds at announcement dates is in a drift-enhancing or drift-contrarian direction. Similarly, in the post-announcement period we examine whether their trading is consistent with drift reduction or seems to impede the price adjustment process. Consistent with returns-to-scale arguments postulated in Wilson [1975], Ohlson [1975], and Cready [1988], we also examine whether these observed drift-contingent trading patterns change depending on the scale/activity level of the institution as noisily revealed by their aggregate annual level of trade activity.

3.2 INSTITUTIONAL LARGE TRADE ACTIVITY

While there is little question that large transaction size activity is dominated by large, particularly institutional, investors, when these investors are also substantively engaged in small trade size trading, this dominance does not necessarily imply that such data are providing unbiased inferences about their trading. For example, if 75% of large investor activity is in large orders while 25% of it is in small orders, then a large transaction size analysis only covers 75% of their activity. If this 25% is also systematically different in nature from the covered 75%, then a large trade size analysis may not provide reliable inferences about the large investor trading. For instance, suppose overall institutional selling and buying are equal, but, relative to their buy orders, more of their sell orders are small. The relative absence of large sell orders here gives rise to positive net buying in large transactions even though large investor overall buying equals overall selling. So, if institutions trade smaller (i.e., they move the same amount of volume to smaller order sizes) or larger depending on the setting or circumstance, then both large and small transaction size-based inferences about large and small investor trading become problematic.

A unique feature of the Ancerno data is that the position changes achieved by the covered institutions are observable. For our purposes, we measure an institution's daily position change as the net number of shares bought or sold by the institution in a given trading day. So, an institution that purchases 1,000 shares of a given security over the course of a day is identified as a 1,000 share position changer irrespective of whether the change was achieved by means of a single large order (transaction) or 100 small orders (transactions). We use these data to examine whether large transaction and order size metrics accurately reflect the overall trading patterns of these institutions. That is, for example, if transaction level data indicate net buying within large trade size categories, we evaluate if this is

[5] For a given firm in our earnings announcement sample, Ancerno trading averages around 13% of the firm's CRSP volume.

consistent with what is taking place in terms of the actual overall position changes.

3.3 INSTITUTIONAL SMALL TRADE ACTIVITY

Institutions become involved in small trade activity for a number of reasons. For example, a large limit order may end up being broken up as it is executed against multiple market orders. Alternatively, institutions may simply favor making only small changes in their holdings at any given point in time. They simply, as a matter of course, choose to trade small. Finally, they may execute a large change in position by entering a series of small orders.[6]

In general, transaction size-based analyses assume that large/institutional trader activity in small transaction size categories is inconsequential. We evaluate this premise by examining whether announcement and post-announcement period trading in small trade sizes by institutions is consistent with or contrarian to: (1) the existing findings in the transaction size-based literature on small trader trading in these time periods; and, (2) the overall trading patterns of these same institutions. If large investor trading impacts are to be ruled out as a source of the existing small trader announcement and post-announcement period findings, then small transaction size net buying should either be unrelated to or positively related to analyst forecast errors (per BM and ALY) and unrelated or negatively related to random walk forecast errors. The relations between small transaction size net buying and the two earnings surprise measures should also be consistent with the relations obtained for large transaction size trading.

Finally, transaction size-based analyses often use relative trading magnitudes within large and small trade size categories to assess whether small or large traders are more responsive to a given news event. For instance, Cready [1988] and Lee [1992] conclude that large traders are more responsive to earnings news than small traders based on increases within large trade size classifications exceeding increases within small trade size classifications. A key assumption of such analyses is that investors or investor groups are not also systematically shifting their trade sizes in response to news. That is, if a given event causes large investors to shift to or shift out of small trade size categories, then distinguishing trader size effects (i.e., relative activity by small and large traders) from trade size effects (i.e., factors causing traders to increase or decrease their trade sizes) is difficult. We evaluate this issue by examining the degree to which institutional trade sizes differ between announcement period and non–announcement period settings.

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[6] Barclay and Warner [1993] term such trading as "stealth trading"; see also Kyle [1985], Cornell and Sirri [1992], Meulbroek [1992], Anand and Chakravarty [2007], and Akins, Ng, and Verdi [2011].

4. Research Design

Our analysis employs detailed daily institutional trading data from Ancerno Ltd. While the names of the institutional investors are not provided, each institution is identified with a unique client code.[7] Ancerno also provides firm identifiers (CUSIP and TICKER symbol), trade date, execution volume, execution price, and whether the trade is a buy or sell.

4.1 INSTITUTIONAL TRADING METRICS

We employ three distinct trading metrics: (1) directional transactions, (2) directional orders, and (3) directional daily position changes. A directional transaction is the number of shares executed in a specific transaction where the buy/sell determination is based on the underlying order. A directional order is the number of shares entered into the system as a single buy/sell order by the institution. Directional position change is the net sum of all directional transactions that occur in a given day for a given investor in a given security.[8]

Three sets of cutoff points are used to classify transactions, orders, and position changes into small and large trade size categories. First, as in BM, a transaction, order, or position change is categorized as large if it equals or exceeds 5,000 shares and small if it consists of fewer than 500 shares. Second, as in ALY, a transaction, order, or position change is classified as large if dollar value of shares executed equals or exceeds $30,000 and small if its value is less than or equal to $5,000. Third, as a dollar value–based alternative, we also use $10,000 (small) and $50,000 (large) cutoffs (Bhattacharya, Black, and Christensen [2007], Shanthikumar [2004]).

Two approaches are used for forming aggregate directional trading measures: (1) following BM, we create excess net-buy metrics (denoted *Ex_NetNumBuy*) based on the counts of buy and sell transactions, orders, and position changes; (2) following ALY, we create a volume-based buy-sell imbalance metric (denoted *Ex_NetBuy*) using the number of shares executed in a given buy or sell transaction, order, or position change. We calculate the daily average excess net-buy for both the earnings announcement period $[-1, +1]$ and the post-announcement period $[+6, +65]$.

4.1.1. Count-Based Excess Net-Buy. Consistent with BM, $NetNumBuy_{it}$ measures are count-based differences between the total number of buy and sell transactions, orders, or daily position changes for stock i on day t. A positive (negative) $NetNumBuy_{it}$ indicates that the buy count for the given

[7] Data representatives at Ancerno Ltd. indicate that they believe clients submit to Ancerno all their trades for transaction cost analysis including trades executed in the "upstairs" or "dark" market.

[8] All of the reported results are robust to defining position change based on either the sum of directional orders placed in a day (irrespective of whether or not they are executed that day) or the sum of executed directional transactions that were both placed and executed in that same trading day.

metric exceeds the sell count for that metric for firm i on day t. Conventionally, such excess net-buy is adjusted for its expected level based on a non-announcement period average. As our analysis examines both earnings announcement and post–earnings announcement period unexpected trading, consistent with ALY, we use pre–announcement period $[-60, -6]$ trading averages to determine our excess net buy metrics as:

$$Ex\_NetNumBuy_{it}[k_1, k_2] = \frac{(\sum_{\tau=k_1}^{k_2} NetNumBuy_{i\tau})/(k_2 - k_1 + 1) - \sum_{\tau=t-60}^{t-6} NetNumBuy_{i\tau}/55}{\sum_{\tau=t-60}^{t-6} TotalNumBuy_{i\tau}/55}, \quad (1)$$

where t is the earnings announcement date. k_1 and k_2 range from -1 to $+1$ for earnings announcement windows and from $+6$ to $+65$ for post-earnings announcement windows. $TotalNumBuy_{i\tau}$ is the number of transactions, orders, or position changes, as appropriate, in firm i's stock on day τ in the given trade size category.

4.1.2. Net Share Volume-Based Excess Net-Buy. Consistent with ALY, our volume-based net buy metric measures trading as shares rather than as counts. So, the buy-minus-sell metrics here, $BMS_{i\tau}$'s, are differences between total buy and sell transactions, orders, or daily position changes measured in terms of shares involved for stock i on day τ. A positive (negative) *BMS* means net-buying (net-selling) activity. The excess net-buy for the announcement and post-announcement periods relative to the pre-announcement period $[-60, -6]$ is:

$$Ex\_NetBuy_{it}[k_1, k_2] = \frac{(\sum_{\tau=k_1}^{k_2} BMS_{i\tau})/(k_2 - k_1 + 1) - \sum_{\tau=t-60}^{t-6} BMS_{i\tau}/55}{\sum_{\tau=t-60}^{t-6} BPS_{i\tau}/55}. \quad (2)$$

The denominator, $\sum_{\tau=t-60}^{t-6} BPS_{i\tau}/55$, is the daily average number of shares bought *plus* number of shares sold within the relevant trade size category during the benchmark period.

