# The Influence of Individual Investors on Ex-Dividend Day Returns

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Last updated: May 2, 2013

## Abstract

This study documents that individual investors increase buy-initiated trades prior to ex-dividend days and increase sell-initiated trades after the ex-day. Institutions supply liquidity to individual investors by increasing their use of sell limit orders in the cum-dividend period and increasing their usage of buy limit orders in the ex-dividend period. Stocks that experience higher net purchases from individual investors operating through discount brokers in the cum-dividend period have lower ex-day returns in the order of 25 basis points. This difference is as large as 44 basis points for high yield securities. This contrasts with the average excess ex-day return of 24 basis points. The results indicate that individual investors play an influential role in ex-dividend pricing.

Keywords: dividend clienteles, individual investors, ex-dividend day premium, order choice

JEL Classification: G11, G14, G23

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## 1. Introduction

It is well established that clienteles exist around the ex-dividend in a number of countries.[1] These studies document that changes in clientele trading volume around the ex-dividend day is generally consistent with their tax preferences for dividends relative to capital gains. The trading of investors is also related to both stock characteristics, such as dividend yield, as well as investor-specific factors, such as eligibility for tax credits and tax discounts on long-term capital gains. The ex-dividend trading of dividend clienteles is important given the recent reports in the financial press about dividend wash sales between foreign and domestic investors in the Australian market (see Boyd (2013) and Chenoweth and Walsh (2013)). If investors alter trading around the ex-dividend day to acquire, or avoid, imputation tax credits, then this could distort ex-dividend day prices observed in financial markets. However, the literature is yet to convincingly document that the trading of different clienteles has an impact on the ex-day premium.[2]

This study contributes to our understanding of how individual investors trade and whether their trading exerts a force on stock prices that leads positive excess returns. Kaniel, Saar and Titman (2008), Barber, Odean and Zhu (2009), Seasholes and Zhu (2010) and Kelley and Tetlock (2013) report conflicting evidence on the ability of individual investors to earn abnormal profits. The ex-dividend day is an appropriate setting to examine trading by individuals as there are clearer motives for trading given preferences for dividends and imputation tax credits over capital gains. This study will be able to address whether trading by clienteles, and in particular, the individual investor clientele, has an impact on ex-dividend prices.

The current study utilises a dataset that allows us to accurately address this question as well documenting a hitherto unreported result that the ex-dividend day premium also influences the

[1] Graham and Kumar (2006) examine how a sample of individual investors in the US trade around the ex-dividend day. Hu and Tseng (2006) examine stock dividends in Taiwan and Chen, Chow and Shiu (2013) investigate cash dividends paid by Taiwanese companies. They both show that investor trading is affected by the ex-dividend day. Rantapuska (2008) finds support for dividend clienteles in Finland. Ainsworth, Fong, Gallagher and Partington (2011) examine a sample of Australian institutional investors and find that they generally avoid the dividend payment.

[2] Li (2010) utilises trade size cut-offs to identify institutions and individuals and finds changes in order imbalance of small and large trades around the ex-dividend day. They also report some evidence that large cum-dividend trades affect ex-day returns. However, there have been a number of concerns raised about using trade size to identify investor types (Hvidkjaer (2008) and Campbell, Ramadorai and Schwartz (2009)).

trading of clienteles after the ex-dividend day. The dataset has three benefits. Firstly, each trade is stamped with a broker identifier that can be identified as belonging to a particular group of investors. We are able to classify brokers as servicing institutions, discount retail clients or full-service retail clients. Secondly, the sample captures all trades made for stocks listed on the Australian Securities Exchange (ASX) and therefore, does not suffer from any potential sample selection bias, such as those that focus on the trades from specific institutions or those made through a specific broker. Thirdly, the data identifies whether the executed trades are either market orders (aggressive) or limit orders (passive), and we do not need to rely on an algorithm to identify buyer- or seller-initiated trades. As such, we are able to provide an insight into the liquidity provision of different types of investors around the ex-dividend day.

Using data on executed trades for the entire Australian stock market from 1995 to 2011, we show that the behaviour of individual investors has implications for the ex-dividend day premium. Specifically, the ex-day premium varies with the cum-dividend net trading of the discount broker clientele. Stocks with higher cum-dividend buying from discount retail brokers have lower abnormal returns on the ex-day. The spread between the high and low quintile of cum-dividend net trading is around 25 basis points when measured in excess returns. The return difference persists in the days after the ex-dividend day and is robust to the impact of dividend yield, imputation level, bid-ask spreads, market capitalisation as well as cum-dividend excess returns. When focusing on high yield dividend payments and those carrying full imputation credits, we observe a differential in excess returns of 44 and 36 basis points, respectively, between the high and low net purchase quintiles. This adverse consequence of trading by discount retail brokers is consistent with an inability to earn profits via a dividend capture trading strategy. Although individual investors that trade through discount brokers are not necessarily the marginal trader, they are nonetheless an influential market participant around the ex-day.

The proportion of trades that are executed using limit and market orders by individual and institutional investors around the deadline imposed by the ex-dividend day reveal stark patterns. We

can identify liquidity provision from the different clienteles and test whether informed traders (i.e. institutions) provide liquidity to uninformed liquidity traders (i.e. individuals).[3] This provides clear indications as to how different clienteles change their trading aggressiveness. We confirm that trading clienteles exist in the Australian market and document interesting patterns in the proportion of trades made using limit and market orders amongst the different clientele. Dividend-preferring individual investors execute a larger proportion of their trades using market buy orders in the cum-dividend period before increasing the share of trades made using market sell orders once the stock begins trading ex-dividend. This pattern exists for both discount and full-service retail broker trades. There are decreases in the use of limit orders. In contrast, trades through institutional brokers are made using a higher than expected proportion of sell limit orders cum-dividend before buy limit order become responsible for an abnormal amount of trades in the ex-dividend period. We interpret this as evidence that institutions are providing liquidity to individual investors. The ex-dividend net trading of both discount and full-service retail brokers are negatively related to cum-dividend returns and the ex-day return. Institutional net trading varies positively with cum-dividend returns and the ex-day return. This result indicates that individual investors are trying to exit those stocks that experienced a price increase prior to the ex-day and are buying the stocks that had the largest price declines on the ex-day. The opposite relationship holds for institutions and is consistent with this group of traders taking on the role of liquidity provider to individual investors.

