Internet Appendix

to

DRIPs and the Dividend Pay Date Effect

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Appendix A. Excerpts from Selected Dividend Reinvestment Plans

The following excerpts exemplify the relevant details common in DRIP documentation.

A.1. H.B. Fuller Company DRIP Document (2011), selected excerpts:

"As the Plan Administrator, Wells Fargo Shareowner Services, a division of Wells Fargo Bank, N.A., (the Plan "Administrator") offers investors a simple and convenient method of investing in H.B. Fuller Company common stock. The Plan Administrator will apply all of the participants' designated dividends … to purchase whole and fractional shares acquired under the Dividend Reinvestment Plan. Such purchases may be made on any securities exchange where such shares are traded, in the over-the-counter market or in negotiated transactions, and may be on such terms as to price, delivery and otherwise as the Plan Administrator may determine.

Dividends are invested as soon as administratively possible on or following the dividend payable date, generally within five (5) trading days. In the case of each purchase, the price at which the Plan Administrator shall be deemed to have acquired H.B. Fuller common stock for the participant's account shall be the weighted average price of all shares purchased plus any per share fees. Depending on the number of shares being purchased and current trading volumes in the shares, purchases may be executed in multiple transactions that may occur on more than one day."

A.2. Carnival Corporation DRIP Document (2007), selected excerpts:

"The shares of Carnival Corporation common stock purchased under the (Dividend Reinvestment) Plan may be newly issued shares or shares purchased for participants in the open market, at Carnival Corporation's option. The Plan currently provides that shares purchased for participants with reinvested dividends will be purchased at fair market value, as determined in the Plan.

WHO ADMINISTERS THE PLAN?

Computershare Trust Company, N.A. (the "Agent"), a bank unaffiliated with Carnival Corporation, administers the Plan. The Agent arranges for the custody of share certificates, keeps records, sends statements of account to participants, and makes purchases of shares of Carnival Corporation common stock under the Plan for the accounts of participants. The Agent will send each participant a statement of his or her account under the Plan as soon as practicable following each purchase of shares of Carnival Corporation common stock. Each statement will show a) any dividends credited; b) plan shares purchased and fractional shares allocated; c) the cost per share of the purchased shares and fractional shares; d) the number of whole shares for which certificates have been issued, if any; and the beginning and ending balances of whole shares and fractional shares … The Agent will also serve as custodian of shares purchased under the Plan to protect participants from loss, theft or destruction of stock certificates.

WHAT IS THE SOURCE OF SHARES PURCHASED UNDER THE PLAN?

Shares purchased under the Plan will come from the authorized and unissued shares of the Carnival Corporation common stock or from shares purchased on the open market by the Agent, as determined by Carnival Corporation.

With respect to any open market purchases made under the Plan, the Agent will have full discretion as to all matters relating to purchases, including determination of the number of shares, if any, to be purchased on any day, the time of day, the price paid for such shares, the markets in which such shares are to be purchased …

WHEN WILL FUNDS BE INVESTED UNDER THE PLAN?

If shares are purchased from Carnival Corporation, the purchases will be made on the dividend payment date and such shares will be credited to participants' accounts on the dividend payment date. If shares are to be purchased in the open market, the Agent is to use its best efforts to apply all funds received by it to the purchase of shares within 30 days of the receipt of such funds from Carnival Corporation …

WHAT IS THE PURCHASE PRICE OF THE SHARES?

If the Carnival Corporation common stock is purchased from Carnival Corporation, the price per share … will be the closing price for the Carnival Corporation common stock on the NYSE Composite Tape on the dividend payment date, as reported in THE WALL STREET JOURNAL or other authoritative source. The price per share for open market purchases will be the weighted average price paid by the Agent for all shares of Carnival Corporation common stock purchased by it for participants in the Plan through negotiation with the seller. No share of Carnival Corporation common stock will be purchased at a price in excess of current market prices at the time of purchase."

Appendix B. Robustness Tests

B.1. Descriptive Statistics for DRIP Stocks and Non-DRIP Stocks in Portfolios II and III

In Tables 1–3 of the main text, we provide the summary statistics for the main variables in our analysis for the first portfolio (I: All Stocks), as well as for the subsets of all DRIP stocks and all non-DRIP stocks, over the sample period, 2008–2012. In Tables B.1–B.3 of this Appendix, we present the analogous summary statistics for the second and third portfolios (II: HIGH_DY and III: HARD_ARB), over the same sample period. In Table B.1, as we proceed to consider each successive portfolio, II and III, the price run-up and reversal around the pay date (AR(0), CAR(0,+1), and CAR(+2,+10)) grow larger in magnitude, and the associated mean differences across DRIP stocks versus non-DRIP stocks become larger and more significant. In Table B.2, the negative correlations between AR(0) or CAR(0,+1) and CAR(+2,+10) become larger in magnitude as we examine the finer subsets of stocks in portfolios II and III with a higher dividend yield and greater limits to arbitrage. Finally, in Table B.3, the subsets of DRIP stocks and non-DRIP stocks in portfolios II and III reveal average firm attributes that remain fairly stable. For example, these respective subsets of DRIP stocks tend to be larger in size, and have higher institutional ownership, smaller spreads, and lower return volatility, in comparison with non-DRIP stocks.

B.2. Re-Estimating the Main Analysis over the Extended Period, 1996–2012

In this Appendix we duplicate the comparative analysis of DRIP stocks versus non-DRIP stocks provided in Figure 2 and Table 4, but we analyze the extended period covering the years, 1996–2012, for which we have lists of DRIP firms from AAII. As noted in the text, the AAII lists indicate an unrealistic increase of 230 new DRIP firms from 2007 to 2008. This increase strongly suggests that these lists omit a substantial number of firms with DRIPs prior to 2008. As a result, before 2008 the implied lists of non-DRIP firms are likely to be corrupted by the inclusion of many firms with DRIPs. Because of this problem with our list of non-DRIP firms, in our main analysis of Figure 2 and Table 4 we restrict the sample period to the years, 2008–2012.

Here we analyze all dividend-paying stocks for the years, 1996–2012, using the AAII lists to distinguish DRIP stocks from non-DRIP stocks every year. However, for the earlier years before 2008, we pursue the conservative approach of excluding the 230 dividend-paying firms that the AAI lists indicate began their DRIPs in 2008. This exclusion ensures that we will not incorrectly include these likely DRIP firms in our list of non-DRIP firms for the earlier years.

The evidence for the extended sample period is presented in Figure B.1 and Table B.4, and is similar to the results provided in Figure 2 and Table 4, respectively, in the main body of the paper. This evidence indicates that our major results also pertain to the longer sample period beginning in 1996, for which we have lists of DRIP firms from AAII.[1]

B.3. Using the Fama–MacBeth Approach to Estimate the Panel Regression Models

Tables B.5 and B.6 present the results from applying the Fama–MacBeth approach to estimate the panel regression models in equations (2), (3), and (4). Equation (2) pertains to the relation between AR(0) and firm characteristics, which is analyzed in Table 4 over the period, 2008–2012, using clustered standard errors. Equations (3) and (4) involve our proxy for DRIP participation, which is analyzed in Table 5 over the period, 2010–2012, using clustered standard errors. The results in Tables B.5 and B.6 are similar to the evidence in Tables 4 and 5, indicating that this support for the price pressure hypothesis does not depend on the technique used to estimate these panel regression models.

