The Wisdom of Crowds: How the Hi-Tech Bubble Enriched Household Investors*

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Abstract

For the two most prominent bubble cycles of recent decades, the Hi-Tech and Global Financial Crisis (GFC) episodes, we show that positive price pressure arising from daily foreign institutional investor order imbalances largely explain daily price changes in all sampled Finnish stocks while households reign in the bubbles via a significant countervailing negative effect of order imbalances in both bull and bear markets. Household investors exhibit superior timing ability, enabling households to obtain significant alphas of 57.8% for profits on realized trades and 67.8% for unrealized profits during the Hi-Tech bubble, according to the four-factor asset pricing model. Both domestic and foreign institutional investors generate alphas insignificantly different from zero. Households appear to benefit from investment horizons that are about 20 times longer than the very short-term focus of foreign investors. Householder order imbalances also explain stock price volatility consistent with the absence of price reversion and thus high information content. We conclude that households appear informed and thus contrarian and foreign institutional investors relatively uninformed and thus trend followers. Our findings are consistent with the predictions of the noisy rational expectations literature and, more specifically, Brennan and Cao (1996, 1997). Since domestic institutions do not perform as well as foreign, our results fail to explain home bias but do indicate that agency, moral hazard, and information asymmetry between households and institutional investors constitute severe impediments to market stability and foreign investor performance.

Keywords: Bubbles; Positive Feedback; Contrarian; Rational Expectations; Households

JEL Classification: G11, G12, G14

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1. INTRODUCTION

Whose trades were responsible for the Hi-Tech boom that began in 1997 with a five-fold rise in the price of internet stocks and collapsed in March 2000 with losses of $700 billion in just two months? Were the same investor categories responsible for the run-up in valuations before the Global Financial Crisis (GFC) commencing November 1, 2007? While the press blames individual investors[4], recently Griffin, Harris, Shu, and Topaloglu (2011) sheet home responsibility for the High-Tech bubble period to institutional investors rather than individuals (see also Ofek and Richardson (2003) for a treatment of the bubble). One would expect hedge funds to be the most rational arbitrageurs, profiting by nipping bubbles in the bud. Strangely, Griffin et al (2011) finds that hedge funds were the most aggressive bubble-creating investors followed closely by mutual funds.

Furthermore, the market share of value traded by individual investors on their own behalf is typically moderate, in our Finnish dataset 4.4% (22.4% of number of trades). It is hard to imagine that investors with such a small market share would move prices away from fundamental values. Similar to Barber and Odean (2000), we observe that the average holding period of individual investors is about 1.5 years. As our data also include institutions, we document shorter holding periods for institutions (0.5 years) and foreign investors (0.2 years or less). Most studies compare the performance of individuals vs. institutions (mutual funds) over shorter time periods than 1.5 years and few are able to compare both categories in the same study. As we stand, no studies have been able to compare the impact and performance of the trading by all individuals vs. institutions over entire price bubble periods from the creation of the bubble until the bubble has been fully corrected. Certainly, no study has been able to utilize daily portfolios and trades identified down to the level of every single individual participant for periods in excess of a decade. This study aims to fill the void in the literature.

[4] As reported by Griffin, Harris, Shu, and Topaloglu (2011), "Economists and market experts say (individual) investors . . . not the so-called 'smart money' on Wall Street—are the reasons behind the greatest bull market in history" ("Little guy becomes market's big mover; professionals lose their lock on Wall St. trading," *The Washington Post*, February 2, 1999, E01). See also "Small investors, in two camps, driving Internet mania," *Los Angeles Times*, November 17, 1998, C4, and "Where no investor has gone before: Amateurs steered the ship through a spacey year, *The Washington Post*, January 3, 1999, H01.

It is important to attempt more than sheet home blame, although an important beginning. The existing literature does not address the mechanism by which institutional investors brought about the bubble and subsequent collapse. Is it trading style based on trend following and positive feedback trading identified initially by Jegadeesh and Titman (1993) as momentum? In turn, is trading style not a style at all but rather a consequence of a combination of agency problems and lack of knowledge when counterparties are better-informed households that are far more patient investors who appear more sophisticated? As identified initially by Grinblatt and Keloharju (2000), households superficially appear to be contrarians who buy when pricing is falling due to institutional selling pressure and sell when institutional investors are driving up prices. Could this appearance be no more than a deceptive reflection of their superior ability to predict prices up to two years in advance by identifying stocks priced above or below fundamentals?

If one gains a better understanding of the bubble mechanism, by which institutional investors create bubbles, then it may be possible to devise rules to prevent or ameliorate future bubbles and crashes. Just as important, the existing literature fails to address whether or not the bubble perpetrators gained from their actions over the bubble cycle that commenced on January 1, 1997 and extended until the bottom was reached in March 11, 2003. If collectively the perpetrators lost out relative to other groups such as households due to their own actions, they would appear to be devoid of information, misleadingly making them appear to be overly optimistic trend followers. Alternatively and less plausibly given our findings, institutional investors participating in the bubble could be largely rational speculators 'riding the bubble' to time the market and successfully make money as modeled by Abreu and Brunnermeier (2002, 2003). In Friedman (1953) loss-making uninformed speculators depart the market, making persistent destabilizing bubbles impossible. Here uninformed investors are speculating with other people's money and are thus not only subject to moral hazard but also the problem that they do not necessarily depart the market when their clients' investments fail. Our evidence is that it is households free of agency problems that successfully time the market, not institutional investors as a whole. Rule-making reform needs to be directed at overcoming agency and moral hazard problems while encouraging failed institutional investors to depart the market rather than bailing them out.

In this paper, we use the daily holdings and trades of every investor in Finland and every foreign investor in the Finnish market to investigate, as precisely as one can, the mechanism creating the High-Tech bubble over the period January 1, 1997 to March 3, 2000 when the Finnish OMXH Index led by Nokia rose by 192.1% and the subsequent correction March 4, 2000 to March 11, 2003 when the index fell by 56.1%, and the GFC bull market between March 12, 2003 and October 31th, 2007, during which the Finnish Index rose by 260.2%, and then fell by 61.4% until the March 9, 2009, bottom linked to Lehman's collapse. In particular, we utilize this rich dataset with the detailed characteristics of every domestic investor individually identified to test a variety of theories of bubble behavior and price formation.

The noisy rational expectations equilibrium models of Hellwig (1980) and Wang (1993) provide a platform for examining the effect of asymmetric information on both stock prices and trading behavior. These models are based on a conjecture of equilibrium price formation that is then verified by market clearing. They enable price volatility to be better explained given Shiller's (1981) demonstration that homogeneously informed investor models cannot generate realistic price volatility levels. Wang (1993) showed that the uninformed are likely to appear trend chasers and the informed, contrarian. His model also shows that the presence of more informed traders with knowledge about future dividends can lead to increases in instantaneous price variability. While it is conventional to believe that the presence of more informed traders will tend to stabilize markets, the opposite can happen due to the greater adverse selection risks imposed on apparently trend following uninformed investors when their counterparty is more likely to be informed. Thus, an increase in the proportion of informed investors can lead to higher price volatility. Unlike bubble models reliant on over-confident or irrational trading, this framework does not impose constraints on short-selling. Moreover, different from traditional asset pricing models criticized by Shiller (1981), overlapping-generations models with rational expectations such as Spiegel (1998) are able to produce the high levels of price volatility empirically observed even when dividends are relatively stable.

Kim and Verrecchia (1991, a, b), Wang (1994), Brennan and Cao (1996, 1997), Orosel (1998), Spiegel (1998), and Watanabe (2008) extend the rational expectations approach. Importantly, the model of Brennan and Cao (1996) can account for high volumes of trading as participants with information of different precision adjust portfolios in response to news with absolute price changes and trade volume positively

associated. Following on from their 1996 model, Brennan and Cao (1997) show that if good (bad) news leads to a price rise (fall) then less informed foreign investors will upwardly (downwardly) revise their expectations by more than better informed domestic investors with prices rising (falling) further and domestic investors selling (buying) more to (from) the foreign investors. This informative mechanism implies that foreign investors will appear to be rational trend followers since their relative lack of knowledge forces them to be more reliant on public sources of information and thus to trade in the same direction as the price movement and more informed domestic investors will appear to be contrarian. Brennan and Cao (1997) only obtain weak evidence for an asymmetric information effect associated with differences in relative foreign-domestic returns. As they note, foreign investor trading can drive up foreign returns (at least in the short-term), making it appear that foreign returns are higher than domestic and thus difficult to provide unequivocal evidence of foreign investor informational disadvantage. Our individual investor level data on daily portfolios and trades of participants stretching over a decade and one half enables us to find much stronger evidence for the Brennan and Cao (1996, 1997) conjectures based on the actual trading profits of all participants.

In Orosel's (1998) model, trend chasing is rational because market participation is costly and when stock prices rise, market participants earn higher rents in the subsequent period. Watanabe's (2008) model with overlapping generations of agents characteristically generates multiple equilibria. The model implies that the trades of relatively informed (and hence contrarian) domestic household investors will be responsible for volatility in the stock price due to their trades releasing private information. Moreover, the apparent trend-following trades (i.e. order imbalances) made by relatively uninformed foreign institutional investors will be positively associated with absolute price changes over the entire bubble cycle while the apparently contrarian household trades will have a negative association. We confirm these predictions stemming from Watanabe's (2008) model. Informed household trades are largely responsible for stock price volatility experienced during the Hi-Tech bubble cycle and foreign institutional investor order imbalance drive the daily difference in the market to book ratio during all phases of the Hi-Tech bubble and correction and, similarly, for the considerable bull-market preceding the GFC and the subsequent global collapse. Hence, from the perspective of our findings, both bubble cycles were driven by relatively uninformed

institutional trading, with the main difference being that the GFC was almost universal and global rather than being confined to hi-tech stocks.

Watanabe (2008) models partial-information equilibria with a constant level of supply shocks to show that as private information becomes more accurate the volatility of price changes rises to that of a full-information equilibrium. The model also motivates trading volume between groups of differentially informed rational investors when stock prices only partially reveal information. Hence, volatility in the degree of over-optimism, as in Scheinkman and Xiong (2003), is not necessary in order to generate significant trading volume. Perhaps our most interesting finding with respect to both bubble episodes is that stock prices move in accord with the order imbalances of foreign nominee (institutional) trend followers that push daily first-differenced market to book ratios both up and down over each cycle and the order imbalances of every individual household investor, that appear better-informed and contrarian, ameliorate the huge price changes. These daily price change models based on order imbalance have an extraordinarily high level of explanatory power with Adjusted R-Squared of up to 23% and, such is the richness of the data, contain up to 2.2 million daily observations across all participants.

Scheinkman and Xiong (2003) (see also Hong, Scheinkman, and Xiong (2006)), build on Harrison and Kreps (1978) to model trading when agents 'agree to disagree' over an asset's value, perhaps because an agent has more (unwarranted?) faith in their own value relative to that of other agents. They predict that trading by such overconfident agents increases trading frequency, raises stock return volatility and drives market to book ratios away from fundamentals to create bubbles when limitations on short-selling are present. By contrast with noisy rational expectations modeling, their model incorporates an overconfidence parameter describing the volatility of the fluctuations in opinion providing the trading motive of each group. Assuming short-sale constraints and risk-neutral traders, the price of the asset consists of two components: a fundamental value to the owner plus a resale option value that reflects profitable sale to the other type of trader at some point in the future when that trader type is more optimistic and thus could play the role of the 'bigger fool'. Volatility in the overconfidence parameter, reflecting differences in the degree of overconfidence, contributes to price volatility during the bubble period. These models can be contrasted with the 'rational bubble' literature (see Santos and Woodford (1997)) that include no such prediction of

volatility rise. Moreover, Santos and Woodford (1997) show that under quite general conditions no infinite-horizon competitive framework rational asset pricing bubble can exist.

