Passing On Family Values:
Informed Trading through Accounts of Children

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Abstract

We argue that a high proportion of underaged accounts is controlled by informed guardians seeking to camouflage their potentially illegal trades, or to share the benefits of their information with their children. Consistent with this conjecture, we find that over the days immediately following their trades, underaged accountholders outperform older investors by more than 20 percent on an annualized basis. Underaged accountholders perform especially well when they trade just before major earnings announcements, large absolute price changes, and takeover announcements. Introducing the proportion of underaged trading as a novel measure of information asymmetry, we also show that stocks with a higher proportion of underaged trading activity have higher rates of return.

Key Words: individual investors, informed trading, insider trading, market efficiency.
JEL Classification: G14, G19.

1. Introduction

There is a significant and growing literature that seeks to understand the investment decisions of individual investors. A large part of this literature explores "investment mistakes" that lower the performance of individual investors (e.g., see Campbell et al., 2005, Odean, 1998, 1999, and Barber and Odean, 2000). More recently, several papers provide evidence that some categories of individual investors are more informed or skilled than others. For example, Grinblatt, Keloharju and Linnainmaa (2010b) document that high IQ investors have superior stock picking skills, while Seru, Shumway and Stoffman (2010) show that the disposition effect subsides and performance improves as individual investors become more experienced. Similarly, Ivkovic and Weisbenner (2005) find that individuals who invest in local companies outperform other individual investors.[1]

This study focuses on the performance of a group of individual investors that has heretofore escaped attention: underaged accountholders between the ages of zero to ten years. This group is possibly of great interest if, as we argue, a relatively high proportion of underaged accounts is controlled by informed investors. The following news account illustrates an example of such informed trading (date??):

> "Police enquiries into the possibility of insider trading by the Sampo-Leonia President and CEO Jouko K. Leskinen are centering on the Leskinen family's own investment company Bellamatic and his daughter's stock trading. The company and Leskinen's underage daughter bought stock in another Finnish insurer, Pohjola, in the early summer of 1999 to a value of around FIM 300,000. The authorities are interested among other things in the precise time when Sampo began its ultimately abortive attempt to take over Pohjola. Such a hostile takeover move generally raises the market price of the company under attack.
>
> At the time of the purchases Leskinen was President and CEO of Sampo, and he was naturally a major player in the rearrangement of Finland's insurance branch that went on throughout much of last year. Leskinen himself was not available for comment yesterday. In a television interview with the Finnish Broadcasting Company he nevertheless admitted that his daughter and the family's investment firm had bought Pohjola stock. Leskinen commented that the buying decision reflected the

[1] Seasholes and Zhu (2010) use the same database as Ivkovic and Weisbenner (2005). However, they account for contemporaneous correlation of returns across household portfolios, and find no evidence that living near a company leads to better performance. Furthermore, Doskeland and Hvide (2010) find negative abnormal returns for individuals who trade stocks within their two-digit industry of employment.

price-attractiveness of Finnish insurance company stocks at that time, and that he was prevented through insider trading rules from buying stock in his own company, Sampo."
(see http://www2.hs.fi/english/archive/news.asp?id=20000922IE7).

This example illustrates the two reasons why we expect a high proportion of informed trading among underaged investor accounts. First, underaged accounts might be used to camouflage illegal insider trading by guardians.[2] To support this claim, we refer to the case above,[3] along with the large number of insider trading cases where insiders or their acquaintences trade through the accounts of spouses and children.[4]

A second, more benign reason to expect a high proportion of informed trading among underaged investor accounts is that informed parents may simply have a penchant to share the spoils of their information advantage with their offspring. Assuming that Leskinen thought his daughter's purchase of Pohjola stocks was legal, this motive applies in the case above. More in general, we argue that the class of individuals who open accounts on behalf of children is likely to have more wealth (to bestow on offspring), and is likely to have more positive stock market experiences, possibly due to superior cognitive skills or comparative advantages in obtaining value-relevant information.[5] These attributes, combined with basic paternal instincts to share the benefits of any information advantage with offspring, could

[2] Note that we use the term camouflage in the sense of hiding from authorities. It is also conceivable that an informed trader uses the accounts of underaged investors to reduce the price impact of his trades, i.e. camouflage in the sense of Kyle (1985).
[3] In December 2006, Finland's supreme court found Leskinen guilty of insider trading when he bought shares worth over 50,000 euros (65,820 dollars) for his immediate family. The court found that, when Leskinen acquired the Pohjola shares, he knew Sampo was planning to buy a controlling interest in the company. It also ruled that, at the time, the exact nature of Sampo's plans was not known by the market. The court fined Leskinen 7,260 euros (9,560 dollars). Leskinen left Sampo in 2001. (source: AFPR,30 December 2006).
[4] For examples of this trading behavior, see U.S. SEC Litigation Release No. 20115 (May 14, 2007, http://www.sec.gov/litigation/litreleases/2007/lr20115.htm), U.S. SEC Litigation Release No. 21271 (October 30,2009, http://www.sec.gov/litigation/litreleases/2009/lr21271.htm), U.S. SEC Litigation Release No. 21578 (Nov. 30, 2010, http://www.secactions.com/?p=2834), and http://yle.fi/uutiset/news/2010/11/environment_minister_cleared_of_insider_trading_suspicion_2137950.
[5] Prior work has shown that these investor attributes are associated with superior investor performance (for example, see Grinblatt, Keloharju, and Linnainma, 2010 (a,b). Cohen, Malloy, and Pomorski (2010) find that trades by insiders are informative. Cohen, Frazzini, and Malloy (2008) find that educational affiliations between mutual fund and corporate board managers are associated with more profitable mutual fund trading.

lead to a disproportionate number of underaged accounts that bear the fruits of informed investor trading.

A key factor behind our conjecture that the proportion of informed trading among underaged accountholders is relatively high is that total trading activity in underaged accounts is very small relative to that by older investors.[6] Consequently, we suggest that informed guardians, trading through the accounts of the small group of young accountholders, might improve their average performance sufficiently to make underaged investors, as a group, stand out relative to the much larger group of older investors. Put another way, if a relatively large proportion of all underaged accounts is managed by informed guardians, then informed trading through underaged accounts is expected to result in outperformance, on average, by the group of all underaged accounts. In contrast, while informed trading might also take place through the accounts of older relatives, this trading may not be discernible ex-post by the econometrician, because these trades are likely to be swamped by normal trading activity of the much larger group of older investors. Based on this reasoning, we hypothesize that trading by informed parents results in a high probability of informed trading among underaged accountholders. This informed trading will be reflected in superior stock market performance by underaged accountholders, as a group.

We test our hypotheses using data from the Finnish Central Securities Depository (FCSD) database during the period, 1995 to 2010. The FCSD records all changes in daily shareholdings for every investor trading on the Helsinki Exchange (HEX). This database also reports the year of birth of the accountholder. Combining this information enables us to separately analyze the performance of trades made in underaged investor accounts versus trades by accountholders in older age categories.[7]

[6] Young accountholders (up to age ten) are responsible for less than one percent of all trades in our sample.
[7] Unfortunately, these data do not identify the accounts of relatives who trade on the HEX. As a result, we are unable to analyze the relative trading performance of parents versus children, siblings, or other relatives.

We find that the average underaged investor account exhibits superior stock picking skills over the days immediately following their trades. Based on all trades made one day earlier, the young accountholder outperforms older investors by approximately 9 basis points (bp), on average (i.e., more than 20% on an annualized basis). This mean outperformance is still more than 6 bp (15% annualized) based on trades two days earlier, and another 6 bp (15% annualized) based on trades made 3 days earlier; and it then becomes insignificant for trades made prior to 3 days earlier. Additional tests show that our results are robust to sample selection, research methodology, the age cutoff for underaged investors, and they are not caused by outliers in daily stock returns. We also find that young local investors outperform young non-local investors, and the outperformance of young investors is greater when they trade small stocks.

Because the exceptional stock-picking skills of underaged traders are only evident for short horizons, it seems likely that their outperformance stems from superior private information that is about to become public. Consistent with this conjecture, we find that underaged accountholders perform exceptionally well based on their trades in the week before major earnings announcements, large absolute price changes, and takeover announcements. For example, when underaged investors trade on the day before major earnings announcements (i.e., day -1), they outperform older accountholders by an average cumulative abnormal return on days 0 and +1 (CAR(0,+1)) of 1.1 percent, and trade in the correct direction 57 percent of the time. Likewise, when they trade one day ahead of large price changes, they outperform older investors by an average CAR(0,+1) of 2.1 percent, and the proportion of trades in the correct direction is 58 percent. Finally, when they trade on the day before the announcements of mergers and acquisitions, their mean outperformance is a CAR(0,+1) of more than 12 percent, and the proportion of correct trades is 72 percent.

In our final section, we test the proposition in Easley and O'Hara (2002) that investors demand a higher return to hold stocks with greater private information.[8] We use the proportion of total trading activity by underaged investors as our proxy for information asymmetry and find that this measure is positively correlated with spreads, and negatively with firm size and turnover. Consistent with the theoretical models of Easley and OHara 2002 and Lambert and Verrechia (2010), we find that stocks with a higher proportion of underaged trading activity, have higher rates of return. Inclusion of the spread and turnover does not change our conclusion that the probability of information based trade, as proxied by the proportion of underaged trading activity, is priced in asset returns.

The remainder of this study is organized as follows. In the next section we describe the data. Section 3 presents the analysis of all trades by accountholders from different age groups. Section 4 provides evidence from focusing on trades made just before major firm-specific announcements or large price changes. Section 5 provides the results of our cross-sectional asset pricing tests, and a final section summarizes and concludes.
(mate...i moved the contributions to the end...they are obvious + would just be repetitive)

2. Data and Sample Characteristics

2.1 Data Sources

This study is concerned with share price performance following trades by investors in different age groups. We obtain information necessary for this analysis from the Finnish Central Securities Depository (FCSD). There are 183 Finnish stocks in our sample, listed on the Helsinki Exchanges (HEX) at any time in the period from January 1, 1995 through May 31, 2010. To trade on the HEX, investors must register with the FCSD. They are then given a unique FCSD account, even if they trade through multiple brokers. The FCSD database

[8] While the theoretical results in EH 2004 have been subject to debate (Hughes et al 2008, Leuz lambert + Verrec), Lambert and Verrecchia (2010) confirm that in illiquid markets, asymmetric information can have an impact on the cost of capital.

records the shareholdings of all registered trading accounts in Finland, and documents daily changes in shareholdings for each investor registered.[9]

Our sample includes the transactions of more than a half million individuals, for the period from January 1, 1995 through May 31, 2010. All transactions placed each day, by every investor, are recorded as either purchases or sales. Trades are aggregated for every investor each day, and we use the daily net change in an investor's position of a given stock as our unit of observation.

We split all individual investors into 6 different age groups. The first group consists of accountholders between ages 0 and 10 years. For this group of accountholders, it is more than likely that a guardian is trading on their behalf. The second age group includes all accountholders between ages 11 and 20 years. For these accountholders, guardians may still be in control of the account, but it is less likely that the guardian will operate without informing the accountholder. The next three age groups are individuals between ages 21 and 40, individuals between 41 and 60, and individuals between 61 and 80. The final age group contains people 81 years and older.