The present study is related to a growing field of research that examines the role of individual investors in financial markets. This literature has focussed on the effects of individual investors on stock returns in general, as well as examining their trading around specific events. Griffin, Harris and Topaloglu (2003) do not find any evidence that trading by individuals impacts daily returns, while Kaniel, Saar and Titman (2008) show that individual investors trade as contrarians, providing liquidity to institutions, earning positive abnormal returns. Barber, Odean and Zhu (2009) show that individual investors are able to correctly predict returns at a weekly

[3] Studies that examine order choice in equity markets include Lee, Liu, Roll and Subrahmanyam (2004), Anand, Chakravarty and Martell (2005) and Kelley and Tetlock (2013).

horizon, but their trading is adversely associated with stock returns at an annual horizon. In contrast, Seasholes and Zhu (2010) find that trades of individual investors are actually value destroying. Kelley and Tetlock (2013) provide evidence that individual investors exhibit skill with their trading earning positive returns over both short and long horizons. Kaniel, Liu, Saar and Titman (2012) examine how individual investors trade around earnings announcements and finds that they can predict future returns. It is clear that a consensus on the skill of individual investors is yet to emerge. The differing results can be attributed to different data sources covering different markets, the trading of a sub-sample of the individual investor population as well as different time periods. Our study is related to these papers as it shows that the trading of individuals does not lead to the capture of abnormal returns.

The remainder of the paper is organised as follows. Section 2 presents the hypotheses and section 3 discusses the data use in the study. Section 4 contains results showing how clientele trading impacts returns and also how returns affect clientele trading. Section 5 concludes.

## 2. Preferences of Dividend Clienteles

Theoretical models of dividend clienteles, such as Kalay (1982), Boyd and Jagannathan (1994), Michaely and Vila (1995), and Michaely, Vila and Wang (1996) show that differences in tax rates will lead to differences in trading around the ex-dividend day by investors. In Australia, the tax rate on dividends is generally the same as the tax rate on capital gains, excluding the 50% discount received on long-term capital gains that are held for greater than 12 months. However, the majority of dividend payments also include an imputation tax credit. Domestic resident investors are able to use this credit to offset against their personal tax liabilities. Resident individual investors that are not eligible for the 50% capital gains tax discount will have a preference for dividends over capital gains as a result of these imputation credits. There are two reasons why individual investors will prefer the dividend compared to institutional investors. Firstly, traders that receive less than A$5000 in imputation credits do not need to comply with the 45-day holding period rule. This rule

required investors to hold stocks at risk for 45 days around the ex-day to be entitled to the imputation credits. This rule is designed to discourage short-term 'arbitrage' trading around the ex-day. Individual investors are those most likely to be exempt from this requirement and will be able to undertake short-term dividend capture trading around the ex-day. The second incentive that domestic resident investors are afforded is that they are eligible to receive any unutilised imputation credits as a cash refund since June 30, 2000. This would apply to investor's with a low or zero tax liability. Individual investors are more likely to fall into this category. The preference of institutional investors is not entirely clear as this group includes foreign investors, who would prefer capital gains to dividends as they are not able to utilise the imputation credits, other than to receive a withholding tax offset. This offset is considerably lower than the benefit that domestic investors receive. Given the strong preference of individual investors, it is reasonable to conclude that institutional investors' preference for dividends over capital gains will not be as strong, and they are therefore more likely to avoid dividend payments.

Based on these preferences we anticipate that individual investors will be net buyers of securities in the cum-dividend period and net sellers of securities in the ex-dividend period. We anticipate that these effects will be more pronounced in stocks that carry full imputation credits and those that are paying a high dividend yield. If institutional investors exhibit a preference for capital gains over dividends then we expect that they would be net sellers in the cum-dividend period and net buyers in the ex-dividend period. It is expected that their trading behaviour will vary with imputation credits and dividend yield.

If individual investors are engaging in dividend capture then there should be changes in the proportion of trades that are executed using market orders and limit orders, both before and after the ex-day. We anticipate that the prevalence of trades made using market buy orders increases as the ex-dividend day approaches. Given their preferences and the concessional rules regarding imputation credits, it is expected that individual investors will be engaging in short-term trading and, as a result, will be trading impatiently. Institutional investors will avoid the dividend and

supply liquidity to individual investors using limit sell orders in the cum-dividend period. After the ex-dividend day we expect that individuals will exit short-term positions and use market sell orders to achieve this aim. Institutions that have avoided the dividend payment will repurchase securities using limit buy orders.

We anticipate that the trading of these clienteles will have an impact on the ex-day premium. The impatient buying pressure from individual investors will lead to an overvalued security that will experience a larger decline in price on the ex-day. If this is the case, then the ability of individual investors to profitably capture the dividend will be hampered. We also undertake empirical tests to determine how the trading of the different clienteles responds to any variation in ex-day returns.

## 3. Data

### *3.1 Sample Description*

Transaction data for equity securities listed on the ASX are obtained from the Securities Industry Research Centre of Asia-Pacific (SIRCA). The dataset covers all stock trades from January 1, 1995 to December 31, 2011. Each trade record includes the timestamp, ticker, price, the bid and ask price just prior to the transaction, trade flag, and buying and selling broker identifiers. The trade flag indicates whether the trade is a buyer- or seller-initiated trade, an auction trade, or an off-market trade. Daily closing prices are sourced from SIRCA. Dividends, ex-dividend dates, imputation levels, capitalization adjustments, and month-end share market capitalization data are sourced from the SIRCA Share Price and Price Relative database. In order to remove thin trading stocks, we follow Bell and Jenkinson (2002) and limit the sample to the largest 250 stocks by market capitalization at the end of the month prior to that in which the stock begins trading ex-dividend. Furthermore, we remove dividend events where the cum-dividend day stock price is below $1 and exclude foreign stocks such as US depositary receipts.

Descriptive statistics on the 7,262 dividend payments made by 577 stocks on 2,304 unique dates are contained in Table 1. Of the 7,262 dividend events, 3,991 carry full imputation credits, 714 have partial imputation and 2,557 do not carry any tax benefits. The dividend payments are not

distributed uniformly throughout the year. The fewest dividend payments are in January (62) and July (87). The most dividend payments occur in March (1,586) and September (1,463). The mean dividend of 17 cents equates to a dividend yield of 2.3%, with an additional 0.3% being attributable to tax benefits, on average. There is considerable variation in dividend yields, but both the mean and median represent economically meaningful components of total returns. The mean drop-off ratio, defined as the price decline from the cum-dividend to the ex-dividend day as a percent of the dividend is 0.71 and the median is higher at 0.85. The average drop-off ratio is consistent with estimates reported in numerous other studies, and on face value, indicates that money has been left on the table by investors. The positive average raw and excess returns on the ex-day also support the notion that money could be perceived as being left on the table. However, there is considerable variation in the drop-off ratio and the return measures.