Scheinkman and Xiong (2003) show that if the volatility of the overconfidence parameter increases the frequency of trading increases as does the resale option value, hence raising stock price. Thus their model attempts to explain the price premium for domestic Chinese A stocks relative to the equivalent Chinese B stocks (i.e. 'foreign' priced stocks) as a function of the excess in the turnover of A stocks relative to B stocks, as shown by Chen and Swan (2008) who have a very different explanation and Mei, Scheinkman, and Xiong (2009). Higher transaction costs will dampen but not eliminate the destabilizing effect of overconfident 'noise' traders, as will a more precise signal of future dividend.

Although the authors do not refer to either positive feedback or contrarian traders, it is clear that both classes of overly optimistic trader must be buying past winners as the price escalates in the bubble and are thus both acts as positive feedback trader types. Moreover, since both classes of trader are overconfident with each having too much faith in their individual conflicting signals, traders are likely to be relatively uninformed. The addition of an informed trader type such as households to their model would dampen the tendency for bubbles to develop. Hence, overconfidence modeling is concerned with trade between not dissimilar investors that display positive feedback characteristics whereas the noisy rational expectations literature attempts to motivate why different classes of investor, appearing positive feedback and contrarian, may not only exist but also trade with one another. We find that the most significant trading activity, including large jumps in trading activity results from matches between foreign institutional investors and domestic households, not within the group of foreign investors themselves as the 'bigger fool' theory might indicate. Nonetheless, we show that there are a substantial number of matches between the foreign institutional investor group as the Hi-Tech bubble peaks and sizeable volatility in the number of such matches.

Abreu and Brunnermeier (2003) model rational arbitrageurs who become aware that the stock is overpriced due to the actions of 'behavioral' or overoptimistic traders such as those modeled by Scheinkman and Xiong (2003) but do not sell for market timing reasons. Even if collectively these arbitrageurs could

defeat the bubble by selling, it is nonetheless rational to hold on with the expectation of selling out prior to the inevitable collapse. Only coordinated action collapses the bubble. These rational traders profit at the expense of the behaviorist traders that lose out in the inevitable collapse.

Largely driven by Nokia, the Finnish Stock Market Index rose between January 1997 and March 2000 during the Hi-Tech Bubble period and then fell during the Tech-Correction period to March 2003. United States (US) institutional holdings in Nokia rose from 0.7% to 24.6% of shares outstanding from 1998 to 2000, a rise in holdings share of 35 fold and then fell to 0.01% by 2004. Hence, US institutional investors participated strongly in Nokia during the Hi-Tech bubble period but had largely sold out by the end of the collapse. For the 16 top Finnish stocks, the daily order imbalances (price pressure) of foreign investors adopting positive feedback trading strategies significantly drove up changes in the daily market to book ratio of these stocks while both neutral domestic institutions and contrarian households exerted pressure in the opposite direction via significant negative order imbalances.

In essence, the expectations by foreign institutional investors of the upward trend followed by the downward trend in prices over the entire bubble period were largely self-fulfilling. Over this period, foreign investor trading made up an incredible 70% (90% in Nokia) of all trading. Over the entire cycle from January 1997 to the market bottom in March 2003 and controlling for investor fixed effects, foreign nominee (i.e., foreign institutional investor using a nominee account) order imbalances created statistically significant foreign investor trading profits over horizons ranging from one-day, one-month, six-months, one-year, and two-years. This was the case even though the average foreign investor holding period was exceedingly short at 19 trading days (approximately one-month). By contrast, domestic institutional (financial institutions registered in Finland) order imbalances only gained in a statistically significant fashion over the one-day and one-month horizon with very small gains. Trading led to slight gains over the six-month horizon but was statistically insignificant. Over the two-year horizon, gains were positive but statistically insignificant and few investors held on for this long. Their average holding period was about six times that of foreign investors at about six months.

Over the same period and controlling for fixed household effects, household trading was significantly profitable over all the longer horizons preferred by households from six-months to two-years. Finnish households trade far less than any other group and have by far the longest investment horizons. For a different perspective on the trading behavior of the clients of a US discount broker see Odean (1999). Over short intervals of around a month, their unrealized losses match the realized gains made by foreign institutional investors. Hence, foreign investor trades not only distorted stock prices from fundamentals but their ability to distort prices actually benefited themselves and far more so, households, at the expense of neutral-feedback institutional traders. Over the two bubble cycles investigated in this paper, households earn far higher overall returns than any other group, between 40 (realized) to 47 (unrealized) fold in the case of the Nokia bubble cycle. The annualized realized gains during the Hi-Tech bubble (28.3% for households compared with 8.3% for institutions and 21.6% for foreign nominees) are also greater for households if one counterfactually adjusts for the differences in holding periods. Although the foreign nominee holding period at about one-month appears very short, some foreign funds could have reestablished similar positions, effectively having a longer holding period. During the financial crisis bubble cycle the annualized realized returns are 4.6% for households, 3.5% for domestic institutions, and 19.2% for foreign nominees. No more than a few foreign funds are likely to have achieved these high annualized-returns as actual realized returns and they still fall short of household returns for the Nokia bubble period.

We find that some of our findings on foreign investors are consistent with predictions of the Scheinkman and Xiong (2003) 'bigger fool' model, in particular, greater frequency of trading as the bubble inflates to its peak and a large and volatile number of trades matched within the foreign institutional investor class. Overall, the noisy rational expectations literature culminating in Watanabe's (2008) overlapping generations model does better than predictions stemming from bigger fool models, although more complementary rather than competing explanations. The rational expectations literature explains why foreign traders lacking local knowledge are trend followers and informed local households are contrarian. These models also explain why it is the apparently contrarian local household investors that create stock price volatility during the Hi-Tech bubble and not the apparently trend-following foreign institutional investors. Contrarian households are better informed, possess more private information and their trades

contain permanent information, ensuring higher stock price volatility due to release of more private information.

Contrary to the view that individuals (domestic households) are unsophisticated and psychologically challenged (subject to the disposition effect such that they sell winners and retain losers as shown in Grinblatt and Keloharju (2001)), we find that contrarian household investors outperform both domestic and foreign institutions. Households generate realized returns of 44.5% (foreigners, 3.4%) and unrealized, 56.4% (foreigners 1.2%) over the Nokia bubble cycle. If households are excessively prone to retain losers and sell winners then one would expect realized returns to be higher than unrealized returns, rather than the other way around. Households also obtain significant alphas of 57.8% for profits on realized trades and 67.8% for unrealized profits, while both domestic and foreign institutional investors generate alphas insignificantly different from zero in the four-factor asset-pricing model.

Recent literature indeed questions the prospect theory explanation to the disposition effect (see Kaustia (2010)) and that the disposition effect would be driven by a preference for selling a stock by virtue of having a gain versus a loss (see Ben-David and Hirshleifer (2012)). Overall there is a very mixed literature on the performance of different investor categories. Barber and Odean (2000) for the US detect no signs of superior performance amongst households. Barber, Lee, Liu, and Odean (2005), Barber, Lee, Liu, and Odean (2009b), and Chen, Johnson, Lin, and Liu, (2009) find foreign investors perform better than domestic investors in Taiwan. Froot, O'Connell, and Seasholes (2001) find that foreign investors are trend followers and that local stock prices are highly sensitive to foreign inflows. Hau (2001) and Dvořák (2005) find that domestic investors are superior performers at intra-month horizons but foreigners are superior performers at horizons beyond one month. Hvidkjaer (2006, 2008) finds that small trades and thus presumably small investors systematically underperform large trades in the United States (US). These findings are not universal. Choe, Kho, and Stulz (2005) for Korea and Chan, Menkveld and Yang (2004) for China find domestic investors are superior performers as do Agarwal, Faircloth, Liu, and Rhee (2009) for Indonesia. Kang and Stulz (1997) find that foreign investors in Japan exhibited a preference for large firms resulting in poor performance. Frazzini and Lamont (2005) show that mutual fund investors are ill-informed. Barber, Odean, and Zhu (2009a) show that retail order imbalances forecasts cross-sectional US stock returns a year

later, Kaniel, Liu, Saar, and Titman (2011) show that individual investors make informed trades around earnings announcements. Kelley and Tetlock (2012) utilize a large sample of individual trader data for the US to show that individual investors order imbalances predict monthly returns without mean reversion and contribute to market efficiency. This paper aims to contribute to what we know about the performance of systematically trading investor categories, analyzing a complete market on investor level to find out how these categories may drive and benefit from asset pricing bubbles.

2. DATA AND METHODOLOGY

2.1 Unique source of investor level transactions

Our data source is the well-established database from Euroclear Finland Ltd (formerly Finnish Central Securities Depository) that includes all transactions in the share depository for all 1.061 million investor accounts (classified into 994,937 households, 722 institutions, 96 foreign investor nominee accounts and 65,010 others) with holdings in 232 unique common stock listed on Nasdaq OMX Helsinki Exchange, Finland. In this paper, we focus on the main three groups of investors: households, institutions and foreign investor nominee accounts and include all transactions for these accounts in the top 16 industrial stocks as of January 1, 1995 carrying the analysis through to December 31, 2010. This is the identical sample of stocks as was used in the first article to make use of this dataset, Grinblatt and Keloharju (2000).

Table 1 provides descriptive statistics for dataset to show across stocks how the trading is distributed between our three main Finnish investor categories of interest, household investors, institutions and foreign nominees during the entire investigated period of 1995-2010. The number of different share series at any one time is 16 non-financial companies, but due to change in ISIN code three stocks are reported under two different codes.

≪ Insert Table 1 about here≫

The table reports the value and number of trades where the investor category is the buying party (that correspond to a similar number of sell trades for the investor group) the average order imbalance, and the market share of the investor category in value and number of trades. *Value buys* is the aggregated value of purchases in billion EUR, *no of buys* is the total number of purchases and *mkts val* is the market share of the

investor category by purchased value of shares. While the foreign nominees stand for most of the traded value, the distribution of number of trades is relatively even between these three categories. During the investigated period, these three categories together represent in average 79.4% of the market by number of trades and 69.8% by traded value. The residual categories are either the much smaller groups of non-financial companies, general government and non-for-profit organizations, plus a residual group of accounts that cannot be categorized as a homogenous group. A significant part of these residual transactions relate to account transfers and re-arrangements of capitalization in the shareholder registry and are not trades *per se*.

Table 2 reports the year-by-year market share of total Finnish shares outstanding held in United States (US) listed American Depository Receipts (ADRs) for Finnish companies by US money managers that make quarterly SEC 13f filings of portfolio holdings. For the largest stock also the total number of shares held by 13f institutions is reported. The table shows how US institutional holdings in Nokia rose from 0.7% to 24.6% of shares outstanding from 1998 to 2000. Total foreign Holdings in Nokia as reported by Euroclear Ltd rose from 36.2% to 87.8% during the same period. US institutional holdings in other Finnish companies are modest but from a breakdown of the data in Table 1 and directly from Euroclear's statistics we observe that foreign holdings in Finnish stocks overall grow from 34.8% to 35.9% from 1998 to 2000. Hence, it is largely US institutional investors that drive purchases of Finnish stocks, especially Nokia, during the Hi-Tech bubble period.