Appendix C. The Intraday Price Pattern on the Dividend Pay Date

[1] The AAII annual data on DRIP firms for the earlier years, 1996–2002, also provide additional information about certain features of these DRIPs. For example, for this sub-period, 25% of all DRIPs charged a fee for participation, while 7% offered the opportunity to reinvest dividends at a discount of 1% to 5% below the market price. In analysis not reported here, we find no evidence that the existence or magnitude of a fee or a discount affects the pay date effect, AR(0), for the 25% of DRIP firms that charged a fee, or the 7% of DRIP firms that offered a discount.

In this appendix we examine the intraday pattern in price movements on the dividend pay date, for the subsets of DRIP stocks in portfolios I–III. This analysis reveals whether investors (or their transfer agents) tend to exert price pressure at certain times during the day that dividend funds are distributed. We analyze intraday midquotes at 5-minute intervals for the first and last 30 minutes of trading on day 0, and at 30-minute intervals during the rest of this trading day. We also analyze the last 3 hours of the previous trading day, on day –1.[2]

For each stock analyzed, we begin by computing the ratio of the midquote at every intraday interval (T) to the closing midquote on day 0. For each portfolio, the average intraday price pattern is then calculated in two stages. First, for every quarter in our sample period, 1996 through 2009, we calculate the cross-sectional average price ratio across dividend events at every intraday time interval (T) during days –1 and 0. Second, we compute the time-series means of these quarterly cross-sectional average intraday price ratios, across all quarters in the sample.

Results are plotted in Figure C.1 for the DRIP stocks in portfolios I–III. For each successive subset of DRIP stocks, the mean intraday pattern begins at a lower price point, and thereby reflects a larger increase on day 0. The magnitude of the price increase from the close on day –1 to the close on day 0 ranges from 5 bps for the DRIP stocks in portfolio I (i.e., 1–0.9995), to 40 bps for the DRIP stocks in portfolio II (i.e., 1–0.9960), to 85 bps for those in portfolio III (i.e., 1–0.9915). For portfolio I, this evidence suggests a smaller close-to-close return than is documented in Table 1 and Figure 2. For portfolios II and III, this evidence closely corresponds to the results in Table 1 and Figure 2. These results indicate that each successive portfolio of DRIP stocks has a larger mean abnormal close-to-close return on day 0.

[2] Midquotes are analyzed rather than trade prices, because trade prices may tend to occur at the bid or the ask at certain times of the day (e.g., at the open or the close). See Berkman et al. (2012) for issues regarding this approach.

In Figure C.1, these intraday patterns of price movements reveal how the price increase transpires gradually throughout the trading hours on the dividend pay date, for these portfolios of DRIP stocks. First, prices are roughly flat during the last three hours of trading on day –1, before rising 10–15 bps in the last five minutes of trading. Then, for portfolios II and III, the mean opening midquote on day 0 is within a few bps of the closing price on day –1, indicating that the mean overnight return before day 0 is also flat for these portfolios of DRIP stocks. This result suggests that transfer agents do not focus their buying at the open on the dividend pay date.

After the open on day 0, the average price for each portfolio increases gradually throughout the trading day, and then accelerates during the last 5 minutes of trading. It is noteworthy that a large portion of the variation in the mean close-to-close return on day 0, across the DRIP stocks in portfolios I–III, appears during the last 5 minutes of trading. Figure C.1 reveals an average 5-minute price increase at the close on day 0 that ranges from roughly 10 bps for portfolio I to 25 bps for portfolio III. Together, this evidence suggests that transfer agents gradually buy these stocks throughout day 0, and then perhaps accelerate their purchase orders just before the close in an apparent attempt to complete their DRIP purchases on the pay date.

Appendix D. Extended Analysis of the Time-Series of Quarterly Profits

This Appendix extends our analysis of the daily and quarterly time-series of abnormal market-adjusted profits, $AR(0)\_K_t$ and $CAR(0)\_K_n$, K = I–III, from our 3 proposed trading strategies that are plotted in Figures 5 and 6, respectively. First, we compute the average risk-adjusted daily return for each strategy by estimating the Fama–French alpha for the daily stream of excess profits. Second, we analyze the quarterly stream of time-series movements in actual profits for each strategy, without subtracting the market return. Third, we explore the robustness of the results from our time-series regression analysis of determinants of the quarterly performance of the second and third trading strategies, CAR(0)_K_n, K = II and III.

D.1. Fama–French Regression on Daily Stream of Excess Actual Profits, RET(0)_K_t –R_{ft}

Table D.1 provides further analysis of the risk and reward characteristics of the *daily* stream of excess profits from our 3 trading strategies over the extended period, 1996–2012. This Table presents the results from regressing the daily mean excess return from each strategy, (RET(0)_K_t – R_{ft}), k = I–III, against the three daily Fama–French factors, along with the daily momentum factor. This Table shows that the Fama–French daily alphas from this analysis are very large and highly significant (alpha = 0.29% for portfolio I, 0.50% for portfolio II, and 0.97% for portfolio III). This evidence indicates that, even after controlling for common sources of risk, our proposed trading strategies yield average risk-adjusted returns that range from 30 to 100 bps per day.

D.2. Time-Series Movements in Quarterly Actual Profits

One conspicuous feature of Figures 5 and 6 is the presence of large spikes in the mean daily abnormal profits AR(0)_I_t and quarterly cumulative abnormal profits, CAR(0)_K_n, during the liquidity crisis of 2008–2009. We conjecture that these spikes reflect a higher liquidity premium during the crisis. Here we explore the alternative possibility that these spikes in *market-adjusted* abnormal returns could be due to the large decline in the *market* during the crisis.

In Figure D.1, we abstract from market movements by plotting the analogous time-series of quarterly cumulative *actual* profits from these three strategies (CRET(0)_K_n, K = I–III), without subtracting the market return. The use of market-on-close orders to implement these strategies would assure that a trader realizes these average quarterly actual returns (CRET(0)_K_n) plotted in Figure D.1. This Figure reveals spikes in CRET(0)_K_n, K = I–III, during 2008 and

2009 that are similar to the analogous spikes in CAR(0)_K_n plotted in Figure 6. Furthermore, when we do not subtract the market return (which is positive in most quarters), the CARs in Figure D.1 tend to be higher than the analogous CARs in Figure 6 for most quarters throughout the sample period. As a result, the cumulative actual return (CRET(0)_K_n) averaged across all quarters is somewhat higher than the average quarterly CAR (CAR(0)_K_n) in Figure 6, for all 3 strategies (i.e., 18.9% for portfolio I, 23.7% for II, and 20.5% for III).

D.3. Determinants of Time-Series Movements in Quarterly Profits for Portfolios II and III

Panels A and B of Table D.2 present the results from estimating equation (6) for the successively smaller subsets of DRIP stocks in portfolios II and III, respectively, over the extended sample period, 1996–2012. The 4 columns in each panel provide the coefficient estimates for different permutations that include different combinations of the independent variables in equation (6). The results are generally consistent with the evidence in Table 7, for the portfolio of all DRIP stocks. Consider the results for each independent variable, in turn.