[Insert Table 1]

### *3.2 Broker Classification*

Our broker classification methodology follows Fong, Gallagher and Lee (2013). Starting with broker names, we collect information about each broker's business in order to classify the broker into one of five distinct categories: discount retail, full-service retail, institutional, mixed (full-service retail and institutional), and other. We focus on the discount retail and full-service retail brokers in this study because they represent pure retail broker types and the comparison yields clear interpretation. The steps we take to collect information on each broker are as follows:

1. Check existing broker's website or archived broker's website from the Internet Archive (http://www.archive.org/).
2. If no website exists or the broker type cannot be determined from its website, search Factiva for newspaper articles, trade journals, company announcements, or web articles on the broker.

3. If no Factiva articles exist to classify the broker, Google search the broker for any credible articles that may classify the broker. From doing this, we classified one broker from a book about the broker's history.
4. If the broker still exists today but has no identifying information from a website, Factiva, or Google, we telephone the broker and ask for their clientele (institutional, mixed, or retail) and the type of services that they provide (advisory or non-advisory). We did this for two brokers.
5. If a broker's classification cannot be determined from the above steps, the broker is classified as Other.

Appendix A replicates Fong, Gallagher and Lee (2013)'s broker classification guide, which shows examples of how they classify brokers.

We focus our attention on trades that are made through discount retail, full-service retail or institutional brokers and thus ignore trades from brokers that service both individuals and institutions (mixed brokers). The amount of trading directed through the different brokers varies considerably. Discount retail brokers have average daily trade volume of $6b between t-10 and t-2. This increases to $8b on the cum-dividend day and remains elevated at $6.6b on the ex-dividend day. Average daily trading volume falls to $5b on days t+1 to t+10. Full-service retail broker trading comprises a smaller proportion of trading than the retail trading made through discount brokers. The average daily value traded is $2.1b between t-10 and t-2. This increases to $2.6b on the cum-dividend day and declines to $2b on the ex-dividend day. Average daily trading volume falls to $1.7b on days t+1 to t+10. Institutional brokers trade $48.6b per day, on average, between t-10 and t-2. This value increases to $51.8b on the cum-dividend day before declining to $45.2b on the ex-dividend day. Average daily trading volume is lower on days t+1 to t+10 at $44.1b. All brokers experience the same general pattern, that average value traded increases on the cum-dividend day before declining on the ex-day, except for discount retail broker trading. Ex-dividend average volume is lower than in the days preceding the ex-day.

## 4. Results

We first document whether the different clienteles are net buyers or sellers on each day in the ex-dividend period before examining how the trade proportions vary between market and limit orders. After establishing their empirical preferences for dividends, we next examine whether their trading has an impact on ex-dividend returns. The final set of results investigates how the trading of the different clienteles responds to ex-day excess returns.

### *4.1 Net Trading by Broker Types*

Net trading is measured as the dollar value of buys minus the dollar value of sells as a percent of total dollar volume on a daily basis. This measure is calculated for each broker type. Table 2 contains the average daily net trading from t-5 to t+5, relative to the ex-dividend day. The net trading by individual investors through discount brokers is consistent with their preferences for dividends and imputation credits (Table 2 Panel A). They exhibit their strongest buying in the cum-dividend period. The ex-day is particularly interesting for the discount retail broker trades, with a positive trading direction continuing despite the dividend and imputation credit detaching from the security. We observe that there is significant net selling from t+2, which is consistent with discount retail traders unwinding dividend capture positions. The size of the net trading is substantially smaller in the ex-dividend period – net trading takes an average value of 9.2 in the cum-dividend period and a value of -2.5 from t+1 to t+5. We also examine the net trading of the different brokers by dividend yield and imputation level. For the discount brokers we observe that there is no buying in low dividend yield stocks prior to the ex-day, however there is a considerable amount of selling occurring in low dividend yield stocks after the ex-dividend day. The cum-dividend purchases take place in the medium and high yield stocks. The net trading by imputation level is also consistent with their preferences as full imputation stocks have the highest net buying cum-dividend and also experience net selling after the ex-day.

[Insert Table 2]

The net trading of individual investors that use a full-service broker exhibits a similar pattern to the discount brokers, except the magnitude of the net trading is not as pronounced (Table 2 Panel B). Full-service brokers are net buyers cum-dividend and net sellers ex-dividend. The net buying occurs in high yielding stocks and those that carry imputation credits. One key difference between the full-service and discount broker trading is that the full-service retail brokers are net sellers on the ex-day. As with the discount brokers the net selling in the ex-dividend period is concentrated in low yield stocks and full imputation stocks. The net selling in the ex-dividend period through full-service retail brokers is stronger that that undertaken by discount brokers.

Institutional broker trading is contained in Table 2 Panel C. The pattern of net trading is substantially different to that of the individual investors. In aggregate they are neither net buyers nor sellers leading up to the ex-dividend day. However, they are net purchasers of stocks once the stock begins trading ex-dividend. When considering the effect of dividend yield and imputation there is mixed evidence on their preferences with net buying of low yield stocks and net selling of high yield stocks taking place in the cum-dividend period. There is clear evidence that institutions prefer to avoid dividends, with net buying taking place across all dividend yield and imputation groups. The net trading results reveal some distinct differences in dividend preferences between the individual and institutional investors that are consistent with our hypotheses.

### *4.2 Executed Orders by Broker Types*

The net trading results show clearly the dividend preferences of the investors. We can provide further detail on their preferences by examining their use of market and limit orders to execute trades. The demand for immediacy by clienteles will yield a clear picture regarding their dividend preferences that cannot be gleaned from net trading. We measure four different types of executed orders – sell limit, sell market, buy market and buy limit. Our measure of executed order types is based on the proportion of each type. The abnormal proportion is calculated as the difference between the average daily proportion of a given trade type for a given stock less the

average daily proportion of that trade type for the same stock in the period between t-50 and t-11. We adjust for a benchmark in this measure otherwise the order types would all be positive. The interpretation of the measure is that the abnormal proportion represents the percentage points above the benchmark level of order execution usage.