We obtain earnings announcement dates from Bloomberg,[10] and merger and acquisition announcement dates are from SDC Platinum. Daily share prices and the number of shares outstanding are from Compustat Global. The market-to-book ratios for all Finnish firms are obtained from Worldscope.

2.2 Sample Characteristics and Trading Activity by Age Group

Table 1 presents descriptive statistics for the variables used in this study. In the first column of Panel A, we report for each age group the total number of trading days across all stocks and accountholders in that age group. In the second column, we provide the percent of the

[9] Grinblatt and Keloharju (2000) provide a detailed description of the FCSD database.
[10] We checked the earnings announcement dates from Bloomberg against the official source at http://www.nasdaqomxnordic.com/news/. We found no discrepancies in earnings announcement dates.

total number of trading days in the sample attributable to every age group. Accountholders in the first age group make up less than 1 percent of the total number of stock-trading days across all accountholders. The second age group comprises slightly less than 2 percent. Not surprisingly, the bulk of trading is done by investors between ages 21 and 80.

The third column of Panel A in Table 1 shows the percent of trading days in which the accountholder was a net buyer, for every age group. Also in line with expectations, we see that young investors tend to be on the buy side, as they are net buyers on two thirds of the days they trade. This proportion drops to 55 percent for the second age group, and remains higher than 50 percent for traders between ages 21 and 80. Investors older than 80 years tend to be sellers on more than 60 percent of the days they trade.

Columns 4 and 5 of Panel A in Table 1 show that, on average, the number of shares bought and sold by young investors tends to be smaller than for older investors. Column 6 shows that the average number of shares bought exceeds the number of shares sold for the youngest two age groups, whereas the opposite holds for the oldest two age groups, especially for investors over 80 years.

Finally, the last column of Panel A in Table 1 provides the percent of all trades made by female accountholders, within every age group. Female accountholders account for almost 50% of all trading days for the youngest group of accountholders. This outcome is consistent with both of our explanations for abnormal performance by underaged accounts – camouflage trading by informed parents and parental sharing of profits from informed trading. There is no reason to expect the gender of the underaged accountholder to play a role in either explanation. In all older age groups, the proportion of trades by female accountholders is lower. This proportion is lowest for investors between ages 21 and 40, and then increases for older investors. The relatively high percentage of female trades among the oldest group of investors might reflect the longer life expectancy of females.

In Panel B of Table 1, we report descriptive statistics for our control variables. Our choice of control variables is based on Grinblatt, Keloharju and Linnainmaa (2010b), who analyze the investment performance of Finnish individuals based on their IQ-score. We report the mean ranks of beta, the market-to-book ratio, and firm size averaged across all stock-trading days in every age category. Panel B also reports the mean rank for four variables that summarize past returns over different windows: the previous year excluding the last month; the previous month excluding the last week; the previous week excluding the last day; and yesterday.

We calculate the rank values for each variable by first computing the firm's beta, market-to-book ratio, market capitalization, and the four past return measures for each stock using daily data. More specifically, we compute the Dimson beta for each stock by regressing the stock's daily return on the value-weighted market return, along with 3 leads and 3 lags of the market return, over a 250-day period ending 1 day before the trade date. Market capitalization is the number of shares outstanding multiplied by the daily closing price. The market-to-book ratio is the market value of equity divided by the book value of equity measured at the end of the prior calendar year. For trade date t, market capitalization and the market-to-book ratio are the median values over a 20-day period ending 20 days before day t. Following Grinblatt, Keloharju and Linnainmaa (2010b), we measure the past return for each stock over the four different windows described above.

For every day in the sample period, we next transform each of the seven control variables into ranks by first sorting the stocks into 10 groups. Next, we assign a value to the stocks in each decile group, where the values range from -0.5 (for the stocks in the lowest decile group) to +0.5 (for the stocks in the highest decile group). The mean rank values in Panel B of Table 1 are averaged across all stock-trading days within each age group.

Columns (1) - (3) in Panel B report the mean Dimson beta rank, the market-to-book rank, and the firm size rank for the stocks bought or sold across all stock-trading days in every age category. The positive values of these mean ranks indicate that individual investors in all age categories tend to be more active in stocks with relatively high betas, market-to-book ratios, and market capitalization. The past return ranks show that the youngest age group (1) and the two age groups with the most trades (3 and 4) tend to be more active in stocks that experienced a price decline over the previous year and the previous month, whereas the oldest investors tend to be more active in stocks that have recently increased in value. The differences in these mean firm characteristics and past returns across age groups are sometimes statistically significant (although these tests are not reported here for brevity). However, these differences in mean ranks are small in magnitude. For example, in Panel B the maximum difference in average ranks between age groups for the same variable is only 0.08 (i.e., the difference in the mean rank for firm size between age group 6 and 3).

3. Stock Returns for Different Age Groups: Analysis of All Trades

We analyze the investment skills of investors in the different age groups, using a Fama-MacBeth (1973) regression approach that is similar to the analysis of Grinblatt, Keloharju and Linnainmaa (2010b).[11] First, for each trading day (t) in the sample period, we identify all accounts that trade in any given stock (i). Second, we separate accounts that are net buyers of stock i on day t from accounts that are net sellers of stock i on day t. This procedure results in two cross-sections for every day (t) that contain the trading activity of all buyers and sellers, respectively, for each stock (i).

We then analyze the return performance on day t, for the stocks bought or sold x days earlier, on day t-x, by investors in different age groups (where x = 1, 2, 3, 4, 5, 1-5, and 6-10

[11] This approach is attractive because it documents the marginal effect of investor age on performance, while controlling for other relevant attributes such as firm characteristics and investor characteristics. In our robustness tests we show that a calendar-time portfolio approach produces similar results.

days earlier). Specifically, we estimate two cross-sectional regressions on each day (t) for the samples of purchases and sales, separately. The dependent variable in the regressions is $Return_{i,t}$, the geometric return of stock i on day t, and the independent variables include dummy variables for the age group that each buying or selling accountholder belongs to, along with a set of control variables that include the day t-x adjusted ranks for the firm's size, beta, market-to-book ratio, and the four past return measures described above.

3.1 Performance of Young versus Older Investors for Trades Made One Day Earlier

We illustrate this analysis with the following cross-sectional regression model that omits the control variables, and includes only the dummy variable for the youngest age group:

$$Return_{i,t} = a_0 + a_1 AGE(0\text{-}10)_{i,t-x} + e_{i,t}. \quad (1)$$

The dummy variable, $AGE(0\text{-}10)_{i,t-x}$, is assigned a value 1 for all net purchases (or sales) made on day t-x by accountholders that are between ages 0 and 10 years, and 0 otherwise. Thus, the intercept (a_0) represents the mean return on day t, averaged across all stock purchases (or sales) made on day t-x, by investors in the omitted group, which includes all accountholders older than 10 years. The coefficient of the dummy variable then reflects the difference between this intercept and the mean return on day t, across all purchases (or sales) made on day t-x by the group of youngest accountholders.

For each day in the sample period, we estimate the cross-sectional regression in (1) for the subsample of purchases and sales, separately. We then compute the Fama-MacBeth mean coefficients across all daily cross-sectional regressions for purchases, and for sales. We use the standard deviation of each time series mean coefficient to construct the t-ratio.

We also provide the mean difference for each coefficient (a_0 or a_1) across the two time series of daily regressions for purchases versus sales. That is, we calculate the mean and standard deviation of the time series of daily differences, (a_0 for purchases - a_0 for sales) and

(a_1 for purchases - a_1 for sales). We will return to the interpretation of these zero-cost "hedge portfolio" returns in our discussion of the results.

The results of the Fama-MacBeth regressions specified in (1) appear in Table 2. The first column in Panel A presents the mean coefficients that represent the average return on day t, along with their t-ratios, for all purchases made on day t-1, omitting the other control variables. These statistics are obtained from 2,904 daily regressions (we exclude days with less than 500 different individual accounts trading at least 50 different stocks). The second column in Panel A provides the analogous results when the control variables are included in an expanded version of (1). Columns 3 and 4 present the same information for sales made on day t-1, while columns 5 and 6 show the hedge portfolio results that reflect the combined performance of buyers versus sellers.

Consider first the evidence for purchases made on day t-1, omitting the other control variables, in the first column of Panel A in Table 2. Note that the mean intercept (a_0) for purchases is small in magnitude (+.009) and not significantly different from zero (t-ratio = 0.2). This result indicates that, on the day after purchases by older investors, the average return is less than one basis point (bp) and is not significantly different from zero. In contrast, the mean coefficient for the age dummy (a_1) is positive (+.057) and highly significant (t-ratio = 3.2). Thus, stocks bought by young investors (in age group 1) significantly outperform stocks bought by older investors by approximately 6 bp, on average, one day later. This result is also economically significant, as an average daily excess return of +6 bp aggregates to an annualized excess return of approximately +15 percent.

Column 2 in Panel A of Table 2 presents the analogous results when we include the seven control variables suggested in Grinblatt, Keloharju and Linnainmaa (2010b).[12] Controlling for these risk factors reduces the average difference between the next-day

[12] Results for these control variables are omitted here for brevity, but are available upon request.

performance for underaged investors versus older investors (a_1) to approximately +4 bp (or approximately 10% annualized). However, this mean difference remains significantly different from zero at the 5% level (t-ratio = 2.8). Thus, consistent with our hypothesis, we find that young accountholders are good stock pickers: the stocks they buy tend to significantly outperform stocks bought by older investors on the following day.

Columns 3 and 4 in Panel A present the same analysis for sales by investors from the two age groups. Again there is strong evidence that underaged investors have exceptional stock picking skills. The stocks sold by underaged investors underperform the stocks sold by older investors by an average (a_1) of approximately -5 bp on the following day, whether or not the control variables are included (t-ratio = -1.8 and -2.0, respectively). Note that the exceptional stock picking skills of young investors also manifest themselves on the sell side. This result contrasts with prior evidence in several studies suggesting that purchases are more informative than sales.[13] A possible explanation for our evidence is that sales triggered by liquidity shocks might be less prevalent for young accountholders than for older investors.[14]

Columns 5 and 6 of Panel A present the mean difference in each coefficient (a_0 or a_1) across the subsamples of purchases versus sales. Each mean difference represents the average return yielded by a hypothetical zero-cost hedge portfolio strategy. According to this strategy, a hypothetical investor goes long \$1/n in all n stocks that are bought on day t-x by all older investors, and short \$1/m in all m stocks that are sold on day t-x by all older investors. The results regarding this hedge portfolio, based on the purchases and sales of older investors, yields an insignificant mean return on the following day of +1.7 or -0.6 basis points,

[13] Papers by Kraus and Stoll (1972), Choe, McInish, and Wood (1995), Cohen, Frazzini, and Malloy (2008) and Grinblatt, Keloharju and Linnainmaa (2010b) find evidence that the market acts as if buys are more informative than sales. In contrast, Cohen, Malloy, and Pomorski (2010) find that both opportunistic purchases and sales by insiders are informative.

