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The Dividend Disconnect *

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> "The humble dividend is reclaiming its rightful place as the arbiter of stock-market value... To investors desperate for income, the argument for buying equities is, well, duh. Who wouldn't want a higher income? Shares might swing around, but corporate managers go out of their way to preserve the dividend."
> - James MacKintosh, *The Wall Street Journal* May 9, 2016

The concept of returns is one of the most basic in asset pricing. By aggregating the capital gain and the dividend yield into a single measure of total performance, academics generally presume that investors (sensibly) care about their total profits from a position, not the composition of such profits. In other words, a dollar of capital gains is considered to be equally valuable to a dollar of dividends. While there may be economic reasons why investors do not view the two as equivalent, such as tax considerations or costs of trading, allowing for such a possibility simply necessitates computing returns net of such costs. Investors are typically not presumed to treat capital gains and dividends differently for purely psychological reasons.

This paper presents evidence that, broadly speaking, investors trade as if they consider dividends to be disconnected from the price level of a security, focusing on either price changes or dividends (depending on context), but rarely both together. We argue that this is due to investors examining price appreciation and dividends in separate mental accounts (Thaler 1980, Thaler 1999, Frydman et al. 2015) whereby capital gains and dividends are considered as separate attributes of a stock, not as a single returns measure. This leads investors to behave as if they are unaware that dividends come at the expense of the price level and are not an independent source of income. We term this behavior the free dividends fallacy. This disconnect between price changes and dividends is of considerable practical importance, affecting outcomes as varied as trading relating to gains and losses, prices of dividend-paying stocks, dividend reinvestment, and marketwide returns. Across a wide range of sophistication levels, investors simply do not appear to evaluate returns in the way that academic finance assumes.

We begin by examining how price changes and dividends separately impact individual investors' trading behavior. Because dividends are relatively stable, whereas price changes tend to be volatile and uncertain, investors may pay more attention to price changes as a measure of changes in how

a stock is performing. If dividends are considered in a separate mental account, then this focus on price changes may cause investors to react only to the price change component, regardless of whether dividend payment has resulted in mechanical price decreases. To test this, we examine a number of trading behaviors based on past performance of stocks, and show that the trading is driven more by past price changes than past returns.

We examine the disposition effect (the tendency to sell winners more often than losers, as in Shefrin and Statman 1985), the rank effect (the tendency to sell extreme-ranked positions, as in Hartzmark 2015), and the rolled disposition effect (for positions bought on a day that another position was sold, the tendency to sell the new position once its value exceeds the initial investment in the old position, as in Frydman et al. 2015). In the literature that studies these phenomena, if the distinction between price changes and total returns is discussed at all, it is typically to mention that either measure yields similar results. We examine these effects, but decompose the drivers of performance into a price change component and a dividend component. For all of the studied patterns, there is significantly less selling response to the dividend component, and in a number of cases dividends do not appear to be part of the gain or loss evaluation at all. Investors' perceptions of gains and losses seem to be largely driven by price changes, regardless of whether dividend payment has affected this price.

The fact that investors do not include dividends in their calculations of gains and losses does not mean that dividends get ignored altogether in the decision-making process. Rather, investors focusing on dividends, presumably for the perceived attractiveness of the income stream, are likely to pay less attention to the capital gains component of returns. Consistent with this, we show that investors are less likely overall to sell stocks that pay dividends, holding them for longer periods of time than other stocks. In addition, dividends make investors less sensitive to past price changes when selling stocks. This supports the prediction that investors do not view dividends and capital gains as equally important contributors to returns, but focus on one variable or the other.

Next we turn to the marketwide implications of such behavior. If investors are subject to the free dividends fallacy, viewing dividends as a source of income, they should place a higher value

on that perceived income stream more when other options for income are relatively less attractive. Perhaps the closest substitute for such an investment is bonds. We examine two proxies for investors' demand for dividends. Firstly, we consider the abnormal return in the interim period after dividend announcement and before the ex-day. Hartzmark and Solomon (2013) show that the returns in this period (which lacks dividend-related news, uncertainty, or tax consequences) are linked to investor demand for dividends. Second, we examine the book-to-market ratios of dividend-paying stocks relative to non-dividend-paying stocks.

We find that both measures of dividend demand are higher when the interest rate is low, and thus the periodic payments from bonds are less attractive compared with a dividend stream. In addition, demand is higher for stocks whose dividends are more stable, and where dividends have increased in the recent past. These results are consistent with investors valuing dividends relative to alternative streams of recurring payoffs such as interest payments. In addition, consistent with the fact that dividends and price changes are considered as separate ways to make money from a stock, the demand for dividends is lower when recent past market returns have been higher. In these times, the smaller predictable stream of payments from dividends is apt to appear less attractive compared with the large recent capital gains, even though both parts contribute to total returns.

If investors view dividend payments as being separate from the value of their position, they may not reinvest dividends into the shares from which they came. This has been shown before for the case of individuals in Baker et al. (2007), who argued that dividends were financing consumption. We show that dividend reinvestment is also rare among more sophisticated groups of investors such as mutual funds and institutions, many of whom do not have an equivalent consumption motive. Using quarterly holdings, we examine how often dividend-paying holdings increase by approximately the number of shares that could be purchased with the dividend on the payment date (when reinvestment requires a non-trivial number of shares). We compare this to another benchmark for passive investing - holding exactly the same number of shares in the subsequent quarter, and leaving the dividend in cash or investing it elsewhere. We show that dividend reinvestment is only about 2.3% as common as zero holdings changes for the case of mutual funds, and 9.6% as common for institutional

investors. Dividend reinvestment among sophisticated investors is unusual. If revealed preference is to be believed, these investors have a desire to marginally reduce their portfolio weights by the exact amount of the dividend starting on the ex-dividend date. It seems more likely that these sophisticated investors are either not directly tracking which dividends correspond to which stocks for reinvestment purposes, or do not care enough to maintain particular portfolio weights.

The reinvestment of dividends outside of the stocks from which they came has predictable effects upon market returns. When we calculate the total amount of dividends paid out on a given day, we show that this is associated with higher market returns that day - a one standard deviation increase in aggregate daily dividend payouts is associated with higher daily market returns of 2.0 basis points (compared with a mean daily market return of 4 basis points). This price increase is consistent with the finding that uninformed shifts in demand can affect prices of individual stocks in the US (Shleifer 1986, Hartzmark and Solomon 2013) and the market as a whole in the case of Chile (Da et al. 2014). We show that dividend reinvestment can affect prices even at the level of aggregate US market returns. However, when the market is decomposed into stocks that paid a dividend that day and stocks that did not, we find that the price increase is more significant for firms that *did not* pay a dividend that day. This is consistent with the institutional and mutual fund results - the vast majority of dividends get reinvested outside the stock from which they were paid, leading to predictable price pressure in those stocks.

Our results are consistent with investors making a considerably more naive evaluation of their portfolio performance than academic finance has generally assumed. We provide direct evidence that investors do not treat dividends and capital gains in the same manner, consistent with investors considering them in separate mental accounts. This leads to each variable receiving different levels of focus depending on context. A general disconnect between price changes and dividends, as our results suggest, would also explain why the popular discourse on dividends diverges so sharply from the academic literature. When US Airways called its frequent flier program "Dividend Miles," they presumably had in mind a definition of "paying dividends" similar to that of the Macmillan

Dictionary - "to bring you a lot of benefits."[1] It seems unlikely they were trying to convey messages like "tax disadvantaged miles," "irrelevant miles" or "signaling miles." The quote at the beginning of our paper is representative of many such articles in respectable financial media outlets which discuss dividends as a source of income on its own, separate from the capital gains component and without an obvious tradeoff in terms of price. If investors do not accurately perceive the tradeoff between dividends and price changes, this stream of payments will seem like an unambiguously positive aspect of stocks. The fact that this apparent confusion exists even in the financial press is consistent with the market-wide impacts we document.

The disconnect between price changes and dividends arising from mental accounting also helps to unify a number of results that are puzzling under normal assumptions about returns. Baker et al. (2007) present evidence that individuals like to consume out of their dividends, consistent with the mental accounting distinctions between dividends and capital gains that we document. Baker and Wurgler (2004b) argue for a catering theory whereby investors have a general demand for dividends due to psychological or institutional reasons, though the psychology behind this is not discussed at length. The free dividends fallacy not only explains psychologically why dividends may be desirable overall, but also why the shifting attractiveness of capital gains and dividends can generate time-varying demand for dividends, as Baker and Wurgler (2004a) document in the context of showing that firms respond to such demand. Valuing dividends purely as an income stream can also help to explain the observed preference that older investors have for dividends documented in Graham and Kumar (2006) and Becker et al. (2011), and the fact that investors do not perceive the risk-reward tradeoff inherent in the change in leverage associated with a dividend Welch (2016). An overall demand for dividends is consistent with Hartzmark and Solomon (2013), who document abnormally positive returns during dividend months linked to price pressure from dividend-demanding investors. Harris et al. (2015) show that mutual funds have a tendency to "juice" their dividend yield by trading in and out of dividend-paying stocks to increase the fund's dividend yield at the expense of overall returns. These results all point to a generalized demand for

[1] http://www.macmillandictionary.com/us/dictionary/american/pay-dividends

dividends that is time-varying, but do not explain why dividends are desirable.[2]

Our findings suggest an answer - mental accounting causes investors to consider price changes and dividends separately, leading to a general neglect of the tradeoff between the two. In such a case, a stream of dividends becomes desirable as a safe source of ongoing profits, but one that is not evaluated in the same way as capital gains. When such an income stream appears more valuable to investors, demand for dividend paying equities is higher, and when it is relatively less attractive demand is lower.

The systematic nature of this dividend demand means that this mistake is costly to investors. While there are the direct costs and benefits (related to taxes, trading costs and reinvestments), the results of this paper suggest that the largest cost may be related to the shift in price of dividend-paying stocks due to time-varying demand. Investors buying dividend-paying stocks when they are relatively over-priced due to dividend demand will earn predictably lower returns. We estimate that investors buying dividend-paying stocks during time of high demand earn roughly 2-4% less per year in expectation. Thus an investor whose preferences for dividends cause him to shift into and out of dividend-paying stocks at the same time as other investors would lose a significant portion of the equity premium by doing so.

1 Data

1.1 Data Sources and Summary Statistics

Information about prices, returns, dividends and market-wide indices are all from CRSP. Information about institutional holdings and mutual funds holding are taken from Thompson Reuters. The individual trader data is the same as used in Barber and Odean (2000) and is processed for analysis

[2]There are other behavioral theories of dividends worth noting. Baker et al. (2016) assume that investors are loss averse (as under a prospect theory value function) over dividend cuts. Shefrin and Statman (1984) describe a number of reasons why dividends may be preferred - self-control over spending habits, prospect theory making it preferable to sometimes split a gain or loss into multiple components, and consuming from dividends having lower regret possibilities than consuming from stock sales, but they do not offer empirical evidence that points in particular to any of these explanations. Our results point to another possibility - if dividends and capital gains are considered in separate mental accounts, investors may not focus on the two variables at the same time, and may not acutely perceive the tradeoff between dividend payment and prices.

as described in Hartzmark (2015) and Frydman et al. (2015).