The results for each broker type are contained in Table 3. Panel A contains the results for the trades made through discount brokers. This group of individual investors use fewer sell orders – both market and limit in cum-dividend period – than they do in the benchmark period. Sell market orders increases from the ex-day onwards. The abnormal proportion of sell limit is significantly negative on the ex-day, which is consistent with individual investors that use discount brokers unwinding short-term trades and demanding immediacy in the process. From day t+1 to t+3, the proportion of limit order sells is commensurate with levels from the benchmark period. On t+4 and t+5 there is an increase in the use of sell limit orders. The proportion of limit buy trades by discount traders in the cum-dividend period does not contain a consistent pattern. However, in the ex-dividend period, the abnormal use of buy limit orders is significantly lower. There is a substantial increase in the amount of trades made using market buy orders in the cum-dividend period. The use of buy market orders is over 4% higher than in the benchmark period on the cum-dividend day. On the ex-day this heightened use of market orders still persists. One could posit a number of behavioural explanations for this result, but we shall only highlight it, rather than attempt to explain this one observation. The proportion of trades executed using buy market orders is substantially lower from day t+1.

[Insert Table 3]

The trades routed through full-service retail brokers behave similarly to those made through discount brokers. There are fewer sell market trades and more market buy orders prior to the ex-day. The abnormal amount of market buy orders increases as the ex-day approaches, reaching 2.5%, compared to the 4% figure for discount traders. In the ex-dividend period the use of sell market orders increases and is significantly positive over all days. There is also an increase in the usage of

sell limit orders ex-dividend. The use of both buy limit and buy market orders are significantly lower than the benchmark period.

The use of market orders – either buy or sell – by institutions does not reveal any ex-dividend induced pattern. In contrast, the use of sell limit orders by institutions is higher cum-dividend and generally lower ex-dividend. Buy limit orders are lower cum-dividend and higher ex-dividend. This provides clear evidence that institutional investors are taking the opposing side of the trades made by individual investors. As a result, through their use of limit order, institutions are supplying liquidity to individual investors operating through both discount and full-service retail brokers.

### *4.3 Portfolios of Net Trading and Returns*

To test whether the trading of the various clienteles has an impact on the ex-day returns we form quintile portfolios based on the net trading of each broker type from t-10 to t-1.[4] The average return in excess of the All Ordinaries Index returns of each quintile portfolio is calculated, as is the difference between the high and low quintiles of net trading. If a particular clientele's trading has an impact on ex-day returns then we anticipate that the difference between the high and low net trading groups will exhibit statistically significant returns.

Table 4 contains the excess returns for each portfolio based on broker net trading. Panel A contains the results for the full sample of trading for each of the discount retail, full-service retail and institutional brokers. All of the discount broker portfolios exhibit statistically significant excess returns on the ex-day except for the portfolio that comprises the stocks that experienced the highest cum-dividend net trading. The spread between the high and low net trading groups is 25 basis points in excess returns. The portfolios for full-service retail and institutional brokers all have significantly positive excess returns, with no difference existing between the high and low net trading groups. These results indicate the cum-dividend trading by individual investors through discount brokers impacts the ex-dividend day price adjustment.

[4] The results are similar if we use net trading from t-5 to t-1.

[Insert Table 4]

To examine if the returns difference for the discount broker net trading portfolios are driven by stock characteristics, rather than net trading, we repeat the portfolio sorting by dividend yield, imputation level and market capitalisation. Given the significance of the result for the discount broker trades we do not report results for full-service retail and institutional broker trading.[5] Table 4 Panel B sorts stocks into terciles by dividend yield. The largest spread difference appears in the high yield securities, where we know that individual investors have a distinct preference. The magnitude of the difference is substantially higher at 44 basis points than the aggregate results. The difference also exists for full imputation stocks as well as mid-cap stocks, and to a lesser extent, large cap stocks. The fact that portfolio return differences exist within a stock characteristic group rather than across a stock characteristic indicates that it is the cum-dividend net trading of discount brokers that is responsible for the difference in ex-day excess returns, rather than stock characteristics.

### *4.4 Regressions of the Returns against Trading and other determinants*

The portfolio approach provides us with evidence that the trading of individual investors affects ex-dividend day returns. We also undertake a regression analysis in order to adequately control for any potential explanations of the return differences between the high and low net trading portfolios of discount retail brokers.[6] In addition, we examine the returns over a number of horizons on and after the ex-day – t=0, t+1, t+2, t=0: t+1, t+0: t+4, t+1: t+5, and t+2: t+6. The regression is of the form:

$$AR_{i,t} = \beta_0 + \beta_1 NTD_{i,t-10:t-1} + \beta_2 CAR_{i,t-10:t-1} + \beta_3 Imp_{i,t} + \beta_4 DY_{i,t} + \beta_5 Mcap_{i,t} + \beta_6 ES_{i,t} + \varepsilon_{i,t}, \quad (1)$$

where $i$ indexes stock and $t$ indexes the ex-dividend date. $AR_{i,t}$ is abnormal return on the ex-day, $NTD_{i,t\text{-}10:t\text{-}1}$ is the net trading by discount brokers between day t-10 and t-1, $CAR_{i,t\text{-}10:t\text{-}1}$ is the cum-

[5] These results are available from the authors on request.
[6] Results for full service retail brokers and institutional brokers are not reported due to the lack of significance from the portfolios analysis. These results are available from the authors on request.

dividend excess return from t-10 to t-1, *Imp* is the imputation level, *DY* is the dividend yield, *Mcap* is the natural logarithm of the firm market capitalisation and *ES* is the percentage effective spread.

[Insert Table 5]

The results show that the net trading impact remains significant after controlling for other stock level characteristics. A one standard deviation increase in cum-dividend net buying from t-10 to t-1 of discount retail clients (0.31) leads to a 7 basis point decrease in the ex-day excess return (0.31 * -0.225 = -7 bp). Over the period from t+2 to t+6 a one standard deviation move in the net trading of discount brokers leads to an 11 basis point decrease in the excess return. Discount broker net trading does not affect excess returns on day t+1, yet has a positive impact on excess returns on t+2. In addition, the cum-dividend trading impact has a significant impact on the ex-dividend returns from t+2 to t+6. Of particular interest is the fact the cum-dividend abnormal returns do not have any relationship with any measure of ex-dividend returns. The other independent variables have mixed results, but generally exhibit the expected sign.