First, the coefficient of the recession dummy (β_1) is positive for all permutations of the model estimated in Panels A and B of Table D.2, and significantly so in Panel B. This evidence suggests a tendency for a larger pay date effect during recessions, and thus greater cumulative profits for our second and third trading strategies in such times of market stress, when there is often a premium placed on dividend-paying stocks. Second, the coefficient of the time trend (β_2) is positive and significant for all but one permutation of the model in Panels A and B, indicating a tendency for the pay date effect to grow in magnitude over time, consistent with the evidence in Figure 1. Third, in both Panels A and B, the average dividend yield is positively related to the magnitude of AR(0) for all permutations of the model (i.e., $\beta_3 > 0$), and significantly so in Panel A, for the DRIP stocks in portfolio II. This outcome supports the view that a higher dividend yield for these portfolios of DRIP stocks tends to be associated with greater profits from trading on the pay date effect. Fourth, the stream of cumulative profits is also significantly positively related to time-series movements in the average spread (i.e., $\beta_4 > 0$), for the DRIP stocks in both portfolios II and III. This evidence indicates that the pay date effect is larger during periods of lower liquidity (i.e., higher spreads) for these portfolios. Fifth, the coefficient of aggregate liquidity (β_5) is negative for all permutations of the model in Panels A and B, and marginally significant for one permutation in Panel A. This outcome suggests a weak tendency for the DRIP stocks in portfolios II and III to have a larger pay date effect during periods of lower aggregate market liquidity. Sixth, there is no evidence in Table D.2 of a significant relation between the VIX and the stream of cumulative profits from these two trading strategies. Finally, the coefficient of the dividend premium is positive in both Panels A and B, and significantly so in Panel B, indicating that the stream of profits from holding the DRIP stocks in portfolio III are higher during periods of greater demand for dividend-paying stocks.[3]

[3] In untabulated results, we have also estimated the quarterly time-series regression model in equation (6), using the quarterly cumulative *actual* return, $CRET(0)\_K_n$, as the dependent variable. In addition, we have also estimated the daily Fama-French 3-factor and 4-factor models using the daily *actual* excess return, $RET(0)\_K_t - R_{ft}$, as the dependent variable. Together, these results reinforce the evidence in Figure 6 and Tables 6, D.1, and D.2.

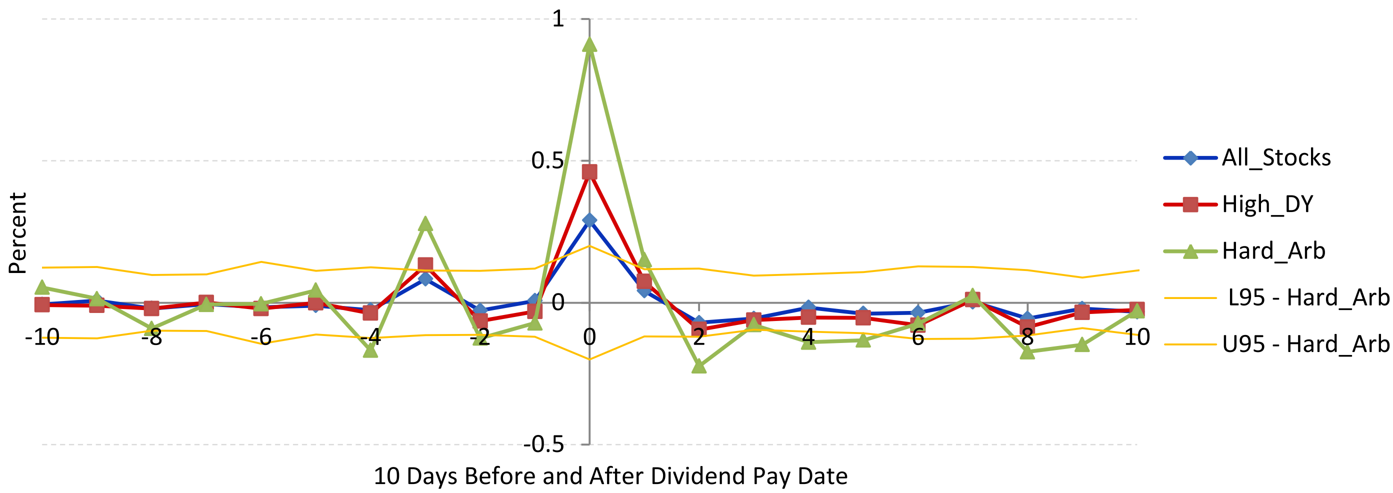
Figure B.1. Mean ARs and CARs for DRIP Stocks or Non-DRIP Stocks: Extended Period

This Figure analyzes dividend pay dates over the extended period covering 1996–2012. We plot the mean abnormal returns (ARs) and cumulative abnormal returns (CARs) across all 21 days in the event window, (–10,+10), around dividend pay dates (on day 0), for the DRIP or non-DRIP stocks in 3 portfolios:

I. ALL_STOCKS = all dividend-paying stocks each quarter;
II. HIGH_DY = the top 33% of all dividend-paying stocks each quarter by dividend yield;
III. HARD_ARB = top 33% by dividend yield, bottom 33% by institutional ownership, and top 33% by spread.

First, daily abnormal returns are computed by subtracting the return on a benchmark portfolio matched to each stock by size and book-to-market ratio. Second, for the DRIP or non-DRIP stocks in each portfolio, we compute the cross-sectional average ARs and CARs for all 21 days, during every quarter in the period, 1996–2012. Third, for each portfolio we compute the time-series mean of the cross-sectional average ARs and CARs across all quarters. Graphs A and B plot the mean ARs and CARs, respectively, for the DRIP stocks in each portfolio. Graphs C and D plot analogous results for the non-DRIP stocks in each portfolio. The 95% confidence band for the ARs in the third portfolio is provided in Graphs A and C, since this portfolio has the widest band.