[14] Chan and Lakonishok (1993) and Saar (2001) argue that liquidity-motivated sales are unlikely to be informative if investors are forced to sell one of the limited number of stocks they already own. Since there are many more different securities to choose from when buying, they suggest that purchases are more likely to convey firm specific positive news.

depending on whether the control variables are included (t-ratio = 1.0 or -0.7). In contrast, the relative performance of underaged accountholders (a_1 for purchases - a_1 for sales) is much more impressive. This analogous hedge portfolio based on the purchases and sales of young accountholders outperforms the hedge portfolio above by an average of roughly +11 bp per day without control variables (t-ratio = 3.0), and +9 bp per day if control variables are included (t-ratio = 3.1). Once again, this mean difference is highly significant, both statistically and economically, as it accumulates to more than 20 percent on an annual basis.

3.2 Performance across Investors from All Age Groups for Trades One Day Earlier

In Panel B of Table 2, we provide the analogous results for an expanded model that revises (1) to include dummy variables for each of the older five age groups, while omitting the youngest age group, as follows:

$$\text{Return}_{i,t} = b_0 + b_1\,\text{AGE(11-20)}_{i,t-x} + b_2\,\text{AGE(21-40)}_{i,t-x} + b_3\,\text{AGE(41-60)}_{i,t-x} + b_4\,\text{AGE(61-80)}_{i,t-x} + b_5\,\text{AGE(80+)}_{i,t-x} + e_{i,t} \qquad (2)$$

Here the intercept (b_0) reflects the performance on day t of purchases or sales made on day t-x by young accountholders, who represent the omitted group in this specification. The remaining dummy coefficients (b_1 - b_5) now indicate the difference between the performance of young investors (b_0) and each of the other five age groups, respectively.

In the first column of Panel B in Table 2, the intercept (b_0) for purchases is +6.6 bp (t-ratio = 1.7). This result indicates that purchases by young accountholders are followed by a tendency for prices to rise one day later. In contrast, the coefficients of the age dummies (b_1 - b_5) for purchases range from -3.5 to -6.4 bp, and are also generally significant. Consistent with the results in Panel A, this outcome shows that the purchases of older investors tend to underperform those of young investors one day later. Similar results are obtained if the control variables are included, in column 2.

Columns 3 and 4 of Panel B provide the analogous results for sales. Now we find an intercept (b_0) that is negative (-5.7 or -1.1 bp) and insignificant (t-ratio = -1.3 or -0.3). This result indicates that sales by young accountholders are followed by a tendency for prices to decline one day later, although these mean price declines are not significant. In contrast, we now find positive coefficients for all age group dummies (b_1 - b_5), that range from 3.5 to 7.2 bp, and are significant in five of ten cases at the .10 level or better. This evidence indicates that the sales of older investors tend to underperform (i.e., lead to smaller negative returns) than the sales of younger investors, one day later.

When we consider the hedge returns in the last two columns of Panel B, we find a significant mean difference in intercepts (b_0 for purchases - b_0 for sales) of +12 bp or +8 bp (t-ratio = 3.2 or 2.7), depending on whether the control variables are included. Such a one-day hedge portfolio return of +8 to +12 bp based on the trades of young accountholders accumulates to approximately 20 to 30 percent per annum. The hedge portfolio coefficients for all of the older age groups (b_i for purchases - b_i for sales; i = 1-5) are consistently negative and significant, indicating that young accountholders outperform all older age groups one day later. Also note that the difference in performance between the youngest investors and each of the other age groups is larger than the differences in performance across different pairs of the respective older investor groups. For example, when we focus on the returns in the last column, the differences in performance on day t between the youngest investors and the other age groups range from +6.9 bp to +10.0 bp, whereas the maximum difference in performance across the respective older investor groups is 3.1 bp.

3.3 Performance of Young versus Older Investors for Earlier Trades

In Panel C of Table 2, we return to the analysis of model (1), but we examine the return performance of trades made two days earlier. Panels D, E and F then present similar results for the performance of trades made three, four and five days earlier, respectively. Finally, in

Panels G and H we provide the analogous results for all trades made during the first or the second week earlier (i.e., during days -1 through -5, or days -6 through -10).[15] The collective results in Panels C - H of Table 2 indicate that the outperformance of young investors persists for three days following their trades, while trades made further in the past reveal no significant outperformance by young investors.

For example, Panel C shows that young investors continue to outperform older investors on the second day after their trades. In Panel C, the mean coefficient of the age dummy (a_1) is almost +4 bp for purchases (t-ratio = 2.1 or 2.5), and ranges from -2.7 to -5.1 bp for sales, depending on whether the control variables are included (t-ratio = -1.3 or -1.9). These results combine to form an average hedge portfolio return difference that ranges from +6.3 to +8.6 bp, two days after the trades of young investors (t-ratio = 2.4 or 2.8). Thus, the trades of young investors continue to outperform those of older investors on the second day following their trades, at an annualized rate of approximately 15% to 20%.

Panel D of Table 2 presents the analogous results for the continued performance by young versus older investors three days after trades are made. Here we find a tendency for continuing positive mean outperformance for purchases by young investors of roughly +1 bp (t-ratio = 0.4 or 0.6), and a continuing negative mean underperformance for sales of -5.4 bp to -7.6 bp (t-ratio = -2.1 or -2.4). These mean coefficients for purchases versus sales combine to form a mean hedge portfolio return of +6 to +8 bp that is significant (t-ratio = 2.1 and 2.3).

Next, Panels E and F of Table 2 show no evidence of significant outperformance by young investors for either purchases or sales, four or five days after they trade. Panel G provides the results for all trades during the first week prior (days -1 through -5). This evidence corroborates the significant outperformance of young investors based on trades during days -1 to -3 in the previous week. In contrast, Panel H shows that trades during the

[15] The analogous results based on model (2), including all age group dummies, are consistent with the evidence provided here, and are available upon request.

second week prior (days -6 through -10) reveal no evidence of any significant outperformance by young investors, for either purchases or sales.

Overall, the results in Table 2 strongly suggest that the group of underaged investors possesses significant short-term informational advantages that result in superior stock returns on the days immediately following their trades. Given the short term nature of this apparent information advantage, we expect the superior performance of underaged investors to manifest itself more profoundly around major corporate events that are commonly associated with increased information asymmetry, such as takeover and earnings announcements. This conjecture is the subject of the section 4.

3.4 Subsets of Data Based on Attributes of the Firm Traded or the Accountholder Trading

In this section we estimate an expanded version of (1), which enables a comparison of the behavior across subsets of data based on firm size or whether the investor is local versus non-local. In this expanded model, we introduce a second dummy variable, as well as its interaction with the age dummy, as follows:

$$Return_{i,t+1} = a_0 + a_1 AGE(0\text{-}10)_{i,t} + a_2 DUMMY_{i,t} + a_3 DUMMY*AGE(0\text{-}10)_{i,t} + e_{i,t}. \quad (4)$$

The new dummy variable in this specification is assigned a value of 1 if a specific attribute applies to the firm traded, or to the accountholder who trades. In our estimation of this model below, we also include the other control variables in the analysis.

3.4.1 Small versus Large Firms

We illustrate the interpretation of model (4), by first examining whether our results are robust across investments in small versus large stocks. In this test, DUMMY is assigned a value of 1

for investments in small firms (i.e., if the firm's market capitalization is smaller than the median firm size), and 0 for large firms (i.e., if it is larger than the median firm size).

The interpretation of the coefficients in (4) can be illuminated by showing how the model behaves for the four different subsets of data that it delineates. For trades in large stocks by older investors, AGE(0-10) = 0 and DUMMY = 0, and the model simplifies to:

$$\text{Return}_{i,t+1} = a_0 + e_{i,t} . \quad (5)$$

For trades in large stocks by young investors, AGE(0-10) = 1 and DUMMY = 0, so that:

$$\text{Return}_{i,t+1} = a_0 + a_1 + e_{i,t} . \quad (6)$$

For trades in small stocks by older investors, AGE(0-10) = 0 and DUMMY = 1, so that:

$$\text{Return}_{i,t+1} = a_0 + a_2 + e_{i,t} . \quad (7)$$

For trades in small stocks by young investors, AGE(0-10) = 1 and DUMMY = 1, so that:

$$\text{Return}_{i,t+1} = a_0 + a_1 + a_2 + a_3 + e_{i,t} . \quad (8)$$

These specifications reveal the interpretation of the coefficients, a_0 - a_3. First, the intercept (a_0) represents the mean return one day later for all trades by older investors (the omitted age group), which are placed in large stocks (the omitted firm size group). Second, a_1 represents the mean differential performance of young investors relative to older investors, for all trades in large stocks (i.e., (6) - (5)). Third, a_2 shows the average differential performance of small stocks relative to large stocks, for all trades by older investors (i.e., (7) - (5)). Fourth, a_3 reflects how firm size and investor age category interact to influence the performance of trades one day later. Finally, the coefficient sum, (a_1+a_3), shows the mean outperformance of young versus older investors across all trades made in small stocks (i.e., (8) - (7)). These interpretations are summarized in Panel A of Table 8. In our discussion below, we focus on the differential performance across young versus older investors in relation to the different groups represented by the dummy variable (i.e., a_1+ a_3, a_1, and a_3).

The Fama-MacBeth coefficients and the relevant coefficient sums that document the differential performance of young versus older investors trading in small versus large stocks are provided in panel B of Table 8. As discussed above, the coefficient sum, (a_1+a_3), reflects the outperformance of young versus older investors trading small stocks. This outperformance is 12.5 bp (t-ratio = 3.0) for purchases, and -4.3 bp (t-ratio = -1.0) for sales. Combining purchases and sales in small stocks, the mean hedge portfolio return indicates that the outperformance of young investors trading small stocks is large and significant, at 16.7 bp, one day later (t-ratio = 2.8). This result shows that young investors significantly outperform older investors when they trade in small stocks.

Next consider the analogous results for trading in large stocks. The coefficient, a_1, indicates that the mean outperformance by young investors trading large stocks is 2.1 bp (t-ratio = 1.7) for purchases, and -3.1 bp (t-ratio = -1.3) for sales. Combining purchases and sales, the outperformance of young investors trading large stocks yields a mean hedge portfolio return that is marginally significant, at 5.3 bp (t-ratio = 1.9). This result shows that young investors also tend to outperform older investors when they trade in large stocks.

When we compare the degree of outperformance by young investors in small stocks versus that in large stocks (a_3), one day later, we find that this outperformance is 10.3 bp (t-ratio = 2.4) for purchases, and -1.1 bp (t-ratio = -0.3) for sales. Combining purchases and sales yields a mean hedge portfolio return of 11.5 bp (t-ratio = 1.9). This evidence indicates that the average outperformance of young accountholders trading small stocks is approximately 11.5 bp greater than their outperformance trading large stocks, but this outperformance is largely due to superior purchases of small versus large stocks.

3.4.2 Local versus NonLocal Investors

Our next test analyzes the robustness of the divergent performance of young versus older investors who are local versus nonlocal. Here we assign the dummy variable in (4) a value of

1 for all trades where the accountholder is local (i.e., resides in the same postcode as the headquarters of the firm traded), and 0 for nonlocal trades (i.e., where the postcodes are different). The results are provided in Panel D of Table 8.