Because part of our tests involve the question of whether investors perceive dividends as resulting in price decreases (as opposed to merely being free income), we begin with some summary statistics about how apparent this tradeoff might be to an investor who was merely observing the two variables. Summary statistics of various measures of performance over various horizons are presented in Table 1 Panel A. Examining the daily correlation between return and dividend yield for individual stocks, conditional on a positive dividend yield we see a positive correlation of about 0.09 (consistent with the ex-day price drop being somewhat less than the size of the dividend, leading to the positive ex-day returns documented in Elton and Gruber (1970)). The correlation between price change and dividend yield is the more relevant number though, because it gets to the question of how apparent the tradeoff between dividends and price changes would be to a casual observer whose understanding was not informed by financial education.

At the daily level, we see a robust negative correlation between daily price changes and dividend yields of -0.50 for individual stocks. It is noteworthy that even at the daily frequency this number is far away from -1 due to daily fluctuations in prices. So even though the price drops by roughly the value of the dividend, market movements and idiosyncratic price changes are a large portion of the daily stock return even on dividend ex-dates. The second and third columns move to the monthly and annual frequency of returns. As the time increases (to a level that is probably closer to what most investors use to evaluate their portfolio), the correlation between price changes and dividend yield moves closer to 0. The correlation in monthly returns is -0.103 and by the annual level this correlation is -0.067. This is a sufficiently low level that the tradeoff between price changes and dividends is not likely to be salient to a casual observer, which motivates the possibility that investors may fail to appreciate that dividends come at the expense of price changes.

In Panel B, we present summary statistics for the individual investor sample, taken from a large discount brokerage, with data being between January 1991 and November 1996. The data covers 54,176 accounts over 313,625 days that included the sale of an equity position. There were 1,506,274 equity positions in total held on those days, with the median investor holding 3 stocks on a day when

he sells a position. Out of these positions, 696,138 were of stocks that paid a dividend while the investor was holding them. We describe the gain or loss status of these dividend-paying positions - 437,805 are gains regardless of whether the price change or the total return is used, 217,467 are losses regardless of whether the price change or the total return is used, and 40,866 are gains under a total return but losses under a price change measure.

2 Trading Behavior Based on Capital Gains and Dividends

If investors are not aggregating price changes and dividends into a single performance measure, then this maybe evident in their trading behavior. In particular, the literature has documented a number of patterns in how the propensity of investors to sell stocks is related to their past performance. In documenting these effects, performance was either measured using price changes or returns, and the role of dividends is examined mostly in terms of showing that similar results are ascertained using performance measures with or without dividends.[3] However, this does not answer the question we are interested in - do investors actually respond to the dividend component, or just the price change component? In this section, we decompose the purported impact of returns into price changes and dividend yields, and find that investors respond mostly, and in some cases entirely, to the price change component. This is consistent with investors behaving as if a position's performance does not include the dividend component.

2.1 Dividends and the Evaluation of Gains and Losses: The Disposition Effect

The disposition effect refers to the fact that investors are more likely to sell a position at a gain than at a loss (Shefrin and Statman 1985). The effect has been documented for a wide variety of assets - stocks (Odean 1998), executive stock options (Heath et al. 1999), real estate (Genesove and Mayer 2001), futures (Locke and Mann 2005), and online betting (Hartzmark and Solomon 2012).[4]It has

[3]For example, Odean (1998) does not include dividends in the calculation of returns as they are not relevant for the tax implications of selling a position. He notes that "The primary finding of the paper... is unaffected by the inclusion or exclusion of commissions or dividends."

[4]The notable exception is delegated assets like mutual funds, where investors in mutual funds display a reverse disposition effect, as described in Chang et al. (2016). Those authors ascribe this difference to the role of delegation

also been documented for different levels of investor sophistication, including futures traders (Locke and Mann 2005), mutual fund managers (Frazzini 2006), and individual investors (in the US Odean (1998); Finland, Grinblatt and Keloharju (2001); China, Feng and Seasholes (2005)).

For many positions, either price changes or returns including dividends will yield the same category of gain or loss. However, some positions are at a gain when dividends are included, but at a loss without their inclusion. Do investors treat such positions as being at a gain or at a loss when evaluating whether to sell the position? This is equivalent to asking whether investors make any adjustment for the mechanical decrease in shares price that results from dividend payments.

We examine three distinct cases of being at a gain or loss: a position that is at a loss regardless of whether dividends are included or not (which we term an "unambiguous loss"), a position that is at a gain when dividends are included but at a loss when they are excluded (a "gain only with dividends"), and a position that is at a gain regardless of whether dividends are included (an "unambiguous gain"). In our sample of individual investors 40,866 positions are in the ambiguous category of being at a gain only after dividends are included.

In Table 2 we examine how the disposition effect varies across these three cases. Using the individual trader data we take observations of all positions in an investor's portfolio on days when the investor sells a stock, and examine the propensity to sell each position in the portfolio. The dependent variable is a "Sell" dummy variable, equal to one if the position in question was sold that day. We regress this variable on various measures of being at a gain or loss. Gain (Price Only) is equal to one if the position is at a gain through price changes alone. Gain (Including Dividends) is a dummy variable equal to one when the position is at a gain including dividends accumulated while the position has been in the portfolio, using returns assuming immediate dividend reinvestment. Since dividends are always positive, all positions at a gain using price changes are also at a gain when including dividends.

Column 1 of Table 2 includes only Gain (Price Only), thereby comparing the unambiguous gain case to the combined category of unambiguous loss and gain only with dividends. It shows

in helping investors resolve the cognitive dissonance of losing positions.

that investors are 7.3% more likely to sell a position at a gain than a loss measured using price changes alone, the unambiguous gain case. Column 2 includes only Gain (Including Dividends), thus comparing the combined category of unambiguous gain and gain only including dividends to that of the unambiguous loss. It shows that investors are 6.6% more likely to sell gains than losses, when gains are measured using returns.

When both "Gain (Price Only)" and "Gain (Including Dividends)" are included in the same regression in Column 3, we can interpret the variables as follows. First, the constant represents the probability of selling in the unambiguous loss case. The coefficient on "Gain (Price Only)" represents how the probability of selling in the gain only with dividends case differs from that of an unambiguous loss. Finally, the coefficient on "Gain (Including Dividends)" represents how the probability of selling in the unambiguous gain case differs from the gain only with dividends case. If investors evaluate positions using returns that include dividends we would expect a large and positive coefficient on Gain (Including Dividends) and a coefficient of about zero on Gain (Price Only), because both the gain only with dividends case and the unambiguous gain case are both considered gains when evaluated using returns. If investors evaluate positions based on price changes we would expect to see a small or zero coefficient on Gain (Including Dividends), but a large and positive coefficient on Gain (Price Only), because a gain only with dividends is considered to be a loss, similar to the unambiguous loss case, and only the unambiguous gain would be considered a gain.

Column 3 of Table 2 limits the sample to only dividend-paying positions, and includes both Gain (Including Dividends) and Gain (Price Only). It shows that investors are about 5.5% more likely to sell a position that is at a gain using price change measures (i.e. unambiguous gains are 5.5% more likely to be sold than a gain only including dividends). However, the coefficient on Gain (Including Dividends) is negative, meaning that the gain only with dividends case is *less* likely to be sold than the unambiguous loss case. This suggests that stocks which are at a loss when dividends are excluded but at a gain when dividends are included are treated more like other losses than like other gains.

Column 4 expands the sample to include all positions, regardless of whether they have dividends, and adds a dummy variable equal to one if a position received any dividend income while it was in the investor's portfolio. The overall difference between gains with and without a dividend is similar to before - the coefficient on Gain (Price Only) is 0.0684, meaning investors are 6.8% more likely to sell stocks in the unambiguous gain case than the gain only with dividends case. However, the coefficient on Gain (Including Dividends) is now insignificant, meaning that the gain only with dividends case is now insignificantly different from the unambiguous loss case. The difference comes from the coefficient on Any Dividend, which is significantly negative. In other words, investors are less likely to sell dividend-paying stocks regardless of whether they are at a gain or a loss, and once this is accounted for the gain only with dividends case resembles the unambiguous loss case.

Column 5 is similar to Column 4, but includes a number of additional controls. We add account fixed effects to control for investor heterogeneity and portfolio size fixed effects. We also control for the level of returns, which has been known to effect selling propensities, as in Ben-David and Hirshleifer (2012) who document a V-shape in selling propensity as returns get higher or lower. We include a number of controls from that paper - price changes in the positive domain (PriceChange*Gain) and price changes in the negative domain (PriceChange*Loss), the square root of the holding period, the volatility over the previous year interacted with gain and loss, and holding period interacted with positive price changes and with negative price changes.

With these additional controls in Column 5, investors are about 5% more likely to sell a gain than a loss using price changes alone, but only about 1.4% more likely to sell a position at a gain only with dividends compared to a position at a loss. In other words, a gain only with dividends is now somewhat more likely to be sold than than an unambiguous loss, but this gap is considerably smaller than the gap between unambiguous gains and gains only with dividends.

Taken as a whole, the table suggests investors view the gain or loss status of a positions based on their price changes. Positions that are at a gain when dividends are included, but at a loss if dividends are excluded, are sold at a rate more similar to other positions at a loss than other positions at a gain. This is consistent with dividends not being aggregated as part of a returns

variable, but being considered separately.

2.2 Dividends and Ranks of Stock Performance: The Rank Effect

In addition to the previous literature documenting patterns trading based on the returns of each stock on its own, Hartzmark (2015) documents that investors engage in relative evaluation within their portfolio to judge performance. They exhibit the rank effect, whereby they are more likely to sell the best and worst performing positions in their portfolio based on combined return since the position was purchased. Like the disposition effect, this presents another way to gauge how investors are assessing the performance of positions in their portfolio. When deciding which are the best and worst-ranked stocks to sell, do investors include dividends in their evaluation of performance?

We examine this question in Table 3. Observations are again taken for all positions on days when the investor sells at least one stock, and the dependent variable is a Sale dummy equal to one if the position in question was sold. As dependent variables, we include dummy variables for the best-ranked, second-best-ranked, worst-ranked and second-worst-ranked positions in the portfolio. We construct two versions of each of these variables - one set for rankings constructed based on price changes since purchase, and another for rankings based on return including dividends since purchase. For example, Best (Price Only) is equal to one if the position has the highest capital gain in the portfolio, and Best (Including Dividends) is equal to one if the position has the highest total return. The omitted category is thus middle ranked positions. By including both versions of the rank variables in the same regression, we can examine which ranking has a larger effect on selling propensities. We also add fixed effects for the total number of stocks in the portfolio, to control for mechanical effects based on correlations between portfolio size and selling propensity.

Column 1 of Table 3 includes only the rank variables and the portfolio size fixed effects. At a univariate level, three of the four price change rank variables are associated with significantly higher selling probabilities, but none of the returns-based measures are. For instance, the best-ranked position by price change is 14.6% more likely to be sold (with a t-statistic of 26.30), compared with the best-ranked position by returns including dividends which is -0.37% less likely to be sold

(with a t-statistic of -0.67). The only significant returns-based rank effect is the second-best-ranked measure, which actually shows a significantly negative effect, not a positive one.