≪Insert Table 2 about here≫

2.2 Partial correlation coefficients

A complete set of partial correlation coefficients is provided for each investor group. Panel A for households shows a considerable negative order imbalance with one day forward returns, strongly indicating their role in providing liquidity to foreign investors utilizing limit orders.

≪Insert Table 3 about here≫

2.3 Order imbalance and returns over short, intermediate, and longer horizons

In order to determine trader category performance we investigate how stock selections for each investor-category perform in the short, intermediate, and longer run. We utilize a method that is similar to the model used in Kelley and Tetlock (2012) to investigate whether positive order-imbalances by number of trades for the main categories individuals, institutions, and foreigners relate to subsequent negative or positive returns in the horizons(*k*) of 1 day, 1 month, 6 months, 12 months, and 24 months. We estimate the following model:

$$Return_{ij(t+horizon\,k)} = \alpha + \beta_1 OI_{iit} + \beta_2 Holding_{ijt} + \sum_{j=1}^{j=n} \gamma_j D_j + \varepsilon_{ijt}, \qquad (1)$$

where $Return_{i,(t+horizon\,k)}$ is the unadjusted close to close price return for the stock(*i*), individual investor(*j*), trading day(*t*) observation for five forward looking horizons(*k*). Each individual investor's order imbalance, OI_{ijt}, is calculated as the difference in number of buys and number of sales by stock and the individual investor compared to the average number of trades for the investor category during the *k*th horizon period, i.e. $OI_{ijt} = \frac{Number\ of\ Buys_{ijt} - Number\ of\ Sells_{ijt}}{Average\ investor\ category\ daily\ number\ of\ trades\ per\ investor\ for\ kth\ horizon}$. $Holding_{ijt}$ is the value of the investor *j*'s holding in the observation specific stock at the end of the trading day observation. $\sum_{j=1}^{j=n} D_j, j \in (n+1)$, is the investor specific fixed effect for each of the three investor groups, households, domestic investors and foreign nominees, to control for not measured investor specific differences for the $n+1$ investors in that category. We also estimate models similar to equation (1) where the horizon extends back 24 months into the past to identify contrarian and positive feedback trading.

3. RESULTS

Panel A of Table 4 reports the distribution of individual investor turnover rates and Panel B the holding periods in number of days by the FIFO (i.e. first in first out) accounting method for the three main investor categories per stock per year for the entire sample period 1995-2010. The cumulative realized FIFO profit is computed for every day for which every single investor in the country and every single foreign nominee

makes a trade, as is the cumulative unrealized profit for every day on which a trade occurs. These daily realized and unrealized profits are expressed as percentage returns and are thus independent of trade and portfolio size. They enable computation of the cumulative realized and unrealized FIFO returns for all investors on an individual investor basis for any start and finish date over the entire sample period 1995-2010, and are aggregated within each of the three groups. We observe from these trades and FIFO calculations that the median turnover rate and the mean holding period for household investors is 1.5 years, which is a longer horizon than the period that most studies of investor behavior up until now analyze (e.g., Odean (1999) and Grinblatt and Keloharju (2000)). The median investment horizon for institutions is considerably shorter, about one-year based on turnover rate and half-a-year based on average number of days each position is held, while foreign nominee hold their stocks with a median value of 2.5 months based on turnover rate and only 19 days based on average number of days each stock position is held. In the foreign nominee case, this turnover obviously represents the net effect of a large selection of different foreign investors. These mean turnover rates are significantly different between the investor categories at the 1% level. These investors actually constitute the whole market rather than a sample as every investor is included.

This distribution of turnover rates and holding periods for the three major investor groups immediately suggests that the groups of irrational or overly optimist traders form part of the foreign nominees due to turnover rates that are exceedingly high with very short holding periods. Scheinkman and Xiong (2003) argue that volatility in opinion differences drive high frequency trading with even shorter durations between trades at bubble peaks. The noisy rational expectations equilibrium model of Brennan and Cao (1997) implies that positive feedback foreign investor turnover is likely to be higher than the contrarian domestic turnover. Rational home bias based on informational superiority means that domestic holdings will be greater than foreign. Thus, mechanically, foreigners must trade more often.

As mentioned previously, one of the major predictions of Scheinkman and Xiong's (2003) 'bigger fool' model of overly optimistic trading is that the time lapse between trades narrows as the bubble inflates. Between October 1999 and the peak of the bubble in March 2000 the monthly number of Foreign Nominee buys increased by 114% with the peak buying rate reached in the following month. While households are net

sellers over the bubble period, the frenzy of the peak of the boom did stimulate an even faster growth rate of household buys with an increase of 354% over the last six months. The small size of these buys in comparison with the foreign nominees and net selling pressure by households means that they were not contributing to the bubble. Rather they were offsetting it.

≪Insert Table 4 about here≫

Panel C of Table 4 presents estimates of FIFO realized and unrealized profit for the three investor groups over the entire Hi-Tech bubble cycle period, January 1997 to March 12, 2003, and the Financial Crisis cycle, from March 12, 2003 to March 9, 2009, derived from the individual trades of every investor in the Finnish market. Household buys and sells realized an amazing profit return of 44.5% (Standard Deviation, 173%) with unrealized gains of 56.4% (201%) over the Hi-Tech bubble period and a more modest realized gain of 7.2% (57%) and unrealized 9.1% (60%) over the GFC cycle. The exceedingly high standard deviation of returns indicates that households tend not to diversity and assume high risk. Institutional investors did not do nearly as well, 4.9% (38%) and 5.1% (37%) over the Hi-Tech period and 2.4% (30%) and 2.8% (29%), respectively, over the GFC cycle while Foreign institutional investors did worse still, 3.4% (29%) and 3.4% (28%) over the Hi-Tech period and 1.1% (14%) and 1.1% (14%) over the GFC cycle, respectively. These differences are statistically significant, also when outliers more than three standard deviations from the mean are omitted, as reported in Panel D. Hence, regardless of which bubble cycle one analyzes, much maligned households perform consistently much better than any other group.

It is obvious from the findings that households are likely to be informed or at least benefit from following an apparent consistent contrarian trading strategy of selling in a rising market generated considerable profits while they gained less from buying in a falling market due to the extent of the nadir in March, 2009. Households sold out to the relatively uninformed positive feedback trading foreign investors at inflated prices during the Hi-Tech bubble period and then bought back in subsequently at lower prices. While far less extreme, the findings over the GFC cycle are similar, indicating that success in the High-Tech period was not one-off.

Not only do profits of households far exceed that of other groups but the ratio of realized to unrealized profit is similar to other groups, indicating no apparent 'disposition effect'. If individuals were prone to selling winners and holding on to losers excessively then realized profits would far exceed unrealized profits. Consistent with our findings, Feng and Seasholes (2005) find that sophisticated individual investors are far less prone to the disposition effect. The findings are also consistent with the predictions of the noisy rational expectations literature such as Watanabe (2008) in that the informed local investors are contrarian and uninformed foreign investors, positive feedback. The results can be contrasted with those of Grinblatt and Keloharju (2000) who conclude that contrarian Finnish households were loss-making traders when comparing returns on stocks bought and sold on horizons up to six months (whereas they trade and perform largely over the one to two year horizon), by comparison foreign institutional investors were large, sophisticated, positive feedback traders purchasing stocks that performed better than those sold. Their sample period, the two years, 1995-1996, followed closely on the opening up of Finland to foreign investors and sizeable gains in the price of Nokia in particular. Seru, Shumway, and Stoffman (2010) investigate the learning process of Finnish household traders and find that investors learn more slowly from their trading than what previous literature has found and often stop trading when not successful. More recently, Grinblatt, Keloharju, and Linnainmaa (2012) find that high IQ Finnish households perform better than Finnish households generally.

Panel A of Figure 1 shows the monthly by month total value of holdings by foreign nominees and households over the Hi-Tech bubble cycle period. Household hold significantly less value and hence their holdings are depicted on a separate right hand side y-axis scale. We contrast these changes in holding to the change in market value for the Nokia Stock. The almost perfect correlation between the value of foreign nominee holdings and the value of Nokia can be seen clearly. The value of foreign holdings peaks at the top of the market in March 2000, and the value of household holdings increasing immediately before and after the peak. The value of household holdings did not peak until about three months later as contrarian households purchase the now cheaper stock.

<<Insert Figure 1 about here>>

Panel B of Figure 1 contrast the average monthly order imbalance of households to the order imbalance of foreign nominees, where order imbalance is the number of buys less the number of sells standardized by the average number of one sided trades during the period. While the magnitude of the household order imbalance measured in terms of the number of buys minus sells appears much higher than for foreign nominees, the household trade size is far smaller. What Panel B demonstrates is that household order imbalances tend to be the mirror image of foreign nominee order imbalances such that when foreign nominees are net buyers, households are net sellers over much, if not all, of the High-Tech bubble cycle period.

Figure 2 shows the daily number of Nokia trades internalized by foreign and household investors over the most crucial Hi-Tech bubble period from January to June, 2000. While there is some volatility in both groups of internalized trades, the most extreme volatility in Nokia's trading is reflected in the differences between total Nokia trades and internalized trades. The huge gaps represent non-internalized trades, for example, between foreign institutions and domestic households. The volatility in trades matched within the foreign institutional trader group is consistent with predictions from the Scheinkman and Xiong (2003) model.

<< Insert Figure 2 about here>>

3.1 Analysis of controlled fixed effects regressions for negative horizons

Table 5 shows that households are highly contrarian throughout the entire period from January, 1995 until December 30, 2010, with the largest negative coefficients on the minus six month and minus 12 month horizons and highest explanatory power over the minus two year horizon with an R Squared of 33.8%. Over the longer negative horizons, not only is the fit better but also the magnitude of the holdings size increases which indicates that larger household investors tend to be more contrarian. Over the shorter High-Tech bubble cycle period and the subsequent bull market leading up to the Sub-Prime and Global Financial Crisis (GFC), household trading is even more contrarian, especially over the longer negative horizon of two years. In fact, over the negative two-year horizon the absolute value of the negative contrarian coefficient on the backward-looking two-year order imbalance increases by a massive 145% to -0.0237 from -0.00969 and the

R Squared to 38% (regression output not shown). Foreign nominee investors also became stronger positive feedback traders with their equivalent two-year coefficient increasing from 0.02291 to 0.02955, a rise of 30%. Watanabe (2008) shows that with a pair of investor groups, if one group follows trends more intensively then the other group must become even more contrarian. Hence, not surprisingly, both trend following and household contrarian trading became stronger during the Hi-Tech bubble period with the negative horizons of both groups similar to the household forward horizon of two years. Household contrarian trading is also high during the GFC financial crisis from November 1, 2007, to March 9, 2009 (not shown) while institutional trading is particularly contrarian during the High-Tech bubble cycle for the negative two-year horizon.

≪Insert Table 5 about here≫

3.2 Returns and realized volatility for household vs. institutional investors' stock selections

3.2.1 Hi-Tech bubble cycle

Table 6 shows the forward looking returns earned by households, domestic, and foreign institutional investors based on order imbalance, over horizons ranging from one day to 24 months, for the High-Tech bubble cycle from January 1997 until March 2003. The results indicate that household trades considerably outperformed over all horizons ranging from six months to 24 months. Order imbalances were particularly informative over the long two-year horizon favored by most households with a positive association of 0.02580 that is significant at the 1% level. Household order imbalances earn significantly negative returns over short horizons ranging from one day up until one month and these negative returns are matched by positive returns of fairly similar magnitude earned by domestic and foreign institutional investors over the same horizons. This is evidence that the naturally contrarian households post limit orders and provide liquidity to both types of institutional investor and is consistent with the evidence of Linnainmaa (2010) that households provide liquidity to other trader types.