### *4.5 Ex-dividend Broker Trading and Determinants*

The results thus far show that institutions supply liquidity to individual investors and that the trading of individual investors through discount brokers impacts returns on the ex-day and subsequent days. We now turn our attention to how the ex-day price drop affects the trading of clienteles after the ex-day. We estimate the net trading of clienteles over three different horizons: t=0, t+1 and t+1 to t+10 using the following specification:

$$NTD_{i,t+1} = \beta_0 + \beta_1 AR_{i,t} + \beta_2 CAR_{i,t-10:t-1} + \beta_3 Imp_{i,t} + \beta_4 DY_{i,t} + \beta_5 Mcap_{i,t} + \beta_6 ES_{i,t} + \varepsilon_{i,t}, \qquad (2)$$

where all variables are as previously defined. Discount retail broker trading is negatively related to the ex-dividend day return. Stocks whose ex-day excess returns experience large declines have larger net buying by discount traders. Ex-dividend net trading is also negatively relate to cum-dividend returns. Although ex-dividend returns in Table 5 are not related to cum-dividend returns we observe that ex-dividend trading is lower for stocks that experience a positive price increase in

the cum-dividend period. Together this result indicates that discount traders are only purchasing stocks that they think are 'cheap'. Dividend yield exhibits a positive influence on the net trading of discount brokers with higher yield stocks being purchased after the ex-day. This is consistent with the univariate results reported in Table 2. The coefficient on the imputation level is negative but is not consistently statistically significant across the various horizons. Market capitalisation and the bid-ask spread do not have a significant relationship with ex-dividend discount net trading either. The interpretation of the ex-dividend trading behaviour of full-service retail brokers is essentially the same as for discount retail brokers.

[Insert Table 6]

The determinants of ex-dividend institutional broker trading are also contained in Table 6. These results stand in contrast to those of the discount and full-service retail brokers. There is a negative relationship between net trading and the ex-day return. Institutions are not simply buying all stocks, but are concentrating their purchases among stocks whose price did not fully adjust on the ex-dividend day. They are also undertaking ex-dividend net purchases of those stocks that had higher cum-dividend returns. This trading is also concentrated in the stocks with the largest market capitalisation. The univariate results as well as the regression results indicate that institutional brokers are supplying liquidity to the dividend capture trades of individual investors.

## 5. Conclusion

This study examines the trading of clienteles around the ex-dividend day in Australia using a dataset that covers the entire market, accurately classifies individual and institutional different investors, as well as clearly identifying buyer- and seller-initiated trades. As a result, we are able to convincingly determine whether clientele trading affects the ex-day premium. We show that individual investors that trade through both discount and full-service retail brokers are net buyers in the cum-dividend period and execute a larger proportion of trades using market buy orders in the cum-dividend period, whilst after the ex-day they use an abnormally high proportion of market sell

orders. Trades made through institutional brokers are net sellers cum-dividend net buyers ex-dividend. In contrast to the impatient trading of individual investors, institutions increase the proportion of cum-dividend trades executed using limit sell orders and in the ex-dividend period they undertake an abnormally high proportion limit buy transactions. We interpret this as direct evidence that institutions are supplying liquidity to individual investors around the ex-dividend day.

The results suggest that individual investors, particularly those trading through discount retail brokers, do attempt to capture the ex-day premium that is allegedly available. However, in doing so, they exert pressure on prices that leads to an evaporation of these abnormal returns. In light of the uncertainty in the literature regarding the skill of individual investors we believe our results suggest that the trading of individual investors is not informed, insofar as they cannot successfully obtain positive ex-day returns, on average. The spread between the high and low net trading quintiles is of a similar size to the average ex-day return. This analysis does directly take into account the value of imputation credits. However, when we examine the portfolio of full imputation stocks with the highest cum-dividend net buying by discount retail brokers we observe a significantly negative ex-day return of -16 basis points. Also of particular interest is the cum-dividend trading of the discount clientele leads to negative returns in the days after the ex-day. We conclude that individual investors may not necessarily be the marginal trader, but they do exert a significant influence on both returns and volumes around the ex-dividend day.

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## Table 1
## Descriptive Statistics

The sample is for dividends paid between January 1, 1995 and December 31, 2011. The cash dividend is the dividend payment in cents. The franking level is the percentage tax credit attached to the cash dividend. The dividend yield is measured as the cash dividend divided by the closing cum-day price. Imputation yield is the dollar value of the imputation credits as a percent of the cum-day price. The drop-off ratio is the cum-day price less the ex-day price as a percent of the dividend and the raw return is the ex-dividend day return. Excess return is the stock return minus the return on the ASX300/All Ordinaries Index.

| | Dividend (cents) | Franking (%) | Dividend Yield (%) | Imputation Yield (%) | Drop-Off Ratio | Raw Return (%) | Excess Return (%) |
|---|---|---|---|---|---|---|---|
| Mean | 17.05 | 59.59 | 2.316 | 0.325 | 0.71 | 0.32 | 0.24 |
| Std Dev | 59.46 | 46.99 | 1.410 | 0.356 | 2.16 | 2.09 | 2.00 |
| Median | 8.00 | 100.00 | 2.093 | 0.295 | 0.85 | 0.04 | 0.11 |
| $25^{th}$ Pctl | 4.00 | 0.00 | 1.538 | 0.000 | 0.20 | -0.67 | -0.81 |
| $75^{th}$ Pctl | 15.00 | 100.00 | 2.815 | 0.534 | 1.32 | 1.19 | 1.14 |
| Min | 0.10 | 0.00 | 0.062 | 0.000 | -72.00 | -18.51 | -18.49 |
| Max | 1301.36 | 100.00 | 36.443 | 8.397 | 21.28 | 29.01 | 31.94 |

## Table 2
## Ex-dividend Net Trading

Trades are classified as discount retail, full-service retail or institutional based on the broker that submitted the order. Net trading is calculated as the value of buy trades less the value of sell trades as a percent of total volume. The daily averages are centred on the ex-dividend day (t=0). ***, **, * denote significance at the 1, 5 and 10% level based on standard errors clustered by stock and ex-dividend date.