These univariate effects may pick up other effects. Investors may differ in terms of overall portfolio turnover rates, so in column 2 we add account fixed effects, and find that they do not impact the results much. Rank-based measures will also be correlated with the level of returns, as in Ben-David and Hirshleifer (2012). In column 3, we add the same list of controls of price changes, holding period and volatility from Table 2. Adding these somewhat strengthens the results, with now all four price-change rank variables being positive and statistically significant. Adding both BDH controls and account fixed effects together in column 4 also produces similar results. Price-change based rank measures all show significantly positive effects on selling propensity, with effects ranging from 1.68% for the second-worst ranked to 13.1% for the best ranked. By contrast, return-based measures are generally insignificant, with only the best-ranked return being associated with a statistically significant 1.45% increase in selling propensity. Again, it appears as if selling decisions based on ranks of past performance are made primarily using price-based measures, rather than utilizing returns including dividends.

2.3 Combining Gains and Losses Across Positions: The Rolled Disposition Effect

Another test of the role of dividends in performance measures is how investors account for profits considered across multiple positions. The typical assumption in many studies of investor behavior is that each position is considered as a separate mental account. However, Frydman et al. (2015) show that on days when investors sell a position and immediately buy another position (reinvestment days), they appear to not close the mental account in the sold asset, but rather they roll the account into the new position. As a result, when investors trade in the new position they evaluate being at a gain or a loss relative to the amount initially invested in the old position (even though it is no longer in their portfolio). Consistent with this, Frydman et al. (2015) document the existence of a rolled disposition effect, whereby investors are more likely to sell a reinvested position when it is at a

gain relative to the amount originally invested in the old position no longer in the portfolio. Again, this provides another test of how dividends are evaluated - when evaluating the basis of rolled gains and losses, are dividends included in the calculation or not?

Table 4 examines the rolled disposition effect and finds that it is driven by the capital gains summed across the two positions, not the total return over the two positions. We consider only positions that were purchased on a reinvestment day where only one stock was purchased and one stock was sold. We take observations for these stocks on all future sell days. The dependent variable is again a dummy for if the stock was sold that day. As independent variable, we consider two versions of "Original Gain." These are both dummy variables that equal one if the value of the position exceeds the amount initially invested in the old position. One version, labeled "Excluding Dividends," calculates the cumulative value using only capital gains on both positions, ignoring any dividends. The other, labeled "Including Dividends," calculates the current value including any dividends paid on both positions. The first two columns show that there are significantly positive effects for measures using both capital gains and returns, when only one or the other variable is controlled for (although the effect without dividends of a 3.39% increase is more than double the effect with dividends of 1.56%).

Column 3 includes both measures together and finds that the dividend-excluding measure has a positive and significant effect of 3.2%, while the dividend-including measure is an insignificant 0.7%. Columns 4, 5 and 6 add further controls for being at a gain or loss on the current position (both with and without dividends) as well as the Ben-David and Hirshleifer (2012) controls for performance of the current position. In all specifications, the point estimate on "Original Gain (Excluding Dividends) is between 0.024 and 0.034, meaning that investors display a strong rolled disposition effect across reinvested positions using prices to calculate combined value. However, the "Original Gain (Including Dividends)" coefficient is either zero or negative once the price-based measure is controlled for, implying that dividends are not being included in the calculation of combined gains and losses across positions.

2.4 Dividends and the Reaction to Price Changes

The above analysis suggests that trading based on past performance is typically examined based on price appreciation alone. This is true whether the aspect of performance considered is the gain or loss status, combined performance or relative performance in the portfolio. It is important to note that this does not mean that dividends do not have a role in trading decisions, but only that they do not get considered in the same category of performance as price changes. Dividend payment may still be considered valuable if investors view dividend-paying assets as a perpetual stream of payments. Indeed, the premise of the prior argument is that investors are not clearly appreciating how price changes and dividends are related to each other. If investors do not fully internalize the fact that more dividend payments mean larger price decreases, then dividend payment may make stock more desirable and less likely to be sold.

We test this possibility in Table 5. As before, the dependent variable is a dummy variable for whether a given stock got sold, taking observations over days when at least one stock was sold in the investor's portfolio. The main independent variables are "Any Dividend," a dummy for whether the stock paid any dividends while the investor has been holding it, and "Dividend Yield," the total amount of dividends paid over period the investor has held it, divided by the previous day's price. Additional controls include account fixed effects and the returns controls from Ben-David and Hirshleifer (2012). In Panel A, regardless of the specification, dividend-paying stocks are significantly less likely to be sold, with the effect being 4.8% without controls in Column 1 and 2.0% after account fixed effects are added in column 4 (with both being highly statistically significant). In addition, stocks that paid a higher dividend yield are generally also less likely to be sold, over and above the effect of the "Any Dividend" dummy. We see a robust pattern that individuals are significantly less likely to sell dividend-paying stocks in general, and dividend-paying stocks that have higher dividend yields specifically. This result holds even relative to the investor's own average turnover level among all stocks in his portfolio. This is consistent with individuals viewing dividend streams as a source of income that represents a distinct and independent aspect of performance

from from price appreciation.

If investors are more likely to evaluate the performance of dividend-paying stocks based on their dividend yield, then this may imply a lower sensitivity to the price change component. In Table 5 Panel B, we examine this in terms of the overall propensity to sell gains (measured using price changes). The dependent variable is again a Sell dummy, while the independent variables are a Gain dummy, an Any Dividend dummy, and the interaction between the two. The main variable of interest is the Gain*Any Dividend interaction. This is large and significantly negative. In column 2, the base Gain coefficient of 0.109 means that non-dividend-paying stocks have a disposition effect of 10.9%. Meanwhile, the Gain*AnyDividend coefficient is -0.0694, with a t-statistic of -17.83. This means that dividend-paying stocks have a disposition effect of 0.109 - 0.0694 = 3.96%, a large reduction. Adding in account fixed effects and the BDH controls reduces the Gain*AnyDividend coefficient to -0.0421, but the effect is still large and highly statistically significant - when evaluating dividend-paying stocks, investors pay less attention to whether the stock is at a gain or a loss using price change measures.[5]

We can also examine the relationship between dividends and the response of selling to price changes non-parametrically over the whole range of capital gains. In particular, we examine the impact of dividends on the V-shaped propensity to sell in Ben-David and Hirshleifer (2012) (which up to this point we have been mostly considering as a control variable). Those authors argue that the propensity of investors to sell at each level of gains and losses follows a V-shape, with both large gains and large losses more likely to be sold. If the focus on dividends implies a relative underweighting of price changes, then we would expect the V-shape to be muted in both directions for dividend-paying stocks. In other words, an investor should be less likely to sell a position with a large capital gain and a position with a large capital loss if those positions pay dividends.

Figure 1 shows a local linear plot for selling propensities based on being at a gain or loss (measured using capital gains), split according to whether or not the position paid a dividend.

[5]One potential concern with the individual investor analysis up to this point is a tax-related explanation. In untabulated results we have replicated all of the tables using individual investor data for the subsample of tax exempt accounts and find materially similar results.

The two noteworthy aspects of this graph are that dividend-paying positions are less likely to be sold and that the slope of the line is lower in both the positive and negative domain for dividend-paying positions. This is consistent with investors being less likely to evaluate performance based on price appreciation for dividend-paying positions. In other words, not only do investors fail to add dividends to capital gains when evaluating stock performance, but dividends actually appear to result in less attention being paid to capital gains.

3 Dividends as an Income Stream

The results above are consistent with investors viewing price changes and dividends in separate mental accounts. If investors are paying more attention to the dividend mental account, they will not fully realize that dividends come at the expense of the price level. If so, they may suffer from the free dividends fallacy and view a dividend as an income stream independent of the price level of a stock. Similarly, if investors are largely focused on the price-based mental account they will focus on price appreciation with relatively less focus on the dividend income being received. If many investors shift their attention from one mental account to another over similar periods of time in this manner this could impact how dividend-paying stocks are valued by the market.

We examine two different variables to proxy for the relative demand for dividend-paying stocks. Hartzmark and Solomon (2013) show that price pressure from investors leads to predictable returns after a dividend is announced and before the ex-day. We call the cumulative characteristic adjusted returns over this period the interim period return. In this period there is no information about the dividend (as the announcement has already been made), no uncertainty about the payment (since paying the dividend is now a legal obligation for the firm), and no dividend-specific tax consequences (since an investor who sells before the ex-day never receives the dividend, making the tax consequences over this period equivalent to holding any non-dividend-paying stock for the same length of time). As a result, the average positive abnormal returns over this period are most consistent with naive price pressure from investors wanting to receive the dividend.

The other proxy we use to examine investor demand is the time variation in the book-to-market of stocks based on their dividend yield (similar to Baker and Wurgler (2004a,b)). Baker and Wurgler (2004a) demonstrate that firms are more likely to issue dividends when the book-to-market ratio of dividend paying stocks is higher. Our paper focuses on the demand side of this equation, why investors have time-varying demand for dividends, while Baker and Wurgler (2004a) focus on the supply. If our interim return measure is capturing investor demand for dividends it should also help to explain when firms decide to issue dividends. If more investors want to receive a dividend-paying stock this interim period return will be larger.

As validation that the interim return measure is also capturing dividend demand, we examine the propensity of firms to initiate dividends based on recent interim returns. In Table 6 we regress a dummy variable equal to one if a firm issues a dividend in a given year, limiting the sample to firms that did not issue a dividend the previous year. In column 1 we regress this dummy variable on the interim return variable and find a positive and highly significant coefficient. This suggests that the interim period return is capturing dividend demand and firms are responding to it. In column 2 we examine the average book-to-market ratio of dividend paying firms divided by that of non-dividend paying firms as of December in the previous year.[6] The negative and significant coefficient replicates the finding of Baker and Wurgler (2004a) that firms are more likely to issue dividends when dividend paying firms appear more over-priced. Finally in Column 3 we include both variables and find strong relationships between both proxies for dividend demand and subsequent dividend initiations. This suggests that both variables are meaningful in capturing dividend demand, so we examine both in subsequent analysis.

We begin this analysis of the determinants of the overall demand for dividends by examining the time-series behavior of the interim period returns with a focus on two notable periods. Figure 2 graphs the interim period returns over time using a local linear plot. The first notable aspect of this plot is the finding of Hartzmark and Solomon (2013) that these returns are generally quite positive. The one major exception to this occurs in the green shaded area. This area is from January 1995

[6]Other versions of the book-to-market ratio gap, such as the difference between dividend-paying and non-dividend-paying firms or the log of the ratio, produce substantially similar results.

through the end of April 2000, which coincides with the tech boom. Anecdotally, during this period investors were highly focused on price appreciation rather than dividends. This is the one period where these interim returns were systematically negative. The blue shaded period represents the recent period with extremely low interest rates. The shaded area represents the period from January 2009 through the end of our sample in June 2016 when the federal funds rate was below 0.50. As the quote at the beginning of the paper suggest, investors suffering from the free dividend fallacy will desire dividend-paying stocks when interest rates are so low. As a further example, dividend-paying products were so popular over this period that some of the larger dividend-focused funds closed themselves to new investors.[7] This period has been notable in the large positive interim returns, consistent with investors focusing on dividends.