≪Insert Table 6 about here≫

Institutional investors do not do nearly as well as households. While order imbalances make a positive return over a six-month horizon, the return is not statistically significant and, moreover, over the twelve-month

horizon favored by many institutional investors the return is negative such that eventual losers are purchased and winners sold. By contrast, foreign nominees make a statistically significant profit on trades over their favored 19 day to one-month horizon with the appearance of higher profits over longer horizons. However, the rate of one-month profit is only about one-tenth of that of households over their 24 month horizon with very few institutional investors holding for more than one month. Had these institutional investors held on for 24 months the mean return would have been higher. If rational arbitrageurs are attempting to time their exit prior to bubble collapse as proposed by Abreu and Brunnermeier (2002, 2003) then exceedingly high turnover rates may be seem as a way of attempting to lock in short-term gains. Hence, despite the fact that foreign investors have less access to information and seem largely responsible for the bubble, they seem to profit from it by more than do institutional investors.

The consistently negative sign on stock holdings for all three groups over all horizons is indicative of larger investors with larger holdings being less informed than are small investors. This is surprising given incentives for information acquisition. By contrast, Gallagher, Gardner, and Swan (2011) show that information levels improve for informed institutional investor traders with stock ownership in individual shares up until about three percent of shares outstanding. Larger holders have fewer incentives for information acquisition due to excessively high market impact.

Scheinkman and Xiong (2003) motivate their 'bigger fool' overconfident trading analysis as explaining the high price volatility observed during bubble periods. Hence their model would predict that the trades of the group of investors most likely to be responsible for the bubble to contribute most to volatility. Volatility in the overconfidence parameter enhances the speculative resale option value in stock price, leading to both higher trading volumes by overconfident traders and higher stock price volatility. Whereas in Watanabe's (2008) overlapping generations model with multiple equilibria, high price volatility is possible with full-information in the absence of information asymmetry and partial-information equilibria can converge to a full-information equilibrium with volatility increasing. Thus high volatility is not necessarily harmful but might simply indicate that more private information is being released via informed trading, with the implication being that relatively informed investors, namely informed contrarian traders rather than positive feedback traders, are most likely to contribute to price volatility.

Table 7 examines the contribution of each investor group to stock price volatility over the Hi-Tech bubble cycle in the form of 'realized volatility', which is the square of each trader group's stock return based on their order imbalance trades over each of the forward horizons ranging from one day to two years. The results are strongly supportive of the noisy rational expectations model prediction that contrarian traders will contribute most to stock price volatility despite the fact that their sell trades accommodate the buying demands of foreign investors during the bubble period. The worst performing group in terms of successfully forecasting stock price movements, namely institutional investors, consistently reduces stock price volatility over all horizons. Since their trades lack private information, prices mean revert following their trades. The same finding is applicable to foreign nominees over horizons ranging from one day to one-month, reflecting their average horizon length of only 19 days, even though not statistically significant. It is true that foreign nominee order imbalances do contribute significantly to price volatility over horizons ranging from six to twelve months but few of their positions are maintained over these long intervals. By contrast, households do contribute hugely to stock price volatility over horizons ranging from one year to two years which is the horizon length for most households. In fact, over the two-year horizon most favored by households the contribution to volatility is more than 400% higher than that of foreign nominees over the one-year horizon.

≪Insert Table 7 about here≫

3.2.2 Financial Crisis cycle

Table 8 shows the returns earned by each investor group over the financial crisis cycle from March 12, 2003 to March 9, 2009. Over this period, households were unable to unload overpriced Nokia to US institutional investors as in the earlier Hi-Tech bubble period. Their order imbalance trading performance was relatively poor over all horizons with the reverse applicable to domestic and foreign institutional order imbalance whose trades contain more valuable information. As indicated in Table 4 above, households gained in overall FIFO terms over this bubble cycle far more than did any other group. Over the two-year horizon preferred by most households, the return was very close to zero, although still just statistically negative. Even the institutional investors did not gain a great deal over their far shorter horizons, despite returns being positive and statistically significant. The effect of holdings on trading performance is consistently negative

and significant for households over all horizons while larger institutional investors perform better on the most relevant horizon of six months. The trading performance of foreign nominees is consistently lower the larger is portfolio size.

≪Insert Table 8 about here≫

Table 9 examines the effect of order imbalance on realized volatility over the financial crisis cycle for the three investor groups. As trading prowess is reversed relative to the Hi-Tech bubble cycle, it is not surprising that the contribution to stock price realized volatility is also reversed. Households that trade poorly over their preferred horizons of one to two years significantly reduce volatility over these horizons while institutional investors achieve a positive contribution to realized volatility from their preferred six month horizon up until two years, although not statistically significant. Trend chasing foreign nominees that slightly outperform over the one month horizon make a significantly negative contribution to volatility over this short horizon, becoming positive over the six-month horizon but not statistically significant.

≪Insert Table 9 about here≫

3.3 First-differenced market to book values and FIFO profits

3.3.1 Hi-Tech bubble cycle and market to book

According to Watanabe (2008)'s model, positive-feedback order imbalances undertaken by foreign institutional investors lacking local knowledge will be positively associated with absolute price changes while contrarian household order imbalances will have a negative association. In Panel A of Table 10 the order imbalances for the three investor groups are regressed on the first difference in daily market to book ratios for, first, the Hi-Tech bubble period, second, the subsequent correction, and, finally, third, the entire Hi-Tech bubble cycle period, January 1997 to March 11, 2003, after controlling for investor holdings and investor fixed effects. Column 1 shows for the initial bubble period that price pressure in the form of foreign nominee investor order imbalances drove stock prices up during the bubble period in a highly statistically significant fashion but household order imbalances acted in the opposite direction to take the pressure out of the bubble. Institutional order imbalances also acted counter to the overwhelming foreign pressure but not in a statistically significant manner. The second column for the post-bubble correction period in which stock

prices fell substantially shows that both domestic and foreign order imbalances drove stock prices lower and once again households act in a contrarian manner to purchase the now heavily discounted shares. The coefficients for all three investor group order imbalances are significant at the 1% level. The third column indicates that, over the entire Hi-Tech bubble cycle period, the positive and significant sign on domestic and foreign order imbalance implies that these groups were trend followers helping to drive very substantial price changes. Both during the bubble correction period and the entire cycle stock holdings have a negative and significant effect on first differences in the market to book ratio. This means that it was smaller holdings that had the largest effect on price changes. This could be because large investors suffer higher market impact, restricting their ability to trade aggressively.

≪Insert Table 10 about here≫

3.3.1 Financial Crisis cycle and market to book

Panel B of Table 10 shows the contribution of the three investor groups to the boom and bust associated with the run-up to the GFC from March 12, 2003 to October 30, 2007, the correction period, November 1, 2007 to March 9, 2009, and the entire crisis bubble cycle period from March 2003 until March 2009. This time both institutional investor groups, domestic and foreign, contribute to the boom and bust with the influence of foreign investors about 1.6 times that of domestic. Based on coefficient magnitude, the absolute influence of foreign investors in driving the boom and collapse was only about one-third of that in the earlier bubble period, probably indicating the more universal nature of the crisis cycle. Apparently contrarian households continue to trade against the trends but the magnitude of their influence in ameliorating the boom-bust cycle was not as great as in the earlier Hi-Tech bubble period.

3.4 Four-Factor Portfolio Alphas for the Hi-Tech Bubble Period

The extremely high FIFO household profits and volatility for the Hi-Tech bubble period reported in Panel C of Table 4 above raises concerns that superior performance might not be due to their postulated informational advantage. Rather, households and other participants could rely excessively on relatively undiversified portfolios, reflecting high CAPM betas, a preponderance of small stocks, high book to market ratio stocks and reliance on momentum. Table 11 addresses this issue of excessive risk by examining the

alphas from the standard four-factor Carhart (1997) asset pricing model incorporating the one year up minus down momentum, in addition to the three Fama and French (1993) factors, the CAPM market risk premium, small minus big market capitalization, and high minus low book to market factors. The three sets of portfolios for households, institutions and foreign nominees, respectively, are constructed using their entire portfolios of stocks for the three participant types and each six-month period for estimation period covering the entire Hi-Tech bubble period from January 1, 1997 until March 11, 2003. Holding period returns are computed using buy and hold future returns over periods ranging from one, one to three, four to six, and seven to twelve months.

≪Insert Table 11 about here≫

The three sets of alphas and risk factor portfolio coefficients for the different participant types are remarkable, not for their differences but rather for their great similarities. Household CAPM Betas are slightly lower and, not surprisingly, households hold more small stocks and momentum affects are smaller. In fact, far from reflecting the superior timing ability of household trades, a comparison of the investor-type alphas shows that, if anything, households achieve slightly lower alphas on their portfolios than do domestic institutions and foreign nominees. The problem with the use of portfolio returns that do not reflect the precise dates of share purchase and sale. It fails to capture the informational advantage of households in being able to time their trades such that they buy low and sell high.

3.5 Four-Factor Realized and Unrealized Profit Alphas for the Hi-Tech Bubble Period

Table 12 presents the same four-factor asset pricing model as Table 11 for the same period but does so using realized and unrealized trading profits rather than buy and hold portfolio returns over different horizons. In these estimations realized and unrealized profits are calculated at the time of each sale using the first in first out [FIFO] accounting rule, averaged across each investor's holdings and then averaged and aggregated monthly for each of the investor categories, households, institutions (registered in Finland) and foreign nominees. The contrast could not be greater now that the four-factor model takes account of the dates on which trades occur. In keeping with far superior timing ability, households obtain statistically significant alphas of 57.8% and 67.8% respectively for realized and unrealized FIFO profits while both local and

foreign institutional investor alphas do not differ significantly from zero. The CAPM beta coefficient for households is slightly higher at 0.94 compared to 0.75 for foreign nominees, and the idiosyncratic risk (measured as annual standard deviation in the model residual) is significantly higher for households at 1.23 compared to 0.45 for foreign nominees. This confirms that the greater profits households earn are obtained through well timed focus on less diversified portfolios and by assuming more idiosyncratic risk. Household risk-adjusted returns are thus higher rather than lower than raw realized and unrealized profits. The low institutional investor raw profits are entirely eliminated by risk considerations.

≪Insert Table 12 about here≫

4. CONCLUSIONS

We investigate the association between order imbalances and past as well as future stock returns to determine which investor categories' trading were responsible for the Hi-Tech boom, January 1997 to March 2000, and subsequent collapse with the nadir at March 11, 2003 and if these same categories contributed to the subsequent price run-up peaking prior to the Global Financial Crisis commencing November 2007 and bottoming on March 9, 2009. Comparing order imbalances to past returns we conclude that households act as if they were contrarian traders. Foreign nominee investor consistently follow what appear to be positive feedback trading strategies, increasingly so in at the peak of the two price bubbles in March 2000 and October 2007, and earn positive short-term returns typically over horizons of less than one month. These realized short-term gains are matched by similar but unrealized short-term losses made by households. Comparing to future returns and first-differenced daily market to book values, we conclude that the positive price impacts of foreign investor order imbalances distort stock prices away from fundamentals in the run-up to both price bubble peaks and in the subsequent bear markets. Measuring realized and unrealized profits, apparently contrarian household investors do exceedingly well over both bubble cycles. We find that households outperform both domestic and foreign institutions by very sizeable percentage margins. These margins are as high as 40 to 47 fold in the Hi-Tech bubble cycle with statistically significant household alphas of 58% to 68% in the four-factor model while both domestic and foreign investor alphas are indistinguishable from zero.