| | t-5 | t-4 | t-3 | t-2 | t-1 | t=0 | t+1 | t+2 | t+3 | t+4 | t+5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Panel A: Discount Retail Broker Trading* | | | | | | | | | | | |
| All Stocks | 8.926*** | 9.198*** | 8.725*** | 9.737*** | 9.170*** | 4.483*** | -1.074 | -1.818** | -2.489*** | -3.470*** | -3.857*** |
| Low DY | 0.566 | 1.068 | -1.069 | -0.508 | 0.644 | -0.688 | -3.537*** | -3.909*** | -4.106*** | -5.661*** | -4.828*** |
| Mid DY | 10.448*** | 10.590*** | 9.922*** | 10.069*** | 9.211*** | 4.724*** | -1.978 | -2.325 | -2.076 | -1.754 | -5.340*** |
| High DY | 15.765*** | 15.935*** | 17.323*** | 19.650*** | 17.655*** | 9.412*** | 2.293 | 0.780 | -1.284 | -2.995** | -1.404 |
| Zero Imp. | 4.059** | 6.406*** | 3.412** | 3.983** | 2.743* | 6.608*** | 0.524 | 1.304 | -0.690 | -3.418* | -2.574 |
| Partial Imp. | 7.978*** | 7.376*** | 5.882*** | 11.953*** | 9.396*** | 3.149 | -2.696 | -4.345** | -3.983* | -6.553*** | -6.94*** |
| Full Imp. | 11.844*** | 11.117*** | 12.257*** | 12.547*** | 12.740*** | 3.543*** | -1.662* | -3.089*** | -3.213*** | -2.908*** | -3.988*** |
| *Panel B: Full-service Retail Broker Trading* | | | | | | | | | | | |
| All Stocks | 2.198** | 3.847*** | 5.004*** | 4.741*** | 5.633*** | -4.731*** | -4.386*** | -2.399** | -1.741* | -3.364*** | -4.263*** |
| Low DY | -4.667*** | -6.264*** | -5.585*** | -6.207*** | -4.355*** | -10.427*** | -10.759*** | -8.323*** | -8.486*** | -7.300*** | -7.397*** |
| Mid DY | 1.672 | 5.217*** | 7.255*** | 6.909*** | 7.335*** | -4.023** | -1.773 | -0.850 | -1.007 | -2.043 | -4.477*** |
| High DY | 9.585*** | 12.582*** | 13.335*** | 13.514*** | 13.912*** | 0.253 | -0.633 | 1.971 | 4.266*** | -0.752 | -0.917 |
| Zero Imp. | -1.645 | -0.193 | -0.485 | -3.447* | -1.027 | -3.928* | -4.218* | -2.187 | -1.547 | -4.741** | -5.045*** |
| Partial Imp. | 4.834* | 4.824** | 5.072** | 4.411* | 10.534*** | -1.770 | 0.078 | -1.068 | -2.365 | -2.796 | -5.534** |
| Full Imp. | 3.921*** | 5.997*** | 8.161*** | 9.533*** | 8.557*** | -5.753*** | -5.324*** | -2.772** | -1.736 | -2.675** | -3.572*** |
| *Panel C: Institutional Broker Trading* | | | | | | | | | | | |
| All Stocks | 0.908 | 0.963 | 0.744 | 1.346* | 0.203 | 3.736*** | 5.660*** | 5.336*** | 5.508*** | 5.636*** | 5.199*** |
| Low DY | 5.472*** | 5.540*** | 5.533*** | 6.013*** | 5.061*** | 6.434*** | 9.055*** | 8.220*** | 7.616*** | 8.445*** | 7.413*** |
| Mid DY | 0.710 | -0.024 | -0.752 | 0.532 | -0.038 | 2.071 | 3.411*** | 3.819*** | 4.278*** | 5.153*** | 5.280*** |
| High DY | -3.455*** | -2.625** | -2.547** | -2.502** | -4.408*** | 2.704** | 4.513*** | 3.969*** | 4.631*** | 3.312*** | 2.905** |
| Zero Imp. | 1.933 | 2.572* | 2.546* | 3.895*** | 2.335* | 1.084 | 4.591*** | 3.909*** | 4.238*** | 5.278*** | 3.194** |
| Partial Imp. | 2.332 | 2.062 | 3.762*** | 3.553** | 3.780*** | 6.480*** | 7.369*** | 7.619*** | 7.403*** | 6.411*** | 6.351*** |
| Full Imp. | 0.004 | -0.235 | -0.946 | -0.641 | -1.796** | 4.823*** | 5.981*** | 5.763*** | 5.916*** | 5.704*** | 6.199*** |

## Table 3
## Abnormal Executed Trade Proportions

This table presents the abnormal proportion of trades made using sell market, sell limit, buy limit or market buy orders. Each trade indicates who initiated the trade and identifies the broker, which we then classify as either discount retail, full-service retail or institutional. The abnormal proportion is calculated as the difference between the average daily proportion of a given trade type for a given stock less the average daily proportion of that trade type for the same stock in the period between t-50 and t-11. *p*-values based on standard errors clustered by stock and ex-dividend date are in parentheses. ***, **, * denote significance at the 1, 5 and 10% level.

| | t-5 | t-4 | t-3 | t-2 | t-1 | t=0 | t+1 | t+2 | t+3 | t+4 | t+5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Panel A: Discount Retail Brokers* | | | | | | | | | | | |
| Sell Market | -1.685*** | -2.399*** | -2.28*** | -2.829*** | -2.541*** | 1.236*** | 1.672*** | 1.526*** | 1.838*** | 1.748*** | 1.934*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Sell Limit | -1.814*** | -1.273*** | -1.187*** | -1.286*** | -1.027*** | -2.612*** | 0.242 | 0.596 | 0.536 | 1.068*** | 1.06*** |
| | (0.000) | (0.001) | (0.001) | (0.000) | (0.003) | (0.000) | (0.51) | (0.13) | (0.17) | (0.004) | (0.008) |
| Buy Limit | 0.952** | 1.025*** | 0.384 | 0.583* | -0.481 | -0.443 | -1.005*** | -0.866** | -1.583*** | -1.229*** | -1.449*** |
| | (0.011) | (0.006) | (0.285) | (0.099) | (0.163) | (0.221) | (0.004) | (0.024) | (0.000) | (0.001) | (0.000) |
| Buy market | 2.546*** | 2.647*** | 3.082*** | 3.532*** | 4.049*** | 1.819*** | -0.91*** | -1.256*** | -0.792*** | -1.588*** | -1.546*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.002) | (0.000) | (0.009) | (0.000) | (0.000) |
| *Panel B: Full-service Retail Brokers* | | | | | | | | | | | |
| Sell Market | -0.737** | -1.485*** | -1.826*** | -1.734*** | -2.635*** | 1.141*** | 1.326*** | 1.016*** | 0.892** | 1.352*** | 1.908*** |
| | (0.038) | (0.000) | (0.000) | (0.000) | (0.000) | (0.001) | (0.000) | (0.004) | (0.017) | (0.000) | (0.000) |
| Sell Limit | 0.061 | -0.165 | -0.173 | -0.422 | 0.06 | 1.535*** | 1.413*** | 0.801** | 0.553 | 0.963** | 0.777** |
| | (0.868) | (0.639) | (0.618) | (0.226) | (0.871) | (0.000) | (0.000) | (0.032) | (0.165) | (0.01) | (0.031) |
| Buy Limit | 0.089 | 0.642* | 0.047 | 0.127 | 0.077 | -1.379*** | -1.236*** | -0.663* | -0.752** | -0.597 | -1.01*** |
| | (0.809) | (0.07) | (0.892) | (0.723) | (0.829) | (0.000) | (0.001) | (0.069) | (0.048) | (0.114) | (0.009) |
| Buy Market | 0.587* | 1.008*** | 1.952*** | 2.03*** | 2.498*** | -1.297*** | -1.503*** | -1.153*** | -0.692* | -1.718*** | -1.675*** |
| | (0.079) | (0.002) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.001) | (0.05) | (0.000) | (0.000) |
| *Panel C: Institutional Brokers* | | | | | | | | | | | |
| Sell Market | -0.166 | -0.256 | -0.19 | -0.6* | -0.239 | -0.234 | -0.505 | -0.282 | -0.79** | -1.193*** | -0.226 |
| | (0.627) | (0.421) | (0.556) | (0.051) | (0.427) | (0.482) | (0.117) | (0.408) | (0.016) | (0.000) | (0.503) |
| Sell Limit | 1.198*** | 1.468*** | 1.277*** | 1.507*** | 1.709*** | -0.313 | -0.977*** | -0.979*** | -0.783*** | -0.393 | -0.984*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.248) | (0.001) | (0.000) | (0.004) | (0.164) | (0.000) |
| Buy Limit | -0.339 | -0.613** | -0.821*** | -0.643** | -1.295*** | 0.619** | 1.083*** | 0.897*** | 1.073*** | 1.399*** | 1.162*** |
| | (0.272) | (0.038) | (0.009) | (0.026) | (0.000) | (0.033) | (0.000) | (0.002) | (0.000) | (0.000) | (0.000) |
| Buy Market | -0.692** | -0.599** | -0.266 | -0.264 | -0.175 | -0.072 | 0.399 | 0.364 | 0.5 | 0.187 | 0.049 |
| | (0.034) | (0.04) | (0.385) | (0.397) | (0.539) | (0.821) | (0.211) | (0.294) | (0.111) | (0.576) | (0.880) |