Graph A. Mean ARs for Subsets of DRIP Stocks in 3 Portfolios



Graph B. Mean CARs for Subsets of DRIP Stocks in 3 Portfolios

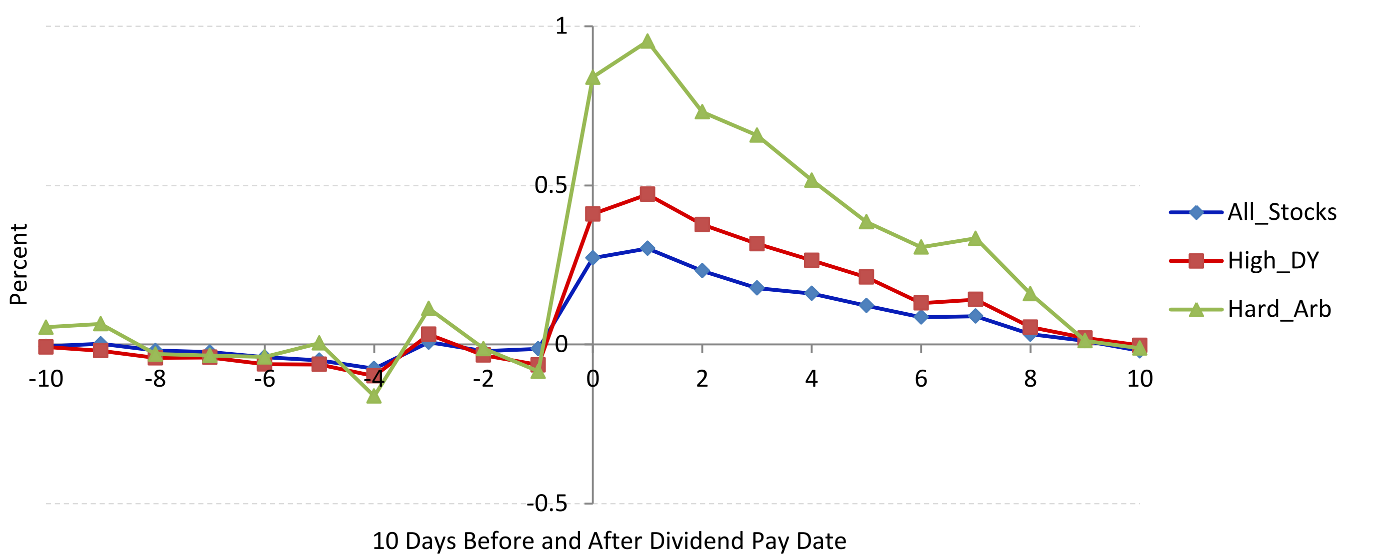
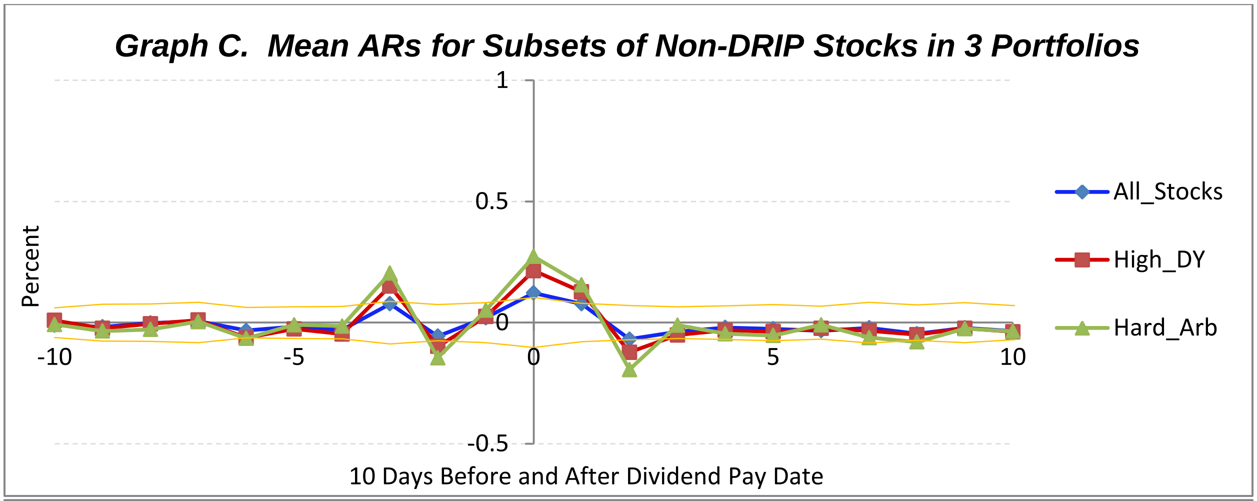


Figure B.1., continued



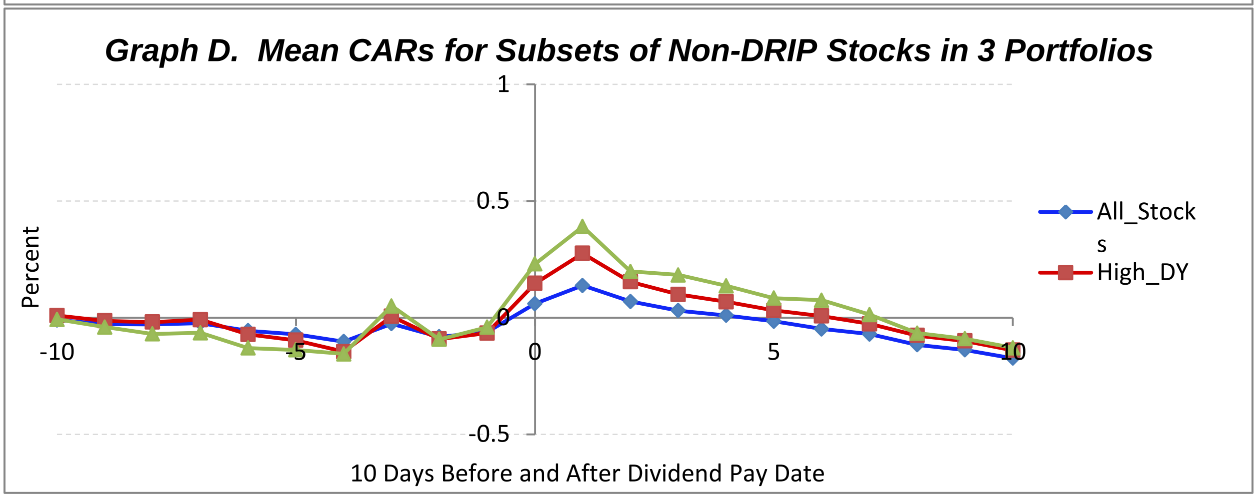


Figure C.1. Intraday Price Pattern on the Dividend Pay Date

This Figure plots the average pattern of price movements over the last 3 hours of trading on the day before the pay date (day –1), and all trading hours on the pay date (day 0), for the subsets of DRIP stocks in portfolios I–III over the period, 1996–2009. We analyze intraday midquotes at 5-minute intervals for the first and last 30 minutes of trading, and at 30-minute intervals during the rest of the trading day. First, for every stock we compute the ratio of the midquote at every intraday time interval (T) to the closing midquote on day 0. Second, for every quarter, we calculate the cross-sectional average price ratio across the firms in every portfolio, at every intraday interval (T). Third, for each portfolio we compute the time-series means of these quarterly cross-sectional means, across all quarters.

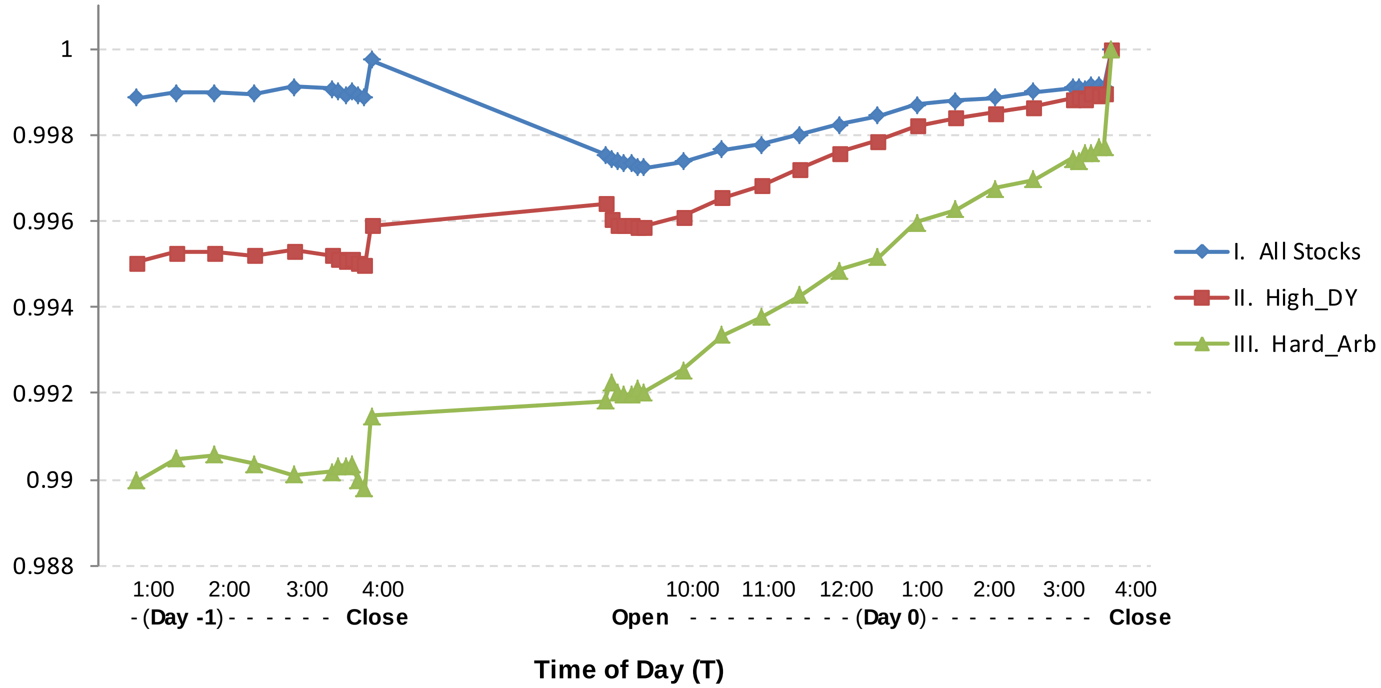


Figure D.1. Time Series of Quarterly Profits, the Mean Cumulative Actual Return, CRET(0)_K_n, for the Subsets of DRIP Stocks in Portfolios, K = I–III, that Pay Dividends on Any Date, *t*, During Quarter *n*