4.2 REGRESSION MODELS

Consistent with BM and ALY, we use the following regression framework to examine the relation between forecast errors and excess net buy activities:

$$Ex\_NetNumBuy_{it} \text{ or } Ex\_NetBuy_{it} = \beta_0 + \beta_1 AFE_{it} + \beta_2 SRWFE_{it} + \varepsilon_{it}, \quad (3)$$

where AFE_{it} is the analyst forecast error obtained by subtracting the consensus analyst forecast from the actual earnings per share on I/B/E/S and scaling by share price at the end of the most recent quarter prior to the earnings announcement date ($(AFE_{it} = (EPS_{it} - CEPS_{it}) / P_{it-1})$).

The consensus analyst forecast ($CEPS_{it}$) is the mean of the analyst earnings per share forecast issued during the 90-day period prior to the earnings announcement.[9] $SRWFE_{it}$ is the seasonal random walk forecast error calculated as the seasonally differenced quarterly earnings before extraordinary items per share in Compustat scaled by price from one quarter before the earnings announcement ($SRWFE_{it} = (EPS_{it} - EPS_{it-4}) / P_{it-1}$). Consistent with BM and ALY, we code *AFE* and *SRWFE* by within-quarter decile and equally space them from −0.5 (lowest decile) to +0.5 (highest decile).

We explore the relationship between excess net buy and forecast errors separately for large and small investors where institution size is based on values of annual trading activities per the Ancerno data. This approach tends to classify active traders as larger and passive traders as smaller. However, to the extent that trader activeness is also indicative of sophistication, then this bias is broadly consistent with the notion of trader sophistication increasing with size.

4.3 DATA AND SAMPLE

We employ institutional trading data from the 2003–2010 period.[10] Ancerno primarily reports trades by pension plan and mutual funds. Ancerno also reports trades by a few clients classified as brokers but we eliminate these from the analysis. Table 1 provides descriptive trading statistics for the 847 unique institutional investors covered in our analysis. In a given year, overall total dollar (share) volume for these investors is nearly $4 trillion (140 billion shares). This number ranges from $7.1 billion (262 million) for the smallest annual trading volume quartile to $3.8 trillion (130 billion) for the largest quartile. The total number of transactions averages around 29 million per year while the total number of orders submitted for execution in a given year is 10.5 million. Hence, orders appear to be commonly executed in a series of transactions.

These investors generate, on average, a total dollar (share) volume of over $11 billion (384 million shares) per year. Per investor, annual average number of transactions (orders) is 81,453 (30,059). Overall, average transaction size is $151,216 (5,359 shares). Average sizes for the smallest (largest) quartiles are $37,287 and 1,398 shares ($161,743 and 5,730 shares). Average order size is nearly triple the average transaction size while the average daily position change is nearly double the average order size. Hence, it seems typical that position changes are achieved using multiple orders and orders are executed in multiple transactions.

Chordia, Roll, and Subrahmanyan [2011] report that the percentage of "large" transactions (those in excess of $10,000) shifted from over 90% to under 50% between 1993 and 2008 with almost all of the shift occurring

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[9] We also use the median analyst forecast over the [−90, −2] period as the consensus forecast and obtain very similar results.

[10] While Ancerno data are available starting in 1997, the data do not encompass substantial numbers of institutions until 2003. Hence, we begin our analysis with the 2003 data.

TABLE 1

Description of Institutional Investor Trading Activity in the Ancerno Sample

	Investor Size by Annual Trading Volume				
	1 = Small	2	3	4 = Large	All
Yearly Aggregate Trading					
Total dollar volume ($ Mil)	7,082	37,679	164,888	3,785,039	3,994,687
Total share volume (Mil)	262	1,398	6,294	130,325	138,278
Number of transactions	193,925	644,395	2,369,452	25,779,264	28,987,037
Number of orders	100,915	311,277	779,545	9,298,638	10,490,375
Number of position changes	129,984	362,657	697,696	3,610,056	4,800,392
Yearly Average per Investor Trading					
Dollar volume per investor ($ 000s)	78,892	417,881	1,853,826	41,747,498	11,024,524
Share volume per investor (000s)	2,931	15,627	71,315	1,446,522	384,099
Number of transactions per investor	2,171	7,222	27,356	289,064	81,453
Number of orders per investor	1,130	3,503	8,868	106,735	30,059
Number of position changes per investor	1,444	4,011	7,791	40,229	13,369
Average Trade Size					
Average transaction size ($)	37,287	59,593	78,694	161,743	151,216
Average transaction size (shares)	1,398	2,229	2,951	5,730	5,359
Average order size ($)	70,870	124,856	227,236	480,222	446,940
Average order size (shares)	2,642	4,657	8,441	16,631	15,532
Average position change ($)	53,998	101,004	228,649	938,986	748,474
Average position change (shares)	2,006	3,778	8,669	32,845	26,301

This table presents summary information on the trading activity of 847 unique institutional investors in the Ancerno data set for the 2003–2010 period. Institutional investors are sorted into four quartiles by total dollar value of shares executed in a given year. *Total dollar volume, Total share volume, Number of transactions,* and *Number of orders* are yearly totals for each investor quartile averaged across all years in the sample period. *Dollar volume per investor, Share volume per investor, Number of transactions per investor,* and *Number of orders per investor* are averages across all investors in a given trading volume quartile in a given year and subsequently averaged across all years in the sample period. *Average transaction size, Average order size,* and *Average position change* are reported for average dollar value of shares and number of shares executed in transactions, orders, and daily position changes. Average trade sizes are also first calculated using trades by all investors in a given trading volume quartile in a given year and subsequently averaged across all years in the sample period.

after 2005. We evaluate the impact of this shift in our data at a descriptive level in table 2, which provides average trade sizes by year for each of the four institution size quartiles. Panel A reports the time series evolution of the average transaction size while panels B and C report order size and position change averages. Our analysis reveals that post-2005 average transaction sizes are sharply lower in only the largest size quartile. This decline is mirrored in order sizes but absent from position changes. Hence, the post-2005 transaction size declines observed in Chordia et al. seem due to increased use of multiple orders to achieve desired position changes by very large institutional investors.[11]

5. Results

5.1 TRADE SIZE AND INSTITUTION SIZE

Table 3 reports trading activity counts for small (<500 shares, <$5,000, and <$10,000) and large (>5,000 shares, >$30,000, >$50,000) trade size pairings in total and by investor size quartile. Reported percentages are these counts divided by all trades, regardless of size, for the given group. Panel A reports counts and percentages based on executed transactions, panel B reports based on submitted orders, and panel C reports based on daily position changes.

The panel A analysis reveals that Ancerno institutions have a substantial small transaction size presence. Depending on the small trade size category in question, between 44.78% (transactions of <$5,000) and 60.95% (transactions of <500 shares) of their transactions are classified as small. Moreover, there is no indication that this presence declines with investor size. The relative activity of the largest two quartiles of investors in each of the three small trade size categories exceeds that of the smallest quartile of investors. For instance, 32.44% of the quartile 1 (smallest) investor trading activity occurs in transactions of less than $5,000, which is substantially lower than the 50.47% and 44.71% companion percentages for the quartile 3 and quartile 4 (largest) investors. So, in this subset of investors, larger investors are relatively more active than smaller investors in small transaction size categories. The positive relation between small transaction involvement and investor size together with the sheer scale of involvement of these institutions in small trades suggest that attributions of all or even most small transactions to individual or "small" investors is likely inappropriate. For instance, given this evidence, it seems highly questionable to rely on small transaction size-based evidence as a basis for asserting that individual investor net buying exhibits a general negative relation with future returns (as is done by Barber, Odean, and Zhu [2009]).

[11] Given this shift in behavior, we repeat all of our analyses using just pre-2006 data. These analyses are provided in the Internet Appendix. We interpret these results as broadly consistent with those reported here.