To understand the implications of these results, consider first the relative performance of young versus older investors who are local (i.e., DUMMY = 1). The coefficient sum, (a_1+a_3), indicates that young local investors outperform older local investors by approximately 5.7 bp (t-ratio = 2.5) for purchases, and -6.7 bp (t-ratio = -2.2) for sales. Combining purchases and sales, the outperformance of young local investors yields a mean hedge portfolio return that is large and highly significant, at 12.4 bp (t-ratio = 3.2). This outcome shows that young local investors significantly outperform older local investors on both the buy side and the sell side.

Next consider the results for trading by young versus older investors who are nonlocal (i.e., DUMMY = 0). The coefficient, a_1, indicates that young nonlocal investors also outperform older nonlocal investors, although by a smaller amount of 3.8 bp (t-ratio = 2.7) for purchases, and -4.3 bp (t-ratio = -1.8) for sales. As a result, the outperformance of young versus older nonlocal investors also yields a significant, if smaller, mean hedge portfolio return of 8.0 bp (t-ratio = 2.9). This result shows that young investors also significantly outperform older investors when they are both nonlocal, although this degree of outperformance is somewhat smaller than when the young and older investors are both local.

When we examine the difference in this degree of outperformance by young or older investors who are local, relative to those who are nonlocal, we find this difference is not significant. The relevant coefficient (a_3) is 1.9 bp (t-ratio = 0.9) for purchases, -2.4 bp (t-ratio = -1.1) for sales, and 4.3 bp (t=ratio = 1.5) for the hedge portfolio. In summary, we find that young accountholders outperform older investors when both are local, or when both are nonlocal, and the outperformance of young investors is somewhat greater when both are local

(although this difference is not significant). Thus, in contrast to Seasholes and Zhu (2010), we find support for the hypothesis that local individual investors have an information advantage over nonlocal individual investors, regardless of their age.

3.5 Robustness Tests and Other Classifications

In Table A1 in the Appendix we include a collection of tests that show the results in Table 2 are robust (i) for different subperiods of the entire sample, (ii) for the subset of all trades that exclude those near the major events analyzed in section 4, (iii) for alternative definitions of young investors, (iv) for rank regressions, and (v) for arithmetic returns. We also show the results are similar if we use calendar time portfolio tests.

Table A2 in the Appendix reports the results of model XX based on the market-to-book ratio and the gender of the trader. We find that the outperformance by young investors in growth stocks is not significantly greater than their outperformance in value stocks, for purchases, or sales, or the hedge portfolio. We also find that the outperformance of young versus older investors is somewhat greater for females, however the degree of this outperformance is not significantly different across females versus males.

4. Stock Returns for Different Age Groups: Trades Made before Major Corporate Announcements and Large Price Changes

In this section we use an event study approach and focus on all trades made in the days prior to takeover and earnings announcements. In addition, we analyze trades in the days before large price changes, which presumably reflect the arrival of substantive value-relevant information. Our tests compare two aspects of the ability of investors to make the correct trading decision with regard to these upcoming events. First we examine the two-day market-adjusted cumulative abnormal return on the day of, and the day after, any given event (CAR(0,+1)), following trades made by investors in each age group x days before the event.

Second, we investigate the proportion of trades made in the correct direction, for trades made by investors in different age groups x days before the event.

In our event studies of earnings announcements and large price changes, we select the sample of events in such a way that, under the null hypothesis that traders are uninformed, the expected CAR(0,+1) equals zero and the expected proportion of trades in the correct direction equals 50 percent. We accomplish this goal by creating a matched sample with an equal number of good news and bad news events, that are similar in terms of the distribution of the absolute CAR(0,+1). By designing such a 'fair experiment,' we attempt to neutralize any potential biases that might arise from the tendency for underaged accountholders to buy more frequently than older accountholders (see Table 1).

Takeover announcements are typically good news for the target firm. We are therefore unable to construct a similar 'fair experiment' that considers an equal number of good news and bad news takeover events. Instead, in our tests of takeover announcements we account for the tendency of young accountholders to buy, by comparing the performance of trades made by young investors on the days just before the takeover announcement with similar trades made a year earlier.

4.1 Event Study Results for Earnings Announcements and Large Price Changes

4.1.1 Sample Selection Criteria for Earnings Announcements and Large Price Changes

We generate our sample of earnings announcements by first obtaining a total of 4,136 quarterly announcements from Bloomberg, made by all Finnish firms over the period, 1999 through 2009.[16] Second, in order to focus on major events that are likely to be characterized by substantial information asymmetry, we select only earnings announcements with a CAR(0,+1) of at least 4% in absolute value. This screen results in a sample of 964 major negative earnings announcements and 760 major positive earnings announcements.

[16] Finnish earnings announcements dates are not available from Bloomberg before 1999.

We then further restrict this sample to have an equal number of good news and bad news events, that are similar in terms of the distribution of absolute CAR(0,+1). We achieve this objective by matching (without replacement) the 760 good news events with the nearest neighbor for absolute CAR(0,+1) in the larger sample of 964 bad news events, where we also require that the difference in absolute CAR(0,1) of the matched pair is smaller than 1%. This exercise results in a final sample of 1,492 events, comprised of 746 good news and 746 bad news earnings announcements. Descriptive statistics are provided in Panel A of Table 3, for the resulting two matched subsamples of good news and bad news earnings announcements.

We follow a similar procedure to create a matched sample of good news and bad news large price changes. First, for each stock, for every year, we select the two days with the largest and smallest market-adjusted abnormal returns, respectively. This selection yields an initial sample of 2,347 large price increases and 2,347 large price decreases for all Finnish firms across all 16 years in the sample period. Second, we only retain a major price change event if it is not within five days of an earnings announcement or acquisition announcement, and if it is not within one month of another large price change event for the same stock. Third, as before, we require that the large price change event has a CAR(0,1) of at least 4% in absolute value. These screens result in 993 positive price change events and 870 negative price change events. Finally, we match (without replacement) the 870 large negative price change events with the nearest neighbor for CAR(0,+1) from the larger sample of 993 positive price change events, where we also require that the difference in absolute CAR(0,1) of the matched pair is smaller than 1%. This final screen results in our final sample that includes 771 large price increases and 771 large price decreases. Descriptive statistics are provided in Panel B of Table 3, for the resulting samples of good news and bad news large price change events.

4.1.2 Event Study Design for Earnings Announcements and Large Price Changes

We wish to compare the event period performance (i.e., on days 0 and +1 around the event), based on trades by young versus older accountholders made in the days and weeks prior to these events. We conduct this comparison using two different measures of performance by investors in different age groups. First, we analyze the cumulative abnormal return around the event, based on trades made by each age group in the days and weeks before the event. Second, we examine the relative frequency of these trades that were made in the correct direction by investors in each age group.

First consider our analysis of the return-based performance. In this analysis, we begin by computing the stock's market-adjusted cumulative abnormal return on the event day and the next day, CAR(0,+1). We then 'sign' this cumulative abnormal return for all trades made by every accountholder, depending on whether that account was a net buyer or seller, x days before the event. If an account was a net purchaser of the stock x days before the event (i.e., total shares bought exceed total shares sold on day t-x), then the event period return for that account equals the stock's CAR(0,+1). Alternatively, if an account was a net seller of the stock on day t-x (i.e., total shares sold exceed total shares bought), then the event period return for that account equals the stock's CAR(0,+1) multiplied by -1.[17]

Next, for each event, we calculate the mean 'signed' CAR(0,+1) across all accounts in each age group which bought or sold the stock on day t-x. We then average these mean 'signed' CARs across all events, for trades made by young and older accountholders, respectively. We report this mean signed CAR, which reflects the average event period performance across all events by investors in each age group, based on their trades on day t-x. The standard error of this mean 'signed' CAR across all events is used to construct a t-test of the null hypothesis that the CAR(0,+1) is zero, for trades by each age group. We also use a

[17] We combine the sample of sales and purchases because the sample size for underaged trades is small, and we find no evidence that the averaged signed CAR(0,1) is significantly different between sales and purchases.

difference in means t-test to test the null hypothesis that the mean signed CAR of young accountholders equals the mean signed CAR of older accountholders.

Second, consider our analysis of performance based on the frequency of trades in the correct direction. In this analysis, we begin by computing the proportion of investors in each age group who trade in the correct direction of the subsequent price move reflected in the CAR(0,+1). That is, we compute the proportion of total trades on day t-x, for which young or older investors correctly *buy / sell* a stock just before a *good / bad* news earnings announcement or a large price *increase / decrease*. We then obtain the mean proportion of correct trades by event, for each age group. Finally, we average these mean proportions across events to obtain the average proportion of correct trades across all events by investors in each age group, based on their trades on day t-x. The t-tests are similar to those constructed for our tests involving the signed CAR(0,1).

4.1.3 Event Study Results for Major Earnings Announcements

Table 4 provides several sets of results for trades made in the days and weeks before major earnings announcements. Each set of results includes three columns. In every case, the first column summarizes the performance of young investors, across the subset of all announcements in our sample where at least one young accountholder trades on day t-x. The second column then documents the performance of older investors, across the larger sample of all events where at least one older accountholder trades on day t-x. The third column then summarizes the mean difference in performance across the two age groups.[18]

The first set of three columns in Panel A of Table 4 provides the results based on trades made one day before the event (day -1). The second set of results in Panel A is based on trades made two days before the announcement (day -2), and the third set presents the

[18] In unreported tests, we compare the performance of young versus older accountholders, using a smaller sample that only contains events if both age groups have at least one individual trading on day t-x. The results for this alternative matched sample of events are similar to those in Table 4 and lead to the same conclusions.

analogous results for trades made three days before the event (day -3). Panel B and Panel C then summarize the analogous performance of all trades made during each of the first six weeks before the announcement.

The first column in Panel A of Table 4 shows that at least one young accountholder trades on day t-1 for 252 of the 1,492 major earnings announcements in the entire sample. For these events, young traders experience a significant mean signed CAR(0,+1) of 1.36% (p-value = .04). In addition, an average of 57 percent of trades by young accountholders on day t-1 are in the correct direction. This average relative frequency is significantly greater than 50 percent (p-value = .03).

The second column in Panel A presents the results for older accountholders trading on the day before major earnings announcements. For 1,474 of the 1,492 events in this sample, at least one older accountholder traded on the day before the announcement. These older investors also significantly outperformed the market, with a mean signed CAR(0,+1) of 0.25% (p-value = .04), and an average of 52 percent of their trades in the correct direction (p-value = .00).

The third column in Panel A then compares the performance across the two age groups. The mean difference t-test indicates that the 1.10% difference in the average signed CAR(0,1) is significant at the .01 level. Likewise, the 5% difference in mean relative frequencies across the two age groups is significant at the .01 level.