To explain these findings the noisy rational expectations literature culminating in Watanabe's (2008) overlapping-generations model does better than predictions motivated by the 'bigger fool' literature based on over-confident trading. The noisy rational expectations literature explains why foreign traders lacking local knowledge appear to be trend followers and informed local households appear to be contrarian. These models also explain why it is the informed and apparently contrarian local household investors that create stock price volatility during the Hi-Tech bubble, because the prices they establish do not mean-revert, and not the apparently trend-following foreign institutional investors. Better informed households appear contrarian, possess more private information and their trades have permanent price impact, ensuring higher stock price volatility due to release of more private information. The model explains why the price impacts of relatively uninformed and apparently trend-following foreign institutional order flow was largely responsible for both the Hi-Tech bubble and correction and the boom preceding the GFC and the severe correction that followed. The model also explains how informed and apparently contrarian Finnish households profited from ameliorating the worst of the excesses of the foreign investor trades by trading against the foreign investor trading maelstrom. Although superficially our finding that foreign investors underperform domestic households would seem to support information asymmetry as the root cause of home bias, domestic institutional investors even more significantly underperform domestic households. Hence, our findings do not support domestic versus foreign informational asymmetry as the cause. Rather, the problem lies in information asymmetry between households and institutional investors and very short-term institutional investment horizons, perhaps due to index benchmarking. Moreover, we see no evidence that households are subject to alleged psychological impairment such as the 'disposition effect'. The differences between realized and unrealized profitability of household trades is small and similar to that of institutional investors. Perhaps most significant of all, is the apparent severe effect of moral hazard on institutional performance. Institutional investors lose other peoples' money whereas households lose their own. Consequently, there appears to be wisdom in crowds investing and trading on their own behalf.

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TABLE 1: DESCRIPTIVE STATISTICS

The table provides statistics by each sample stock and by year for our *Euroclear* database that includes all transactions in the share depository for all 1.061 million investor accounts of which we analysed transactions during the period 1995-2010 for 994,937 households, 722 domestic financial institutions, 96 foreign investor nominee accounts, and 65,010 others. Value buys is the aggregated value of purchases in billion EUR, *no of buys* is the total number of purchases and *mkts val* is the market share of the investor category by purchased value of shares. The number of different share series at any one time is 16 non-financial companies, but due to change in ISIN code some three stocks are reported under two different codes.

	HOUSEHOLDS				DOMESTIC FINANCIAL INSTITUTIONS				FOREIGN NOMINEES			
ISIN	value_buys	no_buys	OI_trades	mktsh value	value_buys	no_buys	OI_trades	mktsh value	value_buys	no_buys	OI_trades	mktsh value
Kesko	2.4	298,220	0.075	0.023	33.3	826,648	-0.026	0.325	66.6	1,238,873	-0.004	0.651
Stockman	0.1	22,901	-0.100	0.224	0.2	8,772	0.003	0.491	0.1	3,712	0.001	0.285
Huhtamaki	0.7	113,644	0.048	0.019	4.7	115,464	-0.009	0.128	31.1	553,899	-0.006	0.853
Huhtamaki K	0.0	722	-0.428	0.067	0.0	811	0.011	0.336	0.0	718	0.001	0.596
Kone	0.4	55,420	0.149	0.070	2.0	27,570	-0.011	0.310	4.0	55,140	0.001	0.620
Kone (spinoff)	2.2	218,678	0.209	0.134	4.6	93,354	0.012	0.057	93.7	1,322,281	0.015	0.809
M Real	1.5	308,885	0.097	0.066	11.5	303,791	-0.023	0.494	10.3	272,417	-0.037	0.440
Nokia	39.6	2,587,200	0.107	0.005	1718.2	8,069,598	-0.073	0.223	5934.9	16,990,730	-0.062	0.771
Nokia K	0.1	6,224	-0.499	0.004	1.4	10,374	0.012	0.097	12.9	33,025	0.018	0.899
Partek	0.1	10,100	0.017	0.035	0.1	2,726	-0.001	0.062	1.7	12,615	0.002	0.903
Metso	0.1	11,704	-0.147	0.005	0.4	7,022	0.000	0.027	13.3	77,484	0.003	0.969
Outokumpu	6.5	767,620	0.116	0.038	83.5	1,622,805	-0.043	0.485	82.1	1,516,803	-0.076	0.477
Cultor	0.0	2,224	-0.225	0.006	0.1	1,671	0.003	0.052	1.6	11,408	0.002	0.942
Finnair	0.0	10,418	0.017	0.003	0.2	13,585	-0.009	0.028	8.2	142,514	-0.003	0.970
Rautaruukki	3.7	509,209	0.100	0.026	49.7	1,209,030	-0.050	0.355	86.8	1,680,673	-0.021	0.619
Stora Enso	0.1	24,697	-0.032	0.012	0.6	16,656	-0.003	0.104	5.2	32,485	0.000	0.884
Stora Enso R	2.7	306,412	0.084	0.004	137.7	1,716,280	-0.014	0.222	479.0	3,291,031	-0.013	0.773
MARKET SHARE	0.044	0.224			0.223	0.229			0.733	0.547		

TABLE 2: US INSTITUTIONAL HOLDINGS IN FINNISH ADRS AS OF YEAR END 1992 TO 2010

This table reports the market share on an annual basis of the total Finnish shares outstanding held in United States (US) listed American Depository Receipts (ADRs) for Finnish companies by US money managers that make quarterly SEC 13f filings of portfolio holdings. For the largest stock (Nokia) the table also reports the total number of shares held by 13f institutions. The sources for these data are the Standard and Poor's 13(f) filings and Compustat Global.

Year End	Nokia Shares Held	NOK	Instrumentarium	Metso	Rauma	Stora-Enso	Sonera	UPM-Kymmene
		Market Share Held by US Institutions						
1993			0.002					
1994			0.007					
1995	74,399,217	0.248	0.006		0.082			
1996	84,297,979	0.281	0.006		0.056			
1997	68,342,670	0.228	0.011		0.039			
1998	4,428,130	0.007	0.003		0.033			0.012
1999	316,374,541	0.273	0.004		0.024		0.008	0.016
2000	1,154,870,691	0.246	0.004				0.004	
2001	1,001,143,864	0.212	0.009				0.001	
2002	786,799,683	0.164	0.002				0.001	
2003	700,899,236	0.146	0.000					
2004	4,629,480	0.001						
2005	867,753,144	0.196						
2006	856,035,612	0.209		0.000				
2007	782,535,493	0.199		0.003		0.040		0.046
2008	786,735,166	0.207		0.001		0.025		0.012
2009	597,213,671	0.159		0.001		0.001		0.001
2010	543,355,522	0.145		0.001		0.001		0.000

TABLE 3: CORRELATION TABLES

Partial correlation between pairs of regression variables.

Panel A: Households

Variable	Forw. 1 d return	Forw. 1 m return	Forw. 6 m return	Forw. 12 m return	Forw. 24 mreturn	Profit FIFO	Unr.Pr. FIFO	OI trades	Holding	Avg days held	MTB
Forward 1 day return	1										
Forward 1 month return	0.3014***	1									
Forward 6 month return	0.1171***	0.4232***	1								
Forward 12 month return	0.0881***	0.3102***	0.7395***	1							
Forward 24month return	0.0471***	0.1874***	0.4897***	0.7292***	1						
Profit FIFO	0.0174***	0.0293***	0.0347***	0.0529***	0.0435***	1					
Unrealized Profit FIFO	0.0203***	0.0367***	0.0457***	0.0646***	0.0523***	0.9926***	1				
OI trades	-0.1728***	-0.0522***	-0.0227***	-0.0187***	-0.0140***	-0.026***	-0.0210***	1			
Holdings	0.0055***	-0.0143***	-0.0329***	-0.0375***	-0.0316***	-0.018***	-0.0223***	0.0175***	1		
Avg days held	-0.0228***	0.0112***	0.0207***	0.0209***	0.0124***	0.0463***	0.0355***	-0.0735***	0.0053***	1	
Market To Book	0.0321***	-0.0022***	-0.0911***	-0.1371***	-0.1598***	0.0510***	0.0707***	-0.0026***	0.0589***	-0.1040***	1

Panel B: Institutions

Variable	Forw. 1 d return	Forw. 1 m return	Forw. 6 m return	Forw. 12 m return	Forw. 24 m return	OI Trades	Holding	MTB
Forward 1day return	1							
Forward 1month return	0.2437***	1						
Forward 6month return	0.0962***	0.4280***	1					
Forward 12month return	0.0754***	0.3389***	0.7356***	1				
Forward 24month return	0.0396***	0.1968***	0.4679***	0.6895***	1			
OI Trades	0.0302***	0.0135***	0.0117***	0.0089***	0.0048***	1		
Holdings	-0.0034*	-0.0162***	-0.0332***	-0.0419***	-0.0386***	-0.035***	1	
Market To Book	0.0271***	0.0245***	0.0264***	0.0098***	0.0003	-0.0090***	0.0252***	1

Panel C: Foreign Nominee Accounts

Variable	Forw. 1 d return	Forw. 1 m return	Forw. 6 m return	Forw. 12 m return	Forw. 24 m return	OI Trades	Holding	MTB
Forward 1day return	1							
Forward 1month return	0.2284***	1						
Forward 6month return	0.0915***	0.4242***	1					
Forward 12month return	0.0666***	0.3162***	0.7210***	1.00000				
Forward 24month return	0.0390***	0.1969***	0.4766***	0.6975***	1			
OI Trades	0.0653***	0.0165***	0.0105***	0.0143***	0.0090***	1		
Holdings	0.0024	-.0096***	-0.0249***	-0.0323***	-0.0338***	0.0404***	1	
Market To Book	0.0245***	0.0093***	0.0006	0.0057***	0.0149***	0.0142***	0.2089***	1

TABLE 4: INVESTOR CATEGORY TURNOVER RATES, HOLDING PERIODS AND PROFITS

Panel A reports the distribution of investor turnover rate calculated as number of shares traded in each buy or sell divided by the shares held in the stock at the time of the trade, then aggregated for each investor and day. Annual statistics are computed for each investor category using the daily investor level observations taking into account every buy and every sell trade on every day for every individual investor. Panel B reports the holding periods in number of days (by first in first out FIFO accounting method) for each the three main investor categories for the entire sample period, 1995-2010. All statistics are first calculated for each investor, by stock, by day of observation on which either a buy or sell trade occurs, and are then aggregated across all the individual investors in each group and day, to finally be aggregated on an annual basis for the whole investor category, household, institutions and foreign nominees respectively, over the entire 16 years of our daily database for every individual investor in the entire country.
*** denotes a 0.1% level significance in difference between the household investor category and one of the other category means.