TABLE 2
Average Trade Sizes

	Investor size by annual trading volume											
	1 = Small Investor			2			3			4 = Large Investor		
	Count	Dollars	Shares	Count	Dollars	Shares	Count	Dollars	Shares	Count	Dollars	Shares
Panel A: Average transaction size												
2003	144,139	39,347	1,601	359,102	64,296	2,812	1,153,588	76,797	3,309	10,643,446	246,237	9,946
2004	153,783	40,003	1,516	480,644	55,489	2,036	972,044	101,078	3,824	20,318,545	213,528	7,418
2005	142,156	41,486	1,460	485,710	67,870	2,401	1,539,983	87,163	3,200	17,822,055	214,481	6,844
2006	201,473	38,739	1,428	723,574	63,732	2,183	1,837,774	103,347	3,407	30,892,774	134,160	4,134
2007	320,569	32,760	953	734,687	72,080	2,049	2,539,622	78,063	2,433	39,847,131	118,827	3,281
2008	198,163	37,725	1,354	943,619	46,439	1,750	2,330,143	88,390	3,311	32,813,964	133,782	4,569
2009	220,592	30,282	1,424	782,523	50,110	2,350	4,553,072	42,508	2,150	24,734,740	127,090	5,777
2010	170,524	37,956	1,448	645,302	56,725	2,252	4,029,393	52,204	1,972	29,161,459	105,840	3,868
Panel B: Average order size												
2003	84,095	67,440	2,743	177,156	130,320	5,700	670,353	132,156	5,695	4,102,986	638,742	25,800
2004	88,172	69,760	2,643	193,844	137,577	5,047	415,627	236,367	8,941	5,705,906	760,140	26,407
2005	78,582	75,033	2,640	235,960	139,645	4,938	506,553	264,962	9,728	5,498,150	695,227	22,184
2006	100,226	77,870	2,870	351,259	131,284	4,497	667,323	284,601	9,381	8,380,863	494,525	15,240
2007	150,563	69,743	2,029	340,129	155,670	4,425	746,263	265,550	8,276	10,547,901	448,876	12,394
2008	97,536	76,640	2,751	479,042	91,469	3,447	672,600	306,215	11,469	13,259,144	331,083	11,307
2009	123,335	54,161	2,547	374,281	104,767	4,913	1,503,774	128,701	6,510	11,561,642	271,889	12,360
2010	84,812	76,316	2,911	338,545	108,115	4,292	1,053,867	199,338	7,530	15,332,509	201,298	7,357
Panel C: Average position change												
2003	124,525	45,376	1,847	291,240	78,350	3,425	531,014	164,898	7,119	2,793,971	864,782	35,144
2004	129,383	47,339	1,795	303,145	87,217	3,206	551,611	174,152	6,617	3,564,085	1,051,680	37,000
2005	123,707	47,606	1,675	342,474	93,908	3,327	592,848	222,984	8,204	3,072,674	1,107,448	35,538
2006	141,258	54,827	2,025	422,334	107,777	3,700	743,669	250,742	8,271	3,803,921	996,873	30,944
2007	153,374	66,996	1,957	395,206	131,646	3,758	724,353	267,173	8,345	4,026,836	1,052,663	29,404
2008	113,853	65,200	2,341	429,452	100,792	3,804	719,572	279,169	10,477	4,139,422	944,330	32,601
2009	143,414	46,220	2,178	385,470	100,190	4,708	992,683	187,346	9,597	3,699,876	756,322	34,877
2010	110,360	58,421	2,231	331,931	108,151	4,297	725,818	28,2731	10,721	3,779,660	737,791	27,255

This table presents average trade sizes in terms of dollar value of shares and the number of shares executed in a given transaction (panel A), order (panel B), and position change (panel C) by investor size for each year in the sample period. Investors are classified into four quartiles in each year with respect to the total dollar value of shares executed in that year.

TABLE 3

Number and Percentage of Trades Classified as Small and Large Based on Transactions, Orders, and Position Changes for Various Investor Sizes

Investor Size	*Small Size Categories*						*Large Size Categories*					
	<500 Shares		<$5,000		<$10,000		>5,000 Shares		>$30,000		>$50,000	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Panel A: Transactions												
1 = Small	858,393	55.33%	503,341	32.44%	753,521	48.57%	79,124	5.10%	402,898	25.97%	260,038	16.76%
2	2,578,075	**50.01%**	1,577,184	**30.59%**	2,264,219	**43.92%**	461,289	**8.95%**	1,685,533	**32.70%**	1,179,034	**22.87%**
3	12,084,464	**63.75%**	9,567,107	**50.47%**	11,485,270	**60.59%**	1,832,871	**9.67%**	4,797,750	**25.31%**	3,668,929	**19.36%**
4 = Large	125,825,965	**61.01%**	92,205,121	**44.71%**	115,062,508	**55.79%**	25,560,494	**12.39%**	59,191,083	**28.70%**	46,741,611	**22.66%**
Total	141,346,897	60.95%	103,852,753	44.78%	129,565,518	55.87%	27,933,778	12.05%	66,077,264	28.49%	51,849,612	22.36%
Panel B: Orders												
1 = Small	332,454	41.18%	167,156	20.71%	269,954	33.44%	94,599	11.72%	338,441	41.92%	246,197	30.50%
2	953,444	**38.29%**	513,830	20.63%	770,110	**30.93%**	451,798	**18.14%**	1,191,131	**47.83%**	929,347	**37.32%**
3	2,806,368	**45.00%**	1,827,141	**29.30%**	2,465,636	**39.54%**	1,360,098	**21.81%**	2,767,363	**44.37%**	2,306,336	**36.98%**
4 = Large	39,933,452	**53.68%**	28,829,579	**38.76%**	35,943,282	**48.32%**	14,780,110	**19.87%**	27,545,817	**37.03%**	23,098,013	**31.05%**
Total	44,025,718	52.46%	31,337,706	37.34%	39,448,982	47.01%	16,686,605	19.88%	31,842,752	37.94%	26,579,893	31.67%
Panel C: Position changes												
1 = Small	426,536	41.02%	204,465	19.66%	352,201	33.87%	84,005	8.08%	387,275	37.24%	258,374	24.85%
2	875,667	**30.18%**	389,966	**13.44%**	700,300	**24.14%**	451,574	**15.56%**	1,446,016	**49.84%**	1,063,329	**36.65%**
3	1,612,703	**28.89%**	912,767	**16.35%**	1,390,775	**24.92%**	1,455,795	**26.08%**	3,175,913	**56.90%**	2,604,527	**46.66%**
4 = Large	8,034,252	**27.82%**	4,757,359	**16.47%**	7,102,506	**24.59%**	10,826,155	**37.49%**	17,267,317	**59.79%**	15,072,365	**52.19%**
Total	10,949,158	28.51%	6,264,557	16.31%	9,545,782	24.86%	12,817,529	33.38%	22,276,521	58.01%	18,998,595	49.47%

This table presents the number and percentage of trades classified as small and large using transactions (panel A), orders (panel B), and position changes (panel C). Columns 1 and 4 use the number of shares executed in classifying trades as small (<500 shares) and large (>5,000 shares). In columns 2 and 5 (3 and 6) trades are classified as small and large if the dollar value of shares executed is less than $5,000 ($10,000) and more than $30,000 ($50,000), respectively. The percentage of trades classified as small (large) is calculated by dividing the total number of trades in that category by the total number of trades in the small, intermediate, and large categories. Quartile 2, 3, and 4 percentages that differ from quartile 1 percentages (significant at the 0.01 level) are in bold.

Panel B considers order sizes, which, unlike transactions, are not subject to execution-related distortions. Relative to panel A, the counts in panel B are much smaller, reflecting a general tendency for orders to be broken up in execution. However, it remains the case that the quartile 4 percentages are substantially higher than the percentages in the other quartiles. And, the relative amount of activity occurring within small trade size categories remains high, ranging between 37.34% (transactions of <$5,000) and 52.46% (transactions of <500 shares).