The second set of three columns in Panel A of Table 4 presents the results for trades made two days before the announcement. Now the mean signed CAR(0,+1) is 0.89% (p-value = .23) for young accountholders, and 0.00% (p-value = .99) for older accountholders. The difference between these mean signed CARs equals 0.88%, and is significantly different from zero (p-value = .04). Likewise, the mean relative frequencies of correct trades by young and older accountholders on day t-2 are 56 and 51 percent, respectively (p-values = .05 and

.33). The difference across these mean proportions is 6 percent, and is significant at the .01 level.

The third set of three columns in Panel A of Table 4 presents the results for trades made three days before the announcement. In this case, the mean signed CAR(0,+1) for young accountholders is 1.43% (p-value = .05), while the analogous results for older accountholders is -0.11% (p-value = .36). These results lead to a difference in mean signed CAR's of 1.54% (p-value = .01). Likewise, young and older accountholders trade in the correct direction an average of 56 percent (p-value = .05) and 50 percent (p-value = .85) of the time, respectively. The 6 percent difference in these mean relative frequencies across age groups is also significant (p-value = .01).

Panels B and C of Table 4 provide analogous results for all trades made during each of the six weeks before the event. The evidence in Panels B and C shows that, as we consider trades made further back in time ahead of the earnings announcement, the outperformance of young investors disappears quickly. While young accountholders outperform older investors in terms of stock returns based on their trades during the week before the announcement, the difference in mean CAR's is never statistically significant for trades made during week -2 to week -6. Similarly, based on the proportion of correct trades, the significant outperformance of young investors is limited to trades during week -1.[19] Overall, we conclude that young accountholders perform exceptionally well based on their trades during the few days before earnings announcements.

4.1.4 Event Study Results for Large Price Changes.

Table 5 presents the performance of trades made by young and older accountholders prior to large absolute price changes. The format of Table 5 is identical to that in Table 4. The most

[19] For day -4 and day -5, the difference in the mean CAR(0,+1) between young and older investors is insignificant. Likewise, the difference in the mean frequency of trades in the correct direction is also insignificant on day -4. For day -5, the mean frequency of trades in the correct direction is significantly higher for young accountholders.

dramatic results in Table 5 appear in the first three columns of Panel A, for trades made one day before major price changes. For these trades, young accountholders experience a significant mean signed CAR(0,+1) of 2.00% (p-value = .03), with an average of 58 percent of these trades in the correct direction (p-value = .01). In contrast, older investors slightly underperform the market with an insignificant mean signed CAR(0,+1) of -0.09%, and an average of 50 percent of their trades in the correct direction (p-value = .85). The 2.1% difference in the average signed CAR(0,1) across the two age groups is significant at the .01 level, as is the 8 percent difference in mean relative frequency of trades in the correct direction.

In the second set of three columns in Panel A of Table 5, there is no significant outperformance by any age group based on trades made two days before large price changes. The third set of three columns in Panel A provides results based on trades three days before large price changes, and shows that young investors outperform in terms of both the mean signed CAR(0,1) and the mean relative frequency of trades in the correct direction. The difference in the mean signed CAR(0,1) is 1.18% (p-value = 0.08) in favor of young investors, and young investors trade in the correct direction 4 percent more frequently than older investors (p-value = 0.10).

The evidence in Panels B and C of Table 5 shows that the outperformance of young investors is limited to trades during week -1. This outcome is consistent with the evidence in Table 4, for trades made ahead of major earnings announcements. We conclude that a relatively large proportion of the trades by young accountholders, during the few days ahead of both major earnings announcements and large price changes, is motivated by superior private information that is about to become public.

4.2 Event Study Results for Merger and Acquisition Announcements

Table 6 presents the results for trades made by young and older accountholders prior to takeover announcements. The major difference between takeover announcements and the events analyzed in the previous section is that takeover announcements are typically good news events. Descriptive statistics for our sample of takeover announcements appear in Panel C of Table 3, and confirm this observation. The mean CAR(0,+1) across all takeover announcements is 10.61%, and more than 75% of these events have a positive CAR(0,1).

Given the distribution of CAR(0,1) for the sample of takeover announcements, we cannot claim to have a 'fair experiment.' It is possible that young investors outperform older investors, simply because of their tendency to buy more frequently than older accountholders (see Table 1). To account for this potential bias, we not only we compare the performance of young versus older investors based on trades in the same period before the takeover announcement, but also compare the performance of trades by young investors on the days just before the event with similar trades by young investors made over a one-year period, one year earlier (covering days -500 through day -250). This own-age-benchmark comparison offers an alternative means to examine whether young investors behave differently in the days leading up to the takeover announcement, in a manner that accounts for the potential bias due to the tendency of young accountholders to buy more often than older investors.

Our initial results appear in Table 6. For all nine time frames examined in Table 6, the mean signed CAR(0,+1) for young investors is positive and large in magnitude, whereas the mean signed CAR(0,+1) for older investors is typically close to zero. For example, in the first three columns of Panel A, based on the 24 announcements where young investors trade on the day before the announcement, their average signed CAR(0,+1) is very large in magnitude, at 12.2%, although it is not statistically significant (p-value = .15). In comparison, older investors are active on the day before the announcement in 139 cases, and realize a mean signed CAR(0,+1) of -0.22% (p-value = .84). For the other time frames, Table 6 also

documents large abnormal returns for young investors. Note, however, that because of small sample sizes and large standard deviations of CAR(0,1), the mean signed CAR(0,+1) for young accountholders is significantly greater than zero for just four of these time frames. The mean signed CAR(0,+1) for older investors is never statistically significant.

The proportion of correct trades for young accountholders is also extremely large throughout Table 6, ranging from 55 percent during the second week before the announcement, to 78 percent of trades made two days before the takeover announcement. This measure is significantly greater than 50 percent for six of the nine time frames analyzed. In contrast, the only time frame where the mean relative frequency of correct trades for older investors is significantly greater than 50 percent, is for trades made on day -3 (mean frequency = 54%, p-value = .09).

The superior performance of young accountholders who trade ahead of takeover announcements is also evident in the *differences* in the mean signed CAR(0,+1) and the mean proportion of correct trades across the two age groups. In the differences column, the elements are uniformly positive throughout Table 6. Furthermore, for the mean signed CAR(0,+1), eight of the nine mean differences in Table 6 are significantly greater than zero at the .10 level or better. For the proportion of correct trades, seven of the nine mean differences in Table 6 are significantly greater than zero at the .10 level or better. This evidence clearly shows that young accountholders outperform older accountholders when they trade ahead of takeover announcements.

While strongly suggestive, we are reluctant to draw conclusions based only on the results in Table 6. As discussed above, the exceptional performance of young investors documented in Table 6 might simply be due to their overall tendency to buy more frequently than older investors. To account for this tendency, we also compare the performance of trades by young investors on the days just before the takeover announcement with a benchmark

sample that includes all trades by young investors made during the one-year period from day -500 through day -250, before the takeover announcement.

This benchmark period covers the twelve months that end one year prior to every takeover announcement. For this alternative benchmark analysis, we therefore lose any takeover events that occur within the first two years of our sample period. There remain a total of 104 takeover events in our sample where at least one young investor traded, and where we have data over this earlier benchmark period. The average signed CAR(0,1) for this benchmark sample of earlier trades by young accountholders is 4.1% (p-value = .01). Likewise, the mean proportion of correct trades for this benchmark sample is 57 percent, which is significantly greater than 50 percent (p-value = .01).

Finally, we compare the performance of trades by young accountholders just before takeover announcements, during the time frames examined in Table 6, with the earlier performance of young accountholders during this benchmark period. Results are only discussed here, for brevity.[20] The mean signed CAR(0,1) for the time frames considered in Table 6 is significantly different from the mean signed CAR(0,1) for the benchmark sample, when we consider trades made on day -1 and on day -3 (p-values are 0.1 and .07, respectively). Likewise, the average proportion of correct trades for young investors is significantly higher than the proportion of correct trades by young investors during the benchmark period, based on trades made during day -1, day -2, day -3 and week -1.[21] These results are consistent with the results in Tables 4 and 5 and indicate that a relatively large proportion of the trades of young accountholders during the few days ahead of takeover announcements is motivated by private information that is about the become public.

[20] Results using this alternative benchmark analysis are available upon request.
[21] When we repeat the same exercise for trades by older investors, there is no evidence of significant differences in either the mean signed CAR(0,+1) or the proportion of correct trades across trades made during the time frames considered in Table 6 relative to trades made during the benchmark period.

5. Trading by Underaged Investors as Measure of Information Asymmetry

Easley and O'Hara (2004) develop a model that shows investors demand a higher return to hold stocks with greater private information.[22] Consistent with this model, Easly, Hvidkjaer, and O'Hara (2002) find that stocks with a higher probability of informed trading (PIN) generate a higher return. This empirical evidence has been subject to criticism. Mohanram and Rajgopal (2008) find that PIN is not a priced risk-factor in the cross-section of stock returns, when the sample period is extended. Duarte and Young (2008) present evidence suggesting that liquidity effects unrelated to information asymmetry explain the relation between PIN and the cross-section of expected returns.

In this section we construct an alternative measure to PIN, based on the proportion of total trading activity by underaged investors, to test the impact of information asymmetry on expected returns. Our measure of stock-specific information asymmetry, UNDERAGED, is the ratio of the total number of times an underaged accountholder was active in the previous 12 months, to the total number of trades for that stock in the previous 12 months. Our joint hypothesis is that: (i) a higher risk of information-based trading for a stock is revealed in an increase in the proportion of trading through underaged accounts, and (ii) this higher risk translates into a higher required return for that stock. Thus, we expect a positive relation between UNDERAGED and future returns.

Summary statistics for the variables used in the asset pricing tests are provided in Panel A of Table XX. For a stock to be included in our sample, we require at least 1000 trades during the previous 12 months. This requirement is included help ensure reliable estimation of UNDERAGED, which depends on the infrequently observed trading activity by

[22] While the theoretical results in EH 2004 have been subject to debate (Hughes et al 2008, Leuz lambert + Verrec), Lambert and Verrecchia (2010) confirm that in illiquid markets, asymmetric information can have an impact on the cost of capital.

young account holders. For each month, the other control variables, BETA, MKTCAP, BM and R12, are the average of the daily values for these variables. Similarly, TURN is the average of daily turnover, defined as the number of shares traded divided by shares outstanding. TRADES is the average of the log of the daily number of trades, and BAS is the average of the percentage bid-ask spread based on the closing bid and ask.[23]

BRIEFLY SUMMARIZE WHAT WE LEARN IN PANEL A.

Panel B of Table XX shows the time-series mean of the monthly correlations between these explanatory variables. We are particularly interested in the correlation of UNDERAGED with the other variables. We also include UNDERAGED1, an alternative measure of the probability of informed trading that only uses trades from the previous month instead of the previous 12 months. Consistent with expectations, UNDERAGED is positively correlated with the BAS (0.095). UNDERAGED is also positively correlated with the market-to-book ratio, and is negatively correlated with the log of market capitalization. Also in line with expectations, UNDERAGED is negatively correlated with TURN.