## Table 4
## Cum-Dividend Net Trading and Ex-dividend Day Returns

Net trading is measured as the daily average of from t-10 to t-1 of the value of buy trades less the value of sell trades as a percent of total volume for each broker. Each dividend is sorted into quintiles based on the value of net-trading. The average of the ex-day excess returns for each portfolio are calculated and reported below. *p*-values based on standard errors clustered by stock and ex-dividend date are in parentheses. ***, **, * denote significance at the 1, 5 and 10% level.

| | Net Trading Group | | | | | High-Low |
|---|---|---|---|---|---|---|
| | 1 (Low) | 2 | 3 | 4 | 5 (High) | |
| *Panel A: Broker Trading* | | | | | | |
| Discount | 0.293*** | 0.422*** | 0.219*** | 0.250*** | 0.041 | -0.252*** |
| Retail | (0.000) | (0.000) | (0.001) | (0.000) | (0.451) | (0.001) |
| Full-service | 0.250*** | 0.292*** | 0.182*** | 0.258*** | 0.186*** | -0.065 |
| Retail | (0.000) | (0.000) | (0.004) | (0.000) | (0.001) | (0.402) |
| Institutional | 0.216*** | 0.253*** | 0.312*** | 0.234*** | 0.299*** | 0.083 |
| | (0.000) | (0.000) | (0.000) | (0.001) | (0.000) | (0.277) |
| *Panel B: Discount Retail Trading by Dividend Yield* | | | | | | |
| Low | 0.306*** | 0.550*** | 0.349*** | 0.366*** | 0.102 | -0.205 |
| | (0.000) | (0.000) | (0.007) | (0.002) | (0.362) | (0.159) |
| Mid | 0.215** | 0.362*** | 0.285*** | 0.015 | 0.139* | -0.076 |
| | (0.022) | (0.000) | (0.004) | (0.859) | (0.083) | (0.516) |
| High | 0.387*** | 0.306* | 0.026 | 0.364*** | -0.055 | -0.443*** |
| | (0.002) | (0.071) | (0.818) | (0.004) | (0.506) | (0.002) |
| *Panel C: Discount Retail Trading by Imputation Level* | | | | | | |
| Zero | 0.395*** | 0.620*** | 0.663*** | 0.638*** | 0.373*** | -0.021 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.868) |
| Partial | 0.301** | 0.758*** | 0.274 | 0.197 | 0.349** | 0.048 |
| | (0.022) | (0.000) | (0.185) | (0.169) | (0.020) | (0.811) |
| Full | 0.206** | 0.226*** | -0.016 | 0.076 | -0.157** | -0.364*** |
| | (0.014) | (0.009) | (0.854) | (0.309) | (0.017) | (0.000) |
| *Panel D: Discount Retail Trading by Market Capitalisation* | | | | | | |
| Small | 0.107 | 0.387*** | 0.198* | 0.054 | 0.030 | -0.077 |
| | (0.149) | (0.001) | (0.067) | (0.500) | (0.677) | (0.448) |
| Mid | 0.335*** | 0.423*** | 0.199* | 0.521*** | -0.037 | -0.372*** |
| | (0.001) | (0.000) | (0.098) | (0.000) | (0.662) | (0.004) |
| Large | 0.412*** | 0.458*** | 0.262** | 0.195* | 0.128 | -0.284* |
| | (0.000) | (0.000) | (0.026) | (0.082) | (0.239) | (0.051) |

## Table 5
## Cum-dividend Discount Broker Trading and Ex-dividend Returns

The dependent variable in the regressions below is the stock excess return. Daily returns are calculated as the average of the excess returns for that day. Returns over multiple days are cumulative returns. Excess returns are the dependent variable. Net trading is measured as the daily average of from t-10 to t-1 of the value of buy trades less the value of sell trades as a percent of total volume for discount brokers ($NTD_{t-10:t-1}$). The cum-dividend cumulative abnormal returns are measured from t-10 to t-1 and abnormal is defined as in excess of the market. The remaining independent variables are the percentage imputation level, the dividend yield, the log of cum-day market capitalisation. The effective spread is time-weighted percentage effective spread on the cum-dividend day. *p*-values based on standard errors clustered by stock and ex-dividend date are in parentheses. ***, **, * denote significance at the 1, 5 and 10% level.