We test this intuition more formally in Table 7 examining how the demand for dividends varies with the interest rate and recent market performance. If investors are suffering from the free dividends fallacy they value a dividend stream as payouts, similar to that of a bond. Thus the interest rate represents perhaps the best substitute to such an investor. When the interest rate is high, such an investor will be happy investing in bonds, while when the interest rate is low an investor may be more prone to hold a dividend-paying stock for its stream of dividend payments. This idea is related to the finding in Baker and Wurgler (2012) that certain stocks have bond-like characteristics which cause them to covary with bond market factors. Second, when recent market performance has been high, investors may focus more on the price appreciation mental account as this appears relatively more attractive. Similarly, in periods of low or negative recent price changes, investors may turn to the perceived stability and relatively higher income stream offered by dividend-paying stocks. Thus we predict that dividend demand should be negatively correlated with both the interest rate and recent market performance.

In Panel A we regress the interim return around the dividend ex-date on our measures of dividend demand as well as controlling for the level of the dividend yield and the number of days in

[7] "Famously low bond yields have encouraged a stampede into stock funds that invest in dividend-rich companies. Vanguard Group closed its $31 billion Vanguard Dividend Growth Fund (VDIGX) to new assets after the fund doubled in size over three years." -John Coumarianos, The Wall Street Journal September 5, 2016

the interim period, which control for other sources of price pressure. Regressing the interim return on the interest rate we find a coefficient of -4.088 with a t-statistic of -3.40. A one standard deviation decrease in the daily interest rate leads to an interim period return 5 basis points higher (relative to a mean interim return of 16 basis points). Regressing the interim return on the market return over the prior month we find a coefficient of -0.0196 with a t-statistic of -5.92. A one standard deviation decrease in the market return leads to an increase in the interim return of roughly 8 basis points. In column 3 we include both measures and find similar coefficients, suggesting that these two sources represent distinct motivations for attention being placed on the dividend or price change mental account.

In Panel B we examine how the book-to-market ratio varies with the interest rate and market returns, according to whether or not the stock paid dividends. We examine a monthly panel of all stocks for the analysis where the dependent variable is a given stock's book-to-market ratio. We regress this variable on our two variables that proxy for shifts in dividend demand (the risk free rate, and the past year's market returns), a dummy variable equal to one if the stock paid a dividend over the previous year and an interaction of the two.

The coefficient of interest is the interaction as this represents the distinct reaction of dividend-paying stocks to the driver of dividend demand, relative to the variable's effects on non-dividend-paying stocks. Intuitively, this is the panel analogue of Baker and Wurgler (2004b) who examine the average book-to-market ratio of dividend-paying stocks relative to the average of non-dividend-paying stocks. In Column 1 we utilize the interest rate as our proxy of dividend demand and find a positive and significant coefficient on the interaction term. This is consistent with times of low interest rates being times of high dividend demand, leading to a more over-priced stock (as measured by book-to-market ratio). In Column 2 we examine the market return over the prior year and again find a positive and significant coefficient. This is consistent with times of high price appreciation being times with lower demand for dividends and thus dividend-paying stocks having relatively lower valuations compared with stocks.

Next we turn to the price impact of two other aspects of dividends - dividend increases and

dividend reliability. To the extent that investors are likely to prefer stable dividend payment (making the stock seem more like a substitute for bonds), demand should be higher when the company has kept its dividends at a level at least equal to past payments. Secondly, because dividends have the potential to increase with earnings (unlike fixed bond payments), demand may also increase when dividends have increased by larger amounts.

In Table 8 we examine how the interim period return varies with both of these characteristics. For change in dividend amount we examine the difference in dividend payment from the current quarter minus the previous quarter. In column 1 the interim period return is regressed on the "Dividend Change Amount" variable along with the dividend yield and days in interim period. The coefficient is a highly significant 0.0313. This indicates that for every penny of additional dividend the interim period return increases by 3 basis points. One may worry that this is simply capturing some sort of time-varying level of the interim return, so in Column 2 we add a year by quarter fixed effect. The coefficient is materially similar, suggesting the regression is not capturing time-variation in the interim return, but rather the impact of the change in dividends. To examine stability we examine a dummy variable "No Div. Cut in Prior Year" which is equal to one if in the current quarter and the three quarters prior the dividend paid was greater than or equal to that of the previous quarter. Column 3 adds this variable to the regression and Column 4 adds year by quarter fixed effects. The columns suggest that consistently paying at least the same dividend amount over the prior year increases the interim period return by 12-13 basis points. In Columns 5 and 6 we include both variables and again find similar results. This suggests that these characteristics are not proxying for each other and each independently impact the interim returns.

The free dividend fallacy has a number of costs. The most direct cost is the tax effect of receiving dividends versus selling the equivalent number of shares. For taxable investors, dividends will generally generate tax consequences, whereas selling shares only results in capital gains tax if the position was sold at a gain, and this was not offset by selling capital losses over the tax year. As a result, dividends are likely to be worse on average for tax purposes. If an investor has a need for a certain amount of money, receiving it in the form of a dividend lets them benefit by avoiding

trading costs associated with selling shares. Alternatively, if an investor would have kept the value of a dividend in their portfolio without the dividend, but do not reinvest it when they receive the dividend, they lose out on the future expected returns.

While these are the direct costs, the previous analysis suggests an indirect cost that may be considerable. Our previous analysis shows that the demand for dividends by investors is not randomly distributed, but rather that investors systematically demand dividends at the same time. To the extent that book-to-market ratio of dividend-paying stocks decreases in times of high dividend demand, and this book-to-market ratio can be interpreted as a stock being relatively over- or under-priced, the analysis suggests that in periods of high dividend demand, dividend stocks are likely to pay lower returns in the future. To understand the magnitude of this cost we conduct a simple, back-of-the-envelope calculation. Our predictor of future mispricing is the average book-to-market ratio of dividend-paying firms in a given month, divided by the average of non-dividend-paying firms. Our measure of future returns is the average cumulative return over the next 12 months of dividend-paying firms minus the same average for non-dividend-paying firms. We regress this return gap on the difference in book-to-market ratios between dividend-paying and non-dividend-paying firms. We find a coefficient of 0.225 with a t-statistic of 2.16 (with Newey West standard errors with a 12 month lag). The interpretation is that the difference in book-to-market ratio of dividend-paying stocks to non-dividend-paying stocks predicts the future return gap between these two types of firms. In other words, when dividend-paying firms are relatively highly valued compared to other firms, they also have relatively lower future returns.

Because dividend demand drives up these valuations of dividend-paying firms, investors who buy such firms due to a demand for dividends may receive on average lower future returns. During the recent period of low interest rates this ratio of book-to-market has dropped by slightly more than 0.1 and as the tech boom ended this ratio decreased by more than 0.2. A decrease of 0.1 is associated with expected returns on 2.3% lower over the next twelve months and 0.2 is associated with returns about 4.6% lower. The exact impact on an individual's expected returns on their portfolio will depend on how actively they shift from dividend to non-dividend-paying stocks over time, but the

simple back of the envelope calculation suggests that the costs of buying dividend-paying stocks when dividend demand is especially high could lead to lower expected returns of roughly 2-4% over the next year, a substantial fraction of the equity premium itself.

We show evidence of predictable returns related to demand for dividends, which raises the question as to why arbitrageurs do not correct such mispricing. While we do not directly test for these reasons, there are a number of factors making trading against these investors risky. Trading against this pattern requires shorting dividend-paying stocks. Perhaps the largest risk here is simply time to convergence. If it is unknown how long a period of strong dividend demand will last, it may no longer be profitable to hold a short position for a long duration. In addition, holders of a short position are responsible for the cost of paying a dividend. Finally, there is the question of why firms do not change the supply of dividends to accommodate the increased demand. Baker and Wurgler (2004a) demonstrate that firms are more likely to issue dividends as they become more relatively over-priced (as measured by their book-to-market ratio). Changing dividend policy is a long-term strategy that is not easily reversed, so firms will be hesitant to change dividend policy purely based on relatively short term fluctuations in dividend demand.

4 Reinvestment of Dividends by Institutions and Mutual Funds

4.1 Frequency of Dividend Reinvestment

Another way to study how investors think of dividends is to examine what they do with such dividends once they have received them. A key part of the dividend irrelevance theorem of Miller and Modigliani (1961) is the idea of dividend reinvestment - an investor who receives a dividend from a share and would prefer to maintain the size of his existing portfolio weight can simply reinvest the dividend. In the case of individual investors, Baker et al. (2007) show that individual investors rarely reinvest dividends, and appear to consume out of dividend income. This is typically ascribed to theories of dividend clienteles, such as Graham and Kumar (2006). In this view, some investors have reasons such as trading or time costs to not want to regularly sell small amounts of

stock, and use dividends as a way to generate a stream of cash flows for consumption at a lower cost. This seems likely to be part of the explanation, especially for individual investors. However, a lack of dividend reinvestment may occur for psychological reasons, if investors treating the dividend payments as a separate mental account to be used elsewhere. This is an idea consistent with the mental accounting literature - that when investors view money as being in separate accounts, they are likely to spend the money from each account in different ways (such as in the house money phenomenon of Thaler and Johnson (1990)). Reinvesting dividends outside of the stocks that paid them would be consistent with the general disconnect between dividends and price changes that we show in evaluating performance.

To test this possibility, we examine the dividend reinvestment policies of investors for whom individual consumption motives seem less likely, namely mutual funds and institutions. In the case of mutual funds, there is no obvious consumption motive, as funds are legally required to distribute all dividends and capital gains they receive to the fund's investors by the end of the year (known as the "pass-through rule") in order to avoid paying taxes. However, the timing of the fund's dividends rarely affects the immediate short-term decision to reinvest, as many funds pay out their received dividends in a single amount, often towards the end of the year. As a result, any dividends received during the year are simply part of the fund value until the fund makes its own dividend payment, and hence they can either be reinvested or left in cash. The fund's choice of whether to reinvest dividends or not is thus more linked to investment policies, rather than consumption. Institutional investors will have different tax arrangements, but many of them also lack an equivalent of a consumption motive. Some, such as charities, may be constrained by the terms of their charters to not spend the principal in their endowment, but many institutional investors are large financial firms who (like mutual funds) similarly lack consumption needs.

To test the level of dividend reinvestment, we examine the changes in quarterly holdings for mutual funds and institutions. There are several possible benchmarks by which to evaluate how much funds reinvest dividends. Given tradings costs and frictions, investors may not always reinvest exactly the amount of the dividend, or may wait some days (at which point the price of the share,

and the amount of shares that the dividend can purchase, may have changed). However, one easy comparison is the frequency with which an investor holds exactly the same number of shares from one quarter to the next. Funds that hold exactly the same number of shares, when the stock in question has paid dividends, are either holding the payment as cash or reinvesting it elsewhere. If dividend reinvestment is reasonably common, then dividend-paying holdings should be less likely to have exactly the same number of shares held from one quarter to the next, relative to non-dividend-paying holdings.

We examine this question in Figure 3. This show the changes in shares from last quarter (the prior report) for positions that received dividends over that time period (the left figure) and positions that did not (the right figure), done both for mutual funds (Panel A) and institutions (Panel B). The green and red bars represent the fraction of positions with exactly zero change in shares, and each blue bar represents the fraction of positions with the indicated number of shares, binned in 50 share change increments.