Following Easley, Hvidkjaer, and O'Hara (2002) and Fama and French (1992), we include the firm's beta, size, and book-to-market ratio to help explain the cross-section of returns. In addition, we include our measure of the probability of informed trading in a stock, UNDERAGED. We then run the following cross-sectional regression for each month during the period, 1995-2010:[24]

$$R_{i,m} = c_0 + c_1 BETA_{i,m-1} + c_2 \log(MKTCAP_{i,m-1}) + c_3 BM_{i,m-1} + c_4 R12_{i,m-1} + c_5 BAS_{i,m-1} + c_5 UNDERAGED_{i,m-1} + e_{i,m} \quad (x)$$

[23] Volume, closing bid, and closing ask are obtained from Reuters.
[24] We only include months where at least 30 different stocks were traded.

The coefficients from these monthly cross-sectional regressions are then averaged through time, using the standard Fama-MacBeth (1973) methodology. The results are provided in Panel A of Table XXX, along with the analogous results for an extended model that also includes two commonly used proxies for liquidity, the bid-ask spread (BAS) and share turnover (TURN). Panel B of Table XXX provides the analogous results for a similar set of regressions, where we first transform the independent variables into decile ranks each month, and scale these decile ranks to range between zero and one. This transformation renders our results less sensitive to measurement errors or outliers, and facilitates the interpretation of the coefficient estimates (see, e.g., Nagel (2005)).

The results in table XXX provide strong evidence that a higher risk of informed trading, as captured by our alternative proxy for the probability of informed trading, UNDERAGED, increases the required return for stocks. In nearly all specifications, the coefficients for UNDERAGED are more than two standard errors away from zero. The results in column XX of Panel A imply that the average difference in returns between the top and bottom deciles of stocks, in terms of UNDERAGED, is more than 3% per month. After Winzorizing (i.e., trimming the sample observations at 1% and 99% of the return distribution), this mean difference declines somewhat to 1.8%, but remains highly significant (t-ratio = ??!). Furthermore, the mean coefficient for UNDERAGED does not change when we include the alternative liquidity measures. This evidence indicates that our new measure of the probability of informed trading based on underaged account activity provides incremental information regarding the valuation of stocks.

In summary, while we are cautious about drawing strong conclusions based on the results in Table XXX because of the small sample, our results suggest that the risk of informed trading as captured by UNDERAGED is an important determinant of required stock

returns. This result provides further corroboration of the value of the proportion of trading in underaged accounts as a measure of information asymmetry.

(when i include only baby sales to measure activity, i still get a coefficient of 1.9)

6. Summary and Conclusions

This study focuses on the stock market performance of underaged accountholders. We argue that there are two reasons to expect a high proportion of informed trading among underaged investor accounts. First, underaged accounts might be used to camouflage illegal insider trading by guardians. Second, informed parents may have a desire to share the benefits of their information with their children. If a relatively high proportion of underaged accounts is controlled by informed investors, underaged accounts should outperform the accounts of older investors.

Consistent with our hypothesis, we find strong evidence that underaged accountholders between the ages of zero to ten years exhibit superior stock picking skills. Over the days immediately following their trades, they outperform older investors by a mean annualized outperformance of more than 20%. Furthermore, we find that underaged accountholders perform especially well when they trade just before major earnings announcements, large absolute price changes, and takeover announcements. This evidence corroborates the view that the investors controlling underaged accounts trade on private information that is about to become public.

Our identification of a group of individual investors who successfully trades on short term private information is important because, as Coval and Moskowitz (2001) state: "sightings of informed traders are rare". [25] With the emergence of databases that identify individual traders, trading activity by underaged investors might provide a useful proxy for

[25] Grinblatt, Keloharju and Linnainmaa (2010b), and Seru, Shumway and Stoffman (2010) also identify specific individual investor groups that consistently outperform. These authors, however cannot attribute this outperformance to private information (as opposed to superior processing of public information).

short term information asymmetry that can be employed in empirical asset pricing tests and market efficiency studies.[26] These results should also be of interest to regulators and other market participants in their endeavours to discover unusual trading patterns, and traders with exceptional trading skills. Second, we show that the outperformance of young accountholders is especially pronounced when it is based on trades made in the days just ahead of major information events that are either anticipated or unanticipated. This ability to predict such information events raises concerns about insider trading, and should therefore be of interest to regulators and other market participants.[27][28]

[26] Databases that have individual investor trading data have been used in studies of stock markets in the US, Sweden, Norway, Finland, China, Australia, and Indonesia. For example, see Barber, Lee, Liu, and Odean (2006), Dvorak (2007), Grinblatt and Keloharju (2000, 2001a,b), Grinblatt, Keloharju, and Linnainmaa (2010a,b), Kang and Stulz (1997), Seru, Stumwall, and Stoffman (2010), and Stoffman (2007).

[27] Our evidence of outperformance is limited to the age group where guardians likely do not feel the need to inform the accountholder (0 to 10 years old). This observation adds further credence to the suggestion that some of these trades might be illegal.

[28] Questions have been raised about enforcement of insider trading rules in Finland during our sample period (http://www.hs.fi/english/article/Sharp+fall+in+reports+on+suspected+insider+trading+in+Finland+over+the+current+year/1135232486130).

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Appendix Robustness Tests of Results in Table 2

This section presents a collection of robustness tests regarding the analysis of all trades in Table 2. First, we use model (1) to examine the differential performance of young versus older traders one day later: (i) for subperiods of the entire sample, (ii) for the subset of all trades that exclude those near the major events analyzed in section 4, (iii) for alternative definitions of young investors, (iv) for rank regressions, and (v) for arithmetic returns. We also present the results of calendar time portfolio tests. Second, we estimate an expanded version of (1), to analyze subsets of the data that are based on various attributes of the firms traded (i.e., firm size or market-to-book ratio) or the traders in each age group (i.e., whether the young or older investor is local versus non-local, or male versus female).

5.1 Subperiods, Subsets of Trades, Alternative Definitions of Young Investors, Arithmetic Returns, Rank Regressions, and Calendar Time Portfolio Tests

Table A1 presents our first set of robustness tests that examine the sensitivity of the results in Table 2 to several aspects of our experimental design. Throughout these tests, we focus on the differential performance across young and older investors for trades made one day earlier, using the version of model (1) that includes the control variables.[29] For ease of comparison, the base case provided in Panel A of Table A1 reproduces the analogous results from Panel A in Table 2. In every subsequent robustness test (Panel) of Table A1, we change only one aspect of the analysis to facilitate comparison with the base case.

Our first robustness test is provided in Panels A and B of Table A1, just below the base case. This analysis re-estimates model (1) over two subperiods, from January 1, 1995 through December 31, 2003, and from January 1, 2004 through May 31, 2010. The cutoff date between periods is selected to give the two subperiods similar numbers of observations. The results in Panels A and B are very close to each other, and to those for the entire sample

[29] We have repeated all tests in this section for trades on day -2, -3, -4, -5 and for all trades during days -6 through -10. We find the previous results in Table 2 are robust to all these variations in research design.

from the base case. This evidence demonstrates that the outperformance of young accountholders is robust over time.

Our second test appears in Panel C of Table A1. This Panel provides the evidence from re-estimating model (1), using a subsample that excludes all stock-trading days for which the subsequent stock return is included in CAR(0,+1), for any of the major events analyzed in Section 4. As expected, the results for a_1 in Panel C are somewhat smaller in magnitude than those for the base case. For this subsample that excludes all trades prior to major events, the mean outperformance of purchases by young investors one day later (a_1) is now 2.3 bp (t-ratio = 1.9), compared with 3.9 bp (t-ratio = 2.8) for the base case. Likewise, the mean underperformance of sales by young investors (a_1) is now -4.0 bp (t-ratio = -1.9), compared with -4.8 bp (t-ratio = -2.0) for the base case. As a result, the hypothetical hedge portfolio return is now reduced to 6.3 bp (t-ratio = 2.6) for this subsample, compared with 8.7 bp (t-ratio = 3.1) for the base case. This evidence indicates that, while the outperformance of young accountholders is attenuated when we exclude trades just before major events, this outperformance remains both economically and statistically significant.

Our third test is provided in Panels D and E of Table A1. These Panels reproduce the analysis using two alternative age cutoffs for our group of young investors: all accountholders ages zero to five years, and all accountholders ages zero to fifteen years. In Panel D, the more restrictive definition of young accountholders, from zero to five years old, results in a smaller sample size, but a somewhat larger mean hedge portfolio return of 8.9 bp (t-ratio = 2.5), compared with the base case of 8.7 bp (t-ratio = 3.1). In Panel E, the less restrictive definition of young accountholders, from zero to fifteen years old, leads to a larger sample size, and a smaller mean hedge portfolio return of 5.1 bp (t-ratio = 2.3). It is noteworthy that the outperformance of young investors is greater for children up to the age of about 10 years old. A possible explanation is that guardians are less likely to engage in any

potentially illegal trading, when it is more likely that the young accountholder will know about this activity.

The fourth robustness test in this section analyzes the arithmetic return, rather than the geometric (i.e., log) return, as the dependent variable in (1). Results are presented in Panel F of Table A1. Once again, the outperformance of both purchases and sales by young accountholders (a_1), as well as the hypothetical hedge portfolio return, is similar to the base case. This outcome shows that the prior evidence of outperformance by young investors is not due to our definition of stock returns.

Our fifth test appears in Panel G of Table A1. This test replaces the dependent variable (i.e., the actual return of stock i on day t) with its percentile rank in the sample. That is, for every day, we replace the actual value of $Return_{i,t}$ with it's percentile rank for that day, where the rank is re-scaled to range between -0.5 and 0.5. In this rank regression, the magnitude of the mean coefficients do not reflect the average returns across age groups any more. Consistent with our main results, the average coefficient for older investors is insignificantly different from zero, indicating no outperformance for older investors. Also consistent with our main results in Table 2, the hedge portfolio based on underaged trades significantly outperforms the hedge portfolio based on trades by older investors. We conclude that the main results in Table 2 are not attributable to outliers in stock returns.

Our last robustness test in this section uses a calendar-time portfolio approach to measure the performance of young investors. The calendar-time portfolios are designed to directly mimic the trading behavior of young or older investors. For example, the return on the young investors' "buy-portfolio" on day t is the average return of all stocks bought by young investors on day t-1. Likewise, the return on the old investors' "buy-portfolio" is the average return of all stocks bought by old investors on day t-1. Since we are interested in the difference between young versus older investors, we calculate the return on a buy-hedge

portfolio that goes long the young-investor buy-portfolio and short the old-investor buy-portfolio. Similarly, we construct a young-old sell hedge portfolio by going long the young-investor sell-portfolio and short the old-investor sell-portfolio. Finally, we construct a buy-sell hede portfolio, by going long the young-old buy portfolio and short the young-old sell portfolio. For all three portfolios, we estimate the following time-series regression equation:

$$R\_Portfolio_t = \alpha + \beta\ R\_market_t + \varepsilon_t . \qquad (3)$$

The results are provided in Panel H of Table A1.The alpha-coefficient for the buy-portfolio is 5.9 bp (t-ratio=3.3), for the sell-portfolio alpha equals -5.4 bp (t-ratio = -1.8), and for the hedge portfolio alpha equals 10.8 bp (t-ratio = 2.9). These coefficients are similar to the results in Table A1, Panel A and show that our findings are robust to research design.