| Dependent Variable: Cumulative Excess Stock Return (t=0 is the ex-dividend day) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | t=0 | t+1 | t+2 | t=0: t+1 | t+0: t+4 | t+1: t+5 | t+2: t+6 |
| Constant | 2.445*** | 0.957* | -0.550 | 3.344*** | 1.968 | 0.114 | -0.419 |
| | (0.000) | (0.088) | (0.283) | (0.000) | (0.125) | (0.918) | (0.704) |
| $NTD_{t-10:t-1}$ | -0.225** | -0.058 | -0.152* | -0.279** | -0.437** | -0.252 | -0.359** |
| | (0.015) | (0.483) | (0.052) | (0.021) | (0.016) | (0.147) | (0.047) |
| $CAR_{t-10:t-1}$ | -0.683 | 0.233 | -0.022 | -0.413 | -0.993 | -0.143 | -0.418 |
| | (0.302) | (0.737) | (0.974) | (0.688) | (0.450) | (0.904) | (0.731) |
| Imputation | -0.423*** | -0.060 | -0.089 | -0.485*** | -0.607*** | -0.125 | -0.047 |
| | (0.000) | (0.362) | (0.169) | (0.000) | (0.000) | (0.427) | (0.753) |
| Dividend Yield | -2.044 | -8.742*** | -2.718 | -10.758* | -18.107** | -18.925*** | -8.659 |
| | (0.656) | (0.003) | (0.327) | (0.062) | (0.018) | (0.002) | (0.145) |
| ln(Mkt Cap) | -0.074*** | -0.030 | 0.026 | -0.102*** | -0.037 | 0.013 | 0.027 |
| | (0.004) | (0.152) | (0.164) | (0.003) | (0.436) | (0.748) | (0.523) |
| Effective Spread | 7.296 | -1.931 | -0.108 | 4.890 | -4.153 | -12.660** | -7.562 |
| | (0.143) | (0.525) | (0.971) | (0.369) | (0.597) | (0.046) | (0.283) |
| Obs. | 5,910 | 5,910 | 5,910 | 5,910 | 5,909 | 5,888 | 5,887 |
| Adj. $R^2$ | 0.014 | 0.003 | 0.001 | 0.012 | 0.009 | 0.004 | 0.001 |

## Table 6
## Ex-dividend Clientele Trading

The dependent variable in the regressions below is the net trading by either discount retail, full-service retail or institutional brokers over various horizons. Net trading is measured as the daily average of the value of buy trades less the value of sell trades as a percent of total volume for discount brokers over the various horizons. The dependent variables are the ex-dividend day stocks returns in excess of the return on the All Ordinaries index (market). The cum-dividend cumulative abnormal returns are measured from t-10 to t-1 and abnormal is defined as in excess of the market. The remaining independent variables are the percentage imputation level, the dividend yield, the log of cum-day market capitalisation and the effective spread is time-weighted percentage effective spread on the cum-dividend day. *p*-values based on standard errors clustered by stock and ex-dividend date are in parentheses. ***, **, * denote significance at the 1, 5 and 10% level.

| | Discount Retail | | | Full-service Retail | | | Institutional | | |
|---|---|---|---|---|---|---|---|---|---|
| | t=0 | t+1 | t+1:t+10 | t=0 | t+1 | t+1:t+10 | t=0 | t+1 | t+1:t+10 |
| Constant | -0.447** | -0.040 | 0.062 | 0.058 | 0.289 | 0.288 | -0.733*** | -0.469*** | -0.501*** |
| | (0.029) | (0.836) | (0.633) | (0.819) | (0.197) | (0.102) | (0.000) | (0.001) | (0.000) |
| $AR_{t=0}$ | -0.069*** | -0.033*** | -0.012*** | -0.027*** | -0.021*** | -0.008*** | 0.018*** | 0.008*** | 0.006*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.003) | (0.000) | (0.007) | (0.000) |
| $CAR_{t-10:t-1}$ | -1.109*** | -0.964*** | -0.634*** | -1.266*** | -0.893*** | -0.788*** | 0.469*** | 0.457*** | 0.439*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Imputation | -0.045* | -0.028 | -0.016 | -0.023 | -0.013 | 0.021 | 0.029 | 0.005 | 0.004 |
| | (0.068) | (0.216) | (0.332) | (0.432) | (0.654) | (0.319) | (0.109) | (0.764) | (0.681) |
| Dividend Yield | 2.979*** | 1.623** | 1.225*** | 2.467*** | 1.762** | 2.715*** | -0.559 | -0.696 | -0.939*** |
| | (0.000) | (0.018) | (0.003) | (0.005) | (0.043) | (0.000) | (0.384) | (0.214) | (0.007) |
| ln(Mkt Cap) | 0.018** | 0.001 | -0.004 | -0.005 | -0.014 | -0.015** | 0.030*** | 0.021*** | 0.022*** |
| | (0.014) | (0.903) | (0.389) | (0.629) | (0.108) | (0.025) | (0.000) | (0.000) | (0.000) |
| Effective Spread | 1.133 | 1.617* | 0.892* | -0.562 | -0.135 | 0.691 | -1.012 | -0.295 | -1.002*** |
| | (0.174) | (0.052) | (0.059) | (0.590) | (0.876) | (0.196) | (0.192) | (0.582) | (0.004) |
| Obs. | 5,910 | 5,910 | 5,910 | 6,024 | 6,024 | 6,024 | 6,121 | 6,121 | 6,121 |
| Adj. $R^2$ | 0.074 | 0.025 | 0.025 | 0.021 | 0.012 | 0.027 | 0.014 | 0.007 | 0.029 |

## Appendix A
## Broker Classification Guide

This table replicates Appendix A in Fong, Gallagher and Lee (2013) and lists the criteria used to classify brokers based on different data sources.

| Broker Classification | Data Source | |
|---|---|---|
| | Broker Website or Archived Broker Website | Company Announcements, Newspapers, Books, papers, web articles |
| Discount Retail Broker | Site states brokerage costs (e.g. 'trade from $19.95') prominently and does not offer full-service or institutional sales. | States the broker is a discount broker, with no mention of the broker being institutional. |
| Full-Service Retail Broker | Site states the broker provides full-service or private client brokerage services and does not provide institutional sales. | States the broker is a full-service or private client broker. |
| Institutional | Provides only institutional or wholesale client (wealthy or high net worth individuals) brokerage services and does not provide full-service retail brokerage, or has a separate private client brokerage arm. Also includes proprietary trading desks and market makers. | States the broker is an institutional or wholesale broker. |
| Mixed | States that broker provides both full-service brokerage and institutional sales. | States that the broker has retail and institutional brokerage services. |
| Other | Clearing houses | Indeterminable brokers from articles or website. |