Several aspects of this picture are noteworthy. First, both mutual funds and institutions are much more likely to hold exactly the same number of shares next quarter in a dividend-paying stock than they are to hold a small amount of shares more (as under reinvestment). Zero reinvestment is a very common outcome for both types of investors, as shown by the left figure in both panels. Second, a comparison of the left and right figures in each panel indicates that the likelihood of holding exactly the same number of shares next quarter is very similar regardless of whether the stock paid a dividend that quarter. For mutual funds, the fraction of dividend-paying holdings where the fund holds exactly the same number of shares next quarter is 31.7%, compared to non-dividend-paying holdings where the fraction is 32.2%, with the difference being insignificant. For institutions, the exact number of shares fraction is 18.2% for dividend-paying holdings, versus 19.0% for non-dividend-paying holdings. The presence of a dividend does not make a large difference in the likelihood that a fund changes the number of shares it holds, consistent with dividend reinvestment being rare.

Another plausible baseline against which to test dividend reinvestment is how often investors'

holdings change by the amount corresponding to full dividend reinvestment. We test this hypothesis in Figure 4. To avoid any issues related to round lots or trading costs of small amounts we limit the sample to dividends where reinvestment involves at least 100 shares. Further we examine only positions where there was a change in shares between reports (thus excluding the large zero investment bars in Figure 3.). If investors are reinvesting dividends, then if they do change the amount of shares they hold, their position should be more likely to increase by the amount of shares corresponding to dividend reinvestment, rather than some other number of shares. To test this, we plot the difference between the actual change in shares for the investor, and the change in shares that would occur if they reinvested all of their dividends back into the stock at the price available on the payment date. A fund that engages in full reinvestment should have a difference of zero. Examining the figure, we see that exact reinvestment (within 100 shares of the number implied by full reinvestment) occurs at a very similar rate to other nearby amounts of share changes. The number of trades motivated by exact reinvestment does not seem large compared to the number of trades of other sizes. Another way of putting this is that if the fund *does* change their holdings in a dividend-paying asset, they are not particularly likely to change them by an amount corresponding to dividend reinvestment.

It is possible that these actions represent a deliberate choice by funds to change their portfolio weights for reasons other than dividend payment. However, the high prevalence of zero share would imply that, under this alternative interpretation, many investors have an explicit desire to reduce their portfolio weight by exactly the amount of the dividend payment, on exactly the dividend payment date. This seems somewhat implausible.

Table 9 uses regression analysis to examine similar questions about dividend reinvestment rates. Panel A examines mutual fund holdings, while Panel B examines institutional holdings. In columns 1 and 2, we examine the likelihood of an investor (mutual fund or institution) holding the exact same number of shares in the subsequent quarter, as a function of whether the holding paid dividends or not. The dependent variable is *Same*, a dummy variable that equals one if the number of shares in the following quarter is exactly the same as the number in the current quarter. The main

independent variable is *Dividend Paying Holding,* a dummy variable that equals one if the stock paid a dividend between the current quarter and the following quarter.

In Panel A (the mutual fund sample), the coefficient on *Dividend Paying Holding* is -0.00534, and statistically insignificant. In other words, the presence of a dividend does not change the likelihood that a fund alters their holdings in a stock. When fund fixed effects are added in column 2, the coefficient increases to 0.00689, with a t-statistic of 2.32 (when clustered by fund and quarter). In other words, after controlling for the overall rate of the fund changing its holdings, dividend-paying holdings are actually *more* likely to have exactly the same number of shares, inconsistent with widespread dividend reinvestment.

In column 3 and 4, we examine the likelihood of the fund increasing its position as a function of whether the share paid dividends. The dependent variable is now a dummy variable that equals one if the fund increased its holdings from one quarter to the next (regardless of how much the holding went up). The univariate coefficient on *Dividend Paying Holding* is 0.0205, which decreases to 0.0138 with the addition of fund fixed effects (with t-statistics of 6.33 and 6.10 respectively). This indicates that funds are significantly more likely to increase their holdings of dividend-paying stocks relative to other stocks. However, the magnitude of this increase is still relatively small - the intercept of 0.307 means that funds have a 30.7% chance of increasing their holdings of a non-dividend-paying stock, versus a 32.8% (0.307 + 0.0205 = 0.3275) of increasing their holdings of a dividend-paying stock.

Finally, in column 5 we examine the likelihood of exact dividend reinvestment. We limit the sample to dividend-paying holdings where the amount of the dividend would have allowed the fund to purchase at least 100 shares at the closing price on the payment date (to ensure that lack of reinvestment is not driven by odd-lot issues or transaction costs making reinvestment prohibitive). We compute the proportion of holdings corresponding to exact-reinvestment - cases where there is an increase in holdings and the number of shares purchased is within 100 shares of the exact reinvestment amount. This proportion is 0.00661, meaning that mutual funds exactly reinvest dividends in only 0.661% of instances for dividend-paying holdings.

In Panel B, we examine the same questions for institutions, and find that they are somewhat more likely than mutual funds to reinvest their dividends, but that dividend reinvestment is still relatively uncommon. In columns 1 and 2, the likelihood of holding exactly the same number of shares is somewhat lower for dividend-paying holdings. The univariate coefficient on *Dividend Paying Holding* is -0.00781 (with a t-statistic of -2.76), which increases with the addition of investor fixed effects to -0.0235, with a t-statistic of -12.01. Given the constant of 0.190, this means that institutions have 19.0% chance of holding the same number of shares for dividend-paying stocks, and a (univariate) 18.2% chance of the exact same holdings for dividend-paying stocks. In columns 3 and 4, the likelihood of increasing the number of shares held for dividend-paying stocks is similar to the mutual fund case - a univariate coefficient on *Dividend Paying Holding* of 0.0222, increasing to 0.0330 with investor fixed effects (both highly significant), relative to a univariate constant of 0.338. Finally, the probability of exact dividend-reinvestment for institutions is 1.17%.

Taken together, these results indicate that dividend reinvestment is relatively uncommon among both mutual funds and institutions. To put these numbers in some overall perspective, suppose that an investor is going to effectively leave their holding essentially unchanged over a quarter, either by just reinvesting the dividend on the payment date or by leaving their holding unchanged and doing something else with the dividend. By comparing the "reinvestment within 100 shares" rate (0.00661) to the exact same number of shares fraction (from column 1, 0.322-0.00534= 0.3166), a mutual fund is 47.9 times more likely to leave their holdings unchanged than they are to just reinvest the dividend. For institutions, the corresponding rates are 0.0117 for reinvestment within 100 shares versus 0.1822 for the exact same number of shares. Thus an institution is 15.6 times more likely to leave their holdings unchanged than they are to just reinvest the dividend.

4.2 Market Impact of Dividend Reinvestment

As noted in section 4.1, mutual funds and institutional investors rarely reinvest dividends into the stocks from which they came. If this is the case, when these investors receive dividend payments they must either increase their cash balances or reinvest them elsewhere. Importantly, because dividend

payment occurs at the same time for all holders of a given stock, this may cause predictable price pressure. If most dividend reinvestment is occurring outside the stocks that paid dividends, then we predict that it is in these non-paying stocks where price pressure should be concentrated. Recall that dividend payment dates and amounts are known in advance, so any price pressure is predictable and tradable.

To test this, we first examine how daily market returns are related to the amount of dividends paid out that day. As an independent variable, we calculate a daily dividend payout yield, as the total dollar value of dividends that had a payment date that day, divided by the sum of market capitalizations on the previous day. We then test whether this explains variation in CRSP market returns, either value-weighted (Panel A) or equal-weighted (Panel B).

We present these results in Table 10. In columns 1 and 2, the dependent variable is the market returns, and higher daily dividend payouts positively predict daily market returns. The coefficient on daily dividend yield is 64.92, with a t-statistic of 2.90. In column 2, we add year by month fixed effects, to ensure that we are not picking up something about the overall economic conditions when dividends are higher, and the effect becomes slightly stronger. In terms of magnitude, a one standard deviation increase in dividend payment (0.0003084) is associated with higher market returns by 2.0 basis points (.0003084 * 64.92 = 0.020). This compares with a mean daily market return of 4 basis points, so the effect is economically large.

In columns 3-6, we test whether, within the market portfolio, these price increases are concentrated among firms that actually paid a dividend that day, or those that did not. We split the overall market return into dividend payers (columns 3 and 4) and non-payers (columns 5 and 6), and repeat the same analysis.

For the firms that actually paid a dividend that day, column 3 shows a smaller coefficient of 39.62 and a statistically insignificant effect, while adding fixed effects results in a marginally significant (t-statistic of 1.72) coefficient of 61.64. This result is at first somewhat puzzling given the results in Berkman and Koch (2016) that there are positive returns for stocks on their dividend pay dates. However, Berkman and Koch (2016) note that these returns are concentrated in firms that have

dividend reinvestment plans, for which there is likely to be more reinvestment in the same stocks. Notably, they also describe how most company-sponsored dividend reinvestment plans have caps on the amount that can be reinvested, meaning that the plans are more likely to apply to retail investors and end up excluding many, if not most, mutual funds and institutions.

By contrast, when we examine the effect of dividend payment solely on the returns of firms that didn't pay a dividend, in columns 5 and 6, the results are similar to the overall effect on market returns, but larger in both magnitude and significance. The univariate coefficient is 73.59 (with a t-statistic of 3.28), increasing to 78.53 (with a t-statistic of 3.38) once year by month fixed effects are added. The larger effects for non-dividend-payers are what would be expected given the dividend-payer results, as that the two subgroups must add up to the total market.

In Panel B, the results are similar and somewhat larger for equal-weighted portfolios of returns. This is consistent with the finding in Hartzmark and Solomon (2013) that price-pressure effects are larger for smaller market capitalization companies which may have less liquidity. The results in Table 10 further confirm that the way investors account for dividends has effects on market prices. Mutual funds and institutions, who make up large fractions of total ownership, tend to reinvest dividends when they are received, but do so mostly outside of the stock that paid the dividends. This creates predictable price pressure when dividend payments are larger, but mostly among stocks without a payment.

5 Conclusion

The idea of returns is an economically sensible one - by combining the capital gains yield and dividend yield on a stock into a single returns variable, an investor can measure the total profit he receives on a position. Nonetheless, the wedge between normative theories of how to account for investment profits (which provide sound measures of overall economic performance for an investor), and positive theories of mental accounting (which describe how investors actually think of their positions) may be considerable. In this paper, we document that investors behave as if they track

capital gains and dividends as separate and largely independent variables. Their behavior does not suggest that these two components are conceived of as part of a single combined returns variable, and this disconnect has important marketwide consequences.

This disconnect between dividends and price changes shows up in a number of ways. When considering whether to sell assets, the performance of stocks is mostly considered in terms of price changes, not returns. Dividend-paying stocks are sold less frequently, and this selling depends less on price changes. Demand for dividend-paying assets increases when interest rates are low, and when recent market returns are low, suggesting that investors value these stocks as an income stream, and compare them to income streams on bonds and the potential for price increases. When even sophisticated investors receive a dividend, they rarely reinvest it back into the asset from which it came. Rather, they reinvest it in other stocks, leading to predictable price pressure from aggregate dividend payments.