Appendix 2

Table 1. Sample Characteristics of Trading Activity by Age Group

This table presents the characteristics of the sample of all trades made by accountholders in different age groups, and the attributes of the firms that are traded by accountholders in different age groups.

Panel A. Frequency and Volume of Trading by Account Holders in Different Age Groups

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
age group (i)	# Trades (n_i)	% Trades (n_i / N)*100	% $buys_i$ (#$buys_i$ / n_i)*100	avg volume buy [Σshares buy_i] / n_i	avg volume sell [Σshares $sell_i$] / n_i	avg net vol buy (4) - (5)	% of Trades by Females
1: 0-10	95,215	0.8%	66.3%	254.8	207.7	47.02	46.8%
2: 11-20	219,366	1.8%	55.5%	336.9	312.4	24.42	34.8%
3: 21-40	3,508,276	28.7%	55.0%	776.2	776.2	0.00	13.1%
4: 41-60	5,870,211	48.0%	55.3%	824.6	822.9	1.75	18.0%
5. 61-80	2,376,590	19.4%	53.5%	610.7	627.8	-17.15	22.9%
6: 81+	154,344	1.3%	37.5%	559.1	776.8	-217.72	42.2%
Total (N):	12,224,002	100.00%					

Panel B. Attributes of Firms Traded by Account Holders in Different Age Groups

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
age group (i)	Rank(β)	Rank(M/B)	Rank(Size)	Rank(year)	Rank(Rmonth)	rank(Rweek)	Rank(Rday)
1: 0-10	0.16	0.12	0.25	-0.03	-0.02	-0.01	0.00
2: 11-20	0.16	0.13	0.26	0.00	0.00	0.00	0.01
3: 21-40	0.19	0.14	0.23	-0.04	-0.02	-0.01	0.00
4: 41-60	0.19	0.13	0.26	-0.03	-0.01	0.00	0.00
5. 61-80	0.17	0.11	0.29	0.00	0.01	0.00	0.01
6: 81+	0.14	0.09	0.31	0.03	0.02	0.01	0.01

Table 2. Performance of Young versus Older Accountholders across All Trades Made over the Previous Ten Days

This table presents the results from estimating model (1) or (2), which analyzes the average return realized by young versus older accountholders on day t, based on trades made on day t-x, where the lag (x) is varied from one to ten days earlier. Panel A provides the results for model (1), based on trades made one day earlier. Panel B presents the analogous results for trades made one day earlier, across all age groups, using model (2). Panels C through G then provide the results for model (1) based on earlier trades made over different time frames covering the previous ten trading days.

Panel A. Results for Model (1), Young versus Older Accountholders, Based on Trades during Day -1

		(1)		(2)		(3)		(4)		(5)		(6)	
		Purchases				Sales				Hedge Portfolio			
Intercept	a_0	.009	0.2	.027	1.1	-.008	-0.2	.034	1.4	.017	1.0	-.006	-0.7
AGE(0-10)	a_1	.057	3.2 ***	.039	2.8 ***	-.054	-1.8 *	-.048	-2.0 **	.111	3.0 ***	.087	3.1 ***
Control Variables		No		Yes		No		Yes		No		Yes	

* indicates statistical significance at the .10 level; ** at the .05 level; and *** at the .01 level.

Panel B. Results for Model (2), Young versus All Older Age Groups, Based on Trades during Day -1,

		Purchases				Sales				Hedge Portfolio			
Intercept	b_0	.066	1.7	.067	2.5 **	-.057	-1.3	-.011	-0.3	.123	3.2 ***	.078	2.7 **
AGE(11-20)	b_1	-.064	-3.1 ***	-.052	-3.3 ***	.047	1.4	.038	1.4	-.111	-2.8 ***	-.090	-2.9 ***
AGE(21-40)	b_2	-.051	-2.7 **	-.034	-2.4 **	.040	1.3	.035	1.5	-.091	-2.5 **	-.069	-2.5 **
AGE(41-60)	b_3	-.062	-3.5 ***	-.043	-3.1 ***	.055	1.8 *	.048	2.0 **	-.117	-3.2 ***	-.091	-3.2 ***
AGE(61-80)	b_4	-.044	-2.4 **	-.038	-2.7 **	.051	1.6	.053	2.2 **	-.095	-2.5 **	-.091	-3.2 ***
AGE(81+)	b_5	-.035	-1.5	-.030	-1.6	.072	2.0 **	.070	2.6 **	-.107	-2.5 **	-.100	-3.0 ***
Control Variables		No		Yes		No		Yes		No		Yes	

Panel C. Results for Model (1), Young versus Older Accountholders, Based on Trades during Day -2

		Purchases				Sales				Hedge Portfolio			
Intercept	a_0	-.008	-0.2	-.008	-0.3	-.050	-1.5	-.008	-0.3	.042	2.8 ***	.000	0.0
AGE(0-10)	a_1	.036	2.1 **	.035	2.5 **	-.051	-1.9 *	-.027	-1.3	.086	2.8 ***	.063	2.4 **
Control Variables		No		Yes		No		Yes		No		Yes	

Table 2, continued

Panel D. Results for Model (1), Young versus Older Accountholders, Based on Trades during Day -3

		Purchases				Sales				Hedge Portfolio			
Intercept	a_0	-.038	-1.0	-.036	-1.4	-.072	-2.1 **	-.030	-1.2	.035	2.1 **	-.006	-0.7
AGE(0-10)	a_1	.007	0.4	.008	0.6	-.076	-2.4 **	-.054	-2.1 **	.082	2.3 **	.062	2.1 **
Control Variables		No		Yes		No		Yes		No		Yes	

Panel E. Results for Model (1), Young versus Older Accountholders, Based on Trades during Day -4

		Purchases				Sales				Hedge Portfolio			
Intercept	a_0	-.040	-1.0	-.029	-1.1	-.065	-1.8 *	-.026	-1.1	.025	1.5	-.003	-0.3
AGE(0-10)	a_1	.014	0.8	.004	0.3	-.018	-0.6	-.003	-0.1	.032	0.9	.007	0.3
Control Variables		No		Yes		No		Yes		No		Yes	

Panel F. Results for Model (1), Young versus Older Accountholders, Based on Trades during Day -5

		Purchases				Sales				Hedge Portfolio			
Intercept	a_0	-.017	-0.4	-.012	-0.5	-.047	-1.3	-.002	-0.9	.030	1.9 *	.011	1.1
AGE(0-10)	a_1	.019	1.1	-.003	-0.3	.014	0.5	.015	0.7	.005	0.2	-.019	-0.7
Control Variables		No		Yes		No		Yes		No		Yes	

Panel G. Results for Model (1), Young versus Older Accountholders, Based on Trades during Days -1 through -5

		Purchases				Sales				Hedge Portfolio			
Intercept	a_0	-.015	-0.4	-.014	-0.5	-.043	-1.3	-.004	-0.2	.027	1.8 *	-.010	-1.1
AGE(0-10)	a_1	.020	2.3 **	.014	2.0 **	-.029	-2.0 **	-.020	-1.7 *	.049	2.8 ***	.033	2.4 **
Control Variables		No		Yes		No		Yes		No		Yes	

Panel H. Results for Model (1), Young versus Older Accountholders, Based on Trades during Days -6 through -10

		Purchases				Sales				Hedge Portfolio			
Intercept	a_0	-.020	-0.5	-.012	-0.4	-.027	-0.7	-.012	-0.5	.007	0.4	.000	0.1
AGE(0-10)	a_1	.007	0.6	.010	1.0	-.007	-0.3	-.009	-0.5	.015	0.6	.019	0.9
Control Variables		No		Yes		No		Yes		No		Yes	

Table 3. Descriptive Statistics for Samples of Events

This table presents descriptive statistics for the samples of events analyzed in this study. Panels A and B provide the results for the samples of earnings announcements and large absolute price changes, respectively. In each row of these first two panels, we separately present the summary statistics for the matched subsamples of good news (CAR(0,+1) > 0) and bad news (CAR(0,+1) < 0) events. Panel C provides the results for the entire sample of takeover announcements.

Panel A: Descriptive Statistics for CAR(0,+1) for Sample of Earnings Announcements

CAR >/< 0	mean	stderr	min	max	q3	median	q1	# > 0	# < 0
good news	8.85	5.03	4.00	60.25	10.73	7.47	5.30	746	0
bad news	-8.86	5.01	-60.61	-4.01	-5.33	-7.44	-10.76	0	746

Panel B: Descriptive Statistics for CAR(0,+1) for Sample of Large Price Changes

CAR >/< 0	mean	stderr	min	max	q3	median	q1	# > 0	# < 0
good news	10.98	8.94	4.00	90.81	12.84	8.50	6.11	771	0
bad news	-10.97	8.97	-91.67	-4.03	-6.07	-8.58	-12.85	0	771

Panel C: Descriptive Statistics for CAR(0,+1) for Sample of Takeover Announcements

CAR >/< 0	mean	stderr	min	max	q3	median	q1	# > 0	# < 0
all events	10.61	22.48	-12.68	184.19	14.10	3.26	0.17	107	32

Table 4. Performance of Young versus Older Accountholders before Earnings Announcement

This table presents the mean cumulative abnormal return on the day of, and the day after, earnings announcements (CAR(0,+1)), that pertains to trades made by young versus older accountholders in the days and weeks ahead of the announcement. We also provide the mean relative frequency of trades in the correct direction (Frequency) over these same time frames.

Panel A. Trades during the Three Days before Earnings Announcements

	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	Trades on Day -1			Trades on Day -2			Trades on Day -3		
	Young	Older	Diff	Young	Older	Diff	Young	Older	Diff
n	252	1,474		237	1,472		220	1,472	
CAR(0,+1) %	1.36	.25	1.10	.89	.00	.88	1.43	-.11	1.54
(p-value)	**.04**	**.04**	**.01**	.23	.99	**.04**	**.05**	.36	**.01**
Frequency	.57	.52	.05	.56	.51	.06	.56	.50	.06
(p-value)	**.03**	**.00**	**.01**	**.05**	.33	**.01**	**.05**	.85	**.01**

Panel B. Trades during the Three Weeks before Earnings Announcements

	Trades During Week -1			Trades During Week -2			Trades During Week -3		
	Young	Older	Diff	Young	Older	Diff	Young	Older	Diff
n	584	1,492		570	1,491		575	1,490	
CAR(0,+1) %	.62	-.02	.63	-.10	-.07	-.03	.05	-.09	.14
(p-value)	.12	.88	**.04**	.81	.52	.92	.88	.42	.62
Frequency	.53	.50	.03	.51	.49	.02	.51	.50	.01
(p-value)	**.07**	.39	**.03**	.60	.21	.26	.64	.35	.35

Panel C. Trades during the Four to Six Weeks before Earnings Announcements

	Trades During Week -4			Trades During Week -5			Trades During Week -6		
	Young	Older	Diff	Young	Older	Diff	Young	Older	Diff
n	602	1,490		566	1,491		581	1,491	
CAR(0,+1) %	-.44	-.25	-.19	.11	-.11	.22	-.18	-.21	.03
(p-value)	.51	**.02**	.45	.78	.28	.45	.63	**.04**	.92
Frequency	.48	.49	-.01	.51	.49	.02	.49	.49	.00
(p-value)	.61	**.01**	.24	.54	.30	.24	.48	**.06**	.78

Table 5. Performance of Young versus Older Accountholders before Large Price Changes

This table presents the mean cumulative abnormal return on the day of, and the day after, large absolute price changes (CAR(0,+1)), that pertains to trades made by young versus older accountholders in the days and weeks ahead of the price change. We also provide the mean relative frequency of trades in the correct direction (Frequency) over these same time frames.