This Figure plots the quarterly time series of the cumulative actual return, $CRET(0)_n$, obtained by aggregating the daily cross-sectional mean actual returns on the dividend pay date, RET(0)_K_t, across all days in every quarter for which at least 1 DRIP stock in each portfolio (K = I–III) pays a dividend. Daily returns are measured from the close on day –1 to the close on day 0. Every day (*t*), we first compute the mean cross-sectional actual return on the dividend pay date, RET(0)_K_t, for the subset of DRIP stocks in each portfolio (K = I–III) that pays dividends on that date. We then compute the quarterly sum of this series of daily mean actual returns, RET(0)_K_t, over all days (*t*) during the quarter (*n*) for which at least 1 DRIP stock in each portfolio pays a dividend. The results reflect the quarterly aggregate cumulative actual return, CRET(0)_K_n, from 3 separate trading strategies that prescribe holding the DRIP stocks in each portfolio (K = I–III) on their respective dividend pay dates during a given quarter *(n)*.

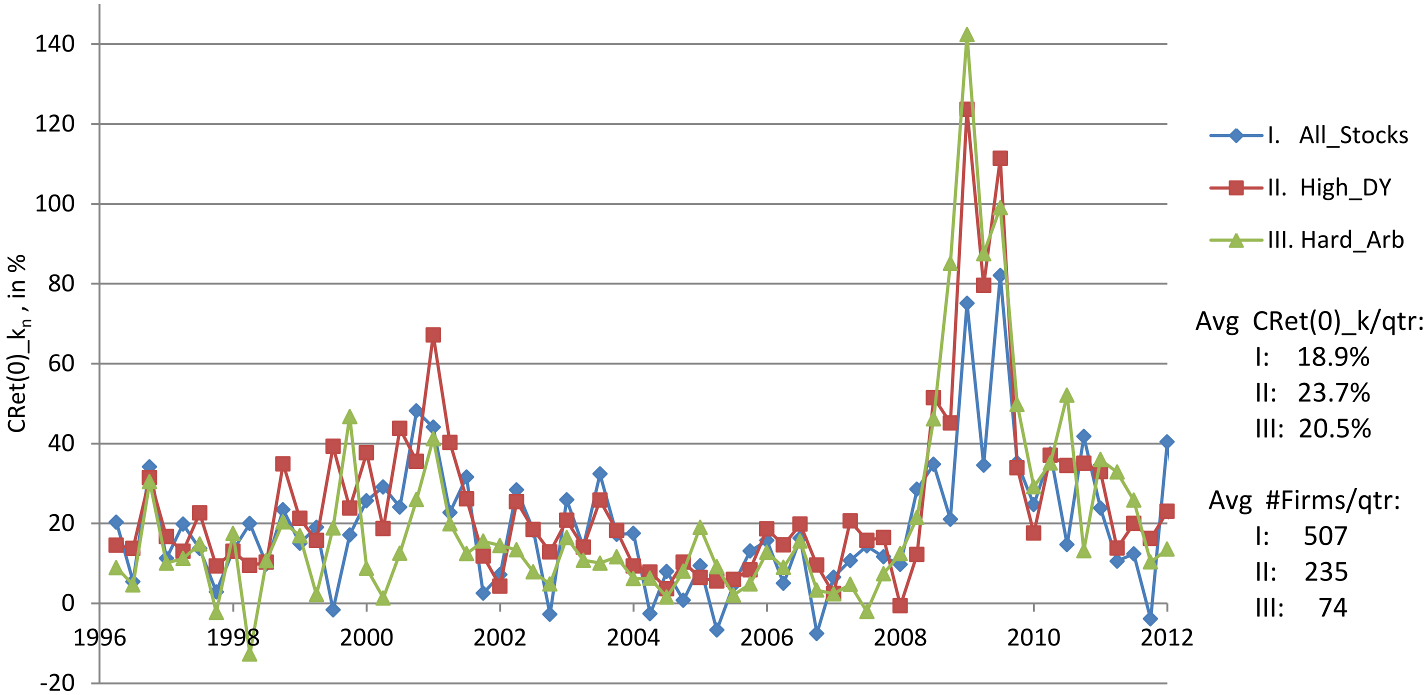


Table B.1. Average Behavior of Stock Prices around Dividend Pay Dates for the Subsets of DRIP Firms and Non-DRIP Firms in Portfolios II and III

This Table presents the average abnormal returns for portfolios II and III over different time frames around the dividend pay dates for the sample period, 2008–2012. The variables, $AR(-3)_{in}$, $AR(0)_{in}$, $CAR(0,+1)_{in}$, $CAR(+2,+10)_{in}$, and $CAR(0,+10)_{in}$ are the percent (cumulative) abnormal returns measured over different portions of the 21-day event window (–10,+10) around the pay date (on day 0) for the i^{th} firm in the n^{th} quarter. These abnormal returns are computed by subtracting the daily return on a benchmark portfolio matched to each stock by size and book-to-market. "$AR(\text{ex-div})_{in}$" is the analogous abnormal return on the ex-dividend date, and "AR(0) – AR(ex-div)" is the mean of the difference between $AR(0)_{in}$ and $AR(\text{ex-div})_{in}$. Panel A provides the results for portfolio II (HIGH_DY), which includes the tercile of all dividend-paying stocks each quarter with the highest dividend yield. Panel B gives the analogous results for portfolio III (HARD_ARB), which includes hard-to-arbitrage stocks (i.e., the subset of all dividend-paying stocks each quarter in the: i) top tercile by dividend yield, ii) bottom tercile by institutional ownership in quarter *n*–1; and iii) top tercile by the percent spread on day –10. In each Panel we provide 7 sets of results for: 1) all stocks in that portfolio, 2) DRIP stocks, 3) non-DRIP stocks, 4) the difference of means across all DRIP stocks and all non-DRIP stocks, and 5)–7) the analogous results for a subset of matched pairs of DRIP stocks and non-DRIP stocks in that portfolio. We describe the matching scheme in the text. We compute the average abnormal returns around the pay date for every portfolio, using a panel regression of each return measure on a constant term, with standard errors clustered by firm (*i*) and quarter (*n*). Analogous mean abnormal returns for the subsets of DRIP firms and non-DRIP firms in each Portfolio are computed similarly.