In panel C, the analysis shifts to position changes. It is only at this level that we find the expected relation between trade size frequencies and investor size. Specifically, in the three small trade size categories the quartile 1 percentages are substantially larger than their quartile 2 through 4 counterparts. And, in the three large categories the pattern reverses—the quartile 4 percentages exceed their quartile 1 through 3 counterparts by wide margins. The position change finding here is consistent with a direct linkage between trade and investor size—relative participation rates by the largest investors are low in small trade size categories and high in large size categories. In contrast, the order size and transaction size findings, while mostly supportive of a link between the largest investors and large trade participation, are not at all supportive of a link between small (in a relative sense) investors and small trade size participation.

5.2 EARNINGS ANNOUNCMENT PERIOD ANALYSIS

Table 4 provides summary statistics on the sample of 58,413 earnings announcements (made between January 1, 2003, and December 31, 2010) employed in our analysis. Actual earnings per share figures and analyst earnings forecasts are obtained from I/B/E/S. We eliminate observations where the earnings announcement date in the I/B/E/S is not within two trading days of the earnings announcement date reported in Compustat. We obtain data on fiscal quarter end price and shares outstanding from Compustat. We drop all firm-quarter observations where stock price is below $1.00 and the market value of the firm is less than $10 million as of the most recent fiscal quarter end prior to the earnings announcement date. When calculating the excess net buy metrics, we require the stock to be traded at least on three trading days during the pre–announcement period (days −60 to −6). In order to ensure that our results are not driven by outliers, we winsorize observations in the top and bottom 1% with respect to the *SRWFE*, *AFE*, and *Excess Net Buy* metrics. Mean *AFE* is 0.0001 and mean *SRWFE* is 0.0012 (both significant at the 0.05 level). Average abnormal returns in the pre- and post-announcement periods are negative. The average announcement period return is positive and significant, consistent with an announcement period risk premium (Ball and Kothari [1991]). In the extreme good news quintiles (quintile 5), returns before, during, and after the earnings announcement are positive and significant; and, in the extreme bad news quintiles, they are negative and significant. Hence, a substantive PEAD effect is present in our sample.

TABLE 4
Earnings Announcement Sample Statistics

	N	Mean	Median	Std. Dev.	5th Pctl.	95th Pctl.
Price	58,413	27.97	19.98	336.68	3.38	60.56
Market value ($Mil)	58,413	5,380	841	20,228	66	20,987
Analyst following	58,413	5.81	4.00	5.37	1.00	17.00
AFE	58,413	**0.0001**	**0.0005**	0.0093	−0.0126	0.0118
SRWFE	58,413	**0.0012**	**0.0013**	0.0374	−0.0458	0.0442
CAR[−60, −3]	58,413	**−0.52%**	**−0.57%**	18.82%	−29.11%	27.80%
CAR[−1,1]	58,413	**0.23%**	**0.08%**	8.86%	−13.23%	13.90%
CAR[+6, +65]	58,413	**−0.43%**	**−0.80%**	20.66%	−29.83%	29.59%
AFE Quintile 5:						
AFE	11,683	**0.0096**	**0.0064**	0.0078	0.0033	0.0319
SRWFE	11,683	**0.0134**	**0.0073**	0.0509	−0.0522	0.1076
CAR[−60,−3]	11,683	**3.54%**	**2.46%**	22.24%	−28.85%	39.31%
CAR[−1,1]	11,683	**3.92%**	**2.80%**	10.02%	−9.60%	20.34%
CAR[+6, +65]	11,683	**1.19%**	**0.37%**	22.99%	−32.82%	37.16%
AFE Quintile 1:						
AFE	11,682	**−0.0108**	**−0.0055**	0.0124	−0.0483	−0.0019
SRWFE	11,682	**−0.0122**	**−0.0068**	0.0513	−0.1139	0.0596
CAR[−60, −3]	11,682	**−4.34%**	**−3.95%**	24.36%	−42.67%	32.03%
CAR[−1,1]	11,682	**−3.58%**	**−2.76%**	10.16%	−19.92%	9.95%
CAR[+6, +65]	11,682	**−0.40%**	**−0.81%**	27.58%	−37.78%	38.28%
SRWFE Quintile 5:						
AFE	11,681	**0.0038**	**0.0027**	0.0117	−0.0119	0.0254
SRWFE	11,681	**0.0412**	**0.0207**	0.0481	0.0094	0.1957
CAR[−60, −3]	11,681	**2.55%**	**1.68%**	21.91%	−29.26%	37.06%
CAR[−1,1]	11,681	**1.71%**	**1.09%**	9.82%	−12.28%	17.68%
CAR[+6, +65]	11,681	**1.47%**	**0.83%**	24.75%	−32.04%	35.75%
SRWFE Quintile 1:						
AFE	11,684	**−0.0048**	**−0.0014**	0.0145	−0.0397	0.0130
SRWFE	11,684	**−0.0379**	**−0.0208**	0.0394	−0.1518	−0.0083
CAR[−60, −3]	11,684	**−3.05%**	**−2.74%**	24.80%	−42.12%	34.36%
CAR[−1,1]	11,684	**−1.34%**	**−1.22%**	10.95%	−17.48%	14.18%
AR[+6, +65]	11,684	**−0.66%**	**−1.02%**	27.02%	−39.34%	40.16%

This table presents descriptive statistics on firm-specific variables for the firms in the earnings announcement sample that includes all quarterly earnings announcements during the 2003–2010 period. Means (Medians) in bold significantly differ from 0 at the 0.05 level based on a two-tailed conventional *t*-test (Wilcoxon signed-rank test). *AFE* is the analyst forecast error obtained by subtracting the consensus analyst forecast from the actual earnings per share on IBES scaled by share price at the end of the most recent quarter prior to the earnings announcement date. The consensus analyst forecast is the mean of the analyst earnings per share forecasts issued during the 90 days prior to the earnings announcement. *SRWFE* is seasonal random walk forecast error calculated as the seasonally differenced quarterly earnings before extraordinary items per share scaled by the absolute value of share price from one quarter before the earnings announcement. $CAR[t_1,t_2]$ is cumulative abnormal return from day t_1 to t_2 relative to the announcement day defined as the firm return in excess of the corresponding Fama-French size and book-to-market 25-portfolio benchmark return. The panel also presents summary statistics for these variables for the largest and smallest *AFE* and *SRWFE* deciles.

Table 5 provides transaction size–related analyses of unconditional announcement period trading. Panel A presents percentage increases in announcement period transactions (relative to the −60 to −6 window averages). Overall, transaction count rises 43.29%, dollar volume rises

TABLE 5

Descriptive Statistics on Earnings Announcement Period Trading Activity

Panel A: Announcement period transactions metrics

		% Increase in Trans.	% Increase in Dollar Volume		% Increase in Share Volume		Ex NetBuy
Investor Size	*N*		Total	Per Trans.	Total	Per Trans.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 = Small	28,233	**54.34**	**89.03**	**42.03**	**90.19**	**42.61**	**−0.058**
2	41,787	**51.06**	**87.56**	**37.42**	**88.24**	**37.44**	**−0.067**
3	48,574	**46.27**	**99.44**	**50.65**	**99.20**	**50.45**	**−0.077**
4 = Large	56,129	**33.21**	**67.26**	**38.31**	**67.11**	**37.79**	**−0.024**
All	56,468	**43.29**	**81.10**	**41.31**	**81.37**	**40.90**	**−0.049**

Panel B: Announcement period order metrics

			% Increase in Dollar Volume		% Increase in Share Volume		
Investor Size	*N*	% Increase in Orders	Total	Per Order	Total	Per Order	Ex NetBuy
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 = Small	23,248	**57.23**	**99.25**	**38.37**	**100.00**	**38.24**	**−0.101**
2	37,720	**50.23**	**97.70**	**33.65**	**97.98**	**33.99**	**−0.075**
3	46,363	**36.22**	**107.79**	**51.33**	**107.98**	**51.22**	**−0.044**
4 = Large	55,757	**14.27**	**70.04**	**48.77**	**69.94**	**48.50**	**−0.010**
All	56,119	**33.18**	**87.49**	**44.83**	**87.91**	**44.78**	**−0.031**