Absent considerations of taxes and transaction costs, dividends are merely another source of profit along with capital gains, and one which will mechanically reduce the price of the stock. However, popular discourse often discusses them as if they are a cost-free stream of income, largely independent of capital gains. Many investors and commentators, if pushed, will readily admit than any given dividend will result in a price drop. However, they will then make puzzling statements such as claiming that the reliability of dividend payments provides a good hedge against the possibility of uncertain fluctuations in prices, or that a high dividend yield is valuable when bond yields are low. A better understanding of the relationship between dividends and price changes would help investors appropriately characterize their profits on each position. How best to teach investors about the proper role of dividends in finance remains an open and interesting question.

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Figure 1

V-Shape in Selling Propensity Based on Dividend Payment

This graph shows a local linear plot of the propensity to sell positions based on their percentage price change. Four groups are estimated separately, being at a loss with no dividend income, being at a gain with no dividend income, being at a loss and receiving dividend income, and being at a gain and receiving dividend income (with gains and losses being calculated based on price changes only).

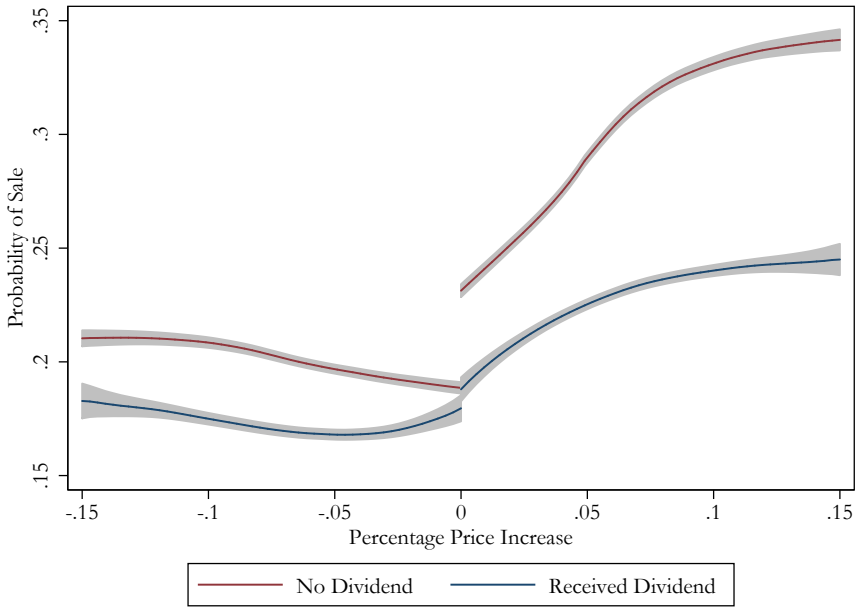


Figure 2

V-Shape in Selling Propensity Based on Dividend Payment

This graph shows a local linear plot of the interim period return (the return after a dividend announcement and before the ex-date) over time. The green shaded area coincides roughly with the tech boom from January 1995 through April 2000. The blue shaded area represents low interest rates begining in from January 2009 through June 2016 where the federal funds rate was below 0.50.

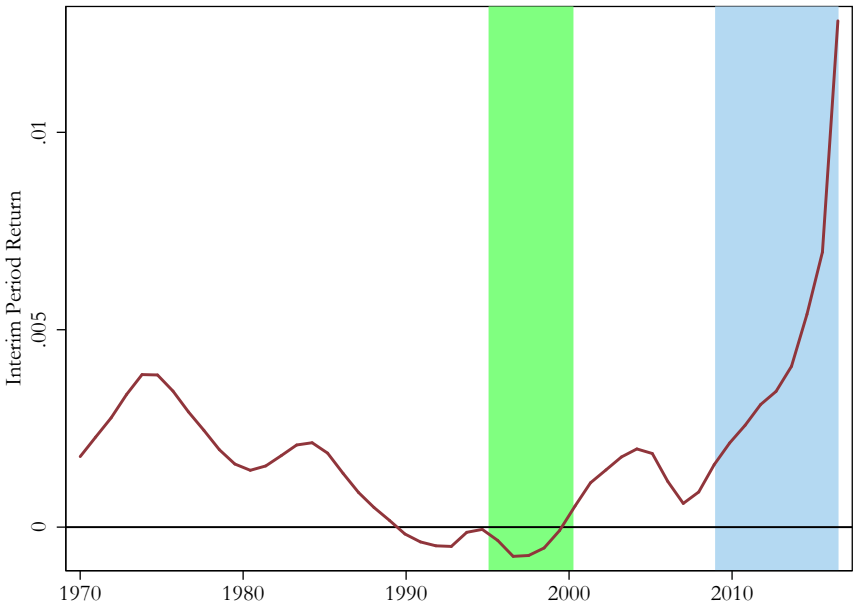
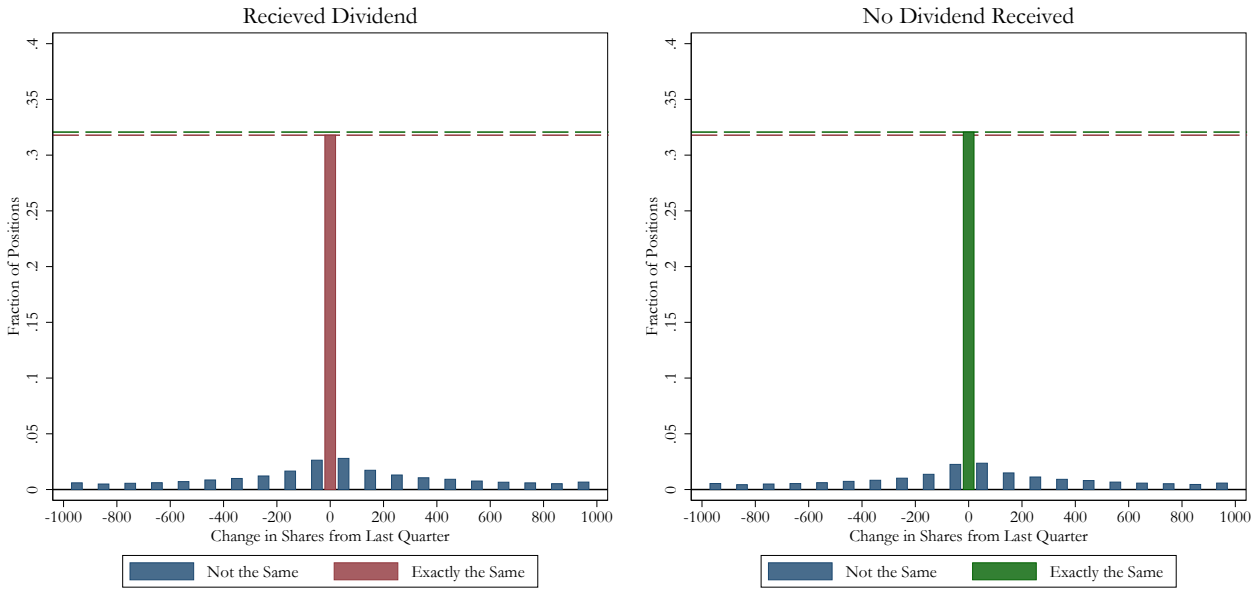


Figure 3

Changes in Holdings for Dividend-Paying and Non-Dividend-Paying Stocks

This graph shows the distribution of the change in number of shares of a given fund holding from quarter to quarter, for holdings that paid a dividend that quarter (left graph) and those that didn't (right graph). Panel A examines holdings changes for mutual funds, and Panel B examines holdings changes for institutions. The maroon and green bars represents the number of holdings with the exact same number of positions from quarter to quarter. The blue bars represent changes in number of position in 100s. Bars are centered at x and to the right of the maroon bar contain changes from $(x-50,\, x+50]$ and to the left $[x-50,\, x+50)$. For mutual funds, only funds with a difference of report days between 60 and 100 calendar days are included.

Panel A: Mutual Funds



Panel B: Institutional Investors

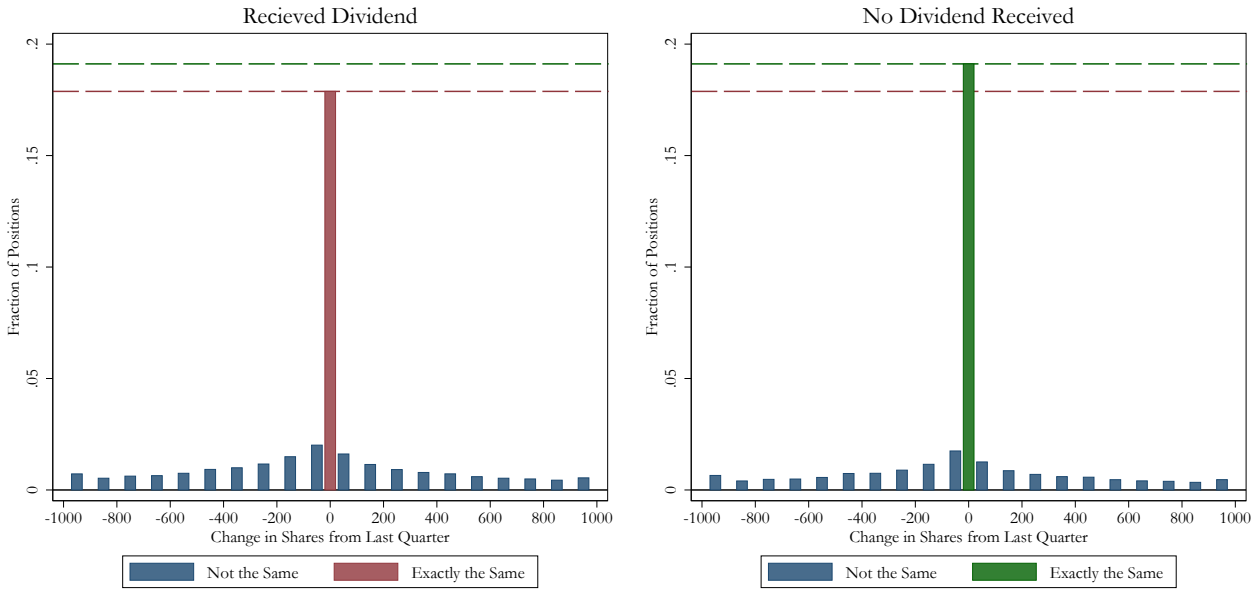
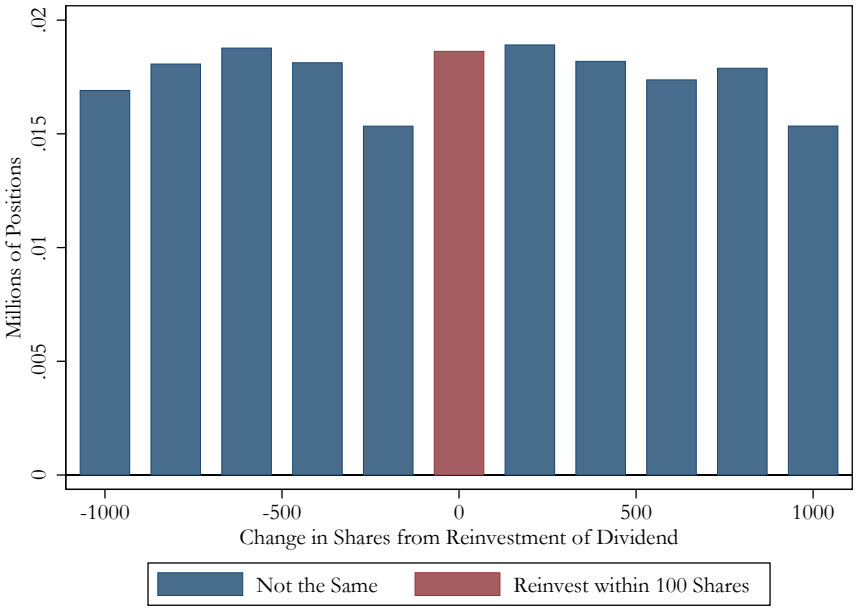