Panel A

	Households	Institutions	Foreign Nominees
(Quantiles)	Turnover Rate	Turnover Rate	Turnover Rate
95%	6.00	13.12	47.75
90%	3.48	4.73	38.02
75% Q3	1.00	1.45	20.08
50% Median	0.67	1.00	4.89
25% Q1	0.00	0.32	1.00
10%	0.00	0.00	0.37
5%	0.00	0.00	0.10
Mean	1.72***	2.91***	12.47***
n (annual account observations)	862,714	3,692	481
StdDev	6.15	8.58	16.11
Median investment horizon in years	1.50	1.00	0.20

Panel B

	Households	Institutions[5]	Foreign Nominees[6]
First In First Out (FIFO) accounting	Holding Period	Holding Period	Holding Period
Average days held	571.4	179.5	23.1
In Years	1.57	0.492	0.063

[5] Estimated on a subsample of 6.9 million transactions.

[6] Estimated on a subsample of 9.7 million transactions, distributed over 28 unique nominee accounts during the first and 19 accounts unique nominee accounts over the second bubble period.

Panel C reports the average realised and unrealised profits in percentage are calculated by account, day and stock and then aggregated equally weighted across accounts for the respective periods. Each time an investor sells shares the first in first out, FIFO, accounting method is used to compute the correct purchase price for the lot of shares sold (parts of the sold shares may have been purchased at different prices and this is accounted for). At the time of each sale realised profits vs. the FIFO purchase price and unrealised profits in the same stock vs. FIFO purchase price are calculated, and averaged across all stocks traded by the investor on that day. These average profits are then aggregated for each of the three investor categories for the investigated time periods, the Tech Bubble Cycle, 1997-2003, and the Financial Crisis Cycle, 2003-2009, and then reported in the table. These profits can also be expressed as holding period adjusted returns but are not reported here as these would be highly hypothetical returns.

Profits are calculated as: $Profit_{ati} = \frac{(Sell\ Price_{ati} - FIFO\ Purchase\ Price_{ati}) \times Number\ of\ Shares\ Sold_{ati}}{FIFO\ Purchase\ Price_{ati} \times Number\ of\ Shares\ Sold_{ati}}$.

*** denotes a 0.1% level significance in difference between the household investor category and one of the other category means. * indicates that the p-value is 2.33% for the comparison of realized profit for Domestic Institutions in the Financial Crisis Cycle.

Panel C

	Households	Institutions[7]	Foreign Nominees[8]
Tech Bubble Cycle 1997-2003			
Realised Profits	44.5%***	4.9%***	3.4%***
StdDev	172.8%	38.0%	28.7%
Unrealised Profits	56.4%***	5.1%***	3.4%***
StdDev	201.0%	37.0%	28.4%
Financial Crisis Cycle 2003-2009			
Realised Profits	7.2%***	2.4%*	1.1%***
StdDev	57.1%	30.1%	14.3%
Unrealised Profits	9.1%***	2.8%***	1.1%***
StdDev	59.9%	28.9%	14.3%

[7] Estimated on a subsample of 6.9 million transactions.

[8] Estimated on a subsample of 9.7 million transactions, distributed over 28 unique nominee accounts during the first and 19 accounts unique nominee accounts over the second bubble period.

Panel D reports the average realised and unrealised profits in percentages. These are calculated by account, day and stock and then aggregated equally weighted across accounts for the respective periods. In this table, extreme observations larger than three standard deviations from the mean are omitted.

Panel D			
	Households	Institutions[9]	Foreign Nominees[10]
Tech Bubble Cycle 1997-2003			
Realised Profits	34.9%***	2.4%***	1.3%***
StdDev	91.6%	26.1	20.7%
Unrealised Profits	35.9%***	2.5%***	1.3%***
StdDev	90.8%	25.7	20.6%
Financial Crisis Cycle 2003-2009			
Realised Profits	1.7%***	0.4%***	0.5%***
StdDev	38.4%	17.1%	9.9%
Unrealised Profits	3.4%***	0.5%***	0.5%***
StdDev	37.0%	16.8%	9.8%

[9] Estimated on a subsample of 6.9 million transactions.

[10] Estimated on a subsample of 9.7 million transactions, distributed over 28 unique nominee accounts during the first and 19 accounts unique nominee accounts over the second bubble period.

TABLE 5: DO HOUSEHOLDS APPEAR TO BE CONTRARIAN AND INSTITUTIONS MOMENTUM TRADERS?

The table reports regressions of daily trade imbalance observations for each stock, investor and day against lagged returns in the 1 day, (-1D), 1 month (-1M), six months (-6M), 12 months (-12M) and 24 months (-24M) lagged horizons (*k*). The following equation is estimated in one regression for each of the three investor categories across the pooled sample of all stock(*i*), investor(*j*), day(*t*), horizon(*k*) observations: $Return_{ij(t-horizon\,k)} = \alpha + \beta_1 OI_{ijt} + \beta_2 Holding_{ijt} + \sum_{j=1}^{j=n} \gamma_j D_j + \varepsilon_{ijt}$. The trade imbalance is computed for each individual investor, or nominee in the case of foreign investors, as the number of buys less the number of sells for the *j*th individual investor deflated by the average sample period number of trades for the investor category for that horizon: $OI_{ijt} = \frac{Number\ of\ Buys_{ijt}\ -\ Number\ of\ Sells_{ijt}}{Average\ investor\ category\ daily\ number\ of\ trades\ per\ investor\ for\ kth\ horizon}$. The estimations control for holdings and investor fixed effects. Based on each individual order imbalance, the return is computed across each of the horizons. There are no overlapping observations.

Lagged Returns **Jan 1, 1995 to Dec 31, 2010**	**-1D**	**-1M**	**-6M**	**-12M**	**-24M**
Households					
Order Imbalance	-0.00219***	-0.01501***	-0.01602***	-0.01721***	-0.00969***
Holdings	2.97E-10***	-1.7E-09***	1.01E-08***	5.79E-08***	3.17E-07***
Observations	4,202,947	4,202,947	4,202,947	4,202,947	4,202,947
R^2	0.0573	0.1182	0.2320	0.3065	0.3383
Institutions					
Order Imbalance	0.00016***	0.00241***	0.00267***	0.00315***	-0.00049
Holdings	-1.138E-14	1.644E-13**	1.07E-12***	2.16E-12***	1.681E-12*
Observations	250,494	250,494	250,494	250,494	250,494
R^2	0.0027	0.0203	0.0643	0.0849	0.1004
Foreign Nominees					
Order Imbalance	0.00041***	0.00458***	0.00892***	0.01408***	0.02291***
Holdings	9.071E-15	1.33E-13***	1.58E-12***	4.82E-12***	2.05E-11***
Observations	248,777	248,777	248,777	248,777	248,777
R^2	0.0010	0.0125	0.0449	0.0639	0.0819

TABLE 6: RETURNS DURING THE TECHNOLOGY BOOM AND BUST 1997-2003 – DAILY INVESTOR LEVEL REGRESSIONS FOR HOUSEHOLD, INSTITUTION AND FOREIGN INVESTOR ACCOUNTS, FIXED EFFECTS.

The table reports regressions of daily trade imbalance observations for each stock, investor and day against forward returns in the 1 day, (+1D), 1 month (+1M), six months (+6M), 12 months (+12M) and 24 months (+24M) forward horizons(*k*). The following equation is estimated in one regression for each of the three investor categories across the pooled sample of all stock(*i*), investor(*j*), day(*t*), horizon(*k*) observations: $Return_{ij(t+horizon)} = \alpha + \beta_1 OI_{ijt} + \beta_2 Holding_{ijt} + \sum_{j=1}^{j=n} \gamma_j D_j + \varepsilon_{ijt}$. The trade imbalance is computed for each individual investor, or nominee in the case of foreign investors, as the number of buys less the number of sells for the *j*th individual investor deflated by the average sample period number of trades for that investor category: $OI_{ijt} = \frac{Number\ of\ Buys_{ijt} - Number\ of\ Sells_{ijt}}{Average\ investor\ category\ daily\ number\ of\ trades\ per\ investor\ for\ kth\ horizon}$. The estimations include observations from the technology boom January 1, 1997 to March 3, 2000 when the index OMXH index rose by +192.1% and the subsequent correction March 4, 2000 to March 11, 2003 when the index fell by -56.1%. The percentage in parenthesis report the change in the OMXH capped all share index for the period on a logarithmic scale. The estimations control for holdings and investor fixed effects. Base on each individual order imbalance, the return is computed across each of the horizons. There are no overlapping observations.

Returns **Jan 1, 1997 to Mar 11, 2003**	**+1D**	**+1M**	**+6M**	**+12M**	**+24M**
Households					
Order Imbalance	-0.01169***	-0.01100***	0.00148***	0.01262***	0.02580***
Holdings	-4.681E-10**	-3.0E-08***	-1.4E-07***	-2.5E-07***	-4.6E-07***
Observations	1,540,725	1,540,725	1,540,725	1,540,725	1,540,725
R^2	0.0805	0.0835	0.2374	0.2961	0.2739
Institutions					
Order Imbalance	0.00502***	0.00860***	0.00275	-0.01631*	0.02195
Holdings	-4.894E-14	-1.4E-12***	-4.7E-12***	-7.1E-12***	-1.4E-11***
Observations	102,519	102,519	102,519	102,519	102,519
R^2	0.0062	0.0129	0.0488	0.0658	0.0782
Foreign Nominees					
Order Imbalance	0.00312***	0.00334***	0.00816***	0.01742***	0.02663***
Holdings	-2.25E-14***	-1.0E-13***	-4.1E-13***	-7.2E-13***	-2.2E-12***
Observations	93,225	93,225	93,225	93,225	93,225
R^2	0.0062	0.0100	0.0366	0.0494	0.0631

TABLE 7: REALIZED VOLATILITY (SQUARED RETURNS) DURING THE TECH BOOM AND BUST 1997-2003 –DAILY INVESTOR LEVEL REGRESSIONS FOR HOUSEHOLD, INSTITUTION AND FOREIGN INVESTOR ACCOUNTS, FIXED EFFECTS

The table reports regressions of daily trade imbalances against forward looking realized volatility (squared returns) in the 1 day, (1D), 1 month (1M), six months (6M), 12 months (12M) and 24 months (24M) horizons. The following equation is estimated in one regression for each of the three investor categories across the pooled sample of all stock(*i*), investor(*j*), day(*t*), horizon(*k*) observations: $\left(Return\right)^2_{ij(t+horizon\,k)} = \alpha + \beta_1 OI_{iit} + \beta_2 Holding_{ijt} + \sum_{j=1}^{j=n} \gamma_j D_j + \varepsilon_{ijt}$.

The trade imbalance is computed for each individual investor, or nominee in the case of foreign investors, as the number of buys less the number of sells for the *j*th individual investor deflated by the average sample period number of trades for that investor category: $OI_{ijt} = \frac{Number\ of\ Buys_{ijt} - Number\ of\ Sells_{ijt}}{Average\ investor\ category\ daily\ number\ of\ trades\ per\ investor\ for\ kth\ horizon}$. The estimations analyse the technology boom and the subsequent correction January 1, 1997 to March 11, 2003. The estimations control for holdings and investor fixed effects.