Panel C: Trade size-stratified announcement period trading

	Transactions			Orders			Position Changes		
	N	% Increase	Ex NetBuy	*N*	% Increase	Ex NetBuy	*N*	% Increase	Ex NetBuy
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Small Trades									
<500 Shares	54,447	**25.84**	−0.005	52,461	**3.27**	−0.006	52,590	**−1.84**	**0.013**
<$5,000	54,815	**24.89**	−0.013	52,758	**3.40**	**−0.011**	52,835	**−1.49**	0.002
<$10,000	55,618	**26.34**	−0.006	54,270	**3.79**	0.004	54,599	**−1.36**	**0.007**
Large Trades									
>5,000 Shares	52,013	**58.74**	**−0.047**	52,194	**48.36**	**−0.016**	52,502	**30.91**	**−0.021**
>$30,000	53,327	**49.35**	**−0.049**	53,193	**34.39**	**−0.046**	53,520	**21.29**	**−0.070**
>$50,000	51,994	**53.10**	**−0.057**	52,127	**39.08**	**−0.054**	52,414	**24.13**	**−0.075**

This table presents descriptive statistics on earnings announcement period, [−1, +1], trading activity. Numbers in bold differ from 0 at the 0.05 level (two-tailed test). Panel A (panel B) reports trading metrics calculated using transactions (orders) for investors grouped with respect to total annual trading volume. Percentage increases are relative to the benchmark period of [−60, −6]. In panels A and B, column 2 presents the percentage increase in average daily trade counts from the [−60, −6] window to the [−1, +1] window. Column 3 reports the percentage increase in average daily total dollar volume executed while column 4 reports the percentage increase in dollar volume executed per transaction (order). Columns 5 and 6 report the percentage increase in average daily total share volume executed and dollar volume executed per transaction (panel A) and order (panel B). Column 7 reports excess net buy defined as in ALY for transactions (panel A) and orders (panel B). In panel C, columns 2, 5, and 8 report percentage changes in transaction, order, and position change counts respectively from the [−60, −6] window to the [−1,1] window for small and large trades based on various cutoffs. Columns 3, 6, and 9 report excess net buy calculated using transactions, orders, and position changes, respectively. Excess net buy for share–based trade classifications is calculated as in BM (see equation (1) of text). Excess net buy for dollar value–based trade classifications is calculated as in ALY (see equation (2) of text).

81.10%, and share volume rises 81.37%. Each of the four investor size quartiles also exhibits marked increases. However, these increases are not uniform across the quartiles. In particular, the quartile 4 increases are smaller than those of the other three quartiles (significant at the 0.01 level). For instance, in terms of dollar value of trading, the quartile 4 increase is 67.26% while the increases in the other three quartiles range between 87.56% and 99.44%. So, the largest institutional investors here appear to be the least responsive to earnings news.

The percentage increase per transaction in panel A is 41.31% when transaction size is measured in dollar value and 40.90% when measured in shares. Such increases could be due to institutions increasing order sizes or to increased aggregation of orders in execution in announcement periods. The panel B order analysis, however, indicates even sharper rises in order sizes of 44.83% (dollar value based) and 44.78% (share based). Hence, much of the increase in announcement period large transaction activity is due to institutions increasing announcement period order sizes. This result is consistent with the general idea that per capita volume should rise in high information content public information release periods (Kim and Verrecchia [1991]). Such order size shifting in earnings announcement periods also has direct relevance for interpreting existing transaction size-stratified analyses of announcement period trading. It is clearly the smaller traders who are exhibiting the greater trade response to earnings announcements. However, because order sizes are increasing so much, activity in large trade size categories increases more than the activity in small trade size categories. Consequently, in this setting neither size-stratified transactions nor mean transaction size metrics accurately reflect the relative announcement period trading activity of small and large traders.

Panel C reports percentage increases in orders and transactions for the three small and the three large trade size strata. In the three small trade size categories, the increases in transactions range between 24.89% and 26.34%. However, increases in the number of orders in these same categories are much lower, ranging between 3.27% and 3.79%. Hence, almost all of the increases in announcement period small transaction activity in our data are due to larger orders being downsized in execution. In contrast, for the three large trade size categories, percent increases in the number of transactions range between 49.35% and 58.74% while increases in the number of orders range between 34.39% and 48.36%. These higher percentages are consistent with the increases in mean transaction and order sizes documented in panels A and B.

The net buying averages reported in all three panels of table 5 show that institutions are net sellers in the announcement period, an inference consistent with existing transaction size-based inferences.[12] Interestingly, for

[12] When the analysis is limited to the 2003 to 2005 time period, there is actually evidence of positive net buying in the small trade size categories while the evidence of net selling in

TABLE 6

Institution Size-Based Analysis of Announcement Period Orders and Net Position Changes

Panel A: Pearson correlations between announcement period excess net-buy and forecast errors

	All Institutions		Institutions in the Largest Size Quartile		Institutions in the Smallest Size Quartile		Institutions in the Two Lowest Size Quartiles	
	Orders	Position Changes	Orders	Position Changes	Orders	Position Changes	Orders	Position Changes
AFE (Rank)	−0.042***	−0.041***	−0.038**	−0.032**	−0.042	−0.029	−0.098***	−0.089***
(*p*-value)	0.008	0.015	0.028	0.032	0.416	0.115	<0.001	<0.001
SRWFE (Rank)	−0.112***	−0.105***	−0.101***	−0.094***	0.012	0.007	−0.061***	−0.059**
(*p*-value)	<0.001	<0.001	<0.001	<0.001	0.729	0.791	0.003	0.004
Observations	56,085		55,723		23,234		40,837	

Panel B: Regressions of announcement period excess net-buy on forecast errors

	All Institutions		Institutions in the Largest Size Quartile		Institutions in the Smallest Size Quartile		Institutions in the Two Lowest Size Quartiles	
	Orders	Position Changes	Orders	Position Changes	Orders	Position Changes	Orders	Position Changes
AFE (Rank)	−0.013	−0.017	−0.025*	−0.024*	−0.064**	−0.069**	−0.067***	−0.064***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.028)	(0.029)	(0.021)	(0.021)
SRWFE (Rank)	−0.101***	−0.093***	−0.101***	−0.089***	0.030	0.003	−0.035*	−0.051**
	(0.014)	(0.014)	(0.014)	(0.014)	(0.027)	(0.030)	(0.020)	(0.021)
Intercept	0.000	−0.009**	0.002	−0.006	0.034***	0.028***	−0.290***	−0.250***
	(0.000)	(0.004)	(0.004)	(0.005)	(0.008)	(0.008)	(0.039)	(0.040)
Adj. R^2 (%)	0.112	0.103	0.124	0.100	0.014	0.018	0.208	0.176

Panel A reports Pearson correlations between individual forecast errors and announcement period [−1, +1], excess net buy, *Ex_Net_Buy* (see equation (2) in the text) for various subsets of investors in the Ancerno sample. Panel B reports estimates from multiple regressions of announcement period excess net buy on both forecast errors included in the regression. For each group of investors, the results are reported using the order-based excess net-buy and position change-based excess net-buy. *AFE (Rank)* and *SRWFE(Rank)* are as defined in table 5. Standard errors (clustered by firm and announcement date) are in parentheses. *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels (two-tailed test), respectively.

the small position change categories reported in panel C, the excess buy effects are positive and significant for both the <500 shares and <$10,000 categories. Hence, when engaging in small overall changes in their portfolios in the announcement period, institutions exhibit net buying, a behavior the literature attributes to "small" traders.

Table 6 reports announcement period earnings "news"–related trading by the Ancerno institutions as reflected in their position changes and net orders. In this context, order activity differs from position changes in that it reflects only those orders entered during the announcement period, thereby excluding position change effects due to stale limit orders. The

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the large trade size categories is weaker. There is also evidence of positive net buying for this time period in the panel A transactions and panel B orders analyses for the largest quartile of institutions.

analysis also explores the degree to which announcement news trading differs with respect to institution size by separately examining trading in the largest quartile and smallest two quartiles of institutions. In terms of simple correlations, as reported in panel A, significant (at the 0.01 level) negative relations exist between directional trading activity and both *AFE* and *SRWFE* across all institutions. So, on an unconditional basis the announcement period trading activity is forecast error contrarian. That is, these institutions' announcement period trading seems to facilitate rather than mitigate the subsequent drift.