Panel A. Trades during the Three Days before Large Price Changes

	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	Trades on Day -1			Trades on Day -2			Trades on Day -3		
	Young	Older	Diff	Young	Older	Diff	Young	Older	Diff
n	192	1,446		168	1,465		167	1,451	
CAR(0,+1) %	2.00	-.09	2.09	-.51	.36	-.87	1.46	.28	1.18
(p-value)	**.03**	.67	**.00**	.64	.21	.21	.16	.14	**.08**
Frequency	.58	.50	.08	.50	.52	-.02	.55	.51	.04
(p-value)	**.01**	.85	**.00**	.95	**.01**	.51	.17	.23	**.10**

Panel B. Trades during the Three Weeks before Large Price Changes

	Trades During Week -1			Trades During Week -2			Trades During Week -3		
	Young	Older	Diff	Young	Older	Diff	Young	Older	Diff
n	505	1,536		465	1,529		493	1,526	
CAR(0,+1) %	1.21	.07	1.14	.11	.01	.10	.13	.08	.05
(p-value)	**.03**	.64	**.01**	.86	.93	.82	.82	.58	.91
Frequency	.55	.51	.04	.53	.50	.02	.52	.51	.02
(p-value)	**.02**	.23	**.01**	.22	.54	.14	.27	.17	.31

Panel C. Trades during the Four to Six Weeks before Large Price Changes

	Trades During Week -4			Trades During Week -5			Trades During Week -6		
	Young	Older	Diff	Young	Older	Diff	Young	Older	Diff
n	479	1,523		487	1,518		467	1,510	
CAR(0,+1) %	.22	-.02	.23	-.29	-.04	-.25	.20	-.05	.26
(p-value)	.71	.92	.60	.61	.80	.57	.71	.76	.55
Frequency	.51	.50	.01	.50	.50	.00	.53	.50	.02
(p-value)	.50	.90	.33	.87	.54	.99	.22	.56	.14

Table 6. Performance of Young versus Older Accountholders before Takeover Announcement

This table presents the mean cumulative abnormal return on the day of, and the day after, takeover announcements (CAR(0,+1)), that pertains to trades made by young versus older accountholders in the days and weeks ahead of the announcement. We also provide the mean relative frequency of trades in the correct direction (Frequency) over these same time frames.

Panel A. Trades during the Three Days before Takeover Announcements

	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	Trades on Day -1			Trades on Day -2			Trades on Day -3		
	Young	Older	Diff	Young	Older	Diff	Young	Older	Diff
n	24	139		16	140		19	135	
CAR(0,+1) %	12.21	-.22	12.43	4.72	.38	4.33	14.52	.36	14.17
(p-value)	.15	.84	**.00**	.13	.64	**.10**	.15	.61	**.00**
Frequency	.73	.47	.25	.78	.50	.29	.76	.54	.22
(p-value)	**.01**	.21	**.00**	**.01**	.84	**.00**	**.01**	**.09**	**.01**

Panel B. Trades during the Three Weeks before Takeover Announcements

	Trades During Week -1			Trades During Week -2			Trades During Week -3		
	Young	Older	Diff	Young	Older	Diff	Young	Older	Diff
n	47	142		52	142		50	142	
CAR(0,+1) %	6.37	-.42	6.79	7.32	-.24	7.56	1.92	.04	1.88
(p-value)	.14	.55	**.01**	**.07**	.73	**.01**	.69	.94	.53
Frequency	.71	.50	.21	.55	.50	.05	.58	.52	.06
(p-value)	**.00**	.83	**.00**	.41	.92	.30	.22	.23	.24

Panel C. Trades during the Four to Six Weeks before Takeover Announcements

	Trades During Week -4			Trades During Week -5			Trades During Week -6		
	Young	Older	Diff	Young	Older	Diff	Young	Older	Diff
n	60	142		51	142		45	142	
CAR(0,+1) %	7.94	.53	7.41	5.10	.09	5.01	8.80	.26	8.54
(p-value)	**.05**	.45	**.01**	**.06**	.91	**.02**	**.01**	.77	**.00**
Frequency	.66	.51	.15	.64	.50	.14	.61	.49	.11
(p-value)	**.00**	.55	**.00**	**.03**	.82	**.01**	.13	.74	**.03**

Table 7. Robustness Tests: Performance of Young versus Older Accountholders o Different Subperiods, Subsamples of Trades, Definitions of Young Accountholde Arithmetic Returns, Rank Regressions, and Calendar Time Portfolio Tests

This table presents the results of estimating model (1), using different subperiods, different subsamples of trades that exclude major events, alternative definitions of young accountholders, arithmetic rather than geometric (i.e., log) returns, rank regressions in which the dependent variable is the adjusted decile rank of CAR(0,+1), and calendar time portfolio tests.

$$Return_{i,t+1} = a_0 + a_1 AGE(0\text{-}10)_{i,t} + e_{i,t} . \quad (1)$$

Base Case Returns for Entire Sample, Reproduced from Panel A of Table 2

	(1)			(2)			(1) - (2)		
Mean Coefficient	Purchases			Sales			Hedge Portfolio		
a_0	.027	1.1		.034	1.4		-.006	-.7	
a_1	.039	2.8	***	-.048	-2.0	**	.087	3.1	***

Panel A. Subperiod 1: Jan. 1, 1995 through Dec. 31, 2003 (N = 1,435 Trades)

Mean Coefficient	Purchases			Sales			Hedge Portfolio		
a_0	.029	.8		.038	1.0		-.008	-.5	
a_1	.045	2.1	**	-.040	-1.1		.084	1.9	*

Panel B. Subperiod 2: Jan. 1, 2004 through May 31, 2010 (N = 1,466 Trades)

Mean Coefficient	Purchases			Sales			Hedge Portfolio		
a_0	.021	.7		.027	.9		-.006	-.6	
a_1	.032	1.9	*	-.055	-1.8	*	.088	2.5	**

Panel C. Subsample Excluding All Trades on the Day before Major Events

Mean Coefficient	Purchases			Sales			Hedge Portfolio		
a_0	.037	1.6		.039	1.8	*	.000	-.1	
a_1	.023	1.9	*	-.040	-1.9	*	.063	2.6	**

Panel D. Alternative Definition 1 for Young Accountholders: Ages 0 to 5 Years

Mean Coefficient	Purchases			Sales			Hedge Portfolio		
a_0	.026	1.1		.032	1.4		-.007	-.7	
a_1	.030	1.6		-.060	-2.0	**	.089	2.5	**

Table 7, continued

Table 8. Robustness Tests: Performance of Young versus Older Accountholders, Considering Attributes of the Firm Traded or the Accountholder Trading

This Table presents the results from estimating Model (4), which analyzes the differential performance of young versus older accountholders based on trades made yesterday, where we take into account certain attributes of the firm, such as firm size or market-to-book ratio, or certain attributes of the accountholder, such as whether the trader is local versys nonlocal, or male versus female.

Panel A. Interpretation of the Coefficients from Model (4)

$$Return_{i,t} = a_0 + a_1 AGE(0\text{-}10)_{i,t-1} + a_2 DUMMY_{i,t-1} + a_3 DUMMY_{i,t-1} * AGE(0\text{-}10)_{i,t-1} + e_{i,t} \quad (4)$$

Our first robustness test in this table assigns DUMMY a value of 1 for small firms, and 0 for large firms. This model simplifies to the following sums of coefficients (ignoring the error term), for each of the four possible subsets of our sample trades, depending on the age group of the trader (young or older) and the attribute of the firm traded (small or large). In Panels B - E, we present the mean coefficient estimates for a_0 - a_3, along with their t-statistics. We also provide the relevant coefficient sums in the bottom row of coefficients from the matrix below, which provide the mean difference in return performance across young versus older accountholders, for trades in small versus large firms made one day earlier.

Firm Attribute:	Small Firms	Large Firms	Small - Large
Young	$a_0 + a_1 + a_2 + a_3$	$a_0 + a_1$	$a_2 + a_3$
Older	$a_0 + a_2$	a_0	a_2
Young - Older	$a_1 + a_3$	a_1	a_3

Panel B. Results for Model (4), where DUMMY refers to Firm Size (Small Firm = 1)

	(1)			(2)			(1) - (2)		
Mean Coefficient	Purchases			Sales			Hedge Portfolio		
a_0	-0.005	-0.1		-0.014	-0.4		0.010	0.5	
a_1	0.021	1.7	*	-0.031	-1.3		0.053	1.9	*
a_2	0.062	1.2		0.081	1.9	*	-0.020	-0.6	
a_3	0.103	2.4	**	-0.011	-0.3		0.115	1.8	*

*** indicates significance at the .10 level; ** at the .05 level; and *** at the .01 level.

Differential Performance of Young versus Older Investors across Trades in Small versus Large Firms

Firm Attribute:	Small Firms			Large Firms			Small - Large		
Young - Older	$a_1 + a_3$			a_1			a_3		
Purchases	0.125	3.0	***	0.021	1.7	*	0.103	2.4	**
Sales	-0.043	-1.0		-0.031	-1.3		-0.011	-0.3	
Hedge Portfolio	0.167	2.8	***	0.053	1.9	*	0.115	1.9	*

Table 8, continued

Panel C. DUMMY refers to the Firm's Market-to-Book Ratio (Value Firm = 1, Low M / B)

	(1)			(2)			(1) - (2)		
Mean Coefficient	Purchases			Sales			Hedge Portfolio		
a_0	0.034	1.0		0.057	1.9	*	-0.023	-1.2	
a_1	0.050	3.0	***	-0.043	-1.6		0.092	2.9	***
a_2	-0.018	-0.4		-0.053	-1.4		0.035	1.1	
a_3	-0.014	-0.5		0.013	0.4		-0.028	-0.6	

Differential Performance of Young versus Older Investors across Trades in Value Firms versus Growth Firms

Firm Attribute:	Value Firms			Growth Firms			Value - Growth		
Young - Older	$a_1 + a_3$			a_1			a_3		
Purchases	0.035	1.3		0.050	3.0	***	-0.014	-0.5	
Sales	-0.029	-0.9		-0.043	-1.6		0.013	0.4	
Hedge Portfolio	0.064	1.5		0.092	2.9	***	-0.028	-0.6	

Panel D. DUMMY refers to the Accountholder being Local or Nonlocal (Local = 1)

	(1)			(2)			(1) - (2)		
Mean Coefficient	Purchases			Sales			Hedge Portfolio		