Panel A. Portfolio II	Portfolio II. High_DY	DRIP Stocks in II.	Non-DRIP Stocks in II.	Difference of Means (2) - (3)	II. Matched Pairs		
	(1) Mean	(2) Mean	(3) Mean	(4) DRIP - Non-DRIP	(5) DRIP	(6) Non-DRIP	(7) Mean Diff
# firms per qtr	468 ***	235 ***	230 ***	6	75	75	0
$AR(-3)_{in}$ %	.24 ***	.18 ***	.30 ***	-.12	.26***	.19*	.06
$AR(0)_{in}$ %	.46 ***	.63 ***	.26 **	.40 ***	1.02***	.34**	.69 ***
$CAR(0,+1)_{in}$ %	.57 ***	.74 ***	.40 **	.34 ***	1.20***	.36*	.84 ***
$CAR(+2,+10)_{in}$ %	-.54 **	-.51 *	-.56 **	.05	-.31	-.27	-.04
$CAR(0,+10)_{in}$ %	.03	.22	-.16	.38 **	.88	.08	.80 *
ex-div $AR(0)_{in}$ %	.23 ***	.14 **	.32 ***	-.18 ***	.20**	.34***	-.15
$AR(0)_{in}$ - $AR(\text{ex-div})_{in}$	.23 ***	.52 **	-.07	.58 ***	.83***	.00	.83 ***

Panel B. Portfolio III	Portfolio III. Hard_Arb	DRIP Stocks in III.	Non-DRIP Stocks in III.	Difference of Means (2) - (3)	III. Matched Pairs		
	(1) Mean	(2) Mean	(3) Mean	(4) DRIP - Non-DRIP	(5) DRIP	(6) Non-DRIP	(7) Mean Diff
# firms per qtr	195 ***	74 ***	120 ***	-47 ***	24	24	0
$AR(-3)_{in}$ %	.43 ***	.43 ***	.42 ***	.00	.47***	.48***	-.01
$AR(0)_{in}$ %	.73 ***	1.40 ***	.32 **	1.08 ***	2.08***	.56**	1.52 ***
$CAR(0,+1)_{in}$ %	.92 ***	1.63 ***	.49 **	1.14 ***	2.23***	.64**	1.57 ***
$CAR(+2,+10)_{in}$ %	-.87 ***	-1.05 **	-.75 ***	-.30	-.90	-.81**	-.10
$CAR(0,+10)_{in}$ %	.04	.55	-.27	.82 **	1.32	-.17	1.47 *
ex-div $AR(0)_{in}$ %	.48 ***	.48 ***	.49 ***	-.01	.38*	.46**	-.09
$AR(0)_{in}$ - $AR(\text{ex-div})_{in}$	.25 *	.93 ***	-.16	1.09 ***	1.71***	.10	1.61 ***

Table B.2. Correlations across Return Measures over Different Time Frames around the Dividend Pay for Portfolio II (High_DY) and Portfolio III (Hard_Arb)

This Table provides correlations across the return measures taken over three different time frames around the dividend pay date: AR(0), CAR(0,+1), and CAR(+2,+10). We compute these correlations across all stocks, DRIP stocks, and non-DRIP stocks within two portfolios selected each quarter. Panel A presents the results for Portfolio II (High_DY), which includes the tercile of all dividend-paying stocks each quarter with the highest dividend yield. Panel B provides the analogous results for Portfolio III (Hard_Arb), which includes hard-to-arbitrage stocks (i.e., the subset of all dividend-[aying stocks each quarter in the : (i) top tercile by dividend yield, (ii) bottom tercile by institutional ownership in quarter n-1, and (iii) top tercile by the percent spread on day -10. The mean correlations are calculated in two stages. First, every quarter we compute each pairwise cross-sectional Pearson or Spearman correlation across the dividend events for each portfolio. Second, we compute the timeseries mean for each pairwise cross-sectional correlation across all quarters in the sample period covering 2008–2012. The standard deviation of every time-series mean correlation is then used to construct the t-test of the null hypothesis that every mean correlation equals 0. The mean Pearson correlations are presented above the diagonal, and the mean Spearman correlations appear below the diagonal. ** indicates significance at the .05 level.

Panel A.	Portfolio II: High_DY			DRIP Stocks in Portfolio II			Non-DRIP Stocks in Portfolio II		
	AR(0)	CAR(0,1)	CAR(2,10)	AR(0)	CAR(0,1)	CAR(2,10)	AR(0)	CAR(0,1)	CAR(2,10)
AR(0)	1	0.69**	-0.03	1	0.7**	-0.05	1	0.68**	-0.02
CAR(0,1)	0.65**	1	-0.1**	0.67**	1	-0.12**	0.63**	1	-0.1**
CAR(2,10)	-0.04**	-0.07**	1	-0.04**	-0.07**	1	-0.04	-0.08**	1

Panel B.	Portfolio III: Hard_Arb			DRIP Stocks in Portfolio III			Non-DRIP Stocks in Portfolio III		
	AR(0)	CAR(0,1)	CAR(2,10)	AR(0)	CAR(0,1)	CAR(2,10)	AR(0)	CAR(0,1)	CAR(2,10)
AR(0)	1	0.66**	-0.07**	1	0.68**	-0.08**	1	0.64**	-0.07
CAR(0,1)	0.62**	1	-0.17**	0.64**	1	-0.2**	0.6**	1	-0.14**
CAR(2,10)	-0.07**	-0.14**	1	-0.07**	-0.16**	1	-0.06**	-0.12**	1

Table B.3. Firm Characteristics for Subsets of DRIP Firms and Non-DRIP Firms in Portfolios II and III

This Table summarizes the descriptive statistics for the main firm characteristics analyzed in this study over the period, 2008–2012. The characteristics are defined in Table 3. Panel A provides the results for portfolio II (HIGH_DY), and Panel B gives the results for portfolio III (HARD_ARB), which are described in Table B.1. In each Panel we present 7 sets of results for: 1) all stocks in that portfolio, 2) DRIP stocks, 3) non-DRIP stocks, 4) the difference of means across DRIP stocks and non-DRIP stocks, and 5)–7) the analogous results for a subset of matched pairs of DRIP stocks and non-DRIP stocks within that portfolio. The matching scheme is described in the text. We compute the average firm characteristics for every portfolio using a panel regression of each variable on a constant term, with standard errors clustered by firm (*i*) and quarter (*n*).

Panel B. Portfolio II	Portfolio II. High DY	DRIP Stocks in II.	Non-DRIP Stocks in II.	II. Difference of Means	II. Matched Pairs		
	mean	mean	mean	DRIP - Non-DRIP	DRIP	Non-DRIP	Mean Diff
# firms per qtr	468 ***	235 ***	230 ***	6	75	75	0
$SIZE_{in}$ (millions)	$6,854 ***	$11,624 ***	$1,969 ***	$9,655 ***	$2,037***	$2,288***	-$251
DIV_YIELD_{in} %	1.33 ***	1.15 ***	1.50 ***	-.35 ***	1.10***	1.17***	-.06 ***
PCT_INST_{in-1} %	51.56 ***	54.89 ***	48.15 ***	6.73 ***	47.86***	49.05***	-1.20
$SPREAD_{in}$ %	1.14 ***	.78 ***	1.50 ***	-.72 ***	1.34***	1.31***	.04
$\ln(HILO_{in})$ %	3.74 ***	3.35 ***	4.14 ***	-.80 ***	3.71***	4.01***	-.30 ***