Figure 4

Difference Between Actual Change in Mutual Fund and Institutional Holdings and Amount Corresponding to Full Reinvestment of Dividends

This graph examines the amount by which changes in mutual fund and institutional holdings differ from the amount corresponding to dividend reinvestment, given that the investor made some change in holdings. For holdings that paid a dividend during the quarter, we compute the actual change in holdings minus the change in holdings that would occur if the dividend were immediately reinvested into the stock on the payment day. As a result, a fund that exactly reinvests the dividend will show a difference of zero. The figure plots the distribution of this difference for all dividend-paying fund holdings where the amount to be reinvested was at least 100 shares. The maroon bar represents a difference between -99 and +100 (i.e. the fund invested within 100 shares of the amount of the dividend). The blue bars are difference amounts binned into units of 100 shares. We exclude observations where the fund made no change in shares. Only funds with a difference of report days between 60 and 100 calendar days are included. Panel A examines mutual funds while Panel B examines the holdings of institutional investors.

Panel A: Mutual Funds



Panel B: Institutional Investors

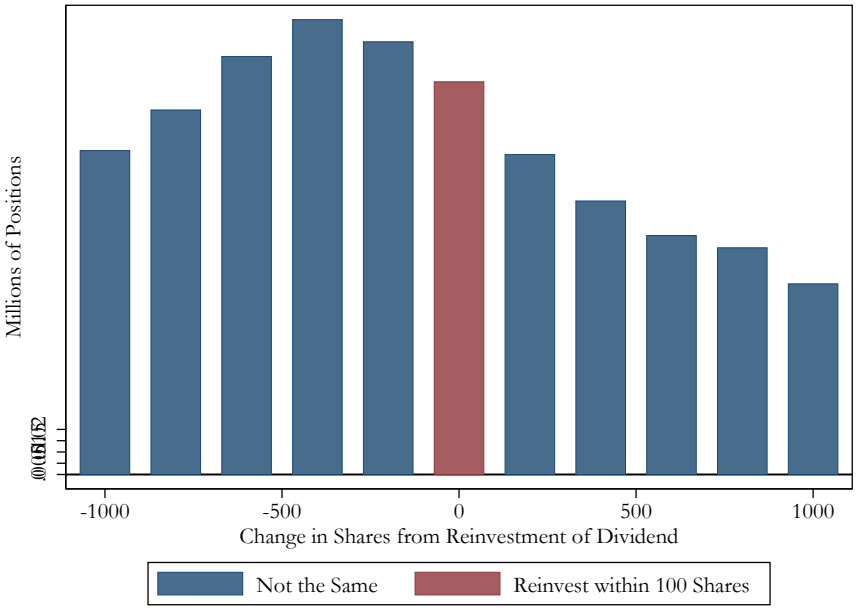


Table 1
Summary Statistics

Panel A explores the returns of stocks, their percentage price changes and their dividend yield at the daily, monthly and annual horizon. The first three rows show the mean value of each. The next three rows show correlations, and the final two row shows the total number of observations and the total number of observations with a positive dividend yield. Panel B shows summary statistics for the individual investor data which covers January 1991 to November 1996.

Panel A: Returns by Dividend Yield

	Daily	Monthly	Annual
Return	.0008	.0113	.1601
Percentage Price Change	.0007	.0094	.134
Dividend Yield	.0001	.0019	.0242
Corr(Ret, Div Yield)	.0061	.0171	-.0097
Corr(Ret, Div Yield|Div Yield>0)	.0925	.0664	-.0263
Corr(Price Change, Div Yield|Div Yield>0)	-.5039	-.1031	-.067
Total Observations	8.71e+07	3752363	287540
Observations with Div Yield>0	744409	658238	155561

Panel B: Individual Investor Summary Statistics

	Obs	Mean	SD	Min	25th Pctile	Median	75th Pctile	Max
Accounts	54,176							
Sell Days	313,625							
Observations	1,506,274							
Portfolio Size	313,625	4.803	7.577	1	2	3	6	358
Dividend Paying Obs.	696,138							
Unambiguous Gain	437,805							
Gain Only with Dividends	40,866							
Unambiguous Loss	217,467							

Table 2
Disposition Effect With and Without Dividends

This table explores the propensity of individual investors to sell positions when they are at a gain, measured using either price changes or returns. The dependent variable is "Sell," a dummy variable for whether a particular share was sold that day, given that some sale occurred. The two main independent variables are "Gain (Price Only)," a dummy variable that equals one for any share at a gain relative to purchase price, computed using only the capital gain and excluding dividends, and "Gain (Including Dividends," a dummy variable for any share at a gain relative to purchase price if dividends are included. "Any Dividend" is a dummy that equals one if the share has received any dividends since being purchased. 'BDH Controls' from Ben-David and Hirshleifer (2012) includes Gain, Gain*(% Price Change), Loss*(% Price Change), Gain*(% Price Change)*(√Holding Days), Loss*(% Price Change)*(√Holding Days), √Holding Days, Gain*Variance, and Loss*Variance where Gain and Loss are defined based on % price change. Data covers January 1991 to November 1996. Standard errors are clustered by account and date, and t-statistics are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Probability of Sale				
	(1)	(2)	(3)	(4)	(5)
Gain (Price Only)	0.0727***		0.0594***	0.0734***	0.0502***
	(14.80)		(12.11)	(14.38)	(15.71)
Gain (Including Dividends)		0.0662***	-0.0228***	0.00549	0.0160***
		(13.39)	(-5.76)	(1.41)	(6.06)
Any Dividend				-0.0570***	-0.0151***
				(-13.62)	(-10.37)
Constant	0.195***	0.197***	0.189***	0.218***	0.895***
	(36.85)	(37.15)	(28.66)	(42.78)	(267.51)
Account FE	No	No	No	No	Yes
BDH Controls	No	No	No	No	Yes
Portfolio Size FE	No	No	No	No	Yes
Only Dividend Obs	No	No	Yes	No	No
R^2	0.00715	0.00580	0.00241	0.0115	0.288
Observations	1506274	1506274	696138	1506274	1508776

Table 3
Rank Effect With and Without Dividends

This table explores how the the tendency of individual investors to sell stocks varies with the ranking of performance within the portfolio, measured using returns and price changes. The dependent variable is "Sell", a dummy variable for whether a particular share was sold that day, given that some sale occurred. "Best," "Worst," "2nd Best" and "2nd Worst" are dummy variables for the ranking of stocks within the investor's portfolio based on total performance. "(Including Dividends)" ranks based on returns including dividends, while "(Price Only)" ranks based only on the capital gain. An investor must hold at least 5 stocks on a sell day to beincluded in the anaylsis. BDH Controls are listed in Table 2, Port Size FE indicates a fixed effect based on the number of stocks in the portfolio and Account FE indicates a fixed effect for each account. Standard errors are clustered by account and date and t-statistics are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Probability of Sale			
	(1)	(2)	(3)	(4)
Best (Price Only)	0.153***	0.152***	0.140***	0.138***
	(27.13)	(26.45)	(25.68)	(24.59)
Best (Including Dividends)	-0.0113**	-0.0104*	0.00477	0.00766
	(-2.01)	(-1.81)	(0.90)	(1.40)
Worst (Price Only)	0.00842*	0.00940*	0.0289***	0.0306***
	(1.79)	(1.94)	(6.10)	(6.18)
Worst (Including Dividends)	-0.00362	-0.00491	-0.00222	-0.00459
	(-0.76)	(-1.00)	(-0.48)	(-0.96)
2nd Best (Price Only)	0.0403***	0.0398***	0.0317***	0.0306***
	(11.01)	(10.67)	(9.26)	(8.73)
2nd Best (Including Dividends)	-0.0133***	-0.0128***	-0.00629*	-0.00483
	(-3.73)	(-3.51)	(-1.85)	(-1.39)
2nd Worst (Price Only)	0.00345	0.00393	0.0154***	0.0164***
	(1.25)	(1.38)	(5.51)	(5.59)
2nd Worst (Including Dividends)	0.00298	0.00233	0.00409	0.00288
	(1.07)	(0.81)	(1.48)	(1.01)
Port Size FE	Yes	Yes	Yes	Yes
Account FE	No	Yes	No	Yes
BDH Controls	No	No	Yes	Yes
R^2	0.274	0.291	0.279	0.296
Observations	1508790	1508790	1508776	1508776

Table 4
Rolled Disposition Effect With and Without Dividends

This table examines the propensity of individual investors to sell positions purchased as part of a reinvestment episode, according to whether the combined position is at a gain or a loss (with or without dividends included). Stocks are included as observations if they were purchased on the same day that another stock was sold (a reinvestment day). For these stocks, we take all days on which some position was sold and use as a dependent variable "Sell," a dummy variable for whether the particular share was sold that day. The main independent variables are "Original Gain," either including or excluding dividends. These are dummy variables that equal one if the new asset (purchased on a reinvestment day) has a value that exceed the amount initially invested into the old asset (which got sold on the reinvestment day) - in other words, whether the combined reinvested position is at a gain or a loss. "Including Dividends" adds the dividends paid on both the old and the new stock to compute whether the combined position is at a gain or a loss. "Gain" (either with or without dividends) is a dummy variable that equals one if the new asset is at a gain just relative to its own purchase price, as a single stock investment. Standard errors are clustered by account and date and t-statistics are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Probability of Sale					
	(1)	(2)	(3)	(4)	(5)	(6)
Original Gain (Price Only)	0.0339***		0.0321***	0.0241***	0.0245***	0.0284***
	(5.21)		(4.81)	(3.70)	(3.77)	(4.75)
Original Gain (Including Dividends)		0.0156***	0.00713	-0.0217***	-0.0201***	-0.0100*
		(2.80)	(1.26)	(-3.65)	(-3.37)	(-1.65)
Gain (Price Only)				0.0610***	0.0999***	0.0586***
				(7.95)	(7.94)	(4.81)
Gain (Including Dividends)					-0.0414***	0.00977
					(-3.52)	(0.85)
Constant	0.208***	0.218***	0.204***	0.193***	0.194***	0.235***
	(31.01)	(34.65)	(29.27)	(27.82)	(27.63)	(24.50)
BDH Controls	No	No	No	No	No	Yes
R^2	0.00159	0.000334	0.00166	0.00553	0.00569	0.0213
Observations	94899	94899	94899	94899	94899	94224