Realized Volatility **Jan 1, 1997 to Mar 11, 2003**	**+1D**	**+1M**	**+6M**	**+12M**	**+24M**
Households					
Order Imbalance	0.00022***	-0.00135***	-0.00661***	0.02172***	0.10129***
Holdings	5.02E-10***	5.41E-10***	-6.0E-08***	-2.6E-07***	-1.8E-06***
Observations	1,540,725	1,540,725	1,540,725	1,540,725	1,540,725
R^2	0.0706	0.0732	0.1660	0.2396	0.1921
Institutions					
Order Imbalance	-0.00036***	-0.00189***	-0.03137***	-0.11326***	-0.14160
Holdings	2.21E-14***	1.97E-13***	3.112E-13	-3.357E-12	-3.923E-11
Observations	102,519	102,519	102,519	102,519	102,519
R^2	0.0290	0.0269	0.0334	0.0535	0.0598
Foreign Nominees					
Order Imbalance	-0.00006	-0.00006	0.00732***	0.02382***	0.09451*
Holdings	8.00E-15***	1.31E-13***	1.21E-12***	1.21E-12***	3.54E-12***
Observations	93,225	93,225	93,225	93,225	93,225
R^2	0.0003	0.0060	0.0196	0.0360	0.0455

TABLE 8: RETURNS DURING THE 2007/2008 FINANCIAL CRISIS – DAILY INVESTOR LEVEL REGRESSIONS FOR HOUSEHOLD, INSTITUTION AND FOREIGN INVESTOR ACCOUNTS, FIXED EFFECTS.

The table reports regressions of daily trade imbalances against forward returns in the 1 day, (1D), 1 month (1M), six months (6M), 12 months (12M), and 24 months (24M) horizons. The following equation is estimated in one regression for each of the three investor categories across the pooled sample of all stock(*i*), investor(*j*), day(*t*), horizon(*k*) observations: $Return_{ij(t+horizon\,k)} = \alpha + \beta_1 OI_{ijt} + \beta_2 Holding_{ijt} + \sum_{j=1}^{j=n} \gamma_j D_j + \varepsilon_{ijt}$. The trade imbalance is computed for each individual investor, or nominee in the case of foreign investors, as the number of buys less the number of sells for the *j*th individual investor deflated by the average sample period number of trades for that investor category: $OI_{ijt} = \frac{Number\ of\ Buys_{ijt} - Number\ of\ Sells_{ijt}}{Average\ investor\ category\ daily\ number\ of\ trades\ per\ investor\ for\ kth\ horizon}$. The estimations include observations from the growth phase March 12, 2003 to October 31, 2007 when the index OMXH index rose by +260.2% and the subsequent financial crisis November 1, 2007 to March 9, 2009 when the index fell by -61.4%. The percentage reports the change in the OMXH capped all share index for the period. The estimations control for holdings and investor fixed effects.

Returns **Mar 12, 2003 to Mar 9, 2009**	**+1D**	**+1M**	**+6M**	**+12M**	**+24M**
Households					
Order Imbalance	-0.00494***	-0.00446***	-0.00547***	-0.00620***	-0.00067**
Holdings	4.77E-10***	-2.3E-09***	-2.8E-08***	-5.6E-08***	-7.7E-08***
Observations	2,023,740	2,023,740	2,023,740	2,023,740	2,023,740
R^2	0.0709	0.0797	0.1524	0.1858	0.2200
Institutions					
Order Imbalance	0.00073***	0.00095***	0.00159***	0.00234***	0.00240**
Holdings	3.264E-14*	4.00E-13***	1.01E-12***	-3.452E-13	-5.0E-12***
Observations	90,403	90,403	90,403	90,403	90,403
R^2	0.0075	0.0419	0.1347	0.1504	0.1065
Foreign Nominees					
Order Imbalance	0.00120***	0.00120***	0.00203***	0.00222**	0.00064
Holdings	3.206E-14**	-1.9E-13***	-1.8E-12***	-4.4E-12***	-9.8E-12***
Observations	99,820	99,820	99,820	99,820	99,820
R^2	0.0067	0.0214	0.0693	0.0886	0.1211

TABLE 9: REALIZED VOLATILITY (SQUARED RETURNS) DURING THE 2007/2008 FINANCIAL CRISIS –DAILY INVESTOR LEVEL REGRESSIONS FOR HOUSEHOLD, INSTITUTION AND FOREIGN INVESTOR ACCOUNTS, FIXED EFFECTS

The table reports regressions of daily trade imbalances against forward looking realized volatility (squared returns) in the 1 day, (1D), 1 month (1M), six months (6M), 12 months (12M), and 24 months (24M) forward horizons. The following equation is estimated in one regression for each of the three investor categories across the pooled sample of all stock(i), investor(j), day(t), horizon(k) observations: $\left(Return\right)^2_{ij(t+horizon\,k)} = \alpha + \beta_1 OI_{ijt} + \beta_2 Holding_{ijt} + \sum_{j=1}^{j=n} \gamma_j D_j + \varepsilon_{ijt}$. The trade imbalance is computed for each individual investor, or nominee in the case of foreign investors, as the number of buys less the number of sells for the jth individual investor deflated by the average sample period number of trades for that investor category: $OI_{ijt} = \frac{Number\ of\ Buys_{ijt}\ -\ Number\ of\ Sells_{ijt}}{Average\ investor\ category\ daily\ number\ of\ trades\ per\ investor\ for\ kth\ horizon}$. The estimations analyse the technology boom and the subsequent correction January 1, 1997 to March 11, 2003. The estimations control for holdings and investor fixed effects. The estimations analyse the lead up growth period and the GFC, March 12, 2003 to October 31, 2007 and November 1, 2007 to March 9, 2009. The estimations control for both investor holdings and investor fixed effects.

Realized Volatility **Mar 12, 2003 to Mar 9, 2009**	**+1D**	**+1M**	**+6M**	**+12M**	**+24M**
Households					
Order Imbalance	0.00008***	0.00049***	-0.00085***	-0.00095***	-0.00939***
Holdings	-4.061E-11**	2.84E-10***	6.57E-09***	-1.1E-08***	-5.1E-08***
Observations	2,023,740	2,023,740	2,023,740	2,023,740	2,023,740
R^2	0.0353	0.0855	0.1037	0.1147	0.1534
Institutions					
Order Imbalance	-0.00002***	-0.00011***	6.143E-07	0.00036	0.00207
Holdings	-4.91E-15***	-1.1E-13***	-5.7E-13***	-2.1E-12***	-8.5E-12***
Observations	90,403	90,403	90,403	90,403	90,403
R^2	0.0323	0.0404	0.0332	0.0172	0.0333
Foreign Nominees					
Order Imbalance	-0.00002***	-0.00010***	0.00034	0.00141	0.00804**
Holdings	-3.207E-16	-2.36E-14**	-4.5E-13***	-2.7E-12***	-1.6E-11***
Observations	99,820	99,820	99,820	99,820	99,820
R^2	0.0120	0.0211	0.0138	0.0085	0.0336

TABLE 10: MARKET TO BOOK VALUE AND PROFITS DURING THE HI-TECH BUBBLE CYCLE
– CONROLLING FOR PORTFOLIO SIZE AND INVESTOR FIXED EFFECTS

Panel A reports regressions of daily trade imbalances against the first difference in daily market to book values. The following equation is estimated in one regression for each of the three investor categories across the pooled sample of all stock(i), investor(j), day(t), horizon(k) observations: $\Delta_{t-(t-1)}MTB_{ijt} = \alpha + \beta_1 OI_{ijt} + \beta_2 Holding_{ijt} + \sum_{j=1}^{j=n} \gamma_j D_i + \varepsilon_{ijt}$. The trade imbalance is computed as the number of buys less the number of sells deflated by the average sample period number of trades for the investor category the observation belongs to as follows: $OI_{ijt} = \frac{Number\ of\ Buys_{ijt} - Number\ of\ Sells_{ijt}}{Average\ investor\ category\ daily\ number\ of\ trades\ per\ investor\ for\ kth\ horizon}$. The estimations control for holdings and investor fixed effects. Column 1 shows the bubble period, January 1, 1997 to March 11, 2000, Column 2 shows the post-bubble correction period**,** March 11, 2000 to March 11, 2003, and Column 3 the entire bubble cycle period, January 1, 1997 to March 11, 2003. Panel B reports regressions of daily trade imbalances against daily market to book values. The estimations control for holdings and investor fixed effects. Column 1 shows the bubble period, March 12, 2003 to October 31, 2007, Column 2 shows the post-bubble correction period**,** November 1, 2007 to March 9, 2009, and Column 3 the entire bubble cycle period, March 12, 2003 to March 9, 2009.

Panel A			
Item	1	2	3
Households Order Imbalance	-0.00779***	-0.0142***	-0.0119***
Institutions Order Imbalance	-0.00132	0.00664***	0.00528***
Foreign Nominees Order Imbalance	0.00595***	0.00271***	0.00311***
Holdings (billions)	-0.0000388	-0.0000252*	-0.00003***
Observations	626,501	1,111,646	1,735,994
R^2	0.22	0.22	0.18
Panel B			
Item	1	2	3
Households Order Imbalance	-0.00456***	-0.00535***	-0.00493***
Institutions Order Imbalance	0.00066***	0.00074***	0.00074***
Foreign Nominees Order Imbalance	0.00108***	0.00127***	0.00119***
Holdings (billions)	0.0000185	0.0000285	0.0000224
Observations	1,596,277	614,291	2,211,720
R^2	0.14	0.23	0.15

TABLE 11: ASSET PRICING MODEL WITH REPRESENTATIVE PORTFOLIO RETURNS – TECHNOLOGY BUBBLE PERIOD JANUARY, 1 1997 TO MARCH, 11 2003

In this table the monthly excess returns for the portfolio of stocks held by the households, institutions and foreign nominees respectively, are regressed on the standard four-factor risks, the equity premium, β_{rm}, which is the monthly excess return on a stock compared to the OMXH portfolio index, and factor loadings for mimicking portfolios of β_{SMB}, which is the small minus big firm size, β_{HML}, which is high minus low book to market, and β_{UMD}, which is the up minus down one year momentum factor. The portfolios are formed using six months of data and the portfolio returns are defined for the future return periods, 1, 1–3, 4–6 and 7–12 months. The significance of the estimated coefficients is reported as follows: ***, ** and * denote a 1%, 5%, and 10% significance level, respectively. *T*-statistics are reported in parenthesis beneath the coefficients and adjusted R^2 for each model is reported after the coefficients. *T*-statistics are corrected for heteroscedasticity and autocorrelation utilizing Newey and West (1987). Adjusted R^2 for each model is also reported.