Panel C. Portfolio III	Portfolio III. Hard Arb	DRIP Stocks in III.	Non-DRIP Stocks in III.	III. Difference of Means	III. Matched Pairs		
	mean	mean	mean	DRIP - Non-DRIP	DRIP	Non-DRIP	Mean Diff
# firms per qtr	195 ***	74 ***	120 ***	-47 ***	24	24	0
$SIZE_{in}$ (millions)	$234 ***	$281 ***	$206 ***	$75 *	$180***	$208***	-$29 *
DIV_YIELD_{in} %	1.40 ***	1.17 ***	1.54 ***	-.37 ***	1.14***	1.17***	-.03
PCT_INST_{in-1} %	24.96 ***	26.10 ***	24.26 ***	1.84	21.80***	21.87***	-.06
$SOREAD_{in}$ %	2.54 ***	2.28 ***	2.71 ***	-.43	2.81***	2.84***	-.03
$\ln(HILO_{in})$ %	4.19 ***	3.91 ***	4.36 ***	-.45 ***	3.93***	4.48***	-.55 ***

Table B.4. Firm Characteristics and the Dividend Pay Date Effect: Extended Sample

This Table analyzes the following relation between firm characteristics and the abnormal return on the dividend pay date, AR(0), over the extended period, 1996–2012, for which we have annual lists of DRIP firms from AAII:

(2) $AR(0)_{in} = \beta_0 + \beta_1 \, DRIP_{in} + \beta_2 \, DIV\_YIELD_{in} + \beta_3 \ln(SIZE_{in}) + \beta_4 \, PCT\_INST_{in-1} + \beta_5 \, SPREAD_{in} + \beta_6 \ln(HILO_{in}) + \varepsilon_{in}$.

All variables are defined in Table 1 and Table 3. The annual lists from AAII contain an unusually large increase of 230 new DRIP firms in 2008, suggesting that the earlier AAII lists omit many of these 230 DRIP firms prior to 2008. While we have validated the accuracy of the AAII lists for the most recent period, we cannot be sure whether these 230 firms had DRIPs prior to 2008. We address this concern by taking the conservative approach of excluding these 230 firms from the extended sample for the earlier years prior to 2008.

We present the results from applying 2 alternative methodologies to estimate this panel regression model, including the Fama-MacBeth approach and a panel regression with standard errors clustered by firm (*i*) and quarter (*n*). For the Fama-MacBeth approach, Newey-West robust standard errors of the mean quarterly Fama-MacBeth coefficients are used to construct the t-ratios, which appear beneath the mean parameter estimates.

Variable		Fama-MacBeth	Clustered Std Errors by firm and quarter
INTERCEPT	β_0	.196	.252
		1.6	2.1 **
$DRIP_{in}$	**β_1**	**.211**	**.252**
		7.1 * **	**7.1 *** **
DIV_YIELD_{in}	β_2	12.97	13.85
		4.4 ***	3.5 ***
$\ln(SIZE_{in})$	β_3	-.004	-.012
		-0.5	-1.5
PCT_INST_{in-1}	β_4	-.324	-.318
		-4.9 ***	-4.7 ***
$SPREAD_{in}$	β_5	1.65	.346
		1.4	0.2
$\ln(HILO_{in})$	β_6	1.04	2.25
		1.6	2.9 ***
Avg # Firms / qtr		1,169	1,176
(Avg) R^2		.019	.0065

*, **, and *** indicate significance at the 10%, 5% ,and 1% levels, respectively.

Table B.5. Firm Characteristics and the Pay Date Effect: Fama-MacBeth Estimates

This Table uses the Fama-MacBeth approach to estimate the following panel regression model that describes the relation between firm characteristics and the abnormal return on the dividend pay date, AR(0):

(2) $AR(0)_{in} = \beta_0 + \beta_1 DRIP_{in} + \beta_2 DIV\_YIELD_{in} + \beta_3 \ln(SIZE_{in}) + \beta_4 PCT\_INST_{in-1} + \beta_5 SPREAD_{in} + \beta_6 \ln(HILO_{in}) + \varepsilon_{in}$
.

This model is applied to the sample including all dividend-paying stocks (both with and without DRIPs) over the period, 2008–2012. All variables are defined in Tables 1 and 3. Newey-West robust standard errors of the mean quarterly Fama-MacBeth coefficients are used to construct the *t*-ratios, which appear beneath the mean

INTERCEPT	β_0	.682 3.2 ***
$DRIP_{in}$	**β_1**	**.299** **6.3 *** **
DIV_YIELD_{in}	β_2	12.10 2.0 *
$\ln(SIZE_{in})$	β_3	-.038 -2.4 **
PCT_INST_{in-1}	β_4	-.399 -2.7 **
$SPREAD_{in}$	β_5	4.70 2.2 **
$\ln(HILO_{in})$	β_6	1.41 1.2
Avg # Firms / qtr		1,205
Avg R^2 / qtr		.026

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table B.6. DRIP Participation, Firm Characteristics, and the Pay Date Effect, AR(0): Fama-MacBeth Estimates

This Table uses the Fama-MacBeth approach to estimate the following two panel regression models that describe:
i) the relation between our proxy for DRIP participation and firm characteristics, and ii) the relation between the pay date effect, AR(0), and our proxy for DRIP participation, as well as other firm characteristics:

(3) $PART_{in} = \alpha_0 + \alpha_1 DRIP_{in} + \alpha_2 BROKER\_NON_{in} + \alpha_3 DIV\_YIELD_{in} + \alpha_4 \ln(SIZE_{in}) + \alpha_5 SPREAD_{in} + \alpha_6 \ln(HILO_{in}) + \varepsilon_{in}$.

(4) $AR(0)_{in} = \beta_0 + \beta_1 DRIP_{in} + \beta_2 PART_{in} + \beta_3 DRIP_{in} * PART_{in} + \beta_4 BROKER\_NON_{in} + \beta_5 DRIP_{in} * BROKER\_NON_{in} + \beta_6 DIV\_YIELD_{in} + \beta_7 \ln(SIZE_{in} + \beta_8 SPREAD_{in} + \beta_9 \ln(HILO_{in}) + \nu_{in}$.

The sample period covers the years for which we have data on broker non-votes, 2010–2012. All variables are defined in Tables 1 and 3. Newey-West robust standard errors of the mean quarterly Fama-MacBeth coefficients are used to construct the *t*-statistics, which appear beneath the parameter estimates.

Dependent Variable for (3) = $PART_{in}$

INTERCEPT	α_0	.546 9.6 ***
$DRIP_{in}$	**α_1**	**.032** **6.4 *****
–		–
–		–
$BROKER\_NON_{in}$	α_2	-.054 -1.9 *
–		–
DIV_YIELD_{in}	α_3	3.86 5.2 **
$\ln(SIZE_{in})$	α_4	-.025 -7.8 ***
$SPREAD_{in}$	α_5	15.64 5.5 ***
$\ln(HILO_{in})$	α_6	-.568 -5.6 ***
–		–
Panel R^2 Avg # Firms/qtr		0.178 804

Dependent Variable for (4) = $AR(0)_{in}$

INTERCEPT	β_0	-.027 -0.2
$DRIP_{in}$	**β_1**	**-.030** **-0.5**
$PART_{in}$	**β_2**	**-.163** **-1.5**
$DRIP_{in}$ *$PART_{in}$	**β_3**	**.630** **2.5 ****
$BROKER\_NON_{in}$	β_4	-.012 -0.1
$DRIP_{in}$ *$BROKER\_NON_{in}$	β_5	.328 0.6
DIV_YIELD_{in}	β_6	8.06 2.0 *
$\ln(SIZE_{in})$	β_7	.001 0.1
$SPREAD_{in}$	β_8	5.97 1.4
$\ln(HILO_{in})$	β_9	1.04 0.6
$\beta_2 + \beta_3$ ***t*-statistic**		**.467** [a] **3.2 *****
Panel R^2 Avg # Firms/qtr		0.021 801

*, **, and *** indicate significance at 10%, 5%, and 1% levels, respectively.
[a] We test H0: $(\beta_2 + \beta_3) = 0$, by constructing the t-statistic for the time series mean of the sum of these 2 coefficients.