Panel B of table 6 reports estimations of equation (3). For *AFE* these results suggest that the negative relation with net buying documented in panel A persists after controlling for contemporaneous *SRWFE*. Specifically, the *AFE* coefficient is negative and significant for the largest quartile of institutions as well as the two smaller quartiles of institutions. These negative relations are particularly strong in the smaller quartiles as the estimated coefficients in these categories are more significant (0.01 level vs. 0.10 level) and are nearly triple the magnitude of those in the largest size quartile. For *SRWFE*, the overall relations also remain negative and statistically significant (0.01 level). However, within investor size quartiles, the effect is opposite. The negative relations are quite strong for the largest investor quartile, but are much less negative or positive for the smaller quartiles. [13]

As the Ancerno data do include limit orders, in an untabulated analysis we explored the relation between earnings forecast errors and announcement period directional limit order executions. While the data do not identify trades by type, we draw indirect inferences about limit order activity based on changes in unfilled orders. *Change in Unfilled Orders* is the difference between total buy order volume *submitted* by investors and total buy transaction volume *executed* in a day minus the difference between total sell order volume *submitted* and total sell transaction volume *executed* in a day. This difference should be largely determined by limit orders going unexecuted. When *Change in Unfilled Orders* is regressed on *SRWFE* and *AFE,* the *SRWFE* coefficient lacks significance, but the *AFE* coefficient is positive and significant at the 0.01 level. Hence, more *AFE*-contrarian limit orders than *AFE*-consistent orders are executed in the announcement period, meaning that in terms of limit orders these investors are: (1) not purchasing or selling underpriced positive *AFE* securities, and (2) not selling or buying overpriced negative *AFE* securities. This result is consistent with the proposition that limit orders suffer from an adverse selection bias (Linnainmaa [2010]).

[13] Kaniel et al. [2012] document that pre-announcement return negatively predicts announcement period buying by individual investors. Inclusion of return over days −60 to −1 is also negative and significant as a predictor of net buying in our data. Inclusion of this variable as an additional regressor, however, has no substantive impact on the estimated *AFE* and *SRWFE* coefficients reported in the tables.

Table 7 evaluates institutional trading responses to *AFE* and *SRWFE* across conventional small and large trade size (trader) categories. Panel A reports transaction level estimations of equation (3). In the three large size categories the *AFE* coefficients are positive and significant (at the 0.10 level or better). These relations imply that large investors trade in a drift-reducing fashion and conform with existing large transaction size-based evidence on announcement period trading. They are not, however, consistent with the negative relations reported in table 6 that reflect the actual trading patterns taking place here. And, when the level of analysis shifts to orders (panel B), the *AFE* coefficients are negative with the coefficient in the >5,000 share column significant at the 0.01 level and the coefficient in the >$50,000 column significant at the 0.10 level. This change of sign between transactions and orders suggests that the positive coefficients reported in panel A reflect the process by which orders are converted into transactions. Structural factors in the order execution process are causing large *AFE*-contrarian orders to be downsized with greater frequency than large *AFE*-consistent orders.[14]

Coefficients on *SRWFE* in the panel A large transaction size columns are negative, and significant at the 0.10 level or better. Coefficients on *SRWFE* in the panel B large order level regressions are also negative and significant at the 0.01 level. These relations support the table 6 evidence of an overall negative relation between *SRWFE* and institutional announcement period trading that is particularly strong for the largest institutions although the stronger order level results suggest that the process by which orders are converted into transactions is suppressing some of this underlying negative relation in the data.

For the small trade size categories, the *AFE* coefficient is negative for all three categories in the panel A transaction level analysis and significant for the <500 share (0.05 level) and <$5,000 (0.10 level) categories. At the order level (panel B), the relations are also negative and the <500 share and <$10,000 coefficients are significant at the 0.01 level. These results are consistent with the negative small trade size relations for *AFE* reported in BM. But, BM attribute this finding to (unsophisticated trading by) small traders and even the smallest Ancerno institutions are, in fact, quite large in size. Finally, since their trading itself is drift contrarian, it seems unlikely that the result is due to Ancerno investors taking the opposite ("passive") side of forecast error contrarian small investor market orders.[15]

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[14] One such structural factor is limit orders, which, by construction, are available for downsizing into a series of smaller transactions. If a limit order effect is in play here, however, then the active side driver must be small *AFE*-consistent market orders. That is, large *AFE*-contrarian limit orders are being broken up to facilitate the execution of smaller active side *AFE*-consistent market orders. Orders that, in light of the table 6 results, are from investors outside of the Ancerno universe. (When *Change in Unfilled Orders* is included as an additional explanatory variable in the table 7 regressions, the results for the *AFE* and *SRWFE* coefficients are similar to those reported in the table.)

[15] Whether individual investors are, in fact, trading in a drift-contrarian fashion with respect to *AFE* is unclear. ALY find no evidence of any relation between *AFE* and directional small transaction activity in the announcement period while Kaniel et al. [2012] find no evidence

TABLE 7

Regressions of Institutional Excess Net-Buy During [−1, +1] *on Forecast Errors*

Panel A: Announcement period net buying in large and small transactions

	Small Size Categories			Large Size Categories		
	<500 Shares	<$5,000	<$10,000	>5,000 Shares	>$30,000	>$50,000
AFE(Rank)	−0.055**	−0.051*	−0.035	0.047*	0.111***	0.094***
	(0.025)	(0.027)	(0.024)	(0.025)	(0.031)	(0.032)
SRWFE(Rank)	0.045*	0.051*	0.031	−0.057**	−0.061**	−0.057*
	(0.025)	(0.026)	(0.025)	(0.024)	(0.029)	(0.031)
Intercept	−0.005	−0.013	−0.006	−0.047***	−0.050***	−0.058***
	(0.010)	(0.010)	(0.009)	(0.008)	(0.009)	(0.010)
N	54,447	54,815	55,618	52,013	53,327	51,994
R^2 (%)	0.007	0.006	0.001	0.011	0.026	0.017

Panel B: Announcement period net buy orders for large and small orders

	Small Size Categories			Large Size Categories		
	<500 Shares	<$5,000	<$10,000	>5,000 Shares	>$30,000	>$50,000
AFE(Rank)	−0.035***	−0.009	−0.031***	−0.039***	−0.019	−0.028*
	(0.009)	(0.010)	(0.009)	(0.012)	(0.015)	(0.015)
SRWFE(Rank)	−0.009	−0.021**	−0.019**	−0.064***	−0.101***	−0.100***
	(0.008)	(0.010)	(0.009)	(0.012)	(0.014)	(0.015)
Intercept	−0.026***	−0.028***	−0.024***	−0.006	0.001	0.002
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.005)
N	52,461	52,758	54,270	52,194	53,193	52,127
R^2 (%)	0.040	0.009	0.038	0.102	0.112	0.118

Panel C: Announcement period net position increases for large and small position changes

	Small Size Categories			Large Size Categories		
	<500 Shares	<$5,000	<$10,000	>5,000 Shares	>$30,000	>$50,000
AFE(Rank)	−0.008	0.002	−0.004	−0.063***	−0.050***	−0.057***
	(0.009)	(0.007)	(0.006)	(0.011)	(0.015)	(0.016)
SRWFE(Rank)	−0.009	−0.005	−0.021***	−0.060***	−0.113***	−0.115***
	(0.008)	(0.006)	(0.006)	(0.011)	(0.015)	(0.015)
Intercept	0.001	−0.004**	−0.007***	−0.021***	−0.011**	−0.014***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.004)	(0.005)
N	52,590	52,835	54,599	52,502	53,520	52,414
R^2 (%)	0.002	−0.002	0.024	0.188	0.175	0.185

This table reports coefficient estimates from the following regression:

$$Ex\_NetNumBuy_{it} (\text{or} Ex\_NetBuy_{it}) = \beta_0 + \beta_1 AFE_{it} + \beta_2 SRWFE_{it} + \varepsilon_{it}$$

for small and large trade size categories using transactions (panel A), orders (panel B), and position changes (panel C). In columns 1 and 4 in each panel the dependent variable is $Ex\_NetNumBuy_{it}$, the excess net number of buys during the earnings announcement period, [−1,+1], defined as in BM (see equation (1) in the text). In the other columns, the dependent variable is Ex_NetBuy_{it}, excess net buy during the [−1,+1] window defined as in ALY (see equation (2) in the text). *AFE (Rank)* is the decile rank of analyst-based earnings surprise converted to [−0.5,0.5]. *SRWFE(Rank)* is the decile rank of seasonal random-walk earnings surprise converted to [−0.5,0.5]. *AFE* is calculated by subtracting the consensus analyst forecast from the actual earnings per share on I/B/E/S scaled by share price at the end of the most recent quarter prior to the earnings announcement date. The consensus analyst forecast is the mean of the analyst earnings per share forecasts issued during the 90 days prior to the earnings announcement. *SRWFE* is defined as the seasonally differenced quarterly earnings before extraordinary items per share scaled by the absolute value of share price from one quarter before the earnings announcement. Standard errors (clustered by firm and announcement date) are in parentheses. *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels (two-tailed test), respectively.