Table 5
Individual Selling Based on Dividends Received

This table examines whether individual investors are more or less likely to sell stocks that pay dividends, and whether dividends are associated with less selling reaction to price changes. The dependent variable is "Sell," a dummy variable for whether a particular share was sold that day, given that some sale occurred. "Any Dividend" is a dummy variable if the stock paid any dividends up until the date in question. "Cumulative Dividend Yield" is the total amount of dividends received as a fraction of the current price. "Gain" is a dummy variable equal to one if the stock is at a gain using only price appreciation. BDH Controls are listed in Table 2. Data covers January 1991 to November 1996. Standard errors are clustered by account and date. t-statistics are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Selling Based on Dividends

	Probability of Sale					
	(1)	(2)	(3)	(4)	(5)	(6)
Any Dividend	-0.0488***	-0.0405***	-0.0252***	-0.0205***	-0.0160***	-0.0129***
	(-11.24)	(-9.10)	(-5.77)	(-13.69)	(-11.33)	(-8.95)
Cummulative Dividend Yield		-0.0116***	0.000811		-0.00759***	-0.00199***
		(-11.61)	(0.74)		(-11.38)	(-3.11)
Constant	0.260***	0.260***	0.232***	0.247***	0.247***	0.205***
	(44.29)	(44.29)	(42.22)	(310.81)	(308.16)	(77.67)
Account FE	No	No	No	Yes	Yes	Yes
BDH Controls	No	No	Yes	No	No	Yes
R^2	0.00327	0.00382	0.0190	0.231	0.231	0.241
Observations	1506274	1506274	1506274	1508790	1508790	1508776

Panel B: Disposition Effect Based on Dividends

	Probability of Sale					
	(1)	(2)	(3)	(4)	(5)	(6)
Gain	0.0727***	0.109***	0.112***	0.0722***	0.0962***	0.0916***
	(14.80)	(20.22)	(22.10)	(20.46)	(23.61)	(22.35)
Gain*Any Divided		-0.0693***	-0.0562***		-0.0506***	-0.0423***
		(-17.81)	(-13.83)		(-16.86)	(-13.79)
Any Dividend		-0.0162***	0.00698*		0.00311	0.0102***
		(-3.89)	(1.80)		(1.60)	(5.41)
Constant	0.195***	0.202***	0.213***	0.196***	0.195***	0.192***
	(36.85)	(40.11)	(39.32)	(93.59)	(89.12)	(71.37)
Account FE	No	No	No	Yes	Yes	Yes
BDH Controls	No	No	Yes	No	No	Yes
R^2	0.00715	0.0131	0.0200	0.237	0.238	0.241
Observations	1506274	1506274	1506274	1508790	1508790	1508776

Table 6
Dividend Initiation and Time-Varying Dividend Demand

This table examines dividend initiation on proxies of dividend demand. The sample has one observation per firm per year and is limited to firms that did not issue a firm in year $y-1$.The dependent variable is a variable equal to one if a firm decides to issue a dividend in year y. The right hand side variable is the average interim return for all dividend paying firms in year $y-1$ and the average book-to-market of dividend paying firms divided by non-dividend paying firms as of December in year $y-1$. Data covers 1964 to 2016. Standard errors are clustered by firm and year. t-statistics are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Interim Return	4.666***		4.503***
	(10.37)		(11.29)
Book-to-market (Div vs. No Div.)		-0.0455**	-0.0417**
		(-2.32)	(-2.34)
Constant	0.0284***	0.0809***	0.0713***
	(57.31)	(3.73)	(3.70)
R^2	0.00394	0.00275	0.00626
Observations	121024	121584	121024

Table 7
Market Impact of Time-Varying Dividend Demand

This table examines how various aspects of dividend paying stocks vary with the nominal risk-free interest rate and past market returns. Panel A presents regressions with the interim return, the characteristic adjusted cumulative return from after a dividend announcement to before the ex-date, as the dependent variable. It is regressed on the interest rate, the market return over the prior month (trading days t-20 to t-40), the stock's dividend yield over the previous year and the number of days between the ex-date and the announcement date. Each observation represents the interim return for an individual dividend payment for a given stock. In Panel B, monthly observations of the book-to-market ratio is regressed on the interest rate, the market return over the prior year (months m-1 to m-13), a dummy variable equal to one if the stock paid a dividend over the prior 12 months (Div. Payer). Data covers January 1964 to June 2016. Standard errors are clustered by firm and date. t-statistics are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Interim Returns Surrounding Dividends

	(1)	(2)	(3)
Interest Rate	-4.088***		-4.121***
	(-3.40)		(-3.44)
Market Return		-0.0196***	-0.0196***
		(-5.92)	(-5.93)
Dividend Yield	0.393***	0.369***	0.392***
	(15.76)	(15.83)	(15.76)
Days in Interim Period	-0.000140***	-0.000139***	-0.000140***
	(-8.74)	(-8.67)	(-8.76)
R^2	0.00207	0.00220	0.00226
Observations	283654	283654	283654

Panel B: Book-to-Market of Dividend vs. Non-Dividend Paying Firms

	(1)	(2)	(3)
Interest Rate x Div. Payer	26.37***		25.38***
	(8.72)		(8.08)
Market Return x Div. Payer		0.115***	0.0889**
		(2.61)	(2.15)
Interest Rate	18.74***		19.52***
	(4.93)		(4.85)
Market Return		-0.0110	-0.0587
		(-0.17)	(-0.86)
Div. Payer	-0.0511***	0.0600***	-0.0590***
	(-3.45)	(5.40)	(-3.95)
R^2	0.0194	0.00314	0.0195
Observations	2397595	2397595	2397595

Table 8
Market Impact of Dividend Stability and Increases

This table examines how the Interim Return (the characteristic adjusted cumulative return from after a dividend announcement to before the ex-date) varies with changes in the dividend paid and stability of the dividend paid. "Dividend Change Amount" is the difference in quarterly dividend from the current quarter minus the amount paid in the prior quarter. No Div. Cut in Prior Year is a dummy variable equal to one if in the current quarter and the three quarters preceding it the dividend change amount is zero or positive. Columns 2, 4 and 6 include a year by quarter fixed effect. Each observation represents an individual dividend payment for a given stock. Data covers January 1964 to June 2016. Standard errors are clustered by firm and date. t-statistics are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dividend Change Amount	0.0313***	0.0307***			0.0318***	0.0313***
	(9.18)	(9.07)			(9.43)	(9.31)
No Div. Cut in Prior Year			0.00126***	0.00116***	0.00139***	0.00130***
			(3.46)	(3.18)	(3.80)	(3.55)
Days in Interim Period	-0.000130***	-0.000131***	-0.000133***	-0.000133***	-0.000131***	-0.000131***
	(-6.86)	(-6.87)	(-6.98)	(-6.97)	(-6.87)	(-6.87)
Dividend Yield	0.0294	-0.0176	0.0231	-0.0284	0.0338	-0.0129
	(1.00)	(-0.54)	(0.78)	(-0.86)	(1.16)	(-0.39)
Quarter FE	No	Yes	No	Yes	No	Yes
R^2	0.000871	0.00601	0.000528	0.00569	0.000934	0.00607
Observations	283539	283539	283464	283464	283464	283464

Table 9
Dividend Reinvestment Among Mutual Funds and Institutions

This table examines the propensity of mutual funds (Panel A) and Institutional Investors (Panel B) to reinvest dividends. In the first two columns a dummy variable equal to one if there is no change in shares between the current and previous report is regressed on a dummy variable for whether the holding paid a dividend over that time period. In the third and fourth columns the left hand side variable is equal to one if there is an increase in shares. In column five the sample is limited to observations where reinvesting a dividend would require buying at least 100 shares and the constant displays the mean value of a dummy variable equal to one if the investor reinvests within 100 shares of what would be necessary for exact reinvestment. Columns 2 and 4 include fund fixed effects. Standard errors are clustered by fund and quarter, and t-statistics are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Mutual Funds

	Same Shares		Increase Shares		Change Shares
	(1)	(2)	(3)	(4)	(5)
Dividend Paying Holding	-0.00534	0.00689**	0.0205***	0.0138***	
	(-0.90)	(2.32)	(6.33)	(6.10)	
Constant	0.322***	0.317***	0.307***	0.310***	0.00661***
	(29.05)	(62.67)	(45.60)	(69.20)	(15.42)
Fund FE	No	Yes	No	Yes	No
R^2	0.0000324	0.235	0.000480	0.122	0
Observations	16737480	16737480	16737480	16737480	3482893

Panel B: Institutional Investors

	Same Shares		Increase Shares		Change Shares
	(1)	(2)	(3)	(4)	(5)
Dividend Paying Holding	-0.00781***	-0.0235***	0.0222***	0.0330***	
	(-2.76)	(-12.01)	(11.46)	(19.25)	
Constant	0.190***	0.198***	0.338***	0.332***	0.0117***
	(31.37)	(84.75)	(69.60)	(201.83)	(31.06)
Manager FE	No	Yes	No	Yes	No
R^2	0.000101	0.122	0.000542	0.0426	0
Observations	57040527	57040527	57040527	57040527	18255268

Table 10
Market Returns Based On Aggregate Dividend Payments

This table explores how the market return varies with the market dividend yield based on dividend payment dates. The returns in Panel A are value weighted and the returns in Panel B are value weighted. The dependent variable is the return to the CRSP index (in columns 1-2) the average returns to dividend paying stocks (in columns 3-4) and the average returns to non-dividend paying stocks (in columns 5-6). The main independent variable is the daily dividend payout yield, measured as the total amount of dividends paid out that day, divided by the total market capitalization at the end of the previous day. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Value-Weighted Returns

	Market		Dividend Payers		Non-Dividend Payers	
	(1)	(2)	(3)	(4)	(5)	(6)
Dividend Yield	64.92***	71.06***	39.62	61.64*	73.59***	78.53***
	(2.90)	(3.06)	(1.17)	(1.72)	(3.28)	(3.38)
Constant	0.0327***	0.0320***	0.0861***	0.0830***	0.0347***	0.0341***
	(4.41)	(4.30)	(7.08)	(6.79)	(4.68)	(4.58)
Year Month FE	No	Yes	No	Yes	No	Yes
R^2	0.000354	0.0497	0.0000676	0.0630	0.000453	0.0499
Observations	23784	23784	20236	20236	23784	23784

Panel B: Equal-Weighted Returns

	Market		Dividend Payers		Non-Dividend Payers	
	(1)	(2)	(3)	(4)	(5)	(6)
Dividend Yield	95.86***	99.17***	27.02	73.40**	98.43***	101.9***
	(4.34)	(4.41)	(0.91)	(2.36)	(4.44)	(4.51)
Constant	0.0721***	0.0717***	0.116***	0.109***	0.0715***	0.0711***
	(9.85)	(9.96)	(10.84)	(10.24)	(9.74)	(9.84)
Year Month FE	No	Yes	No	Yes	No	Yes
R^2	0.000790	0.0864	0.0000410	0.0755	0.000829	0.0863
Observations	23784	23784	20236	20236	23784	23784