Table D.1. Fama-French Regressions on Daily Mean Excess Returns, ($RET(0)_t$ – RFT), from 3 Trading Strategies

This Table presents the results from estimating a Fama-French 3- or 4-factor model to analyze the mean daily excess actual returns on the dividend pay date, ($RET(0)\_K_t$ - R_{ft}), from the 3 trading strategies that prescribe holding the subsets of DRIP stocks in the 3 portfolios (K = I–III) that pay dividends on any given date (*t*). First, we construct portfolios I–III each quarter over the period, 1996–2012, as described in the text. Second, we compute the daily actual return on every dividend pay date (*t*) for each stock (*i*), $RET(0)_{it}$, over this period. Third, we compute the mean daily actual return on the pay date, $RET(0)\_K_t$, across all DRIP stocks in each portfolio (K = I–III) that pay dividends on any given date (*t*). The resulting time series of daily mean returns, $RET(0)\_K_t$, represents the daily actual return to each of our 3 trading strategies. Finally, we subtract the daily riskfree rate from this series of daily returns to obtain the time series of daily mean excess returns, ($RET(0)\_K_t - R_{ft}$), that is the dependent variable analyzed in the Fama-French regression. Newey-West robust standard errors are used to construct the *t*-statistics.

		DRIP Stocks in Portfolio I (All_Stocks)		DRIP Stocks in Portfolio II (High_DY)		DRIP Stocks in Portfolio III (Hard_Arb)	
		3-factors	4-factors	3-factors	4-factors	3-factors	4-factors
INTERCEPT	α	.290	.295	.496	.505	.971	.985
t-stat		12.0 ***	11.9 ***	14.2 ***	14.3 ***	12.0 ***	12.0 ***
($R_m – R_f$)	$β_1$	.920	.889	.812	.759	.570	.518
t-stat		23.7 ***	27.3 ***	15.6 ***	16.3 ***	5.6 ***	5.5 ***
HML	$β_2$	.631	.576	.667	.563	.686	.544
t-stat		7.7 ***	8.1 ***	6.3 ***	6.3 ***	3.2 ***	3.1 ***
SMB	$β_3$	.251	.261	.190	.205	.209	.240
t-stat		4.7 ***	5.0 ***	2.6 ***	2.9 ***	1.5	1.6
UMD	$β_4$		-.117		-.200		-.239
t-stat			-2.3 **		-3.1 ***		-1.8 *
Adj R^2		.398	.401	.274	.281	.100	.104
F-Stat		842.8 ***	640.1 ***	357.8 ***	277.9 ***	51.5 ***	40.7 ***
# of days		N = 3,814 days		N = 2,836 days		N = 1,363 days	

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

[a] We obtain similar results when we analyze profits in terms of the market-adjusted or benchmark-adjusted abnormal returns on the pay date, AR(0), rather than actual returns, RET(0), and when we analyze the more recent period covering the years, 2008–2012.

Table D.2. Determinants of Quarterly Profits from Trading Strategies that Prescribe Holding the DRIP Stocks in Portfolios II and III

Panels A and B of this Table present results for the time series regression model that analyzes determinants of the quarterly cumulative abnormal profits from our last two trading strategies, as follows:

(6) $CAR(0)\_K_n = \beta_0 + \beta_1 RECESSION_n + \beta_2 TREND_n + \beta_3 DIV\_YIELD\_K_n + \beta_4 SPREAD\_K_n + \beta_5 AGG\_LIQ_n + \beta_6 VIX_n + \beta_7 DIV\_PREM_n + \varepsilon_n$.

The dependent variable, $CAR(0)\_K_n$, is computed in 2 steps. First, for every day (*t*) in our sample period, 1996–2012, we compute the stream of average *daily* profits as the cross-sectional mean market-adjusted $AR(0)\_K_t$ across all DRIP stocks in each portfolio (K = II or III) that pay dividends on that day. Second, for each quarter (*n*), we aggregate this stream of *daily* profits, $AR(0)\_K_t$, across all days in which at least one DRIP stock in each portfolio pays a dividend, to obtain the cumulative abnormal profit, $CAR(0)\_K_n$, for each portfolio (K = II or III). $RECESSION_n$ is a dummy variable that equals 1 for all quarters during recessions, and 0 otherwise. $TREND_n$ is a deterministic trend that counts the quarters in our sample. $DIV\_YIELD\_K_n$ is the mean dividend yield in quarter *n* for the DRIP stocks from each portfolio (K = II or III). $SPREAD\_K_n$ is the mean daily closing percent spread on day –10 prior to the dividend pay dates in quarter *n*, for the DRIP stocks in each portfolio (K = II or III). AGG_LIQ_n is the aggregate liquidity measure of Pastor and Stambaugh (2003), averaged across the three months during quarter *n*. VIX_n is the average of the monthly CBOE VIX index values during quarter *n*. DIV_PREM_n is the quarterly average of the monthly aggregate market dividend premium (PDND), from Baker and Wurgler (2006). The Newey-West *t*-ratios appear beneath the parameter estimates.

Panel A. Portfolio II: High Dividend Yield Stocks

RECESSION	β_1	10.23	7.56	6.37	.15
t-ratio		1.3	1.0	0.8	0.0
$TREND_n$	β_2	.32	.41	.31	.71
t-ratio		1.9 *	2.4 **	1.5	2.7 ***
$DIV\_YIELD\_K_n$	β_3	70.73	59.47	57.28	50.04
t-ratio		3.5 ***	3.1 ***	3.1 ***	2.5 **
$SREAD\_K_n$	β_4	14.91	16.33	12.63	19.93
t-ratio		3.2 ***	3.4 ***	2.1 **	2.7 ***
AGG_LIQ_n	β_5		-1.01	-.64	-.74
t-ratio			-1.8 *	-1.0	-1.2
VIX_n	β_6			.56	.27
t-ratio				1.1	0.4
DIV_PREM_n [a]	β_7				.20
t-ratio					0.7
Adj R^2		.60	.63	.64	.69
Overall F		26.0 ***	23.8 ***	20.6 ***	19.7 ***

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

[a] The models in the first three columns are estimated over the entire 68-quarter sample period, 1996–2012. The last column is estimated over the period, 1996–2010, due to data limitations on the dividend premium (PDND) from Baker and Wurgler (2006).

Table D.2., continued

Panel B. Portfolio III: Hard-to-Arbitrage Stocks

RECESSION	β_1	20.88	19.13	18.76	9.93
t-ratio		2.4 **	2.3 **	2.3 **	1.4
$TREND_n$	β_2	.88	.89	.82	1.17
t-ratio		5.0 ***	5.4 ***	5.3 ***	6.5 ***
$DIV\_YIELD\_K_n$	β_3	9.83	8.98	6.47	5.57
t-ratio		0.8	0.8	0.5	0.5
$SPREAD\_K_n$	β_4	13.89	13.62	12.00	16.31
t-ratio		4.8 ***	5.3 ***	4.7 ***	5.6 ***
AGG_LIQ_n	β_5		-.53	-.27	-.36
t-ratio			-1.0	-0.5	-0.7
VIX_n	β_6			.46	-.14
t-ratio				0.9	-0.2
DIV_PREM_n [a]	β_7				.51
t-ratio					2.4 **
Adj R^2		.68	.69	.69	.75
Overall F		37.2 ***	30.4 ***	25.6 ***	26.6 ***