At the transactions level, the *SRWFE* coefficient is positive and significant (at the 0.10 level or better) in the <500 shares and <$5,000 small trade size categories. This result is not consistent with the negative *SRWFE* relations reported in table 6; nor is it consistent with what is observed at the order level where all three coefficients are negative, significant at the 0.05 level for the <$5,000 and <$10,000 categories. It is also not consistent with the negative relations that arise in the large trade size categories. Consequently, since in table 5 the increases in small transaction activity greatly exceed companion increases in small order activity, it seems that large *SRWFE*-consistent orders are getting downsized in execution and screened into the small transaction size categories. If the orders being so downsized are also active side market orders, then this evidence suggests that such selective downsizing is an alternative mechanical explanation for existing findings of a positive relation between *SRWFE* and "small investor" directional trading activity in the announcement period.

Finally, it is noteworthy that, in the transaction level analyses, the *AFE* small trade size coefficients are negative while the *AFE* large trade size coefficients are positive and the *SRWFE* small trade size coefficients are positive while the *SRWFE* large trade size coefficients are negative. These small/large sign inconsistencies are not present in the order size (panel B) or position change (panel C) analyses. Seemingly, transaction size analyses are inherently prone to producing spurious opposite sign effects across small and large trade size categories.

Panel C extends the analysis to position changes achieved by investors during the announcement period. All of the forecast error coefficients in the large trade size categories are negative and highly significant (0.01 level), indicating that, when the position change is sizable, these investors are trading in a forecast error contrarian fashion. In the small position change categories, however, the coefficients lack statistical significance at conventional levels with the sole exception being a significant negative *SRWFE* coefficient in the <$10,000 size category.

5.3 POST-ANNOUNCMENT PERIOD ANALYSIS

Table 8 repeats the table 6 total trading activity by institution size for the post-announcement period [+6, +65]. In terms of simple correlations across all trading activity, as reported in panel A, significant (0.01 level) positive relations exist between directional trading activity and *AFE* while significant negative relations exist between directional trading activity and *SRWFE*. For *AFE,* however, this relation holds for only the larger institutional investors. It is of mixed sign and lacks significance in the lower two size quartile analyses. This evidence suggests that the post-announcement period trading activity by larger mutual and pension fund investors is *AFE*-consistent and, in general, their trading is *SRWFE*-contrarian.

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that directional individual investor orders (inferred directly from NYSE trading records) are related to *AFE* after controlling for pre–announcement return driven trading.

TABLE 8

Institution Size-Based Analysis of Post-Announcement Period Orders and Net Position Changes

Panel A: Pearson correlations between post-announcement period excess net-buy and forecast errors

	All Institutions		Institutions in the Largest Size Quartile		Institutions in the Smallest Size Quartile		Institutions in the Two Lowest Size Quartiles	
	Orders	Position Changes	Orders	Position Changes	Orders	Position Changes	Orders	Position Changes
AFE (Rank)	0.043***	0.042***	0.051***	0.052***	-0.025	-0.032	0.022	0.016
(*p*-value)	<0.001	<0.001	<0.001	<0.001	0.421	0.331	0.781	0.534
SRWFE (Rank)	−0.032***	−0.027***	−0.026***	−0.021**	−0.048	−0.046	−0.042*	−0.040*
(*p*-value)	<0.001	<0.001	<0.001	0.017	0.213	0.201	0.033	0.085
Observations	56,085		55,723		23,234		40,837	

Panel B: Multiple regressions

	All Institutions		Institutions in the Largest Size Quartile		Institutions in the Smallest Size Quartile		Institutions in the Two Lowest Size Quartiles	
	Orders	Position Changes	Orders	Position Changes	Orders	Position Changes	Orders	Position Changes
AFE (Rank)	0.085***	0.084***	0.108***	0.108***	−0.010	−0.018	0.059**	0.050**
	(0.013)	(0.013)	(0.014)	(0.014)	(0.036)	(0.033)	(0.024)	(0.023)
SRWFE (Rank)	−0.013	−0.009	−0.009	−0.007	−0.045	−0.040	−0.049**	−0.045**
	(0.012)	(0.012)	(0.013)	(0.013)	(0.032)	(0.032)	(0.022)	(0.021)
Intercept	0.021***	0.020***	0.026***	0.026***	−0.065***	−0.068***	−0.240***	−0.217***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.008)	(0.008)	(0.044)	(0.043)
Adj. R^2 (%)	0.092	0.094	0.130	0.134	0.002	0.002	0.087	0.072

Panel A reports Pearson correlations between individual forecast errors and the post-announcement period, [+6, +65], excess net buy, *Ex_Net_Buy* (see equation (2) in the text) for various subsets of investors in the Ancerno sample. Panel B reports estimates from multiple regressions of post-announcement period excess net buy on both forecast errors included in the regression. For each group of investors, the results are reported using the order-based excess net-buy and position change–based excess net buy. *AFE (Rank)* and *SRWFE(Rank)* are as defined in table 5. Standard errors (clustered by firm and announcement date) are in parentheses. *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels (two-tailed test), respectively.

Panel B of table 8 reports estimations of equation (3) for all institutions as well as various institution sizes. The coefficient on *AFE* is positive and significant (0.05 level or better) in the overall trading analysis as well as the largest quartile and bottom two quartile analyses. However, it is negative (not significant) when based on the trading activity of only the smallest quartile of institutions. These results suggest that, after controlling for contemporaneous *SRWFE*, a positive relation is present between *AFE* and post-announcement buying activity for all but the smallest of these investors. For *SRWFE*, however, the effect is somewhat the opposite. The overall relation is negative, but lacks significance. However, there is evidence of a significant (0.10 level or better) negative relation in the bottom two size quartiles while there is no evidence of a significant relation in the largest size quartile.

TABLE 9

Regressions of Institutional Excess Net-Buy During [+6, +65] *on Forecast Errors*

	Small Size Categories			Large Size Categories		
	<500 Shares	<$5,000	<$10,000	>5,000 Shares	>$30,000	>$50,000
Panel A: Post-announcement period net buying in large and small transactions						
AFE (Rank)	0.082***	0.056***	0.080***	0.085***	0.077***	0.077***
	(0.019)	(0.018)	(0.015)	(0.011)	(0.014)	(0.014)
SRWFE(Rank)	0.023	0.015	−0.000	−0.021**	−0.014	−0.015
	(0.018)	(0.017)	(0.000)	(0.010)	(0.013)	(0.014)
Intercept	0.084***	0.058***	0.048***	0.014***	0.014***	0.010**
	(0.006)	(0.006)	(0.005)	(0.003)	(0.004)	(0.004)
N	54,447	54,815	55,618	52,013	53,327	51,994
R^2 (%)	0.051	0.021	0.05	0.141	0.070	0.070
Panel B: Post-announcement period net buy orders for large and small orders						
AFE(Rank)	0.041***	0.038***	0.055***	0.072***	0.077***	0.074***
	(0.011)	(0.012)	(0.010)	(0.008)	(0.014)	(0.013)
SRWFE(Rank)	0.011	−0.005	0.004	−0.022***	−0.016	−0.020
	(0.010)	(0.010)	(0.009)	(0.008)	(0.013)	(0.013)
Intercept	0.035***	0.021***	0.025***	0.013***	0.012***	0.010***
	(0.004)	(0.005)	(0.004)	(0.002)	(0.004)	(0.004)
N	52,461	52,758	54,270	52,194	53,193	52,127
R^2 (%)	0.042	0.018	0.066	0.169	0.071	0.066
Panel C: Post-announcement period net position increases for large and small position changes						
AFE(Rank)	0.010	0.004	0.017**	0.081***	0.095***	0.095***
	(0.006)	(0.007)	(0.007)	(0.009)	(0.015)	(0.015)
SRWFE(Rank)	−0.003	−0.009	−0.006	−0.022***	−0.020	−0.028**
	(0.006)	(0.006)	(0.006)	(0.008)	(0.013)	(0.014)
Intercept	0.016***	0.005*	0.006*	0.010***	0.016***	0.013***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
N	52,590	52,835	54,599	52,502	53,520	52,414
R^2 (%)	0.003	0.001	0.011	0.211	0.097	0.096