	Households				Institutions				Foreign Nominees			
	Holding period Months				Holding period Months				Holding period Months			
	1	1-3	4-6	7-12	1	1-3	4-6	7-12	1	1-3	4-6	7-12
α	0.067***	0.066***	0.056***	0.048***	0.087***	0.085***	0.073***	0.065***	0.096***	0.084***	0.075***	0.072***
	(3.9)	(8.1)	(7.9)	(8.5)	(5.0)	(8.5)	(7.1)	(8.0)	(4.8)	(7.2)	(6.3)	(7.5)
β_{rm}	0.093**	0.106***	0.143***	0.161***	0.159***	0.155***	0.173***	0.198***	0.112**	0.138***	0.168***	0.208***
	(2.2)	(5.4)	(8.5)	(13.2)	(3.7)	(6.3)	(7.0)	(11.1)	(2.2)	(4.8)	(5.8)	(9.9)
β_{SMB}	-0.464	-0.724***	-0.701***	-1.124***	-0.520	-0.537*	-0.244	-0.718**	-0.506	-0.360	-0.122	-0.562*
	(-0.83)	(-2.6)	(-2.8)	(-5.8)	(-0.52)	(-1.7)	(-0.68)	(-2.5)	(-0.86)	(-0.97)	(-0.31)	(-1.8)
β_{HML}	-1.889***	-0.767**	0.742**	1.132***	-1.186*	-0.819**	0.386	1.019***	-0.855	-0.885**	0.503	1.097***
	(-2.8)	(-2.4)	(2.3)	(4.5)	(-1.8)	(-2.1)	(0.81)	(2.9)	(-1.1)	(-2.0)	(0.90)	(2.6)
β_{UMD}	-0.159***	-0.155***	-0.104***	-0.067***	-0.171***	-0.176***	-0.135***	-0.102***	-0.233***	-0.185***	-0.140***	-0.118***
	(-2.7)	(-5.6)	(-4.4)	(-3.8)	(-2.8)	(-5.1)	(-4.0)	(-3.9)	(-3.3)	(-4.6)	(-3.5)	(-3.8)
R^2	1.0%	1.2%	1.3%	1.2%	2.2%	2.1%	1.8%	1.6%	1.9%	1.9%	1.6%	1.6%

TABLE 12: ASSET PRICING MODEL WITH ACTUAL REALIZED AND UNREALIZED RETURNS USING THE FIFO ACCOUNTING METHOD

– HI TECH BUBBLE PERIOD JANUARY 1, 1997 to March 11, 2003

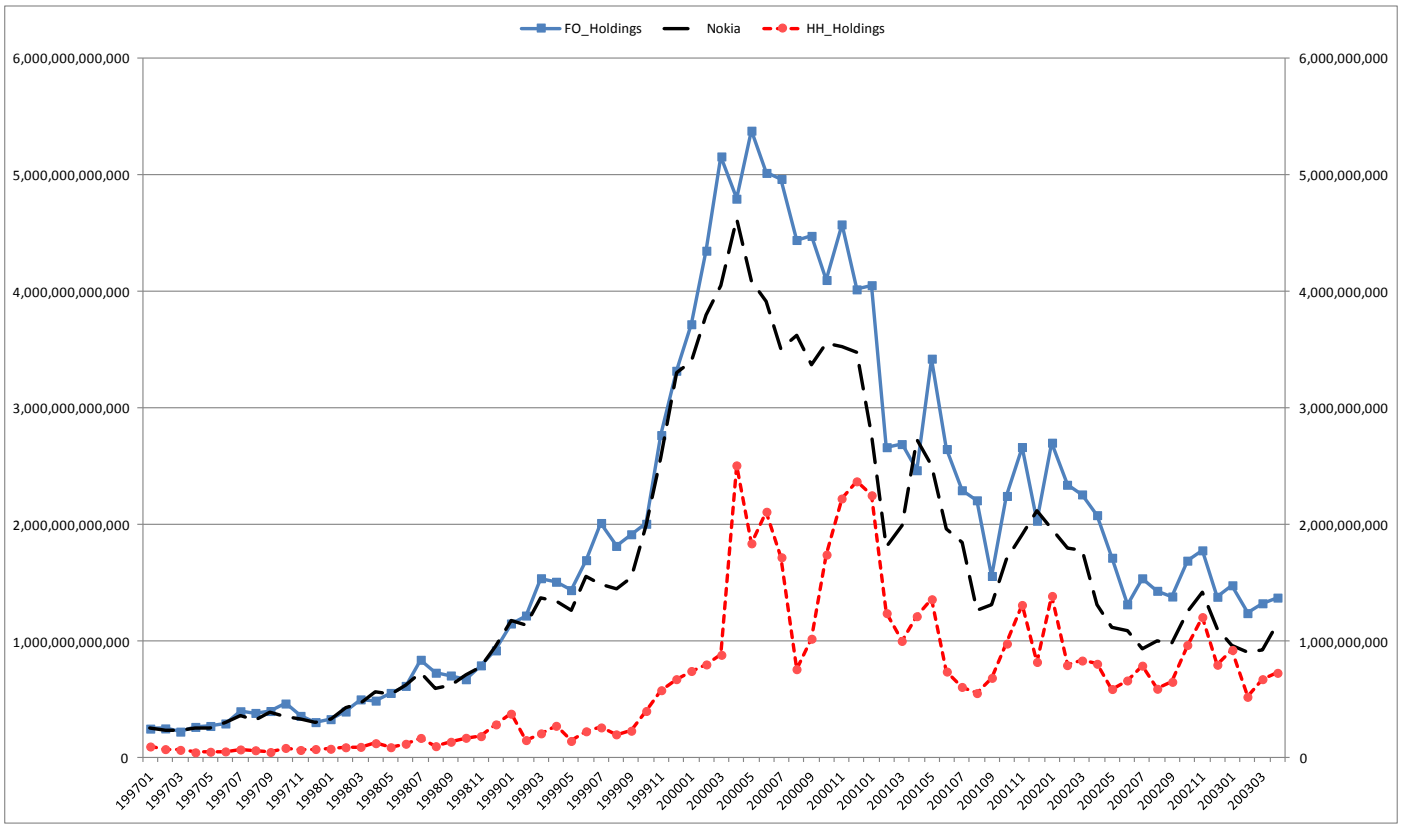
In these estimations realized and unrealized profits are calculated at the time of each sale using the first in first out [FIFO] accounting rule, averaged across each investor's holdings and then averaged and aggregated monthly for each of the investor categories, households, institutions (registered in Finland) and foreign nominees. The monthly average profits are regressed against the equity premium, β_{rm}, which is the monthly excess return on a stock compared to the OMXH portfolio index, and factor loadings for mimicking portfolios of β_{SMB}, which is the small minus big firm size, β_{HML}, which is high minus low book to market, and β_{UMD}, which is the up minus down one year momentum factor. The significance of the estimated coefficients is reported as follows: ***, ** and * denote a 1%, 5%, and 10% significance level, respectively. *T*-statistics are reported in parenthesis beneath the coefficients and adjusted R^2 for each model is reported after the coefficients. *T*-statistics are corrected for heteroscedasticity and autocorrelation utilizing Newey and West (1987).

	Households		Institutions		Foreign Nominees	
	Realized Profits	Unrealized Profits	Realized Profits	Unrealized Profits	Realized Profits	Unrealized Profits
α	0.578**	0.678***	0.0818	0.107	0.103	0.0872
	(2.22)	(2.25)	(1.16)	(1.24)	(1.37)	(1.2)
β_{rm}	0.940	1.04	0.674***	0.655***	0.749***	0.748***
	(1.49)	(1.48)	(2.72)	(2.67)	(3.11)	(3.12)
β_{SMB}	-2.03	-1.15	1.61	1.59	1.20	0.986
	(0.15)	(0.08)	(0.50)	(0.50)	(0.32)	(0.26)
β_{HML}	-42.7***	-51.7***	-13.1***	-13.5***	-17.9***	-18.2***
	(4.89)	(5.18)	(3.50)	(3.63)	(4.61)	(4.65)
β_{UMD}	-1.23	-1.41*	-0.272	-0.273	-0.247	-0.262
	(0.67)	(1.81)	(1.11)	(1.14)	(1.27)	(1.33)
Ann.StdDev of Residual	1.23	1.38	0.417	0.412	0.447	0.450
R^2	37.8%	40.5%	38.4%	39.5%	47.2%	47.5%

Figure 1: HOLDINGS AND ORDER IMBALANCE PRE- AND POST- THE HI-TECH BUBBLE

The Figures depict (Panel A) the time series development in monthly by month total value of holdings by Foreign Nominees vs. Households with Households measured on the much smaller RHS scale and contrasted with the market capitalization of Nokia, and (Panel B) the total monthly order imbalance in number of trades ((number of buys – number of sells) / average number of trades) for Foreign Nominees vs. Households.

Panel A: Value of Monthly Holdings by Foreign Nominees vs Households over the Hi-Tech Bubble Cycle, and the Value of Nokia



Panel B: Total Monthly Order Imbalance in Number of Trades ((Number of buys – Number of sells) / Average number of trades) for Foreign Nominees vs. Households over the Hi-Tech Bubble Cycle

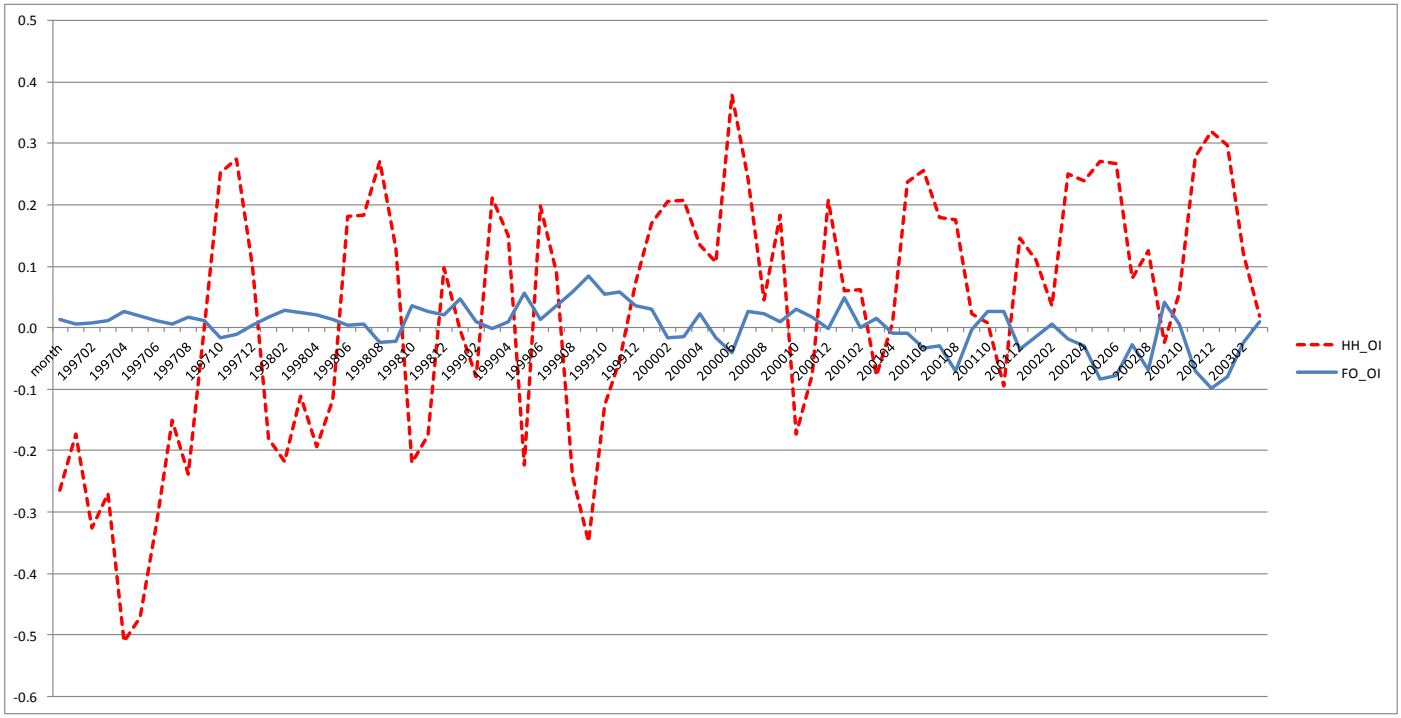


Figure 2: NUMBER OF INTERNAL FOREIGN INSTITUTIONAL AND HOUSEHOLD TRADES COMPARED WITH TOTAL NUMBER OF TRADES IN NOKIA, JANUARY TO JUNE 2000