This table reports coefficient estimates from the following regression:

$$Ex\_NetNumBuy_{it} (\text{or } Ex\_NetBuy_{it}) = \beta_0 + \beta_1 AFE_{it} + \beta_2 SRWFE_{it} + \varepsilon_{it}$$

for small and large trade size categories using transactions (panel A), orders (panel B), and position changes (panel C). In columns 1 and 4, in each panel the dependent variable is $Ex\_NetNumBuy_{it}$, the excess net number of buys during the post–earnings announcement period, [+6,+65], defined as in BM (see equation (1) in the text). In the other columns, the dependent variable is Ex_NetBuy_{it}, excess net buy during the [+6,+65] window defined as in ALY (see equation (2) in the text). *AFE (Rank)* and *SRWFE(Rank)* are as defined in table 5. Standard errors (clustered by firm and announcement date) are in parentheses. *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels (two-tailed test), respectively.

Table 9 repeats the table 7 trade size-stratified analysis for the post-announcement period [6, +65]. In contrast to the announcement period findings, the transaction-based analyses in panel A and the order-based analyses in panel B yield very similar inferences. Across both small and large trade size categories, the *AFE* coefficients are positive and significant (0.01 level), consistent with the positive *AFE* relations documented in table 8. However, in table 8 there is no evidence of a positive relation among

smaller institutions while significant positive relations exist within the conventional small trader trade size categories. Hence, large institutional trading patterns are actually driving a systematic same direction impact in small trade size categories. The *SRWFE* coefficients are mostly positive within the small trade size categories for both transactions and orders, but they lack statistical significance. In the large trade size categories, however, these coefficients are negative. Only in the >5,000 shares column in both panels are the coefficients on *SRWFE* significant at the 0.05 level or better.

5.4 ANNOUNCMENT PERIOD IMBALANCE AND PEAD

In a further untabulated analysis (available in the internet appendix), we explored the relationship between PEAD magnitude and announcement window excess net buy (*EX*) by Ancerno investors following the basic regression framework described in ALY.[16] Unlike ALY, we find no evidence that net institutional buying reduces the magnitude of *AFE* associated drift. We do, however, find weak evidence that net buying is positively associated with *SRWFE* drift, a relation that ALY suggest reflects large traders exploiting *SRWFE* drift-related mispricing opportunities. When we subdivide the Ancerno net buy activity by transaction, order, and position change sizes, the results are similar in that there is only weak evidence of a positive relation between large trade size net buying and *SRWFE* drift magnitude. There is no evidence of any other significant net buy–related effects.

6. Concluding Remarks

This analysis raises several core concerns about what sorts of conclusions we can reliably draw from trade size-based analyses addressing differences between "small" and "large" investor trading behavior. In general, we find that large investors are clearly active in the small trade size arena. Based on conventional size cutoffs, upwards of 50% of *orders* by the institutions in our data are small. Hence, the implicit assumption underlying much of the trade size literature that "large investors ... are unlikely to make very small trades" (Miller [2010, p. 2117]) seems implausible. Indeed, while mean transaction sizes do generally increase with investor size in our data, this fundamental (to the literature) relation does not survive in the typical coarse trade size partitions (e.g., transaction sizes of under 500 shares or under $10,000) employed in examinations of "small" traders. In particular, relative to smaller institutions at least, large institution trading activity is more concentrated in small as well as large transaction size partitions.

In earnings announcement periods, which are the preeminent information-related trading events examined in the trade size literature,

[16] In the ALY approach, return in the 60-day period following the earnings announcement period is regressed on forecast errors and interactions of these errors with announcement period net buying.

order sizes rise markedly, around 40%, relative to their nonannouncement sizes across all investors. This shift in order size effect leads to announcement period percentage increases in small transaction and order size categories that are substantially smaller than those observed in corresponding large trading categories. Conventional analyses based on identification of traders by their trade sizes would interpret such evidence as indicating that large traders are more active in announcement periods than small traders. However, when we examine the actual trading activity (based on position changes) by investor size, the opposite is true—smaller institutions increase their announcement period trading activity more than large institutions. Investors here are systematically migrating into different (larger in this case) trade size categories in response to the information they are assimilating.[17] If investors do not stay at home in terms of the trade sizes they engage in, then trade size shifting becomes a plausible alternative explanation for any transaction size-based claim about small and large investor trading behavior. Any transaction size-based claim that one trader size group is more or less responsive to some information item (e.g., 10K reports, accrual information, EDGAR filings, conference calls) than some other group, or even that a given size group has changed its responsiveness to some information item, should be viewed as suspect.

Our evidence of announcement period trade size effects among relatively unsophisticated Ancerno institutions complements evidence in Frazzini, Israel, and Moskowitz [2012] that highly sophisticated institutional investors actively manage their order sizes when trading on asset pricing anomalies. In particular, the investors employ trading algorithms that optimize both overall position changes and the order sizes entered to achieve such changes. Variation in order sizes and even position changes for these investors depends on factors such as the degree of mispricing present, order flow, number of sophisticated competitors, and liquidity price sensitivity, again undercutting the viability of transaction sizes as a reliable mapping to the size of the investors who are trading.

The announcement period analysis also reveals that the process by which orders are converted into transactions seems prone to generating spurious inferences in event settings. At the transactions level, net buying is positively related to *AFE* in large transaction sizes and *SRWFE* in small transaction sizes, while it is negatively related to *AFE* in small transaction sizes and *SRWFE* in large transaction sizes. At the orders level, however, only the two negative relations survive. Moreover, the two positive relations change

[17] Indeed, from the perspective of theoretical models of trade response to information such as Kim and Verrecchia [1991] and Kandel and Pearson [1995], these endogenous order size responses are not that surprising as per capita demand shifts (i.e., order sizes) change with differential precision (both predisclosure and in interpreting disclosures), the precision of the information being disclosed, and surprise magnitude. So, trader size seems best thought of as simply one of several underlying sources of observed systematic patterns in small and large trade size responses to information disclosures.

sign. Hence, the transaction level basically yields correct (true to order size) inferences in two out of four tries, the same success rate that would be obtained using coin flips. Relatedly, the two erroneous positive direction transactions-based inferences are consistent with transaction size-based evidence reported in both BM and ALY. Given our results, it is unclear whether these findings are reflective of underlying trading behaviors or are produced in the course of converting orders into transactions.

Our analysis also provides insights about the earnings announcement trading activity of mutual funds and pension funds. It finds little evidence to support the position that these institutions trade in the direction of forecast errors, *AFE* or *SRWFE,* in the announcement period. Indeed, the smaller funds are particularly prone to trading against the *AFE* while the larger funds are particularly prone to trading against the *SRWFE*. This evidence complements that reported in Ke and Ramalingegowda [2005], who find that institutions vary in their trading responsiveness to drift-related mispricing, with only "transient" institutions changing their positions in a manner consistent with exploiting the drift. Our evidence suggests that, at the announcement date at least, mutual and pension funds are not in this group of drift-exploiting institutions. Moreover, there is no evidence of a negative relation between their *AFE*-based announcement trading and PEAD magnitude such as that reported in ALY.

The fact that the data we employ are for mutual and pension funds represents a substantive limitation to our analysis as they are only a subset from the larger population of institutional traders. Consequently, our findings that they shift to larger announcement period order sizes, do not engage in announcement period stealth trading, and are heavily involved in small order activity may not generalize beyond them. However, it is also noteworthy that these investors account for roughly 10% of institutional trading volume. Indeed, for the securities in our sample Ancerno trader volume averages around 13% of the CRSP volume. In contrast, individual investors account for under 5% of NYSE volume (Jones and Lipson [2005]). Hence, the trading patterns of these investors would seem to be no less consequential for understanding overall market trading than the trading of individual investors.

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